

Bill: Welcome to the chat everyone! Let's get to watching some Perseids!

k923: wow so cool you guys are doing this NASA

Bill: Very welcome!

CJSNASA: Will the full moon affect our viewing?

Bill: Yes, the light will wash out the fainter Perseids, resulting in only about 1/3 of them being visible.

Connery: My name is Connery and my mom is allowing me to stay up to watch the meteor shower. I have one question. Can you see a meteor shower with all comets or only certain ones or types? Thanks.

Bill: Only comets with orbits that pass close to Earth's can produce a visible meteor shower.

Aakash: Why do the Perseid meteor showers happen?

Rhiannon: Comet Swift Tuttle is in orbit around the sun, and when the Earth passes through the debris it left, we have the Perseids! Swift Tuttle is a very old comet and so we have seen Perseids (pieces of Swift Tuttle) for nearly 2000 years (first recorded in 36 AD)!

Rastalamm: is it time to go out and check out the Perseids?

Bill: It is if it's after dark. ☺

alex5: i saw one awhile ago while i was driving and it was great

Rhiannon: That's awesome!

DAMNATION666: how can we see this?

Rhiannon: Lie on your back, let your eyes adjust to the dark (it takes at least 30 minutes) and just look straight up. Enjoy! Hope you see lots!

nsgrimm: too overcast in Tampa to see =O(

Bill: That's too bad, but maybe you can see them on our Ustream. Or, there are some excellent links to other all sky cameras at this link: <http://www.nasa.gov/connect/chat/allsky.html>

lana18: In north georgia, which direction should i look for the best view?

Danielle: You just need to get away from lights, then look straight up!

hurricanezac23: Can some meteors be seen before perseus rises?

Rhiannon: You can see meteors, but not Perseid meteors.

agent77: What time is the highest peak?

Rhiannon: 3-4 AM local time.

nwostar: Too bad it's cloudy here in Indiana, can't see anything outside

Danielle: Sorry to hear that! Hopefully you'll be able to see something on the live feed.

Patrick: from ontario canada have seen 8 so far!!!

Rhiannon: Awesome! Shout out to Ontario! 😊

parsec: so these meteorites are from the comets tail. I was wondering how long is this tail?

Bill: The Perseids are debris left behind in the comet's orbit -- they aren't part of the tail. Swift-Tuttle was last in our neighborhood back in 1993 and is now very, very far out in the solar system.

Zeroshadow: Is there a general time where one can see the most or will the amount visible vary a lot through out the night? Also thank yall very much for doing this from DFW, Tx

Rhiannon: They are seen throughout the night though you will see the most from 3-4 AM. And you are so welcome! It is our pleasure!

CJSNASA: Do you see doing this is reaching out to the public?

Bill: Yes, and that makes it fun!

anniewiz: which direction is the shower PLEASE!!

Rhiannon: Look straight up! And let your eyes dark adjust 😊

Gapdfh: but sir i have a question , i'm from Morocco can i see the meteor shower with my own eye sor is the love streaming showing to me or am i not going to get to see it ??

Bill: You can see Perseid meteors after 2 in the morning until dawn.

NewJersey: When do you think is the best time to go outside and be able to see them the clearest?

Bill: Best time is a couple of hours before dawn until dawn.

kay: I've seen 5 in the last 40 minutes here in southern New Hampshire, including the biggest, brightest meteor I've ever seen. When it started it ws a yellow gold color then changed over to white as it hit teh horizon. Beautiful! Have to get back outside now. :-)

Rhiannon: That's awesome! We love hearing these good reports!

Deborah: Hello, I have a question. about 15 minutes ago i seen on the live cam a object the shape of saturn. what was that?

Bill: That was some old video we were looping before the live stream started. Good eye, that WAS Saturn from a previous observation. 😊

NASA\_fan: what si the difference between a meteor and a perseid?

Danielle: A Perseid is a meteor. Perseid meteors can be seen July 17-Aug 24 and they travel 130,000 mph. Perseids are debris left behind by comet Swift-Tuttle

csweeney250: How bright will the meteors be?

Rhiannon: Some can get as bright as the crescent Moon, but most will be about the brightness of planet Mars.

jennydeng: it is very cloudy here in toronto, is there anything I can do?

Rhiannon: You can watch our Ustream above! We have clear skies here in Huntsville, Alabama, and are live-streaming our sky. ☺

Chanel: WILL I BE ABLE TO SEE THE SHOWER FROM SOUTHERN CALIFORNIA???

Danielle: If you've got clear weather and dark skies you should be able to see bright Perseids.

Bill: Hi everyone -- we're getting numerous questions about local viewing times and best ways to view. Here's some information from Danielle: "Who can see it: Given clear weather and dark skies, the Perseid meteor shower can be seen by most of the world, though it is best viewed by observers in the Northern Hemisphere. In the Southern Hemisphere, the Perseid radiant doesn't climb very high above the horizon or isn't visible at all. So Southern Hemisphere observers will see fewer Perseids than their northern counterparts. Places where the Perseid radiant isn't visible include the southern parts of Australia, Africa, and South America, and all of Antarctica. Where to look: If it's not cloudy, get as far away from bright lights as you can, lay on your back and look up. Put the horizon at the edge of your peripheral vision as you let the sky and stars fill your field of view. Give your eyes some time to adjust to the dark and you should start seeing Perseids. No binoculars or telescopes are necessary!

NASA\_Science: What is the etymology of "Perseids"?

Bill: Meteor showers are named after the constellation in which their radiant is located. Perseids seems to come from the constellation Perseus, hence the name.

Aat: When would be the best time to view the ISS for the tristate region?

Rhiannon: [www.heavens-above.com](http://www.heavens-above.com) is a great site in which you can enter your location and time zone and it will tell you exactly where and what time to look. Hope you see it. ☺

rae: where do the meteors go when nobody can see anymore?

Bill: Meteors burn up in the atmosphere many miles above your head -- so where do they go? They go away!

Connery: How often does the Swift-Tuttle comet pass near earth?

Rhiannon: Every 76 years. The last pass was 1992-1993 so it will be a while until we see it again.

kimran: Why are meteors so consistent?

Danielle: I'm not sure what you mean. Perseid meteors travel at the same speed, 130,000 mph, and they all appear to radiate from the constellation Perseus. This is because Perseid meteoroids are debris left behind by the comet Swift-Tuttle.

Moonbeam: Beautiful skies here in Baltimore. Clear as anything, just too much light pollution. If I drive out to the county, I'll get harrassed by cops. Sad.

Bill: With the moon this bright, driving to the country wouldn't help you much. Be consoled. 😊

mike\_rohan: First of all thank ou for spending time chatting with us

Danielle: No problem! Thanks for being here!

CJSNASA: Will the light of the computer screen make it harder to see?

Bill: If you're talking about the video, no, it won't. If you're talking about actually seeing Perseids outside, yes, it will. If you're watching the Ustream above, you'll have a better chance to see them by blowing it up to full screen.

Paige\_Frazier: Can you see the meteorites in a neighborhood with dim orange street lights and dim house lights if you can see a few stars like Big Dipper?

Danielle: Yes, you should be able to see some Perseids

NASA\_Science: i hope i get to see it because there is a full moon right now

Rhiannon: We do, too! Unfortunately the full moon does hamper the results a lot.

nikki211: How old is the comet?

Bill: Many millions of years. We don't know an exact age.

Em: Oh dear, why did the moon have to choose tonight to be full.. its so bright! Does the moon "set" at a specific time?

Bill: During a full moon, the moon sets at sunrise -- so no relief there!

Paige\_Frazier: Are there any visible planets tonight?

Bill: Later on, Jupiter will be visible in the east.

Dylan\_B: on the ustream above what is all the white noise and static/occasional ringing?

Rhiannon: The 'white noise' you see are either stars or hot pixels. The audio you hear are pings and whistles from passing meteors.

Janet: Thanks for all the great questions! We are working our way through all the questions in queue -- will get to yours asap.

dude: How large in centimetres on average are these meteorites?

Rhiannon: These Perseids would only be a few cm in diameter at most. Most of what you see will be on the order of 1/10th of a cm, or 1 mm.

blaziken: Why do they make weird sounds?

Bill: That noise you hear is from a radio receiver tuned to distant TV stations. When you hear something that sounds like a blip or bleep, that's a meteor scattering the radio waves back to the receiver. This is a simple meteor radar.

Ana: Can the perseids meteors be viewed every year?

Rhiannon: You bet! Every August. 😊

StarGrazer: has anyone been able to spot one on the live stream yet?

Bill: Not so far that we know of.

RCP: can i get them on the camera..any tipd from pro photographers

Rhiannon: Yes. If you can do long exposures. We would recommend 5-10 minutes.

paulidirac: Why hasn't the debris from Swift Tuttle not already been exhausted in previous passages of the Earth through it? Thanks for taking questions!

Danielle: Every time Swift-Tuttle passes close to the Sun on its orbit it releases more dust.

alex5: awhile ago i was saw a perseid meteor and right after that i saw a bright light going really fast high in the sky was that the space station?

Bill: The space station WAS visible tonight for many locations across the U.S.

LaurieOhio: Thank you for all this. It's fun and educational.

Rhiannon: You are welcome! We love it!

Catherine: Is it true you may be able to hear them through some dead fm channels?

Bill: Yes, that's true.

jred123: is there a specific place that i should be looking at right now in the sky

Rhiannon: Just look up! And give your eyes time to dark-adjust.

NASA\_Science: how big are these meteors?

Bill: They range in size from less than a millimeter up to several centimeters. In terms of imperial units, range from fractions of an inch all the way up to a couple of inches.

Dylan\_B: in NY in which approximate direction is perseus located this time of night if its visible at all?

Rhiannon: Perseus will be rising from the North/NorthEast, however you don't want to look directly at the radiant. Just look up!

kimran: Why do we not see anything like the late heavy bombardment today?

Bill: Because Jupiter, Saturn, Uranus, and Neptune are no longer migrating, the gravitational disturbance caused by their motion at the beginning of the solar system created the late heavy bombardment.

dante: The main camera you are using to stream, how does its light sensativity compare to the human eye? Is this what I would see if I could get outside of my area's light pollution?

Rhiannon: Good question. This camera is about twice as sensitive as your eye.

superflutist: Do they always burn up, or do they sometimes reach the ground?

Bill: Perseids always burn up and never make it to the ground.

JayC: Thanks Bill, Danielle, Janet and Rhiannon! What type of material makes up the debris in a comet tail?

Rhiannon: Dust /dirt and ice!

parsec: was the comet big in the sky in 92/93? i saw a huge comet object in the night sky for about a week or so

Bill: Not really -- it was a telescopic object, nothing very spectacular.

JesseC : I have a quick question, I can't see the meteors, is there a link you could send or do I need to click play on the video above?

Rhiannon: Click on the video above to see our skies here in Huntsville, Alabama!

cosmicluck: Is it possible for some larger meteors to survive the intense heat of entering the atmosphere and possibly hitting the ground?

Bill: Perseids are made of ice and no matter how big they are, ice melts. ☺

Chicago\_Geek: My son asks: why should we not use a telescope?

Rhiannon: Good question. Using a telescope will give you too small of a field of view. You want the largest field of view as possible for meteor showers.

swanita: What are the chances of seeing anything within city limits?

Bill: You'll see the brighter Perseids. Actually, with the moon so bright, you may see almost as many as a country dweller.

Tina: I live in Northern Ontario....want to get my kids up what time should I start seeing them

Rhiannon: You can start seeing them now, but the best time will be 3-4 AM if it is clear for you!

superflutist: Thank you for actually talking to us, this is my first time watching a meteor shower!!

Rhiannon: Awesome! We are excited for you!

jk73: Howdy all, thanks to Bill Danielle and Rhiannon for being here on this fine evening. It is a huge blessing to have the morning off tomorrow to be able to witness this. As a soldier this is one of the things that keeps me motivated, a extravagant display of beauty that this world has, all nations alike.

Bill: We're honored that you're on -- thank you for your service!

Tim: How does this compare to Haleys Comet?

Bill: Halley's Comet is bigger than Swift-Tuttle and produces more dust.

Kristin: Do you guys have an estimate of how fast these meteors are traveling? Also, does their speed vary much?

Rhiannon: These meteors are going 59 kilometers a second, or about 130,000 miles per hour. FAST!

just\_engaged: how do we know if we can see the meteor shower?

Danielle: Given clear weather and dark skies, the Perseid meteor shower can be seen by most of the world, though it is best viewed by observers in the northern hemisphere. Places where the Perseid radiant doesn't rise above the horizon (where you can't see Perseids) include: southern parts of Africa, Australia, and South America, as well as Antarctica.

k923: wow! the livestream is amazing!

Danielle: Glad you are enjoying it! 😊

NASA\_fan: so,perseids are just dust?

Bill: Yes, ice mixed with dust.

Viva\_Las\_Perseids: My balcony faces west. Might I see anything from there, or shall I go outside?

Rhiannon: It would be better if you went on the ground and looked straight up. The radiant is rising from the NorthEast.

Paige\_Frazier: How do you figure out how old a planet or comet/meteorite is?

Bill: Meteorites are easy because we can bring them into the lab and date them by radioactive decay. Since meteorites come from asteroids, and in some cases planets like Mars, we know that the planets have to be older than they are.

Connery: Can Jupiter be seen without a telescope?

Danielle: Yes, though it'll look like a big bright star.

just\_engaged: when will the comet be visible to the midwest?

Rhiannon: The comet will not be visible for many decades again. What we are seeing tonight is debris left from the comet. 😊 And you can start to see them at about 9 to 10 pm local time but the peak will be about 3-4 AM.

Laura: Hi Bill. I was just wondering how many more days we have to view the Perseids and when the peak viewing time will be? I live in Ontario, Canada if that makes a difference.

Rhiannon: Peak is tonight! 3-4 AM local time. You will be able to see some Perseids tomorrow night, and the night after, etc, however the rates will be considerably less the further you get from the peak.

Em: So do these comets appear every August? Or only once every 76 years, when the comet is close to Earth?

Rhiannon: These meteors appear every August - the comet appears every 76 years. The meteors are pieces of the comet that fell off the last time it came close to the Sun.

Curtis: Hi from Northwest GA, Bill! How can you estimate the 3-dimensional trajectory of a meteor?

Danielle: You need 2 cameras separated by a large distance so that you can use triangulation.

aep892: Clear skies with VERY bright moon. Also, I see a very shiny star. Could it be a planet? Haven't seen any yet.

Bill: Right now looks like the brightest star is Vega, high in the east. Jupiter rises around 11:20 local time.

A.Rives: Are there any cameras on satellites streaming this? I'd like to see this from a view above.

Bill: Unfortunately, no. I'd like to see a view from above, too!

Flash: Why are there more meteors in the morning?

Rhiannon: It has to do with the motion of the earth. The motion of the Earth is such that in the morning they are looking towards the direction the earth is moving. It is kind of like bugs hitting the windshield - - you will get more hitting the front of the car instead of the side.

superflutist: So with the moon being full tonight, we will only see a fraction of what is happening?



Bill: You'll be able to see about 1/3 of the meteors.

Paige\_Frazier: Are all the meteorites that are visible tonight Perseids?

Rhiannon: There will be some background meteors -- called sporadic -- and even possibly some South Delta Aquarids! Very fun night. ☺

jennydeng: i dont hear any "pings", it is the video above this chat right?

Bill: Yes, the embedded Ustream. You'll only hear pings when there are meteors.

rae: Which part of the world where Jupiter will be visible and also what time?

Bill: About 11:20 local time in the northern hemisphere.

agent77: Is it true that the stars we see each night could be hundreds or even thousands of years old and may already be gone, but we still see them because it takes that long for the light to reach us here on earth?

Bill: Yes, that's true.

JesseC: Wow! This is amazing! Are you excited about seeing them tonight?

Danielle: No matter how many meteors I've seen, I'm always excited to see more!

NASA\_Science: I can't locate the constellation Perseus. Can you please give me a location or a direction to look in to find the constellation?

Rhiannon: Look northeast. Cassiopeia is just above it.

laurenm: what will the perseids look like on the stream?

Bill: They'll look like a streak moving across the video. They move fast, so you have to watch carefully.

Paige\_Frazier: Everytime there is a whistle or bleep wil there be a meteor visible?

Bill: No, the "radar" can detect meteors outside the field of view of the camera.

superflutist: What does the space station look like from the ground?

Rhiannon: It looks like a bright satellite -- or a plane that does not have blinking lights. Isn't it so cool that we can see the space station from Earth?! We love that.

MeaganF: Hi! I was just wondering, if there were no full moon tonight, what would be the rate of meteors per hour? How much of a difference would there be?

Danielle: The rate would probably be 80-100 meteors/hour under perfect viewing conditions. (As opposed to 20-30 meteors/hour.)

Janet: Lots of great questions! Please be patient with us as we work through all the questions. We will get to yours soon!

Willow: my son got to see his first meteor and I got to share that moment with him. Hard to see here with street lights, but got to see one

Rhiannon: Fantastic!

JesseC: The meteor showers in my area have been going on alot. Does this happen in August?

Bill: Every August around this time we have Perseids. You were also seeing a lot of Southern Delta Aquarids over the past couple of weeks.

gad\_jet: Where do the meteors come from

Rhiannon: These Perseid meteors come from comet Swift Tuttle.

Kyle: do the magnetic poles have any effect on the direction the meteors travel?

Bill: No, the ice is non-magnetic.

echo: Won't swift tuttle one day create an extinction event?

Rhiannon: No. No worries, Echo.

Rhiannon: Yup! The Ustream video above will be online tomorrow.

bioloka: Do you see at NASA's channel????????????????????

Rhiannon: We have seen meteors!

HelloMandy: What causes the meteors to streak across the sky with different colors? :)

Danielle: Some of the different colors are due to differences in color perception in your eyes. But the dominant composition of a meteoroid can play an important part in the observed colors of a meteor -- certain elements display certain colors. For example, sodium produces a bright yellow color.

Gapdfh: what do you actually mean by FM channels ?, sorry the question is a little stupid, but i' m new at this buti have a real pasion for it

Bill: Best way to detect meteors is to tune to frequencies of 20 MHz or under. We tune to the carrier frequency associated to TV channel 3.

gad\_jet: How many meteors will there be?

Bill: About 20-30 per hour.

dufflerpud: Any way to turn dim that darned moon?

Bill: I wish!

chrsrc3: Will the full moon affect the view?

Rhiannon: Unfortunately yes. On a moon -- less night we could expect to see 100 per hour, but the rates are more like 20-4 per hour because of the moon.

k923: what is the static coming from the live stream?

Bill: You're hearing noise from the meteor radar. That noise you hear is from a radio receiver tuned to distant TV stations. When you hear something that sounds like a blip or bleep, that's a meteor scattering the radio waves back to the receiver. This is a simple meteor radar.

nikki211: This is sooo cool u guys did this! Thanx!

Bill: You're welcome -- happy to be here.

dazzled: when do you expect them to start showing up bright enough on the ustream video? and thanks again for doing this since there is too much light pollution where I'm at! =)

Bill: Perseids will start to appear around 2 AM. You'll see other meteors before then.

edjcox: Where in the sky should i look North East West South?

Danielle: Get away from bright lights, lay on your back and look up. Put the horizon at the edge of your peripheral vision as you let the sky and stars fill your field of view.

superflutist: what are meteors made of?

Bill: Ice and dust mixtures.

boyles: is there a certain part of the sky we should be watching or all of it?

Rhiannon: Just look up. You will see the most between 3 and 4 AM local time. Lie on your back and let your eyes dark adjust.

NASA\_fan: I'm in Illinois and I can see anything! too cloudy!

Danielle: Sorry to hear that! Hopefully you'll be able to see something on the live feed!

RandCsleepover: How do you recommend we take a picture with an iPhone?

Bill: Will be hard with an iPhone! You need a camera that can take a time exposure of 30 seconds or longer.

DetroitAndrew: Poor transparency in Detroit should clear in 2 hours

Rhiannon: Well that will be perfect timing to start seeing Perseids!

jk73: An Army thanks and hooah to Bill, Danielle, and Rhiannon! Meteors are one of this soldiers favorite things!

Bill: One of mine, too, and thank you for your service!

MARY: JUST LISTENING TO THE NEWS AND THEY SAY TO LOOK TO THE NE, IS THIS CORRECT?

Rhiannon: No. Look straight up. The radiant will be rising in the northeast, but if you want to see the most meteors look straight up.

Gapdfh: i really want to see one tonight with my own eyes, really REALLY do or at least on the ustream , do you think i might get a chance?

Danielle: I do think you'll be able to spot one in the Ustream. If you've got clear weather and dark skies, and you let your eyes adjust to the dark, I think you have a shot of seeing a few in person, too!

Steph: I'm in Missouri, which is central timezone, when would the best viewing time for me be?

Rhiannon: 3-4 AM local time.

Bill: Hi everyone -- lots of questions about local viewing and how to view. Here's some information on that: Who can see it: Given clear weather and dark skies, the Perseid meteor shower can be seen by most of the world, though it is best viewed by observers in the Northern Hemisphere. In the Southern Hemisphere, the Perseid radiant doesn't climb very high above the horizon or isn't visible at all. So Southern Hemisphere observers will see fewer Perseids than their northern counterparts. Places where the Perseid radiant isn't visible include the southern parts of Australia, Africa, and South America, and all of Antarctica. Where to look: If it's not cloudy, get as far away from bright lights as you can, lay on your back and look up. Put the horizon at the edge of your peripheral vision as you let the sky and stars fill your field of view. Give your eyes some time to adjust to the dark and you should start seeing Perseids. No binoculars or telescopes are necessary!

Janet: Great questions -- we are working to get them all answered!

leassa: so the best viewing time is around 3am? even in missouri?

Bill: Yes, that's right. Doesn't matter where you are.

cosmogazer: How can the dust of a comet engulf the entire Earth?

Danielle: The comet leaves behind a trail of dust and the Earth runs into it as it orbits about the Sun.

Gapdfh: this is the first time for me to see a meteor shower so i don't know what to expect to see , do i just go outside and watch the sky and i'll see one , it's 3:00 am right now so am i going to see anything right now?

Rhiannon: Yup! Head outside and let your eyes dark adjust! And let us know how many you see.

Kyle: If we were to be on the space station, would the show be more spectacular or would we see about the same amount?

Bill: The show would be more spectacular because you'd be looking down on a very spectacular Earth. The meteors would probably be fainter than what you'd see on the ground.

chrisrc3: Will the full moon affect veiwing in a good or bad way?

Danielle: A bad way, unfortunately. The full moon will wash out all but the brightest Perseids.

honeygirl123: Is it true that there are some trace of DNA molecule found on meteorites? Btw tnx for talking to us tonight

Bill: We have found organic molecules on meteorites -- nothing as complicated as DNA.

JesseC: Ah! I think I saw another one! But this time, its was really quick, a bright light moving across the screen in a blink of an eye

Bill: Yep! That's what a meteor will look like on the feed.

Joel: how does the dust and ice react to the earths atmosphere?

Bill: It burns up. 😊

superflutist: What is happening that causes this meteor shower? I know that it happens every August, but what is it from?

Rhiannon: We see this meteor shower because comet Swift Tuttle left debris that Earth travels through.

Tim: Do you guys have a lot of coffee?

Bill: We do! And other forms of caffeine. 😊

Jim: I understand the Space Station will be visible tonight as well. Is that true?

Rhiannon: Yup! We already had one good pass here in Huntsville. Check out [www.heavens-above.com](http://www.heavens-above.com) and enter your time zone and location to get specific times and directions.

Vanessa: Can you explain how the comet dust is so much younger than the comet, at around only 1000 years in age? I haven't been able to successfully explain this to my five-year-old. :-)

Bill: The comet dust is as old as the comet because it was once part of it. But, the dust separated from the comet 1,000 years ago -- so it's only been a separate piece for that long.

mjgrams: If the perseids radiant is near the perseus constellation? Is the Leonids randiant near the leo constellation?

Danielle: Yes, meteor showers are named after the location of their radiant. Perseids appear to radiate from the constellation Perseus. The Leonids appear to radiate from the constellation Leo. The Draconids are named after Draco, the Orionids are named after Orion, and so on. ☺

clab: Will the live stream be recorded so that people who have to sleep can watch the shower later?

Rhiannon: Yup! Though there is something that much more special about it when you see it for yourself. ☺

CJSNASA: I have been looking at the perseids pictures posted by NASA on Twiter. Would we be seeing anything that extrodinary?

Bill: Yes, if you look long enough you'll see some bright, spectacular Perseids. Cameras have the advantage that they don't get tired or need to go to the bathroom!

jennydeng: which direction do i look out for jupiter on the screen

Rhiannon: Jupiter cannot/will not be seen on the ustream.

trev: Will there be the rest of the meteors tommorrow night?

Danielle: Yes you will be able to see Perseids tomorrow too (if you have clear weather and dark skies), though maybe not as many as tonight.

mjgrams: My wife and I had one of our first dates watching the leonids for a field in north Texas. This brings back memories

Rhiannon: Very Sweet!

Aat: What should I look for to see the ISS?

Bill: The ISS will be very bright object moving slowly across the sky. You can find out when the ISS will be visible from your area by going to: [www.heavens-above.com](http://www.heavens-above.com).

pam9000: Hi from Florida. Went outside, but have not seen any yet. Will keep on looking.

Bill: Stay with it -- you will see meteors with patience. ☺

Anonamouse: I saw a small white dot move from the top right towards bottom center of the live feed. Was that a satellite?

Rhiannon: Likely yes. If it was moving very fast it was probably a meteor.

jes\_h: when is the best time to view?

Rhiannon: 3-4 AM local time

Sam\_Steele: Thank you guys once again for contributing your time here. Do meteors provide any useful data as they burn up? Such as upper level atmospheric conditions?

Danielle: No problem! Our team is mainly interested in meteor rates, speeds, brightness, and meteoroid orbits.

Chris\_from\_Boston: How many light years or distance does a comet travel before it burns out? Is the number too large to print :-) ?

Bill: Comets go around the sun for millions of years before evaporating. If you're talking about meteors, the Perseids you see tonight traveled billions of miles before kamikazi-ing into our atmosphere.

Eyes\_in\_Colorado: Have any of the experts online tonight seen a meteor storm?

Rhiannon: Bill saw the Leonids in 1999/2001/2002.

michellenguyen180: will being around large buildings obstruct my viewings of the shower?

Danielle: If they crowd too much of your sky, then yes.

JesseC: Will constellations be seeable tonight?

Bill: You can see Perseus, of course...Cassiopeia...Lyra...Cygnus the Swan, numerous constellations.

Aat: I wish I could see some. I think the moon is drowning out the view

Rhiannon: Unfortunately yes. The moon takes the rate down from 100 to about 20-40 per night. If it is early on for you, hold out for the ones later on. The later it gets the more you will see -- the rates will start to pick up at 2 AM likely (local time) and peak between 3 and 4 am.

parsec: i follow the space station with binoculars every time it goes by. i love the space station sighting page

Rhiannon: Very cool!

NASA\_fan: hi,i want to be an astronomer at nasa when I grow up.any tips?

Danielle: Study math and physics -- that will give you a solid foundation to work from. And get involved -  
- go out and observe!

Jenuine: what time is optimal to see them tonight/tomorrow morn?

Bill: A couple of hours before dawn until dawn, your local time.

Neil\_B.: Hey -- I am also from UWO! (Hi Rhiannon :P). What is the typical speed of that these meteors enter our atmosphere at?

Rhiannon: Hey, Neil! Hope you are enjoy the night! These meteors are moving at 59 km/s or 130,000 MPH.

jmcd0: My husband and I saw a large green meteor streak that was so bright that I almost expected to hear a boom like you get from fireworks. What causes the green color?

Bill: Oxygen being ionized by the energy from the meteor.

Shubham: My balcony is south facing, so will i be able to watch the shower at all(In NC)

Rhiannon: It would be much better if you went down to the ground and got the full sky in your field of view.

Jana: I read that meteor ice is composed of water, methane, ammonia, or other volatiles. Where does the water come from that makes the ice?

Bill: Comets contain all sorts of volatiles like ices.

luis: just saw my first meteor for the first time!!! from CT

Danielle: Congratulations, Luis!

NASA\_Science: Will a telescope be imperative to view Jupiter?

Bill: If you want to see the moons and cloud belts, then yes.

HachiRoku: Any way to mod our scopes to negate the moon's intensity?

Bill: Not easily.

WayToDawn: When will the meteors officially start to appear?

Rhiannon: If your skies are dark you will be able to see meteors now, but you will start to see more at 2 AM local time and even more between 3 and 4 AM local time.

superflutist: Will Swift Tuttle ever lose all of its mass in time?

Bill: Yes, in a few million years it will be no more.

logan\_inwood: this is awesome i got to see my first meteor

Bill: Congratulations! :)

Roberto\_Cideos: Ive a lot of questions though, but i rather want to thank to you guys, Bill, Danielle and Rhiannon, for sharing this time with us, thanks!!!

Bill: You are very welcome -- our pleasure to be here!

Audrey: I think we have to be patient to wait for it! :) I wish I could see them, the meteors is so pretty :D



Bill: That's exactly right -- patience is very important when viewing meteors!

Dylan\_B: a little of topic but: how often does haleys comet come around and when will the next time be?

Danielle: Comet Halley is visible from Earth every 75-76 years. It'll next be visible in 2061.

tanya\_lall: does this happen every year?

Bill: Yes, every year in August.

NASA\_fan: how many days will this last?

Rhiannon: Perseids will be able to be seen for the next week or so, but considerably less than you will see tonight.

Chris\_from\_Boston: How long is the cloud of debris from the Swift Tuttle comet?

Bill: It covers the entire orbit -- billions of miles.

Usmann: when you say the Perseids will appear at 2 am, is that EST?

Bill: That's 2 AM local time, wherever you are.

leassa: is there a lot of math involved in astronomy?

Bill: Yes, very much.

aep892: Thank you all for doing this. It is VERY educational and EXTREMELY fascinating!

Rhiannon: We are so glad you are enjoying it!

superflutist: Is this one of the largest meteor showers? Or are there bigger ones?

Rhiannon: The Geminids in December have rates between 100 and 120 at their peak.

Alice: what do you mean the edge of your peripheral vision?

Bill: Just look up. ☺ You'll see meteors not only up, but also out of the corner of your eye.

Theyain: Is there a recorded count (per year) of the meteors? If so, what's the highest count in one shower?

Danielle: There are meteor shower records online and in scientific journals. The Leonids in 1966 exhibited 100,000 meteors per hour.

Kristin: Why is Swift-Tuttle known as "the single most dangerous object to humanity?"

Bill: Even though it comes close to Earth, Rhiannon and Danielle will tell you that I'm the most dangerous object to humanity. 😊

superflutist: My father is currently deployed in the Middle East, will he be able to see them as I do? I sure hope so, because it would be a cool memory to share!

Rhiannon: That would be so great! Yes he will be able to see them in the Middle East. 😊

Patricia\_: oh good to know I was going to wake my dad up at 4am... 3am is better? for NY?

Rhiannon: Between 3-4 AM is your best bet. 😊

Eyes\_in\_Colorado: What are the chances of any of these meteors hitting the ground tonight?

Bill: Perseids can't hit the ground, but meteors from asteroids can make it to the ground as meteorites.

Katrina: What determines the colors of the meteors? Sometimes they look white, sometimes blue, and sometimes more reddish. Is that temperature or composition?

Danielle: Meteoroid composition plays an important part in the colors people observe. Certain elements display signature colors. For example, sodium produces a bright yellow color. Nickel shows green, I believe.

leobocc: its this camera on the perfect condition to see the meteors??

Bill: It's optimized to look for meteors in the atmosphere, yes.

ZeusOmoose: How far away from a city should one be? I'm several miles outside of Philadelphia, is this too close or will it be possible to see a few meteors?

Rhiannon: With the moon as bright as it is tonight, city lights don't matter as much.

friendswwod\_TX: I dont see anything on the live feed.

Bill: Just be patient -- you'll see meteors as bright streaks that move very swiftly across the screen.

angelman2be: so if it peaks in 2.5 hours is that even on the west coast?

Rhiannon: You will see the most meteors between 3 and 4 AM your local time (even at the West coast 😊 )

Bill: Many questions about local viewing. Here's some information on that: Who can see it: Given clear weather and dark skies, the Perseid meteor shower can be seen by most of the world, though it is best viewed by observers in the Northern Hemisphere. In the Southern Hemisphere, the Perseid radiant doesn't climb very high above the horizon or isn't visible at all. So Southern Hemisphere observers will see fewer Perseids than their northern counterparts. Places where the Perseid radiant isn't visible include the southern parts of Australia, Africa, and South America, and all of Antarctica. Where to look: If it's not cloudy, get as far away from bright lights as you can, lay on your back and look up. Put the

horizon at the edge of your peripheral vision as you let the sky and stars fill your field of view. Give your eyes some time to adjust to the dark and you should start seeing Perseids. No binoculars or telescopes are necessary!"

MissVic: Where is the UStream located?

Bill: On this page, just above this chat window.

ckg: First timer you will love it , it is the most awesome thing you will ever see I cant wait I have missed so many because I didnt know about them this site is such a wonderful idea.

Bill: Thank you! We like doing this!

onionhead: A question on the Ustream feed: Can you please briefly describe the camera setup you have running at MSFC for the stream? Is it a plain 'ol video camera, attached to a telescope, or something out-of-this-world?

Bill: It's a low light level security camera with a 17 mm lens, giving it a 23 degree field of view. No telescope, nothing fancy, about \$300 total equipment cost.

deanna\_borders: what time does the meator shower start in kentucky

Rhiannon: You can start to see meteors now, but the later you stay out the better. You will notice more after 2 AM and even more between 3 and 4 AM. ☺

Ariadne: Where in relation to the Earth and the Sun and other planets is the comet Swift-Tuttle currently? How large is its orbit?

Danielle: I'm not sure where it is currently. It was last near the sun in 1992. It has a period of 133 years, so it's on its way back out to aphelion. The semi-major axis of the comet's elliptical orbit is 26 AU -- about 26 times the distance between the Sun and the Earth.

Cliff: Is the ISS or other satellites in any danger of the meteor shower?

Bill: Meteor showers represent a time of increased risk to satellites, but they're designed for such events. ISS is the "tank" of low Earth orbit, and meteors pose little risk to it.

wsells: Thanks for doing this! Here's hoping the people and government can start seeing the worth of institutions like NASA and give you all some operating funds! Hang in there! =)

Bill: You're welcome, and I'm hangin'. ☺

eric: do u know when another meteor show will come, but without a full moon?

Rhiannon: Next year there will be several major showers in which the moon is at a better phase to view the meteors. ☺

tanya\_lall: is it visible only in night time?

Bill: Yes, only at night.

krolyat: I've been told that i should look south east from the nothern hemisphere...is this correct?

Rhiannon: Just look up. That is how you will see the most! And let your eyes dark adjust.

DetroitAndrew: Bill are the fragments carbonaceous chondrites or dirty ice?

Bill: Dirty ice, in this case.

Curtis: How wide (degrees) is the field of view on the streaming camera?

Bill: Field of view is 23 degrees.

Janet: Thanks for all the questions -- we are working our way to your questions 😊

Kristin: do things like lightening affect meteors (aside from visability?)

Bill: No, meteors burn up well above normal lightning.

gggm: are any time lapse cameras running on the iss that might show us an over-view later??

Bill: No, nothing like that available.

Johnny: Im so confused!! 3am for everyone? Or 3 am in New York, L.A. or Alabama?? 3 am in NY is midnight here. Or 3 am no matter where?

Bill: 3 AM local time, always a couple of hours before sun-up, no matter where you are.

edjcox: Painters of long ago depicted swarms of meteors and descriptions voiced heavy falls as well, why do we never see this anymore?

Rhiannon: Meteor storms do still happen occasionally. Bill saw the Leonids in 1999/2001/2002.

mithun.kar: Why meteors are hitting our atmosphere. Is it our gravitational pull OR they have some external energy that is pushing them to us ?

Bill: No, they're running right into us at 130,000 mph!

bob: understand that 3am is the BEST time. But it's now 11 PM on the east coast. Should we see anything? Moon is very bright here, skys are slightly cloudy

Rhiannon: You may see some meteors at this point, but the later you stay up the better. 😊

Linda-Florida: Is there a difference between a falling star and a meteor...and what is the difference?

Bill: They're the same thing.

jweir: How many days after todays peak night will we be able to see the meteors?

Bill: You can see Perseids for about another week.

Chris\_from\_Boston: If the Earth did not have an atmosphere, would the debris land harmlessly on the ground?

Danielle: No. The Earth's atmosphere provides a lot of protection from meteoroids. Without it, the meteoroids would strike the Earth with a great deal of energy.

Lucasb001: How big are those things

Bill: They range in size from less than a millimeter up to several centimeters. In terms of imperial units, range from fractions of an inch all the way up to a couple of inches.

astronomylover: What is the difference between a perseid meteor and a normal meteor and will they both be out tonight?

Rhiannon: Yes, you will see both background (sporadic, 'normal' meteors) and Perseid meteors tonight. The main difference is that background meteors come from all different directions, but Perseids come from the same direction -- specifically the stream that comet Swift Tuttle left.

Turbolag: where is the live stream camera located? I am on the east coast

Danielle: The live stream camera is located at the NASA Marshall Space Flight Center in Huntsville, Alabama, USA

jennydeng: you guys are cool!

Bill: Thank you very much! But we think our audience is cool. 😊

Kristin: how often do you guys stay up all night as a part of your job in researching things like this? and thank you by the way, so cool to be able to interact with NASA

Bill: Very rarely up all night -- I'm old and let my cameras do my observing now. (And thank you!)

\_Elin\_liu: are you going to work here overnight, and not see the shower?

Bill: I'll look at the video in the morning.

dude: The live stream is really good, I have seen some already!!

Rhiannon: Fantastic. Glad to hear it!

anotherguest: Ooohh! Just saw one on your Huntsville feed! Makes me want to get the bug spray and lie on the lawn!

Rhiannon: You absolutely should! Seeing it live is always best.

leejere: where can we watch it online

Danielle: We are streaming video online. You can find the feed on the same webpage you found this chat room.

hurricaneZack23: Will the pings be heard before or after I will see them on the stream? Or are they not necessarily gonna be where you can see and then hear one or vice versa?

Bill: You'll hear pings from meteors not in the field of view and sometimes you'll see a meteor and hear the ping at the same time.

NASA\_Science: when will I see the ISS if I live in Illinois?

Rhiannon: [www.heavens-above.com](http://www.heavens-above.com) is a great site. Enter your location and time zone. It will give you specific times and directions. 😊

leejere: where can we watch it online

Bill: You can watch the Ustream link embedded above, or you can also check out other all sky cameras links on this page: <http://www.nasa.gov/connect/chat/allsky.html>

logan\_inwood: What is the best type of location to watch from?

Danielle: Anywhere with clear weather, dark skies, and an unobstructed view of the sky. I like campgrounds, myself. 😊

excited\_1: I am in Charleston WV and the view is great here! I have seen quite a few already!!

Danielle: Congratulations!!

Audrey: It burns in the atmosphere right?? and how if the meteors hit the ISS, will it hapen?? please answer my qustion

Bill: If a meteor smaller than an inch hits ISS, it will break apart against the armor. Perseids burn up in the atmosphere.

CJSNASA: Are you all the same ones who did it last year? You do it very good!!

Bill: Thank you! This is our second time covering the Perseids.

starryguy: Saw 50,000 in a couple hours on Leonid meteor storm 1966

Rhiannon: I'm jealous!

vincent: is there a clue where these meteors are heading and do they keep traveling forever across the universe

Bill: The meteors are heading into our atmosphere, so this is the end of the line for them!

leejere: where can we find it recorded on the internet to be able to watch it tomorrow

Rhiannon: On the same page that the chat is on right now.

edjcox: If comets are principally ice and water why do they not simply sublimate away in the vacuum of space?

Rhiannon: Eventually comets do 'run out', but it takes many orbits around the sun.

niquey36: Can tell how much debris the Swift tuttle comet left? Also, can you approximate or give a definite as to when the debris/meteors will no longer be seen by us?

Bill: No to the first question -- we'll see Perseids for many thousands of years.

missK: Do meteors affect our environment or our planet in any manner?

Bill: They deposit metals and other elements in the atmosphere, making a minor contribution.

kimran: SO HOW IS A COMET DIFFERENT TO A METEOR PHYSICALLY AND APPEARANCE WISE?????

Rhiannon: A comet is like a big dirty snowball of ice and dirt. A meteor is like a little rock. Meteors are smaller than comets.

mwjn: Is it called Persied because they seem to come from Persius constellation?

Bill: Yes, that's correct.

Laura: Just read Tim's question -- "Do you guys have a lot of coffee?" -- LOL I think I'll go make a pot myself.

Bill: Sounds like a good idea! ☺

colamann: what fascinates you about comets

Bill: People used to think comets heralded disaster, but I like to think of them as guardians of the secrets of how our solar system formed.

vincent: how fast are these meteors going?

Bill: 130,000 mph

Aaron: Do meteroids in orbit have an average speed?

Rhiannon: The average speed of meteoroids in low-earth orbit is approximately 24 kilometers/second.

JENNIFER: What is that large flashing item going down the right side?

Rhiannon: An airplane

Patricia\_: when you say local time -- what is your location? I am in NY

Bill: That means your local time -- Eastern, in the case of New York.

hifromconnecticut: is there any hope of seeing some meteors if the giant full moon is shining on my backyard?

Bill: You'll see the brighter meteors, so yes, there is hope. ☺

kelseyxx14: will the iss be blinking or just a bright light?

Bill: Just a bright light, no blinks.

Chris\_from\_Boston: How would the space station or other spacecraft avoid this debris field? Is it something tht needs to be avoided?

Bill: The debris is widely scattered unlike what you see in movies like Star Wars, so the odds of a meteor hitting ISS are very small. Imagine three meteors per square mile. That's a lot of empty space.

baypharm: do the meterors pose any risk to the iss?

Rhiannon: They do, however the ISS has armor that protect it. Also we (The Meteoroid Environment Office) run models that quantifies this risk.

benstar: We saw two meteors so far watching the ustream, but we did not hear any corresponding noises on the audio.. why is that?

Bill: Because they didn't reflect any radio waves towards our receiver. This happens a lot.

Ana: Enjoying the meteors?

Bill: Yes, we are!

Paige\_Frazier: Can you see meteors even if it's not 3 or 4am?

Bill: Yes, but you see more closer to sun-up.

CJSNASA: Where are you guys holding this? I would love to see pictures! Could you post some on Flickr?

Danielle: We are chatting and streaming the video/audio feed from the NASA Marshall Space Flight Center in Huntsville, Alabama, USA. There are some Perseid pictures on the Flickr page linked from the same webpage where you found this webchat.

RandomOnYou: I'm still confused on what the noise is that I'm hearing. Could you explain it into simpler terms? :P

Rhiannon: The meteors ionize the air around them as they burn up and these ionized air molecules reflect radio waves back. As the meteor moves, the frequency changes, which accounts for the various sounds.



CosmoStarGazer: is there any reason why they appear to radiate from the direction of perseus?

Bill: The meteors are moving together in a group. Think of it like the rails on a railroad track. If you look down the track, it appears like the rails come together farther down -- same thing is happening here.

leslie: Is this year any different than other years as far as viewing Perseids in August?

Rhiannon: Every year the Perseids occur, and every year the peak is August 12/13. The difference this year is that we have a full moon that is hampering our ability to see as many as previous years!

Eddie: What will be the best time tomorrow?

Bill: Same time tomorrow -- a couple of hours before dawn until dawn.

Guest\_MI: What direction is the ISS traveling, west to east?

Bill: Tonight it did.

Audrey: are you nasa astronaut??

Bill: No, definitely not. I hate heights!

Kavya\_: I am only 11 but I am really intrested in this ... so wondering if I will be able to see the Meteor Shower in North York Toronto

Rhiannon: Yup! If you have clear skies, go outside for a while and let your eyes adjust. The later you stay up, the more meteors you are likely to see. The most will be between 3 and 4 AM local time.

Audrey: Will the meteor hit the ISS??

Rhiannon: Yes. But the ISS has protection armor.

Chris\_from\_Boston: How thick is the Earth's atmosphere that burns these up?

Bill: The Earth's atmosphere extends up to about 100 miles above us. Depends on where you want to define the threshold.

jmcd0: Where would you like most to be to watch this meteor shower? Up in the mountains where the atmosphere is thinner or out in the middle of the ocean where the light pollution is minimal or in the desert where the humidity is greatly reduced? I was in the Atacama desert in the Chilean Andes a few years and the starry sky blew away anything I had seen in Texas driving on those lonely highways at night. Is it the lack of light, humidity or thin atmosphere that makes the most difference? Thanks

Rhiannon: Ohhh very cool! I'd have to say that Hawaii would be a particularly lovely location to be viewing this. 😊

Wheelz: I'm in New Zealand ( Southern Hemisphere), if the sky is clear tonight will I be able to see anything? or are we, as the page suggests, too far south?

Bill: New Zealand is too far south! [http://www.nasa.gov/images/content/579471main\\_wherelook.jpg](http://www.nasa.gov/images/content/579471main_wherelook.jpg)

Kavya\_: Please answer my Question.. I really want to see the Meteor Shower.. Never seen it before.. I live in North York Toronto and was wondering if I will be able to see the Meteor Shower

Bill: Yes, you can. [http://www.nasa.gov/images/content/579471main\\_wherelook.jpg](http://www.nasa.gov/images/content/579471main_wherelook.jpg)

superflutist: How many miles of debris is Earth passing through?

Bill: The Perseids stream is several million miles wide.

jtmcrazy3: is the camera in the eastern timezone?

Rhiannon: Our camera is in central time zone.

kimran: SO HOW IS A COMET DIFFERENT TO A METEOR PHYSICALLY AND APPEARANCE WISE?????

Bill: Comets are big, dirty snowballs, miles across. Meteors are tiny pieces from these big snowballs.

CJSNASA: How far away are teh closest and the farthest meteors?

Rhiannon: Most Perseids ablate by 50 miles high.

Miscast: Hey Bill, Danielle, and Rhiannon. Great job with the questions and thanks for being here! Got any advice for us photographers? :)

Bill: Perseid photography will be hard tonight with the full moon -- next year will be better!

stephen: How far away is the perseids from earth?

Bill: The closest one has gotten to us this year has been 47 miles up.

doc: Could the meteors we see throughout the year also be from the Swift-Tuttle comet or are they likely from somewhere else?

Rhiannon: The other meteors we see throughout the year come from many other comets -- not just Swift-Tuttle.

eric: What state is the UStream located? thanks

Rhiannon: The Ustream comes to you from Huntsville, Alabama. ☺

Kavya\_: All this information you guys have been sharing is just AMAZING I have learned ALOT

Rhiannon: So glad you have enjoyed this!! We enjoy doing this!

Kin: I love watching this, its funny because its my birthday today, and well, its like a gift from the cosmos :D

Rhiannon: Happy Birthday ☺

paradoxy: Can I pick up the ionosphere disturbances on my home equipment? Should one use a radio, or a television? What should one set it to? Thank you for answering our questions!

Bill: Use a Ham radio receiver tuned to channel 3 or channel 4. TV won't work.

Wade: I'm going crazy as I really want to witness this phenomenon and nothing as of yet. Any ideas what the best time for viewing in Las Vegas is? we are Pacific time.

Rhiannon: Stay out real late! 3-4 AM local time is your best bet at seeing the most meteors.

Moonbeam: It helps if you don't have city light shining in your eyes and your peripheral. Will still have a better chance to see them away from city lights, despite the moon.

Bill: It would help -- but only a little bit.

bootes19: i'm so glad you guys are doing this site. only problem is i'm so busy reading all the questions and answers im forgetting to watch for meteors

Rhiannon: Us, too! We are so busy answering the questions that we keep missing meteors that come through the Ustream. However it will be online tomorrow!

davy: I live in Montreal, does the 3-4am viewing time apply as well? it is on the east coast

Bill: It's 3:00 AM local time, wherever you are.

Anyarose.o: Do the city lights make it harder to see?

Rhiannon: Yes, but due to the full moon this year, the city lights aren't hampering your view too much more than ours.

Kavya\_: When is the next time there will be a Meteor Shower? Will I be able to see it today in North York Toronto and what time is the best?

Bill: You can see Perseids tonight with clear skies. Go out a couple of hours before dawn and look straight up.

Nick: What's the rate at which they will fall at the peak hour? And what time does the shower peak at?

Rhiannon: Due to the full moon, you will see about 20-40 an hour this year (other years it has been 80-100 per hour).

Bill: Lots of questions about local viewing times. This will help: Who can see it: Given clear weather and dark skies, the Perseid meteor shower can be seen by most of the world, though it is best viewed by observers in the Northern Hemisphere. In the Southern Hemisphere, the Perseid radiant doesn't climb very high above the horizon or isn't visible at all. So Southern Hemisphere observers will see fewer Perseids than their northern counterparts. Places where the Perseid radiant isn't visible include the

southern parts of Australia, Africa, and South America, and all of Antarctica. Where to look: If it's not cloudy, get as far away from bright lights as you can, lay on your back and look up. Put the horizon at the edge of your peripheral vision as you let the sky and stars fill your field of view. Give your eyes some time to adjust to the dark and you should start seeing Perseids. No binoculars or telescopes are necessary!"

Abby: Hello! :) , i was wondering how old do you think the meteors are? .

Rhiannon: These meteors are millions of years old!

darcy: could the vikings have seen and be aware of this back in the day? ? Can this help a sailor navigate lost at sea ?

Bill: Viking definitely saw meteors, but they don't last long enough to navigate by...

SUnshineJen: I think I am going to wake my children to see it but I just wanted to double check on the time .... We are Eastern Standard Time ... Maryland... So the best time would be 3"3- - 4:00 am?

Rhiannon: Yup ☺ 3-4 AM local time.

leobocc: Are you recording a video of this now??

Rhiannon: Yes -- we have our all-sky cameras taking videos of the meteors and the live-stream you see is being recorded and will be online tomorrow.

Klindar: What is the origin of the term meteor? Why do they call weather science meteorology?

Bill: We owe that to Aristotle, who thought that meteors were vapors in the air (an atmospheric phenomena). Meteorology was then the study of atmospheric phenomena and came to be applied to the weather.

Chris\_from\_Boston: Would you say that scientists know most of what there is to know about Swift Tuttle or are there some surprises left?

Bill: Definitely some surprises!

Lucasb001: how big are they

Rhiannon: The particles themselves are at most a few centimeters, most are only millimeters. However what you see is the ionization which is much larger -- more like the size of a battleship.

Bob40938458690: When is The next Meteor Shower? October 8th?

Bill: Yes, the Draconids will storm, maybe, on Oct. 8, but you'd have to be in Europe or the Middle East to see the show.

javagoddess: The live feed is just all black. Why can't I see it?

Danielle: Not sure. Maybe try refreshing the feed. Or check the settings on your computer monitor.

Anand: its 12:03, all I see is bright moon and a billion stars... no meteors yet

Rhiannon: Don't give up! The later you stay out the more likely you are to see Perseids. ☺

jtmcrazy3: will we be able to see the iss?

Bill: Yes: [www.heavens-above.com](http://www.heavens-above.com). You won't be able to see it on the camera -- it's pointed in the wrong direction.

Janet: Keep those questions coming! Thanks for your patience as we work to answer them.

NASA\_Science: How long can you see the meteor before it gets burned up in the atmosphere?

Bill: Meteors only last a second or two. On average, Perseids penetrate about 12 miles into the atmosphere.

astronomylover: I am going to be looking up into the sky at 3-4 pm! This is so awesome!! Thanks for doing this and being an active part of this all!!!!

Bill: Very welcome! Thanks for being here.

Don: Is there a site on the internet where you can view the shower. I am in a place with a lot of ambient light.

Danielle: We are streaming a video feed from Huntsville, AL. You can find it embedded in the same page you found this webchat. Or you can go to <http://www.ustream.tv/channel/nasa-msfc>

Chris\_from\_Boston: What size are the meteorites when they strike the atmosphere? If they are only a millimeter or so, how do they produce such a flash of light?

Rhiannon: The ionization spreads out much much further than the size of the meteor. A meteor a cm across can create ionization as wide as a battleship. This ionization is essentially the meteor burning up in our atmosphere.

vincent: do meteors ever fly into black holes?

Bill: Don't know -- I'd suppose so.

Deepak : do any meteor shower will turn up next year too???

Rhiannon: You bet! Every meteor shower happens yearly.

ejohnsonaz: Do we have to look carefully? Will this be like, "I think I just saw it but I'm not sure" or will it be obvious when we see it?

Bill: On the video, the meteor will move across the field very fast, so you have to pay careful attention.

jw21st: can metteors effect airplane communication in flight?

Bill: No, no effect.

Eyes\_in\_Colorado: Looking to the future, are there any significant metoer showers or meteor storms coming? ...or is there anyway we can even predict that?

Danielle: According to the models, the Draconids this year are expected to outburst -- several hundred meteors per hour -- on October 8. But it will best be observed from Europe.

IVI1K3: How much physics is involved in astronomy?

Bill: Too much! ☺ There's an awful lot of physics. My undergrad degree is in both physics and astronomy.

Fangirl: Will the astronauts in the ISS be able to see this much better?

Rhiannon: Not necessarily much better than us -- but the interesting thing about the ISS astronauts observing the meteor shower is that they have to look down instead of up!

NASA\_fan: how old is this comet?

Bill: Billions of years.

marshaam: oh geez... I live in Tulsa.. do you think I will be able to see anything? It's not very bright where I'm at in fact it's pretty dark but will the lights of Tulsa dim the perseids out?

Bill: No, the moon will be more a of a problem this year.

Chris\_from\_Boston: Is there a comparable intense meteor shower that we should also put in our calendars to look out for in the coming years?

Danielle: After the Draconids in October of this year, the next intense meteor shower will be the 2016 Perseids.

gad\_jet: what time zone is the the stream camera in

Bill: Our Ustream feed above is in Central time.

CJSNASA: What is that static noise comming from the Live Feed?

Bill: That noise you hear is from a radio receiver tuned to distant TV stations. When you hear something that sounds like a blip or bleep, that's a meteor scattering the radio waves back to the receiver. This is a simple meteor radar.

spacegirl123: Please help! I don't see many meteor. Is there something wrong with the video? Or is it just me?

Rhiannon: We haven't seen too many yet. But it is still early - 11:34 local time - after 2 AM we will probably start seeing more, and even more between 3 and 4 AM!

carynkty: Do we look north, south, east or west in general??

Bill: Lie flat on your back and look straight up!

Kavya\_: When you can see the moon does that mean no Meteor Shower for that area?

Danielle: It just means that the Moon, because it is so bright, it will wash out all but the brightest meteors.

skydreamer303: is it just me, or is there a whole bunch of nothing on the livestream?

Bill: Just flickering stars right now. Keep watching -- you will see meteors.

superflutist: We went to a empty park around 10, and by 11 the meteors were already starting to pick up, I can't wait to see what it will be like at its peak!

Danielle: So happy to hear that! 😊

jw21st: if we were standing on mars would you see a meteor shower pass?

Rhiannon: Mars would have its own meteor showers! Since it goes through different trails of debris left by comets.

deejayh: What is the brightness of the perseids compared to most of the stars

Bill: Perseids are generally brighter than second magnitude stars.

ZeusOmoose: Are there rare occasions where relatively large pieces fall into our atmosphere, maybe a foot across? Or are all meteors going to be at most a few centimeters?

Rhiannon: There are some larger meteors! Some meteors even land on the earth and become meteorites.

dataanti: What are the size of these meteors that we are going to see tonight? They said on news that most of them are the same size of a grain of sand O.o

Bill: They range in size from less than a millimeter up to several centimeters. In terms of imperial units, range from fractions of an inch all the way up to a couple of inches.

Angeleyes119: You mentioned that the peak is the 12-13. Is that every year?

Bill: Yes, that's right.

JesseC: \*Yawns\* I might not take this any longer. But I'm staying up! \*Smacks forehead\* There! You think you'll last it through tonight?

Bill: Caffeine, my friend. ☺

Alice: is the meteor supposed to leave a long tail because i'm not seeing much :[

Bill: It will be a quick streak -- you won't see many right now.

gad\_jet: whats that white stuff on the stream

Bill: The flickering dots are stars.

Magda: why has the swift-tuttle comet not been completely used up yet? is it just really big or is it regenerating itself somehow

Bill: Because it's really big!

Alec: How big would a meteor have to be to see a "fireball"?

Danielle: Most meteors are produced from particles that are millimeters across. Fireballs are produced by cm sized particles.

dmac: How much energy is in a meteor when it blazes through the atmosphere and could that energy power a large city?

Bill: Not enough to power a large city, but the bigger ones have the energy of several hundred pounds of dynamite.

onionhead: Earlier you mentioned that the closed Perseid so far was 47 miles up. How do you measure the altitude of an incoming meteor? Thanks!

Rhiannon: With our all-sky cameras! We have several cameras spread out around Alabama/Tennessee/Georgia and when they see the same meteor they automatically talk to each other and calculate its speed, height, and other quantities.

Ryan: On the Ustream camera, the audio I'm hearing just sounds like static with a low hum. How will it change when a meteorite is in view?

Bill: You'll hear a blip or ping.

ameeran12: i dont see any on the Ustream and i've been watching for the past hour and 27 minutes

Rhiannon: We will likely see more as the night goes on! But the video is being recorded and will be on the site tomorrow if you want to catch it then.

Alec: What are other prevalent annual meteor showers?

Bill: The best meteor shower of the year is the Geminids in mid-December. Other good ones are the Orionids in October...and the Quadrantids in early January.



k923: hi! :) What are the dots on the live stream are they stars or meteors?

Bill: Those are stars.

mwjn: So, basically the Earth is like a big ball getting thrown through a big dust storm?

Bill: Yes, something like that, except the dust storm is hitting us.

Roberto\_Cideos: How far we are, in AU, from the Swift-Tuttle, and what are the chances for the moon for being hit by a Perseid meteor?

Rhiannon: The moon does get hit by Perseids! We detect meteors hitting the moon with our lunar observatory here in Huntsville. We have seen several meteor showers hit the moon.

dataanti: Will there be HD recordings of tonights shower?

Bill: No, the camera is a simple 640 x 480. We'll have a recording, but it won't be in HD.

maria: What happens when the particles hit the atmosphere?

Rhiannon: When the particles hit the atmosphere, you see meteors! ☺

skydreamer303: do we ever get meteors from the sun? for example, a comet hits the sun and rains meteors on earth?

Bill: No, but comets do plunge into the sun.

jladd11: Will the meteor shower be happening tomorrow also?

Rhiannon: Yes, though the rates will be significantly decreased.

Anis: is there any other meteors showers caused by other comets ? and at what time of the year can we see them ?

Danielle: Yes! Most are caused by comets. One of the most famous meteor showers, the Leonids, is the result of debris from the comet Tempel-Tuttle. You can see Leonids in November. Other examples include the Eta Aquariids in May and the Orionids in October -- both from the comet Halley.

joehague: what are the college requirments to become an astronimer

Bill: Lots of math and physics courses.

foods32958: The answer is probably no, but could I possibly hear the disturbances from a Walkie Talkie?

Bill: No. Too poor of a receiver...

Alec: Will Jupiter hamper the viewing of them?

Bill: No, the moon is the problem.

Chris\_from\_Boston: How does something so small penetrate so far into Earth's atmosphere?

Danielle: Meteoroids are traveling incredibly fast!! Perseids move 130,000 mph. That's almost 100 times faster than the Concorde jet.

aplummer239: when will we see the haley's comet?

Bill: 2061 -- only 50 years to go!

IV1K3: What's the difference between a meteor and an asteroid?

Rhiannon: An asteroid is a large meteor. The specific size difference between a meteor and asteroid is not well defined, but if the particle is larger than a boulder it is most often called an asteroid.

Bradicus: How do you appease the clear sky gods? I am hindered by yet another cloudy sky in Arizona which is known for clear skies...Aaaarggg!

Danielle: Try feeding them PEZ. 😊

tony: is the "green cloud" in the feed video light pollution?

Bill: We don't see a green cloud -- you might need to check your monitor. You might have a magnet or speaker close to it that's giving it a green tint.

laramyc: how fast are these metors going when they hit the atmposphere?

Rhiannon: The Perseids are moving at 59 km/s or about 130,000 MPH. Meteors in general hit our atmosphere between 11 and 72 km/s.

abbie2001: I heard we would be able to see the space station is that true

Bill: Yes, this is a good link: [www.heaven-above.com](http://www.heaven-above.com).

dataanti: What type of meteorites are these?

Danielle: The meteor shower we are talking about (and observing) tonight are the Perseids.

chyu: When is the peak?

Bill: Best time to view is a couple of hours before dawn until dawn.

Arborist: Would you say about 6000 stars are visible to the naked eye?

Bill: Yes, that's very close.

Cappy: so...which direction should you look in to view the showers? I'm not familiar with the location of the constellation.

Rhiannon: The constellation Perseus is rising from the northeast, but to see the perseids you just want to look straight up!

Anand: I am confused.... why these meteors are visible to us only a few seconds?

Rhiannon: They burn up very quickly!

dmac: how is it these meteors are millions of years old? If they are just big dirty snowballs traveling at that rate of speed then how is it they don't melt? I would figure as it got close to the sun it would heat up. Alos what is the track this particular meteor takes since we see it once a year and Haleys Comet is once in a life time?

Bill: Question 1: they are moving fast, but they don't get hot because they don't get that close to the sun. They only melt when they hit our atmosphere. Question 2: The orbit these meteors travel in takes them well beyond the orbit of the planet Uranus.

Abby: Hi! So this is a little off topic, but i was wondering will the comet Elenin affect the earth on its close approach on fall 2011? Thanks for answering our questions!! ;D

Rhiannon: Elenin will have no significant affect on Earth.

House043: What's the iss?

Bill: The International Space Station.

Chris\_from\_Boston: Did many or any ancient civilizations recognize the frequency of this meteor shower which is now known as Perseids? Romans, Egyptians, Maya, or Aztec?

Bill: We have records of the Perseids meteor shower going back 2,000 years. The Chinese definitely saw the Perseids and they're mentioned in records from medieval Europe.

seaofwires: Is the 3-4am local time because of the position on the moon in the sky at those times?

Rhiannon: No, because of the position of the sun. At 3-4 AM (which is close to sunrise) the Earth's direction is moving INTO the meteors -- just like a car gets splatted by most bugs on its front.

we155kruezNJ: Are street lights VERY detrimental to viewing?

Bill: YES, definitely!

Anand: why do ISS astronauts need to look down to see this meteor shower? If they are coming from outer space, they could see above ISS right?

Bill: Because meteors are only visible when they burn up in the atmosphere.

Magda: why do the stars on the ustream twinkle?

Bill: Atmospheric scintillation.

antmo: When i look up into the sky at the time that the heavens above website said to look to see the ISS how will I know that what I see is the ISS

Rhiannon: The ISS looks like a bright satellite -- or a plane -- but has no blinking lights. It also moves quite fast.

Bill: Lots of questions about local viewing. This information will help: Who can see it: Given clear weather and dark skies, the Perseid meteor shower can be seen by most of the world, though it is best viewed by observers in the Northern Hemisphere. In the Southern Hemisphere, the Perseid radiant doesn't climb very high above the horizon or isn't visible at all. So Southern Hemisphere observers will see fewer Perseids than their northern counterparts. Places where the Perseid radiant isn't visible include the southern parts of Australia, Africa, and South America, and all of Antarctica. Where to look: If it's not cloudy, get as far away from bright lights as you can, lay on your back and look up. Put the horizon at the edge of your peripheral vision as you let the sky and stars fill your field of view. Give your eyes some time to adjust to the dark and you should start seeing Perseids. No binoculars or telescopes are necessary!"

dataanti: you said you use a radio radar or something, can i use my stereo radio and set it to a channel with nothing being broadcasted and listen for bleeps and bleeps?

Bill: No -- you probably need something like a HAM radio receiver.

alekskelec: Whats the average speed of meteors?

Rhiannon: The average speed of Perseids is 59 km/s or about 130,000 MPH. But the speed of any meteor is between 11 and 72 km/s

Michael1: How can we see them if we are staring at this computer?

Bill: You can stare at the Ustream link embedded above. ☺ Or you can try links on this page, too: <http://www.nasa.gov/connect/chat/allsky.html>

Steph: Is this what people call "shooting stars" ?

Bill: Yes, they are the same thing.

Chris\_from\_Boston: Does science or man actually have a piece of a Perseids meteor?

Rhiannon: No Perseid meteors. But we do have other meteors -- which are called meteorites once they hit the ground.

Darian: Are all Meteor Showers named after the constellation they seem to appear from?

Rhiannon: You got it!

Pure: How possible are meteorites from a shower such as tonight?

Bill: No meteorites from Perseids -- they're made of ice, and the ice melts long before it hits the ground.

Alec: When is the next time Swif-Tuttle will come into view?

Bill: In the year 2126. Don't hold your breath. 😊

exaus: May I just say how exciting this is. My son wants to be an aerospace engineer. He will be staying up with me so we may view the showers. Since we live in the midwest we were thinking of watching the showers around 3:00 am. Will that be too late?

Rhiannon: That would be perfect. We hope you see lots!

RandCsleepover: R and I both want to work at NASA when we grow up. Any suggestions?

Rhiannon: Take math and science! 😊

Jman84: are you sitting outside right now?

Bill: No, sitting in a nice comfortable chair, watching the video.

Lakshmi: what is the intensity of light of the fireball? is there a scientific measurement to it?

Bill: A fireball is a meteor brighter than Venus, or brighter than magnitude -4.

NASA\_Science: When meteors crash on the ground can you tell me how many bombs would need to explode simultaneously to be equivalent to the energy of that meteor crashing to the ground?

Rhiannon: It entirely depends on the size of the meteor.

DocLee69: What time are the peak hours\*?

Bill: A couple of hours before dawn until sun-up, local time to wherever you are.

Anand: Is there something called asteroid shower?

Rhiannon: No. An asteroid shower would in theory be a meteor shower with really large particles.

lilging: have you guys seen any yet

Bill: Yes, we've seen several.

Kat\_B\_-\_FL: I read online that some meteors are ice particles. How can the ice remain on fire without melting? Is there some sort of metallic content?

Rhiannon: It does melt. But there is dirt/dust in there as well as ice.

Melissa\_D.: When we see the streaks, does that mean the objects passed into our atmosphere and could strike earth?

Rhiannon: The meteors you see tonight are not large enough to hit earth. They all burn up by 50 miles up.

aplummer239: which way should we look to see them north east south west or up?

Bill: Lie on your back and look straight up.

dmac: Is it true that on November 8th Asteroid 2005 YU55 will pass the earth and be closer than the Moon? If so where will this pass and be visible?

Bill: To answer first question, that's true. To answer the second, go to: <http://ssd.jpl.nasa.gov> and it will tell you everything you need to know about the circumstances of that close encounter.

kvnmn7: what causes meteors/comets to fly so quickly ? is gravity part of it?

Rhiannon: Good question. Gravity does have an effect, but the speed of meteors is dependent on the speed that they get ejected from the comet. Speed of comets depend on many things such as which major bodies it has come in contact with (objects can get a gravitational slingshot from planets).

kvnmn7: What is the closest star to Earth at the moment?

Bill: The sun! Outside of the Sun, it's Proximus Centauri at four light years away.

tony: I have an HD video camera, if I put it on my tripod I should just point it straight up? Or would I need a wide angle lense?

Rhiannon: Not necessarily. If you put the camera on a long exposure and just point it up you may catch meteors!

kelseyxx14: will i be able to view this video tomorrow?

Bill: We'll try to leave the Ustream feed up over the weekend. There will also be videos permanently archived on the feed.

Lakshmi: is the NASA camera positioned directly to view the Perseids?

Bill: It's positioned to minimize the interference from moonlight.

Aquarionfan1: What should you do to avoid moonlight and actually see some meteors?

Bill: Can't avoid moonlight because it makes the sky brighter.

stephen: IS the meteors best seen at dark or near the sun?

Bill: Best seen just before dawn.

Lakshmi: Has anyone considered a webcam on the ISS?

Rhiannon: We just put up an image of the ISS on twitter (MeteorScientist), it was a composite image of still from an all-sky video camera we have here. :)

bootes19: how often do just "normal" meteors pass by?

Bill: On a clear night, you can see about 6-8 meteors per hour even when there's no meteor shower happening.

shtar: they travel with 1000s of miles of velocity

Bill: Yes, 130,000 mph on average.

andy512: Is the ISS in any danger of colliding with the Perseids?

Rhiannon: There is a chance the ISS would get hit by Perseids, however it has an armor that protects it from these hits. One of the jobs of the Meteoroid Environment Office is to let the ISS know how much danger various meteor showers will be to it!

rp: not a question, just a big thank you for using terms i can visualize, like bugs splatting on a windshield!

Rhiannon: You are welcome 😊

starryguy: 140 years ago next October 8th, a lot of Chicago, all of Peshtigo Wisconsin, most of the peninsula of Wisconsin and several towns in Michigan burned. Some think it was caused by Comet Biela. Any opinion?

Bill: I've heard this and don't think it's credible.

JessicaD: I had two different websites give me two different times for when the iss will pass, how can I figure which is right?

Rhiannon: Were the times in UTC (Universal time) and local time? Or perhaps did you specify what time zone you are in correctly? Hopefully that helps!

Fangirl: Does the ISS moving make it essier to see? And, i know i already asked about the astronouts, but as mentioned before, if the astronouts are looking down on the meteors, would they be able to see them much closer?

Bill: No, the ISS is 400 miles above Earth, and Perseids burn up at about 65 miles above the Earth. So you're 65 miles from the meteor, and the astronouts are 335 miles away from the meteors. You have the better view.

Darian: Will there be a record of this conversation in case we want to go to bed and read it later?

Rhiannon: Yup! A transcript of this chat will be on the webpage for the chat promo by Wednesday.

MeIRae06: wHY CAN'T i SEE THEM ON THE LIVE FEED?

Bill: You just have to be patient -- you won't see a meteor every second. You'll have to watch for a few minutes.

Sam: what will the meteor look like? fast streak, or slow movement

Bill: A very fast streak. Slow movers are planes or satellites.

JoshuaD: Were these meteors debris orbiting Swift-Tuttle?

Rhiannon: These meteors ARE debris from Swift-Tuttle. 😊

jessi1221: Is it possible for any of the meteors to make it to the earth's crust?

Bill: Perseids are made of ice and burn up about 60 miles above our heads.

RCP: what about the other parts of the world like Europe and Asia..have they already witnessed this activity yesterday ?

Bill: If it's daylight there, they've already seen their best view.

Anand: you said ISS astronauts can see meteors only when burn. What will they see if a meteor just passes the ISS? And how can they protect themselves? Will their armor defend a meteor that speeding @ 130K mph?

Bill: The meteor is so fast that their eyes can't register it and the armor on the ISS will stop meteors up to 1" in diameter.

dustylens: why doesn't the ice sublimate long before it finds earth?

Bill: Because it doesn't get close enough to the sun for the ice to sublimate.

JoshuaD: Are these meteors also falling on our moon?

Bill: Yes, they are.

Elizabeth: How is new material for future Perseid showers being created to replace what's burning up tonight?

Rhiannon: Great question. This debris is orbiting. It is moving along all at the same speed. So when earth passes through the debris trail it isn't leaving a hole in the debris trail. As well, the debris trail is millions of miles wide, so we can't think of it as a thin ribbon of particles. Also Swift-Tuttle is still orbiting the Sun (though every 76 years), and so when it comes by next it will leave more debris.

victor: is the swift tuttle the main meteor?

Bill: Swift Tuttle is the comet the meteors come from.

hi: Would the view be much better from outside or the live stream if you are in Atlanta?



Bill: Outside is better, if you can stand the bugs. ☺

skypilot74: Does the crew of the ISS have to take any special precautions due to the Perseids?

Rhiannon: Not the Perseids this year. Spacecraft is taking special precautions for the Draconid meteor shower in October. It is going to be a very short but very strong meteor shower.

jmcd0: Has the ISS taken any pictures of meteors burning up in Earth's atmosphere? I assume the astronauts would see the meteors regardless of the cloud cover since I think the meteors burn up well before they hit the clouds. It would be quite cool to see photos of a meteor from below AND above.

Bill: We have video of the Perseids taken by shuttle astronauts and of the Leonids taken from the Space Station.

Kat\_B\_-\_FL: What is the "dirt/dust" made up of? Is there some sort of metallic content? Or is it simply ground up rock?

Bill: Ground up rock is a pretty good description!

Lakshmi: is someone actually taking a look at the colour stream of the lights to figure out what elements might exist in these showers?

Danielle: Yes -- the color gives some indication of composition. Certain elements display certain colors. Sodium shows bright yellow, for example. There are several scientists that study meteor spectra.

ajtoce: if i can see the meteors on this feed from huntsville, should i also be able to see them at the same time from louisiana?(weather permitting)

Rhiannon: The ones on our live-feed probably not. But the biggest brightest ones very high up -- maybe. These meteors are high enough that they could possibly be seen by observers 200 miles apart.

Buck\_Rock\_Lookout: How is the best way to take pictures of the shower?

Bill: You need a camera that can do time exposure -- digital, single lens reflex camera, that has the ability for at least a 30-second exposure.

Pulsar: What are Lagrangian points? Is it a point where there is no gravitational pulls between two objects in space?

Bill: They are points where the gravitational pull of two bodies cancel each other out.

jw21st: how long is a light year...?

Bill: six trillion miles.

shtar: is the swift-tuttle comet far from earth? doesn't earth's gravity attract the comet itself?

Danielle: Swift-Tuttle travels quite far from Earth (and the sun) during its orbit. It is mainly influenced by the gravity from Jupiter and the Sun, as they are so massive.

jw21st: with the ozone shrinking, does this have an effect on meteors getting closer to earth?

Bill: No, no effect.

roy: does any of the debris ever make it to land or does all of it burn up completely in the atmosphere?

Bill: Perseids burn up completely in the atmosphere.

Gian: Is that really space noise we're hearing on the live feed????

Bill: That noise you hear is from a radio receiver tuned to distant TV stations. When you hear something that sounds like a blip or bleep, that's a meteor scattering the radio waves back to the receiver. This is a simple meteor radar.

Anand: when we can see meteors (when they actually burn up in our atmosphere), why can't we see the comet which is much bigger than the meteors?

Rhiannon: Comet Swift-Tuttle is very far away from us right now. It takes 76 years to orbit the sun and its last close-approach was in 1992/1993, so it will be a while until we see it again!

GabrielaGLamberg: These meteorites come from the ionosphere, right? Like Auroras??

Danielle: The bright Perseid meteors we've seen burn up between heights of 55 and 65 miles.

Quin101: How is this thing gonna look

Bill: A bright streak that moves very fast.

JoshuaD: How many Perseid meteors in total will fall to earth?

Rhiannon: None will fall to Earth --they all burn up 50 miles up!

Melissa\_D.: How can scientists be certain that all of these meteors will burn up before hitting the earth?

Bill: Because ice can't survive temperatures of 2,000 degrees.

MickeySmilez: When is the meteor shower expected to 'peak'?

Rhiannon: 3-4 AM local time ☺

starguy23: what are the perseids average size

Rhiannon: The Perseids are on the order of a few millimeters across. The largest ones would be a few cm across.

Anand: I wish we had many cameras pointing at meteors from various time zones/places like we see many channels at one time in DirectTV

Bill: In addition to the feed above, you might find this list of camera links helpful:  
<http://www.nasa.gov/connect/chat/allsky.html>

Eric: Could the ISS in theory get hit by one of these particles and have damage caused?

Danielle: Yes it could. But ISS is heavily armored against debris.

Sevalley: what is that generator engine noise on the video?

Rhiannon: That is just background noise. If you hear chirps and whistles that is caused by the meteors!

GabrielaGLamberg: Where is the camera from the Ustream located?

Bill: At Marshall Space Flight Center in Huntsville, Alabama.

Sirius: Is the ISS getting hit with any of the meteors?

Bill: No, it's not.

dataanti: How much longer do I have to wait D: I know it says 11PM EDT but im not that good with timezones, Im in EST, it is 1:06 AM atm

Rhiannon: You can start seeing Perseids in a couple hours. ☺ The later you stay up, the more meteors you will see!

Aaron113: Is this estimate of how many meteors per hour local or global? I'm guessing local.

Rhiannon: Yup. Local.

NASA\_101: How many times a year or decade do meteor showers come

Danielle: Many meteor showers occur each year. There are certain years that see higher rates than others, however, and that varies from shower to shower. The Draconids, for example, stormed in 1933, 1946, 1985, and 1998. The Leonids storm or outburst every 33 years or so.

bootes19: so is it because the meteors are burning up in the atmosphere that we can see them as bright streaks of light? if they didnt burn up we couldnt see them at all?

Rhiannon: You are exactly right! It is the ionization -- the burning up -- that we see.

hektik: How many of these meteors are debris from man made objects in orbit? Also how do you tell the difference if there is a way?

Bill: None of them are man-made and we can tell the difference by how fast they move. Man-made space junk hits the atmosphere much slower than meteors.

StarLover: where is the video??

Danielle: <http://www.ustream.tv/channel/nasa-msfc>

scott2173: we will see it better after the moon goes down more right ?

Bill: No, because the full moon sets at sunrise.

Andrada: Is it better to look at the sky as a whole without focusing in a particular spot or better to focus in one small spot with a strong focus?

Rhiannon: It is best to look at the full sky. The larger your field of view, the better!

finfan88: what direction are you pointing the live feed?

Rhiannon: The live feed is pointing north and has about a 23 degree field of view.

Emily\_15: You may have mentioned how to do this, but being 15 I'm a bit incompetent when it comes to astronomy. I live in the suburbs about an hour away from Chicago, what time would you recommend me going out to view the shower? I was able to view last year's Perseids around 1am, will that work this year or do you have a better time?

Bill: A couple of hours before dawn until sunrise. In your case, approximately 2-4.

watcher4: what other meteor showers do we see in the us in the upcoming months

Rhiannon: The next meteor shower that is worth staying up for are the Geminids in December! They always provide a great show.

Aquarionfan1: I've been up for several hours now and I still have yet to see a single meteor. What can I do to improve my chances?

Bill: Best thing is to wait until a couple of hours before dawn.

Sally: Thank you for taking the time to share all this awesome knowledge. I really appreciate it. In Northern CA, so packing up to go see the showers now . . .

Rhiannon: Hope you see lots!

Moonbeam: which direction will they be traveling across my screen. from top to bottom, left to right, etc?

Bill: Any direction is possible except bottom to top.

acornyrjr: which way will the space station come from and, about what time?

Rhiannon: [www.heavens-above.com](http://www.heavens-above.com) is a great site. Enter your location and time zone and it will tell you exactly where to look and when!

PK: why do some burn longer and brighter than others..is it because they are bigger? or why?

Bill: Basically because they're bigger and are moving slower.

AspensCommonSense: I'm in Aspen at approx. 8,500 ft. elevation -- can I see them better from up here than at sea level?

Danielle: You do manage to get above low level clouds and some light pollution. In this case, however, the full moon so lights up the sky that only the brightest Perseids can be seen.

volcomchick.02: Pretty dissappointed. Been watching since 11:30pm EST and have only seen one. =(

Rhiannon: The later you stay out, the better! If you are looking at the live-feed, we are hoping the show will get better after 2 AM (it is 12:18 here now).

Puppupchickenrocks103: we layed on our backs and looked stright up and there is nothing in the sky

Danielle: You have to have patience. ☺ Make sure you let your eyes get used to the dark, too.

JoshuaD: What caused the debris we're viewing tonight to separate from Swift-Tuttle?

Bill: As the comet approaches the sun, the ice turns to gas (sublimates) which releases tiny bits of dust and ice. Over time, these particles move away from the comet's orbit into orbits of their own.

Ana: Where did the name "Swift-Tuttle come from?

Rhiannon: Good question! By the comet's discoverers... Lewis Swift And Horace Parnell Tuttle.

Homer: what are we seeing on the screen???

Bill: You're seeing stars, light clouds, and hopefully some meteors!

mithun.kar: If these meteorsshowers are ice and they are melting in the atmosphere ..can it create cloud at least few amounts ?

Bill: No, they're much too small!

ArleneA: In an earlier answer you said that the earth was passing through the debris and that the debris trail is millions of miles wide, so am I understanding you to mean that earth can go through a debris trail millions of miles wide just overnight? What exactly is the time line?

Rhiannon: Good question. We see Perseids for a few weeks. We are holding this chat tonight because it is the peak -- but we have been seeing Perseids for a couple weeks here, and will likely continue to see them for a couple weeks. We are just going through the most dense part of the stream tonight.

NASA\_Science: how long is the chatting thing? I hope it's till like 4 or something!!!!

Rhiannon: Yup! We are staying out here until 4 Central Time.

Anand: Shouldn't ISS stay on day side of the earth during these meteor showers, just in case to avoid any damages/accidents?

Bill: No, it doesn't matter. There are meteors in the day, too, but you just don't see them because the sky is too bright.

Angeleyes119: Could you say again the next meteor showers? i missed that.

Bill: Draconids on Oct. 8, Orionids on Oct. 20.

JoshuaD: What caused the debris we're viewing tonight to separate from Swift-Tuttle?

Rhiannon: As the comet comes close to the sun, the ice and gas sublimates (melts) and particles get ejected from the comet. Great question.

Ellen2: do i see the dipper and the north star?

Bill: No...the camera is pointed close to there, though.

joehague: will the shower be better tomorrow night

Rhiannon: Tonight is the best -- the peak. Tomorrow night you may be able to see half of what you see tonight.

Chris\_from\_Boston: Why did they credit two people with discovering the Swift-Tuttle comet?

Bill: Because both reported the discovery on the same day.

ejohnsonaz: I'm fighting to stay awake, but I'm an old man. If I sleep through pre-dawn and dawn will I have missed something amazing or can I catch it on YouTube?

Rhiannon: We will post the video tomorrow and the chat sometime next week.

Laura: The Leonids storm every 33 yrs-- when will the next storm be? Are there any other meteor storms expected in the near future?

Bill: The next Leonid outburst isn't expected until the 2030s.

erinbpace: What equipment is being used to make the live feed?

Bill: Using a low-light level video camera with a 17 mm lens connected to a streaming box.

ameeran12: Um, where I live I don't see any stars, is it possible that i won't be able to see the meteors either?

Bill: If you don't see stars, then you won't see meteors...

TOURWITH311: Does the Solar Wind Speed and/or Density have any influence on the Perseids approach?

Bill: No, has no effect.

Quin101: what's the differences between Draconids and Orionids?

Rhiannon: The Draconids and Orionid meteors come from different comets. The Draconids come from 21P (Giacobini-Zinner) and the Orionids come from Halley's comet!

volcomchick.02: Is the camera pointed at Perseids right now?

Bill: No, the camera is pointed about halfway up towards the north, away from the moon. Perseids will be seen later if the clouds stay away.

broken\_softly: If this is little bits of comets, will the comets we know eventually disappear completely as they fade into melted ice dust in our sky?

Bill: They will disappear, but it will take millions of years.

Emily\_15: Is it possible to see meteors without a meteor shower going on? About a month ago I was stargazing and I saw what appeared to be a meteor, although it was nearly a week and a half early before the Delta Aquarids were supposed to be visible. Just wondering what it was

Rhiannon: Yup! There are many background meteors. On any given clear night you can likely see between 4 and 8 meteors per hour.

moonchild: when will we be able to see something in eastern time

Rhiannon: You will start to see more meteors at 2 AM local time, and even more between 3 and 4 AM local time!

jmcd0: If you are flying westward in the wee hours of the morning, would you get to see the meteors for a lot longer than those of us earthbound? Or would it be too difficult to spot meteors since airplane passengers can only look out the window instead of straight up? Are pilots able to see more since they have more windows?

Bill: You'd be able to see meteors a little while longer, but passenger airplane windows suck as far as transparency. The pilots would have the best view.

TOURWITH311: How do you measure the streams density, VLBA?

Bill: No, we use visual meteor counts to estimate the density of the stream.

stephen: will the video of perseids be on tv this morning?

Bill: It will be embedded on this page.

Thetwins: I've looked on several star maps and such and I can never find Perseids! Where is it?

Bill: You want to look for constellation Perseus, not Perseids. Meteors are not plotted on star maps.

bamababy: Do comets ever collide?

Bill: I know of no instance where that's happened.

eric\_nakamura: For how long can a meteor streak? can one fly across for up to 5 seconds?

Bill: If they're large and slow-moving, then yes, they can.

stephen: how can u tell the difference from seeing a planet and a star?

Bill: The traditional way is that stars twinkle and planets don't.

Suzy: A few nights ago, I saw a large green fireball that left a smoke trail. What elements cause the green color?

Bill: Ionized oxygen.

Nps: Is it still possible to see the meteors with a lot of city lights?

Bill: If you can see stars, you can probably see meteors. No stars = no meteors.

Petelf: So this debris trail that is several million miles wide, isn't actually following the comet anymore, correct? It's broken away and now just orbits the sun and we pass through it each year, is that right? Or am I totally confused :)

Bill: Yes, you are correct!

mich: Its a little cloudy outside, will i get to see anything? Im in EL Paso Tx. Will i miss much? i have a test tomorrow morning

Bill: If you can see stars, you can see meteors.

Anand: if we can see meteors on any clear night sky , not just during meteor shower, where do they come from?

Danielle: Background or Sporadic meteors come from asteroids and comets. But they aren't associated with any specific asteroid or comet, like a meteor shower is.

P3ns317: This is more a comment then a question but, some on here are having trouble finding the constellation. You may suggest if they have a smartphone to use Google Skymap. It helps alot and has a night vision feature.

Rhiannon: This is true -- there are great apps for this! However keep in mind that you don't need to see the constellation Perseus in order to see Perseid meteors!

Fangirl: will laying on a table in front of a large window work?

Bill: 1) Are room lights off? 2) Can you see stars? May be better to go outside... 😊



starguy23: i saw a meteor with a redish tint . why?

Rhiannon: The color could be how your eye perceives it -- or it could be due to the chemical make-up of the particle.

PastorLee: Is it true that stars do not "twinkle" when viewed from space?

Rhiannon: That would be true. The twinkle is caused by our atmosphere.

Jongoodp: if stars twinkle and planets don't, how would you identify a satellite?

Bill: A satellite moves slowly across the sky, taking several minutes to cross the entire sky. Planets move over a period of months.

blow305: is Georgia a good location for observation?

Rhiannon: As long as your skies are clear, you are in a good location. 😊

cfeedback: is there any reason to have the sound on for this video feed?

Bill: Yes, you can hear meteors. The noise you hear is from a radio receiver tuned to distant TV stations. When you hear something that sounds like a blip or bleep, that's a meteor scattering the radio waves back to the receiver. This is a simple meteor radar.

JoshuaD: What caused the debris we're viewing tonight to separate from Swift-Tuttle?

Danielle: Comets can be thought of as dirty snowballs. When comets travel near the sun they heat up and the ice sublimates. Dust is released from the comet at that time.

JENNIFER: Approximately how many have you seen on the live video stream in the last hour? It's about 1:30am ET and I haven't seen many or I may just be missing them.

Bill: We've seen about five.

freda: is there a certain direction to look for the meteors

Bill: Look straight up.

Anand: you said debris trail is several million miles wide, how big is the comet in terms of the size of earth?

Bill: The comet is about 10 miles across.

pymi: Does the moon get many impacts from crossing through the meteoroid streams?

Bill: Yes, it does, but they leave very small craters.

Andrada: wow, i really appreciate u are here to answer these question for us! i think i learned more just from reading here then i did in my school classes in 1 year, haha. many cool facts to tell everyone :) feel

honored to talk to you. i do have one more question though. Those rare space rocks that are found on Earths surface today, are those the cause of big meteors that made it to the Earths surface that did not get burn up?

Rhiannon: Yes -- the very dense and large meteors can make it to the ground. And we are so glad you have enjoyed this! ☺

Angela: Are the meteors really bright from your view?

Bill: They look the same to us as they do to you...

Janet: Great questions -- keep them coming!

goldfish: At what altitude do most of the fragments disintegrate?

Bill: About 60 miles overhead.

Noah: How long will the meteor shower last?

Bill: The Perseids will last for another week or so.

jw21st: are there other comets comming our way we have not seen yet?

Rhiannon: Yup! We are constantly discovering new comets and asteroids.

liberty1776: we are on the shore of ocean city md & moon is very bright. Do we still have the ability to see any of these meteors & looking in what direction?

Danielle: Yes, you should still be able to see the brightest Perseids, despite the full moon.

Unfortunately, a lot of the fainter Perseids won't be visible with such a bright sky. ☹ You don't need to look in any particular direction. It's best if you look straight up. Perseids can appear anywhere in the sky.

RicoA\_Leadville\_CO: I dont know if my question got answerd but do any of the meteors ever hit the ground??

Rhiannon: Perseids do not since they are too icy and small. Larger, more dense meteors do hit the ground sometimes. It is always exciting to pick up a 'space rock'!

Bill: More questions about local viewing times. The peak of the activity will be a couple of hours before dawn until sunrise, your local time. Here's more information for viewing: Who can see it: Given clear weather and dark skies, the Perseid meteor shower can be seen by most of the world, though it is best viewed by observers in the Northern Hemisphere. In the Southern Hemisphere, the Perseid radiant doesn't climb very high above the horizon or isn't visible at all. So Southern Hemisphere observers will see fewer Perseids than their northern counterparts. Places where the Perseid radiant isn't visible include the southern parts of Australia, Africa, and South America, and all of Antarctica. Where to look: If it's not cloudy, get as far away from bright lights as you can, lay on your back and look up. Put the horizon at the edge of your peripheral vision as you let the sky and stars fill your field of view. Give your

eyes some time to adjust to the dark and you should start seeing Perseids. No binoculars or telescopes are necessary!"

stephen: How can u tell what kind of planet and/ or star it is in the sky?

Bill: Look on a star chart or in a planetarium program.

Quin101: How big is a Comet ?

Rhiannon: A comet can be all different sizes. Swift-Tuttle is 10 miles across.

AMFT: My little brother is interested in the brightest object in the Eastern sky, I told him I thought it was a planet is this true?

Bill: If you're talking about a bright object around 11:30-midnight, that would be the planet Jupiter.

Rafa: hello is there any chance we get to see the Perseids in South America or is there any similar event we should wait to see? I currently live in Bolivia. Thank you

Rhiannon: There are other showers that are better seen from the southern hemisphere. The Eta Aquarids are an example in May.

Noah: This might be odd, but have any recent meteor showers like these ever done human harm or property damage before?

Bill: Meteor showers, no, but meteorites have crashed through roofs and hit cars. In the 1990s, a meteorite went through the trunk of a Chevrolet Malibu coupe in New York

Ginandpop2: What time does the showers start PST?

Rhiannon: You will start to see more Perseids after 2 AM, and even more between 3 and 4 AM.

Suzy: Are the Perseids the largest meteor shower during the year? Or are they popular because it's summer and more people can stay up and see them?

Bill: No, the Geminids are the largest shower, and yes to your second question.

Rodun: When can we expect the next perseid to occur?

Bill: The next Perseid shower will be August of 2012.

HilmRob: What would you say is the average size of the Perseids we will see tonight?

Bill: They range in size from less than a millimeter up to several centimeters. In terms of imperial units, range from fractions of an inch all the way up to a couple of inches.

tev414: I just want to thank you for being here answering our questions when you could be doing lots of other things with your time.

Bill: Like sleep? ☺ Seriously, we enjoy the questions.

christian: i was looking outside and i saw a very large blue streak that went across the sky can you tell me what it was?

Bill: No idea -- might have been a meteor.

scanner404: what is that loud humming noise on the live cam?

Bill: That's the radar...

greazy: what is a meteorite

Bill: A meteorite is a piece of rock from an asteroid or planet that's survived passage through our atmosphere.

keely: how well will I be able to see the shower through the live stream? I can't really make anything out because of the cloudyness and what have you

Rhiannon: Hopefully as the night goes on we will see more and more! And hopefully these clouds will just drift away. ☺

victor: what is the swift-tuttle?

Danielle: Swift-Tuttle is a comet. It's responsible for the Perseid meteor shower we're observing tonight.

Anand: If I happen to get a meteorites in my backyard, how do I know it;s not a regular rock and its indeed meteorite? If its, what should I do? And how valuable would that be? Sorry if the question is so stupid....

Bill: Not a stupid question. Meteorites often are magnetic, feel heavy, and have a fusion crust from melting. You can Google "meteorites" and look at the photos to get a better idea of what they look like.

Emily\_15: If you don't want to necessarily work for NASA, but are still interested in astronomy, what jobs include studying the cosmos?

Rhiannon: Academia is a popular choice -- working in a university setting. There are also many other private companies that do science/engineering work.

Mike\_Koston: What direction do we need to look in?

Bill: Straight up...

AnthonyZ: This chat is the coolest thing next to the meteor shower itself!

Rhiannon: We are glad you think so!

sergiy: any particular way you guys are looking, north/south?

Bill: You need to look straight up to take in as much sky as possible.

rach\_ann1: Do i just look straight up and hope i see something or is it better to look in a specific direction like north south east or west?

Danielle: Just look straight up. Perseids can appear anywhere in the sky.

GabrielaGLamberg: is there an App for iPhone where we can see this USTREAM?

Bill: If you're on your iPhone, look up Ustream in the app store.

volcomchick.02: Is there a reason the camera is filming in black and white? Also, the live stream keeps stopping/freezing...

Rhiannon: It is a black/white Watec CCD. We are sorry to hear about the live stream freezing! Hopefully it is better now.

brian12: where do meteors come from

Bill: Comets, asteroids, and very rarely, planets such as Mars.

dnorris: is special equipment needed to record images of the shower this AM? or will my camera/video camera work?

Bill: It needs to be a low light level camera. A standard camcorder won't work.

annie: Slightly off-- topic question that's about the ISS, seeing as it can be sighted this week as well. What does it look like to the naked eye?

Rhiannon: It looks like a bright satellite, or a plane that does not blink. It also moves fairly quickly across the sky!

nimdok: So are Perseids merely particles cast off from Swift-Tuttle?

Bill: Yes, they are.

Kat\_B\_-\_FL: I think I just saw one a few minutes ago. It seems like a quick flash through the sky. Is this what I'm looking for?! I'm SOOOO STOKED! :D :D :D

Rhiannon: That is RIGHT! We are stoked for you ☺

NASA\_Science: How much electricity can a meteorite provide? Does it provide any?

Bill: It doesn't provide any electricity.

acornyrjr: what makes a meteorite go so fast? Is it us travelling that fast through them, or them flying by us?

Rhiannon: A combination, actually!

Ginandpop2: Which direction will the Perseid meteors travel?

Bill: Down. 😊

gazers: where can we view nasa cameras

Bill: The Ustream link from Marshall is embedded on this page, above this chat module. You can see non-NASA cams at this link: <http://www.nasa.gov/connect/chat/allsky.html>

marisa: Is the ISS long? I think I may have seen it tonight but I wasn't sure if that was it or not.

Rhiannon: Most sightings are between 1 and 6 minutes. It moves across the sky quickly!

greazy: this chat is awesome, i am learning so much, i want to thank all of you for taking the time to do this

Bill: You are so welcome!

Anand: I am staying up all night, enjoying reading all the questions and answers.... my advance apologies if i curse you tomorrow for keeping me awake all night....

Bill: Glad you're enjoying. It's worth losing a little sleep.

gazers: is there a website to view perseids

Rhiannon: The Ustream just above this chat box!

NASA\_Science: Which would you prefer: viewing a Lunar Eclipse or a Meteor Shower? Why?

Bill: Meteor shower because I'm a meteor guy -- but lunar eclipses are cool.

goldfish: What's producing that tone in the radar feed?

Bill: That noise you hear is from a radio receiver tuned to distant TV stations. When you hear something that sounds like a blip or bleep, that's a meteor scattering the radio waves back to the receiver. This is a simple meteor radar.

volcomchick.02: Bill, Danielle, Janet, and Rhiannon...what are your job titles/descriptions? =)

Rhiannon: Bill is Lead of the Meteoroid Environment Office. Danielle and I are members of the Meteoroid Environment Office -- my official job title is 'Meteor Physicist'. Janet works in the Public Affairs Office and plans these events for us to participate in!

Holly: Whoaa....I see one! I thought it was a helicopter but it's too far away in the sky for that. And it doesn't move..and NO it's not a star! COOL.

Rhiannon: Awesome. 😊

christian: i looked at the pictures on the website about the perseids meteor shower and i was wondering if its going to be that awesome

Bill: If you mean the photos on the right side of the page by Michael Menifee -- those are really great. Believe those were from 2010, when the moon wasn't the factor that it is tonight...

e.t.\_3000: how often do meteor showers happen?

Danielle: Several meteor showers happen each year. There are 40 or so well established showers. Check out the list maintained by the IAU:

[http://www.ta3.sk/IAUC22DB/MDC2007/Roje/roje\\_lista.php?corobic\\_roje=0&sort\\_roje=0](http://www.ta3.sk/IAUC22DB/MDC2007/Roje/roje_lista.php?corobic_roje=0&sort_roje=0)

Chris\_from\_Boston: How fast does the earth 'travel' compared to a meteor?

Bill: Earth moves 30 km per second around the sun, and meteors move up to 42 km per second at Earth's distance from the sun.

Isabel\_Wiche: How fast meteors travel? Do they pose a hazard to airplanes?

Rhiannon: Perseids go about 130,000 MPH. They pose a hazard to spacecraft, but not airplanes -- almost all meteors are burned up much higher than airplanes fly.

Anand: I am confused now. Which one should I look? your chat which i enjoy every Q & A or the live feed where I don't see any meteor?

Bill: You should be able to watch the Ustream feed while you're chatting. Just be patient, and you'll see some meteors on the feed, as long as the weather stays clear!

greazy: is the comet swift-tuttle in danger of hitting earth at any time

Rhiannon: Nope! It won't be hitting us.

Gabbers: whats an ISS?

Rhiannon: The International Space Station.

stephen: how long will u guys be online?

Bill: We'll be taking questions until 5:00 AM EDT.

Emily\_15: You probably get this a lot, but I appreciate your help. Thanks for setting up this live chat, it's been a pleasure reading your answers and learning so much. You guys are amazing, keep up the good work! Enjoy the shower! :)

Rhiannon: Thanks, Emily! It is our pleasure. ☺

mostal: What beverages does one customarily consume while watching a meteor shower?

Bill: There's an episode of "The Big Bang Theory" that explains this in good detail... ☺

doug: will you do this live chat and feed for other meteor showers this year-- very cool, very informative and great for me because we are cloud covered

Bill: Probably for the Geminids in mid-December.

Suzy: Who were the earliest people to document their witnessing of meteor showers?

Rhiannon: The earliest record of Perseids was in 36 AD in Chinese Annals. There were subsequent records in the 8th, 9th, 10th, and 11th centuries. So this meteor shower has been observed quite a long time!

EPL: how do you deal with the distances involved? I mean, okay, the meteors burn up in our atmosphere, but they come from a comet SO far away, with a background of stars that are even further away. I admit I can't, but how do you even envision those distances?

Bill: The distances are hard to comprehend, but the math helps with the visualization.

GarretFields: what is the best time to see all the meteor showers not just the Perseids

Rhiannon: 3-4 AM Local time! Can see up to 8 per hour on a non-shower night.

P3ns317: Is the live stream camera in Florida or Huston? Or some other place?

Bill: It's at Marshall Space Flight Center in Huntsville, Alabama.

Erin: which yearly shower usually has the most activity? Or is it always different?

Bill: The Geminids usually has the most activity.

GabrielaGLamberg: I'm going to sleep! I'll be back at 3:30 am!!! this chat has been great!

Rhiannon: We hope you see lots at 3:30 AM!

christian: whats the difference between a comet and a meteor

Bill: A meteor is a piece of a comet.

Janet: Thanks for staying up and watching the meteor shower! Keep those questions coming.

deke16: Will i be able to see any meteors tomorrow night?

Bill: Yes, but not as many as tonight.

matt: What is the meaning of everything?

Ellen2: Just learned that meteors are from comet stuff. from what are asteroids?



Bill: 90% of meteors are from comets, remaining 10% come from asteroids and planets like Mars.

Curiosity: If meteors survive to our atmosphere tonight, will they be picked up to be studied later?

Bill: Perseids don't survive, but meteors from asteroids have been found on the ground and collected by a NASA-modified U2 spy plane operated by JSC (Johnson Space Center).

Erin: How were these early sightings described? Was there an understanding of what they actually were?

Rhiannon: It wasn't until the early 1800's that they associated these meteors that were recorded every August with a meteor shower. They began to realize they all emanated from the constellation Perseus. The history of the Perseids is quite interesting -- for example some Catholics in the past referred to the Perseids as the 'tears of St Lawrence' since August 10th is the date St Lawrence was martyred.

sergiy: how does ISS deal with this? Any potential damage?

Bill: The ISS is armored so the chances of damage are small. If the astronauts have free time, they might look down at Earth and see meteors in the atmosphere below.

playingwii: what time dose the shower start?

Rhiannon: You will see more meteors after 2 AM local time, and even more between 3 and 4 AM local time.

EXTREMEmdp: have any meteors shown up on the live streaming cam tonight? I have been watching but haven't seen any.

Bill: Yes, we have seen some.

Anand: when will we see Geminids shower?

Bill: In mid-December. Peak is on December 14.

CLAYTON\_EDEN: Are those clouds or the milky way?

Bill: Clouds.

Bill: Just saw a meteor on the Ustream feed!

matt: HAHA thanks Bill! :)

Bill: Welcome. 😊

christian: are shooting stars and comets the same things and if they arn't why?.. ps thank you for your time and effort

Bill: Shooting stars and meteors are the same. Comets are a different animal. (You're welcome!)

NASA\_Fan: What will a meteor look like on the screen/feed?

Danielle: It will look like a quick streak of light.

matt: How far are these meteors in respect to the earth?

Rhiannon: Most of these meteors have burned up 50 miles above us.

Bengals: Would the government ever tell us if a killer asteroid is going to hit earth

Bill: After we head for the hills. ☺

doug: when it peaks tonight what is the prediction of how many per hr that we will see

Bill: 20-30 per hour.

Antny: Aboard the ISS would you look down to see the Perseids?

Bill: Yes, that's correct.

Thetwins: what are the pieces that break apart from a meteor called?

Rhiannon: When a meteor breaks apart in the atmosphere it is called 'fragmenting'.

Majed: When is it appearing above the middle east?

Bill: Already happened over the Middle East.

Anand: did we just one going right to left in the middle of live stream @ 2:02EDT?

Bill: Yes, we saw that! Nice one.

Leaj: What's the difference between a comet and an asteroid?

Rhiannon: Comet = dirty snowball. Ice and dirt. Asteroid = giant rock.

brirob67: What qualifies as a meteor "Shower"? A certain number of sightings or just a term?

Bill: A meteor shower is caused by meteors originating from the same parent body, usually a comet, more rarely an asteroid. This is different from normal or sporadic meteors which can't be traced back to a source.

West: Been on here a while and havent seen my questions answered? sorry to sound pushy.

Rhiannon: We are sorry, we are doing the best to answer as many questions as possible. There are 3 of us answering questions and we have received almost 3,000 questions in the last 3 hours. Hopefully if we don't answer your specific question we will answer a question like it.

Angeleyes119: I just want you all to know that what you're doing is awesome! My daughter and I love watching these showers. And when we can't it's nice to know that we have you guys. Keep up the excellent work!!!! Hope to see you in Oct.

Bill: Thanks very much -- glad to have you along!

roy: So if the meteor can scatter the radio waves to your receiver, does it have any effect on cell phone service or other wireless transmissions that people use everyday?

Danielle: No it doesn't. As a side note, do a search on meteor burst communications -- a method for actually (briefly) communicating using ionized meteor trails. It's interesting stuff. ☺

GarretFields: my son who is 11 wanted to say hi! to everyone. He is enjoying the meteor shower on the live webcam

Rhiannon: Fantastic. We are glad you are enjoying it!

Scienceandspaceforknowledge: Please, This content's chat should be publish at any page, because is very important and interesting for other people, that are not here now.. . we can learn more and more about meteor shower. Thanks NASA Group.

Bill: We'll be posting a transcript of this chat by Aug. 19. It will be a link here on this page.

Bill: Saw a really nice one just go by on the stream! 1:09 Central.

DforDavid: is there going to be another meteor in the feed?

Rhiannon: We hope so. It is 1:08 here and we are hoping it will pick up about 2 am and see even more at 3-4 AM.

gazers: are meteorites brittle like stone

Rhiannon: Meteorites are of various densities.

doug: during the peak for the Geminids how many are they predicting per hr? Thanks folks this is really awesome and informative

Bill: Geminids have a peak rate about 100 per hour, but this year the moon will interfere (again!)

volcomchick.02: Just saw one go down the middle of the live feed! Ok, I think its time to go out onto the balcony. Have a great evening everyone and thanks for doing this guys! Its really interesting! :)

Rhiannon: We saw that, too! Hope you see some outside. You are very welcome ☺

enchante: what part of the sky should I be looking in if I live in Northern Oregon?

Bill: Look straight up.

matt: What are the typical size of the meteors 50 miles above us? Please include an example of what is compares to like a basketball..ect

Bill: They range in size from less than a millimeter up to several centimeters. In terms of imperial units, range from fractions of an inch all the way up to a couple of inches.

mcaramb: BEAUTIFUL! First good FIREBALL of the night :) Reported with my iPhone web app :)

Bill: Good deal -- outstanding!

victor: when you say 2am is that in alabama?

Rhiannon: Yes, but the Perseids should start becoming more frequent at 2 AM \*local time\*.

twitters: sorry if you've already answered this question, but where should i look (North, south etc) to get the best view of all this?

Bill: Look straight up.

stephen: On fhs estream, is the debris or clouds?

Bill: Those are some clouds drifting across the sky.

Leah: Will Australia be able to see this meteor shower?

Rhiannon: Only the northern part of Australia.

foods32958: Would a ham radio app work for hearing the disturbances the meteors create?

Danielle: You need an actual ham radio, or a receiver with SSB or CW capabilities and the ability to turn squelch off. Check out [http://www.nasa.gov/offices/meo/outreach/forward\\_scatter\\_detail.html](http://www.nasa.gov/offices/meo/outreach/forward_scatter_detail.html) for more details.

stargazer: which direction do u look if u live in the southern us?

Rhiannon: Look straight up! Lie on your back and take in as much of the sky as you can.

myndian: The moon is too high overhead, I fear... and there is a bit of a haze in western NC... When will be the best time to look? 3-4?

Rhiannon: Yes, the moon isn't helping us out here. (though it is beautiful, isn't it?).

german\_alarcon: is this visible from south america?

Danielle: It is visible from northern South America. It can't be seen from southern South America -- portions of Argentina and Chile. Check out the map at [http://www.nasa.gov/images/content/579471main\\_wherelook.jpg](http://www.nasa.gov/images/content/579471main_wherelook.jpg)

alan\_w: As a young man in '63 or '64 I saw what was later explained as a 'bolide'. THAT was impressive. Are bolides very rare?

Rhiannon: You are very lucky!

brirob67: What did you mean by "the moon will interfere"?

Rhiannon: The moonlight basically acts as light pollution and so we can see fewer meteors (it blocks out the fainter meteors).

hiblooooooop: Can you see them from Ontario?

Rhiannon: You bet!

annie: What are bolides?

Rhiannon: Bolide = very very bright meteor. Superbolide = brighter than full moon.

Hawaii\_Mom: Will those of us in Hawaii be able to see the meteor shower? If so, when would be the best time to view? It's just a little after 8pm right now. Many thanks!

Rhiannon: After 2 AM local time you will be able to see considerably more, and even higher rates will occur between 3-4 AM local time.

yaman: thanks for hosting this chat! Will all of North America (including Michigan) be able to view this shower?

Rhiannon: You are welcome! And yes, all of North America.

GBodnar: Is it possible that any Meteors from this shower may reach the earth's surface?

Rhiannon: No Perseids. They burn up completely by 50 miles up.

Isabel\_Wiche: At the end of July, my boyfriend and I were watching the stars and the Dipper and I saw a quick, fast, long light. My boyfriend told me it was a meteor. Do you think it was part of the meteor shower?

Rhiannon: It is possible! It also could have been a South Delta Aquarid meteor.

CLAYTON\_EDEN: Would like to thank you for making this presentation available. Is there a place to go to find other such, future events that are being made available?

Bill: Yes, you can go to the NASA Chats page: <http://www.nasa.gov/connect/chat/index.html>

Erin: What causes bolides to be so bright?

Rhiannon: The size of the particle.

Bill: Lots of questions about local viewing -- this will help! Who can see it: Given clear weather and dark skies, the Perseid meteor shower can be seen by most of the world, though it is best viewed by observers in the Northern Hemisphere. In the Southern Hemisphere, the Perseid radiant doesn't climb very high above the horizon or isn't visible at all. So Southern Hemisphere observers will see fewer Perseids than their northern counterparts. Places where the Perseid radiant isn't visible include the southern parts of Australia, Africa, and South America, and all of Antarctica. Where to look: If it's not cloudy, get as far away from bright lights as you can, lay on your back and look up. Put the horizon at the edge of your peripheral vision as you let the sky and stars fill your field of view. Give your eyes some time to adjust to the dark and you should start seeing Perseids. No binoculars or telescopes are necessary!

RufferC: Hey is it true you can get a real good look of the Space Station Tonight?

Bill: We did earlier -- also check at [www.heavens-above.com](http://www.heavens-above.com).

jw21st: where did the ice and dirt come from on the meteors?

Bill: From the beginning of the solar system.

tev414: Why does the moon seem brighter than any other full moon?

Bill: Looks the same to me -- maybe you have clearer skies than usual? 😊

101: when is the next haley's comet going to appear?

Justine: Are meteors cool?

Rhiannon: Physically cold? 😊 Yes, when they are in space they are cold. But as soon as they enter the atmosphere they burn up and get very hot!

Ivan-Maryland: when is the next predicted bolide? Or can they be predicted?

Bill: They can't be predicted -- we can predict times of meteor shower, but can't predict when we'll see individual meteors.

Curiosity: It seems to me that I heard a beep, it's amazing, I like radar's sound :)

Bill: They range in size from less than a millimeter up to several centimeters. In terms of imperial units, range from fractions of an inch all the way up to a couple of inches.

bhpnbr: could you comment on the stars/constellations i am seeing in the live feed

Bill: We're working to see if we can get a map link for you soon. Will share to the room when we have it.

GarretFields: Does the ISS see the shower

Rhiannon: The astronauts currently on the ISS could see Perseids by looking down instead of up. 😊

Blanktrostart: Do bollides/superbollides enter the atmosphere?

Bill: Yes, that's how they become bollides, or large meteors.

dasdsa: im in NJ when would be the best time to go outside and look for metors

Bill: A couple of hours before dawn until sunrise, your local time.

Kin: Is the perseids the most active meteor shower of the annual showers?

Rhiannon: They Geminids have slightly higher rates -- they are in December. The Perseids are a little more well-known because they occur in August which has better weather to lie out late at night. It is a little chilly to stay outside all night in (most parts of) North America in December!

Bill: Check out the meteor iPhone app from the Oak Grove Observatory:

<http://www.oakgroveobservatory.com/reporter>

Anand: A person here mentioned that he had seen bollides back in 60's. Was that the last time anyone saw bollides or does it happen randomly on any clear night sky?

Rhiannon: Bollides have occurred many times since the 60's. For example, in the fall of 2009 a superbollide fell over Ontario, Canada. This was caught on the University of Western Ontario's all-sky-camera network and the meteorites were eventually found on the ground. This is very cool and very rare for meteors to be caught on camera and then picked up later.

AlgolDemon: how much mass is lost when the comet nears the sun ?

Bill: The comet loses several yards of its surface with every passage. The mass varies with comet size and also depend on how close to the sun it gets.

GarretFields: when was the last time a sizable meteorite hit the Earth

Bill: Last decent meteorite falls was in Grimsby Ontario in 2009.

Sara\_D.: If you were to ever come across a meteor, is it safe to touch it with your bare hands or is there a certain type of equipment needed?

Bill: Yes, by the time a meteor lands, it's very cool.

newjerseyperseid: I once saw a green meteor soaring across the sky...are these known, or are they anomolies?

Bill: Green meteors are common, and the green color is due to ionized oxygen.

blow305: are you guys looking at the sky as well while answering our questions?

Rhiannon: We have the live-stream projected big-screen in the room where we are... but we keep missing the meteors due to staring at the computer screen! Good thing we get to re-watch the video tomorrow! 😊

Blanktrostart: What type of research is done on anything that hits earth from outer space?

Bill: Meteorites are subjected to laboratory analysis -- their ages and compositions are determined.

gad\_jet: how much would someone pay me for a meteor

Bill: Put your find on eBay and find out! 😊

GarretFields: would there be any radiation from a meteorite

Bill: No, no radiation.

qazrat: do meteor remains go through a quarantine before they are picked up

Bill: No, no quarantine. The passage through the atmosphere would destroy any germs.

Erin: Do most meteorites have a similar composition?

Bill: Most are chondrites which are stony in nature.

qazrat: can hubble take images of the shower

Bill: No, Hubble isn't designed to look at meteors.

James: If any germs are destroyed, does that mean something like the book The Andromeda Strain is impossible?

Bill: Not impossible, but highly unlikely.

Blanktrostart: Bill why are you the only one answering questions?

Bill: We spell each other throughout the night. Six hours is a long time not to have a break. 😊

ghostrider\_sweetpea\_3806: how big can a meteor get??

Bill: Meteors can be up to a couple of meters across.

jmttcp: During an event such as this, how many meteors might be expected to actually reach the earth's surface?

Bill: Perseids will burn up in the atmosphere.

alan\_w: I found a rock that registered as a piece of metal on a metal detector. I looked to me as just an ordinary rock. Is this possibly a meteor?



Bill: Possibly -- look on Google and look at images to see if it looks like yours.

Kin: Will the moon be hit by any meteors?

Rhiannon: YES! One of the projects we currently are undertaking at the Meteoroid Environment Office is taking videos of meteors hitting the Moon. We detect the flashes from meteors slamming into the moon.

friend: When will the next perseids happen?

Rhiannon: Next August! This shower happens at the same time every year.

Andrada: what exactly are tactites?

Bill: Tektites occur when a crater is produced and bits of the meteorites mix with bits of the ground. When this solidifies, this produces a tektite.

Curiosity: a very long beep on radar that means something?

Bill: Yes -- means that the radar has picked up a larger meteor than normal.

quantum111: how big would a meteor have to be to cause a cataclysmic event on earth

Bill: Would have to be a big asteroid, not a meteor. A 10-mile diameter asteroid would ruin everyone's day!

qazrat: are these moon impacts visible through a telescope?

Rhiannon: Yes -- we use telescopes to observe them. See [http://www.nasa.gov/offices/meo/outreach/lunar\\_impact\\_monitoring\\_detail.html](http://www.nasa.gov/offices/meo/outreach/lunar_impact_monitoring_detail.html) for more information :)

gordo: bill will the perseids meteor shower be visible in northern california?

Rhiannon: You bet! 3-4 AM local time will be the best time to observe them.

hiblooooooop: When is the next big meteor/comet expected to pass by earth?

Bill: There will be an asteroid passing close by Earth in November of this year.  
<http://neo.jpl.nasa.gov/news/news171.html>

ghostriider\_sweetpea\_3806: in next August when it happens again will it be at the same time or will it be at a different time?

Bill: At roughly the same time.

Anand: Is it because moon doesn't have air and atmosphere, meteors don't get burned?

Rhiannon: Yup. Exactly. Meteors don't get burned up before they hit the moon -- they impact it directly.

Kevin\_L: Are there pictures or video available to the public of meteors striking the moon?

Rhiannon: [http://www.nasa.gov/offices/meo/outreach/lunar\\_impact\\_monitoring\\_detail.html](http://www.nasa.gov/offices/meo/outreach/lunar_impact_monitoring_detail.html) Check that out.

shilo: why is the camera cloudy?

Bill: Because we have some light clouds drifting in.

EPL: The mind is willing but the body is weak. Thank you to Nasa, scientists, moderators, and all (if they're separate.) I enjoyed this chat and find that it being moderated is FAR more useful than an open forum (questions and answers being matched makes for such a nice reading experience.) I've learned a lot and enjoyed this immensely.

Bill: Thank you for being here. We hope the reward is worth the late night. 😊

NASA\_Science: What is the maximum size of the meteor the earth's atmosphere can handle in order for it to destroy it completely?

Bill: It will break up meteors/asteroids up to 100 yards across.

Bill: Another broadcast message about local times: Who can see it: Given clear weather and dark skies, the Perseid meteor shower can be seen by most of the world, though it is best viewed by observers in the Northern Hemisphere. In the Southern Hemisphere, the Perseid radiant doesn't climb very high above the horizon or isn't visible at all. So Southern Hemisphere observers will see fewer Perseids than their northern counterparts. Places where the Perseid radiant isn't visible include the southern parts of Australia, Africa, and South America, and all of Antarctica. Where to look: If it's not cloudy, get as far away from bright lights as you can, lay on your back and look up. Put the horizon at the edge of your peripheral vision as you let the sky and stars fill your field of view. Give your eyes some time to adjust to the dark and you should start seeing Perseids. No binoculars or telescopes are necessary!

Anand: When an object travel towards earth, Will the moon gravity pulls it towards the moon or Earth will pull it?

Bill: Depends on how close it passes to the moon.

CLAYTON\_EDEN: What optics could I use to get this wide of a view?

Bill: We're using a 17 mm lens on our video camera.

KUDutch: So if a meteor 200 yards across hit earth, how big would it be when it lands, 100 yards?

Bill: Unknown -- depends on the composition. An iron meteorite would be essentially intact, where a stone will be broken into pieces.

Curiosity: could this radar hear pulsars too?

Bill: No, only detects meteors in the atmosphere.

Janet: Thanks for joining our chat -- we are working to answer your questions!

Ron: this transcript available later from this website?

Bill: Yes, on Aug. 19.

jjwag123: would the best time to view be about 3 a.m

Bill: Yes, a couple of hours before dawn until sunrise, your local time.

Mike: when calculating possible asteroids that could hit earth is the moons gravity a factor or are asteroids that big not effected enough to factor it in?

Bill: The moon's gravity needs to be taken into account.

ghostrider\_sweetpea\_3806: will we have another metero shower this year?

Bill: Yes, there will be several between now and the end of the year.

pdawg123: the low humming noise im hearing every now and then...what is that? is it meteors passing overhead

Bill: That noise you hear is from a radio receiver tuned to distant TV stations. When you hear something that sounds like a blip or bleep, that's a meteor scattering the radio waves back to the receiver. This is a simple meteor radar.

shilo: Do I need to look in a certain direction in order to view the meteors?

Bill: Look straight up.

Anand: Is it true Earth once had a second moon and our current moon swallowed it?

Bill: Not as far as I know!

stephen: Is it better to see the shower live or when u see it recoreded?

Bill: Up to you, but I prefer live.

Justin\_Swift: If I may ask a slightly off topic question, would you consider astronomy a career that is realistic? Or is it considerably difficult to break into?

Bill: It's realistic, but there are very few jobs available right now.

SaraD: How big is the Leonid Meteor shower?

Bill: This year, Leonids will have about 20 meteors per hour.

yaman: What is the approximate speed of metiors approaching the earth's atmosphere?

Bill: 130,000 mph for the Perseids.

Gurge47: What, in your opinion of course, is the best meteor shower to view?

Bill: The Geminids, if you can stand the cold!

Alayna: Will the live video be recorded to be played back later?

Bill: Yes, there will be archived footage available.

marisa: Will the asteroid in November be visible to the human eye?

Bill: No, even at its closest, it will require a telescope.

NASA\_Science: Bill are the other chat experts taking a break?

Bill: Yes, they are. Six hours is a long time. ☺

FlowerGirl: Here is a silly question that my 5 year old nephew just asked "Why do the stars blink at me?"

Bill: Because the air moves and that causes the light from the stars to blink, or twinkle. Not a silly question!

Bill: Nice meteor -- two of them! -- just flashed by on the Ustream feed, 2:53 AM Eastern.

Anand: Will you be answering all unanswered questions and post the transcripts later in this website?

Bill: No, just the questions that have been answered here in the chat tonight will be posted.

House043: What is the peak date this year for the gemindis?

Bill: December 14.

Shannon: They say to look northeast for the shower?

Bill: Look straight up.

Shannon: When is the best time to look for it?

Bill: A couple of hours before dawn until sunrise, your local time.

LBIdeb: Does the size of the Leonid Meteor shower vary from year to year?

Bill: The shower rate varies from year to year -- on average, 15-20 meteors per hour.

Theperson: What type of video camrea are you using for this?

Bill: Watec 902H2 Ultimate

Kin: Are there any neo's that may pose a threat to Earth? Say, in the next 25 years

Bill: Not in the next 25 years.

Anand: may be stupid question.... what if we wear a sunglass now and look up the sky? will not block moon's interference?

Bill: A little bit -- polarizers help a little bit, but you won't see anything because the glasses will cut out too much light.

elizabeth: when does the leonid meteor shower start?

Bill: Around November 17-18.

finfan88: WHATS THE BRIGHT STAR ON THE LIVE FEED?

Bill: We're investigating that as we speak...

newjerseyperseid: Are any of the perseid meteors or any meteors related to the shower happening tonight striking the moon?

Bill: Sure -- not the ones you see in the atmosphere, but Perseids do hit the moon.

Sara\_D.: I really hope I can see a few. I have to work tomorrow and I'm scared of the dark but I'm faithfully staying out all night because I love this stuff.

Danielle: That's very brave of you. ☺

tony: I need some video tips...I shot some test video and after looking at it, it's just black...no stars visible at all. Suggestions?

Bill: Do you have a low light level camera, and is automatic gain control turned off?

stephen: there r clouds coming on the ustream, will it effect our sight of the meteor shower?

Danielle: Yes, clouds in the Ustream will block our view of meteors.

EXTREMEmdp: i haven't seen any meteors tonight .....yet. :(

Danielle: Hang in there. Things are picking up.

NASA\_Science: What is the highest speed a meteor can reach (not only in this particular Meteor Shower) when entering the Earth's atmosphere? Second question: Is the full moon that is visible today in it's apogee or perigee phase?

Bill: That would be Leonids meteors -- 159,000 mph. The moon is in-between apogee and perigee.

FlowerGirl: On a normal day what is the typical amount of shooting stars seen within an hour?

Bill: 6-8 per hour.

Procz: So a meteoroid is outside our atmosphere, a meteor is inside our atmosphere, and a meteorite has hit the Earth, correct? Are those the only differences between the three?

Bill: Yes.

Klak: Will the Perseids be visible tomorrow night?

Bill: Yes, but not as many.

Jesse: I was listening to a radio/sound stream like this one on spaceweather radio earlier tonight, and heard something that was so loud it shook the speakers on my laptop for about ten seconds. Could that have been a large meteor, or was it probably something else?

Bill: Yes, it could have been a large meteor.

Thetwins: How likely is it to see the shower with the moon so bright?

Danielle: The moon will wash out all but the brightest Perseids. Normally, under perfect viewing conditions, we'd expect 80 meteors per hour. But with the full moon that rate is greatly reduced so that we expect only 20-30 per hour.

Kin: On the topic of my last question, an asteroid passed earth during 2004, will it ever make a return seeing that asteroids follow an elliptical route?

Bill: Yes, it will return. If you mean Apophis, it will be back in 2029.

tony: not a low light camera, just a Flip HD...everything is automatic :(

Bill: Not gonna work! Sorry...

Theperson: Where is this video feed coming from? State wise

Bill: Alabama

marisa: In relation to the Big Dipper, where is the Perseus constellation located?

Danielle: Check out the "Whole sky chart" link at <http://www.heavens-above.com/>

googggat: Why are some meteors metallic and some are stony? Do they appear as different colors going through our atmosphere?

Bill: Because they come from different locations. Color is more related to the speed of a meteor than it is to its composition.

Mike: I read that the ISS is going to be visible where i live at 430 am, what exactly does the ISS look like from land?

Bill: A bright star slowly moving in the sky, taking about 5 minutes to complete the pass.

Stargazer: Disappointing. A wall of clouds happened to fill the skies this past hour, and peak viewing time for Chicago suburbs is now. I know Perseids go on for about a week after tonight, but how're my chances on seeing a few meteors tomorrow night (good weather provided) compared to tonight?

Bill: Pretty good -- if the weather is clear, you'll see Perseids.

ghost rider\_sweetpea\_3806: what are meteor's made of???

Bill: Ice mixed with dust.

jess: is there a live feed to view the meteor shower???

Bill: Yes, there's a Ustream embed on this page, above the chat promo.

Janet: Keep the questions coming!

marisa: You don't have to reply back, just thought I'd let you guys know you're awesome for chatting with us! What other events do you do live chats for?

Bill: Thank you! NASA's upcoming chats are promoted on this page:

LBIDeb: Is it true that stars twinkle but planets don't?

Danielle: That's true. Stars are so far away that they are essentially points of light on the sky -- as the atmosphere churns the starlight is refracted in different directions and it appears to twinkle. Planets have finite size and turbulent atmosphere effects average out so that the planet appears pretty stable to the eye.

Moon\_Boots: How is an asteroid different from a meteoroid?

Bill: Asteroids are bigger and are mainly stony -- meteoroids are small bits of ice and dust.

yaman: is it possible to see a meteoroid, since it is outside our atmosphere?

Bill: None have been detected outside the atmosphere.

Sarah32: will the meteors fall in toward one direction? or all over

Bill: You'll see them all over the sky.

elizabeth: is apophis visible without a telescope?

Bill: No, you need a BIG telescope.

ammar: where can we see it live ?

Bill: On the Ustream link above, and on various links from this page:

West: Saw only 2 here in 25 minutes. What makes them appear and disappear so quickly (in the blink of an eye)? Also, the orange color around them and blueness trail?

Bill: Perseids move fast, so they don't last long when they burn up. The colors are probably artifacts from the video.

marisa: On average, do you know how many Perseids there have been per hour this year?

Danielle: Check out the webpage of the International Meteor Organization at [www.imo.net](http://www.imo.net). Their top story is about the Perseids, and you can see a graph of the rate versus time.

Alayna: Sort of off topic but... Do even astronomers use google sometimes for info?

Bill: All the time!

AZstargazer: Will I still be able to see the Perseids tomorrow? I live in Arizona, and it is cloudy and rainy right now. :(

Bill: Yes, you'll still see some, just not as many.

stephen: have u found a map of the stars so we know what were looking at on the live feed?????????

Bill: Still working on that.

Bill: Tips on local viewing: Who can see it: Given clear weather and dark skies, the Perseid meteor shower can be seen by most of the world, though it is best viewed by observers in the Northern Hemisphere. In the Southern Hemisphere, the Perseid radiant doesn't climb very high above the horizon or isn't visible at all. So Southern Hemisphere observers will see fewer Perseids than their northern counterparts. Places where the Perseid radiant isn't visible include the southern parts of Australia, Africa, and South America, and all of Antarctica. Where to look: If it's not cloudy, get as far away from bright lights as you can, lay on your back and look up. Put the horizon at the edge of your peripheral vision as you let the sky and stars fill your field of view. Give your eyes some time to adjust to the dark and you should start seeing Perseids. No binoculars or telescopes are necessary!

clueless: am i looking for streaks or just a twinkle

Bill: Streaks.

NASA\_Science: By how much does the speed of the meteor change when it comes into the Earth's gravity?

Bill: Fast-moving meteors like Perseids and Leonids accelerate a small amount. Slow-movers like Draconids -- 20 km per second -- have their speeds changed by about 5 kms per second or so.



FlowerGirl: My nephew would like to know if stars live forever?

Bill: Nothing lives forever, but stars may last for billions of years.

West: Is it true that stars can burn out years before we see their light on earth?

Bill: Yes, that's correct.

Theperson: How much longer will the perseids shower last?

Bill: For about another week.

Julio: Does the radar emit any particular sound when a meteor appears? Because I'm watching the chat while only hear the sound of the ustream live and I dont want to miss any meteor.

Bill: That noise you hear is from a radio receiver tuned to distant TV stations. When you hear something that sounds like a blip or bleep, that's a meteor scattering the radio waves back to the receiver. This is a simple meteor radar.

Sherpdog: are there any planets in view on the huntsville camera right now?

Bill: No, it's looking north, away from any planets.

Marc: How many meteors are we likely to see per hour ?

Bill: 20-30 per hour.

ThunderJoe: How big is the comet Temple/Tuttle that left this debris trail?

Bill: It's Swift-Tuttle and it's about 10 miles across.

AZstargazer: What are other good meteor showers to watch during the year?

Bill: Orionids, Leonids, Geminids, Quadrantids, Eta Aquariids.

AlaskalsCold: Are there ever daytime perseids? Like ones that are visible to the naked eye? Not just radio ones.

Bill: No, I know of no daytime Perseids reported.

West: How fast (mph) are they?

Bill: 130,000 mph

Moon\_Boots: Do the meteors ever change direction? or does it just appear as if they do sometimes? Why?

Bill: No, meteors don't change directions. If you see something that does, it's not a meteor!

Sarah32: which direction is the camera facing?

Bill: North

flam24: when is the best time to watch tonight

Bill: A couple of hours before dawn until sunrise, your local time.

bhpnbr: Have we seen any decent ones so far?

Bill: Yes, we've seen some nice ones on the video feed.

ask212011: so how do the meteors form?

Bill: They're bits of dust and ice shed by comets when they approach the sun.

jess: ok i cant find the link for the live feed

Bill: It's on this same page -- the embedded Ustream link.

teweems: Are meteors always easier to see just before dawn or is that just true of the Perseid?

Bill: In general that's true for background, sporadic meteors and most -- but not all -- meteor showers.

Orland: Do you consider meteors to be events that happen in outer space?

Danielle: No. Meteors are events that occur in the atmosphere.

NASA\_Science: What is the cause of the two tails created by a comet? And what determines the specific direction an ionic tail will be created in?

Bill: Comets have a dust tail and an ion tail. The ion tails always points directly away from the sun, as it's affected by the solar wind. The dust tail is typically at some angle to this.

victor: what is a "Neo"?

Danielle: A NEO is a Near Earth Object.

gad\_jet: what is the time on the live stream

Bill: Central Time.

Bill: Nice meteor just went by one the feed! Make that two!

Sassy: is it better sitting towards the moon or with your back to the moon?

Bill: Back to the moon.

Lloyd: Which is the largest, most extensive meteor shower?

Bill: The Geminids in mid-December.

Tholloway: How wide is the view on the live feed?

Bill: 23 degrees.

finfan88: IS THIS LIVE FEED SUPPOSE TO BE GRAINY?

Bill: Yes, because the gain is turned high.

AnthonyZ: which direction, on the feed, will we see them cross?

Bill: Any way except bottom to top.

NASA\_Science: How come the camera keeps on freezing in the middle for a second or two?

Danielle: I'm not having that problem. Could it be your network connection?

Lisa: We have a full moon tonight in CT, so it is pretty bright outside. Is it still possible to see the meteor shower?

Bill: If you can see stars, you can see meteors.

ehzool: Will I hear a beep just as the shooting star happens? Or does one happen first?

Bill: Sometimes you'll hear a beep, sometimes not. Depends if meteor is positioned so that the radio wave is reflected back to our receiver.

Nick: How many meteors will be falling at the peak hours?

Bill: 20-30 per hour.

roy: What causes Swift-Tuttle to even have a debris cloud? What created the Perseid cloud I guess is what I mean.

Danielle: As comet Swift-Tuttle travels close to the Sun, it heats up, and some of the cometary ice sublimates, or turns to gas. This releases dust particles.

Sarah32: YAY I finally just saw two really good ones on the video!!

Bill: Those were good ones!

yaman: are there going to be any comets passing by earth any time soon that we can see?

Bill: Comet Elenin should be visible in October.

SaraD: Will there be a live chat during the Geminids?

Bill: Yes, we're currently planning to cover that one in December.

Raybaudi: Does the atmosphere suffer any damage as the Perseid cloud hits it? If it does, how long does it take it to be back in optimal conditions again?

Danielle: No, no damage. The Earth's atmosphere is hit by meteoroids all the time.

teweems: What's the altitude of the meteors above Earth's surface?

Bill: They burn up about 60 miles above Earth.

Janet: Thanks for joining the Perseid chat. Keep those questions coming!!

Theperson: Can meteor shows be viewed from space? like looking down to earth

Bill: Yes, we have video of meteors taken from the space shuttle and the space station.

Shannon: How bright in magnitude can these things get. Because I know that the more negative something is in the night sky, the brighter it is.

Bill: Perseids can get as bright as the quarter moon, about magnitude -9 -- those are very rare.

fdnyBob: how long will perseid last?

Danielle: We will continue to see Perseids for another week or so. But the highest rates, and your best chance to see them, are tonight. You also have a fair chance to see them tomorrow night.

David: Let me ask this differently. The meteor trails of the Perseid meteors are occasionally different in color. Since they are essentially debris from the same comet, why would they produce different colored trails?

Bill: Because some of them are larger and dump more energy into the atmosphere.

Pariahterra: How long does it take a comet like Swift-Tuttle to completely lose all of it's mass?

Bill: Billions of years.

Patricia\_: i just shared a memory or a life time with my dad--- we saw one together. Thank you for doing this!

Bill: You're very welcome!

Anand: what is that very bright one in eastern sky that doesn't twinkle and move? What planet is that?

Bill: That's Jupiter.

jess: danielle whitch one should i click on i need help

Danielle: What are you trying to find? The Ustream video feed? It's embedded in this chat page. You can also find it at <http://www.ustream.tv/channel/nasa-msfc>

Moon\_Boots: I'm not expecting you to post this but just wanted to say thank you so much for this chance to ask a few questions, it's really cool and much appreciated. I hope there will be more events. It's fun and interesting! Have a great night.

Bill: Thank you for being here!

Desi: So are meteor showers not really constant meteors flashing across the sky like in the movie?

Bill: Hollywood exaggerates almost everything. 😊

NASA\_Science: Are you guys allowed to move the camera?

Bill: No, it will mess up the plate calibration.

Scienceandspaceforknowledge: "stellarium" is a good program for views of map of the stars at on the live feed and in every country at time real.

Danielle: I've used it quite a bit also! Good suggestion!

Nick: Are meteors quick bursts of light across the sky or do they seem to drag gently across the sky?

Bill: They will be very fast streaks across the sky.

Bill: Many of you have asked about the bright star in the camera view is Alrai in the constellation Cepheus, 45 light years distant.

yaman: are the comets that pass by a once in a lifetime thing?

Bill: No, we typically get bright comets every 5-10 years. By bright, I mean something you can see with your eyes, not needing a telescope.

James: Hey Bill are you going to be doing the chat for Geminids, too?

Danielle: That is a possibility, yes. Though it too will suffer from a bright moon.

elizabeth: is the best viewing time the same all week or is that just for tonight?

Bill: Best viewing is tonight, but you can still see some Perseids for about a week.

A\_Pokharel\_: What temperature do they reach at when they burn ?

Bill: About 2,000 degrees.

siran: what should we see exactly ?

Bill: A bright, brief streak across the sky.

NASA\_Science: Bill you said that meteors go up to 130,000 mph are those small ones or big ones?

Danielle: Perseid meteors travel an average 130,000 mph, independent of size.

A\_Pokharel\_: After how long will Swift-Tuttle lose all of its mass ?

Bill: Millions of years.

nina101: i just saw my first meteor im never going to forget this moment thank you very much for staying up..... :) :)

Bill: Thank you for being here.

NASA\_Science: How do the meteors form these kinds of noises?

Bill: That noise you hear is from a radio receiver tuned to distant TV stations. When you hear something that sounds like a blip or bleep, that's a meteor scattering the radio waves back to the receiver. This is a simple meteor radar.

Jesse: Do Perseid meteors ever make it all the way to the ground?

Danielle: No they don't, they burn up in the atmosphere.

Jesse: Why do radio waves reflect off of the meteor trails?

Bill: Meteors ionize the air as they pass through it and radio waves bounce off the ionized atoms. So the reason radio waves reflect is because they're ionized gas.

KK: Will the whole Northern Hemisphere be able to see this?

Bill: Yes, it will.

FlowerGirl: Is there any way that I can get emails to update me on up coming events such as these?

Danielle: Do you mean nasa webchats? Or meteor showers? For the webchats, those are announced on nasa.gov. Meteor showers are often reported on by the media; they're also listed at [www.imo.net](http://www.imo.net). I don't know of any e-mail lists you can sign up for. There may be newsgroups out there devoted to this sort of thing, but I do not know for certain.

CoraJack: I see Vega too, not Jupiter, not that I expect this to be answered since I have sent 20 messages. Vega does not twinkle and move here either. Not in Ohio

Bill: Then you must have very steady air over your location. Congratulations.

David: Where is the camera located? We are in The Texas Hill Country.

Bill: Huntsville, Alabama.

Sarah32: Thank you so much for taking the time to chat with us! This was very fun. Time for me to go outside and watch the rest in person!!!

Bill: Enjoy!

jbone: what area of the sky should i be looking in?

Bill: Look straight up.

Stargazer: How visible will the Geminids be this December? Providing the weather is good

Bill: The moon will be nearly full, so once again the shower will be less impressive compared to last year.

jo: Is it possible to see one in daylight ? and if yes would it leave a streak like a cloud

Bill: I know of no reports of daylight Perseids, but meteors have been seen in daylight -- big ones -- and they do leave a streak and a "smoke trail behind.

NASA\_Science: How come I only hear the noises but not see the actual meteor?

Bill: Because the radar is picking up meteors outside the field of view of the camera.

Alice: the little dots blinking -- are they meteors?

Bill: Those are stars -- meteors would be streaks.

theleo: Thank you! And as is every year the Perseids are right on schedule, on my birthday (Aug 13).

Bill: Happy birthday!

DforDavid: a meteor is not the same thing as a shooting star right?

Bill: They are the same thing.

2Tiggers: Our Mom let us stay up late to watch! We saw one in California.. Even with the moon!

Bill: Great! You have a good mom. :☺

jo: can't see much here in Dallas too cloudy

Danielle: Hopefully you'll be able to catch some on the video feed!

SopranoAscends: Please remind us, what year was the really big shower? We packed kids down to the beach in San Francisco, and it was something none of us will forget! Thx

Bill: You probably mean the Leonids meteor storms of 2001-2002.

2Tiggers: Is the military Space weather radio We're listening to the SAME as the one with this Live Video?

Bill: No, it's not the same one.

Vanessa: Saw my first Perseid meteors! Gainesville, Florida! Only two, about 25 minutes ago, but boy were they awesome! Must go to bed now because my kids will be in full force soon. Thank you all so much for this session! You all rock!

Danielle: Congratulations Vanessa! And thanks for joining us!

theleo: I am up here in the pacific NW, Eugene. When will the moon go down so that I can see the darkened sky?

Bill: It won't go down until sunrise, so you won't see a darkened sky.

Donshay: when does the shower begin?

Danielle: The Perseid meteor shower is happening now.

Desi: What's the difference between astoids, meteors and meteorites? (Sorry for any typos, there's not spell check!)

Bill: Asteroids are big rocky bodies. Meteors are small piece of comets burning up in the atmosphere, and meteorites are pieces of asteroids or planets that survive passage through the atmosphere to make it to the ground.

NJJudy: Do we have any meteor showers in the next year that are going to be over active? I remember one probably 8-10 years ago that I went out on a dark road to view & it's was the most incredible thing I ever saw. I believe they said that one was that active every 70 yrs or something-- once in a lifetime type show! Just wondering if there's any coming up again in my lifetime?

Danielle: The Draconids on Oct 8 of this year will have high rates, but they are best viewed from Europe. After that, the Perseids in 2016 are expected to be a good show

yaman: Do the Perseids and Geminids orbit around anything or do they stay in the sams spot every year?

Bill: They orbit around the sun. All meteors orbit the sun.

Claudia: how many meteors per hour have you all seen so far

Bill: Haven't been counting -- busy answering questions. 😊

tiffneysanders: So tonight is basically like a watching a sure shooting star?

Bill: I suppose -- you will see Perseids tonight. 😊

Julio: What percentage of the Perseids event we see in the sky make contact to the earth? Where areas or countries should they mostly fall ? Thanks!

Bill: Zero -- they all burn up in the atmosphere.



michelle: what's the peak time for watching meteors?

Bill: Just before dawn.

AMFT: Should there be a noticeable increase in sightings after 3am?

Bill: Yes, that's correct.

mcaramb: We're (oakgrove) reporting 3-4 per hour so far. One amazing small bolide, but still worst Perseids ever.

Bill: The moon is really interfering!

tiffneysanders: We have seen three here in Central Alabama is that typical?

Danielle: How long have you been looking? We've seen about 30 bright meteors this evening in another instrument we've got running (not the one on the Ustream feed). I haven't been able to count the ones in the feed, but we've had several reports from people who've seen some.

NJJudy: That was the one I saw, Leonids in '01-'02! It was like it was raining shooting stars! It was the most amazing sight I've ever seen! Any like that again in the next decade??

Bill: Perseids in 2016 should be pretty decent -- couple hundred per hour.

David: Is the camera focused below Perseus or above?

Bill: It's pointed north in the direction of the constellation Cepheus.

stevev: Any fireballs reported tonight?

Bill: We've seen above 30 fireballs on our all sky camera.

emmitt: I just saw one streak in the NNE sky of Lafayette, IN

Bill: Great!

Moon\_Boots: I understand that we are passing through a cloud of debris left from a comet but was there some event that caused this cloud? or was the only cause that the comet came too close to the Sun?

Danielle: The comet starts shedding debris as it gets close (within 2.5 to 3 AU) to the Sun

mcaramb: Heck, the Delta Aquarids were better than this :) Stupid moon.

Bill: The moon has definitely been a hindrance tonight!

kaylin: can u see lots of meteors now in california?? it is really hard to find....:(

Danielle: Try to be patient! That's a lot of what meteor observing is -- patience and lots of coffee! ☺

House043: I've seen six or seven on the live stream :]

Danielle: Great!

DforDavid: when can we see perseids? sorry if you answered this. and what is it?

Bill: Best rates will be a couple of hours before dawn until sunrise, your local time.

A\_Pokharel\_: I have just seen a Perseid on the live cam. What star is that powerful one ?

Danielle: Alrai in the constellation Cepheus

Anand: another one @3:46

Bill: We saw that, too.

Alayna: What will the moon be like for this shower next year?

Bill: Moon will be favorable next year, waning crescent.

Jesse: What makes some meteor showers stronger or weaker than others from year to year (besides light from the moon and cities)?

Bill: Depends on how close the Earth passes to the meteor stream and whether or not gravitational perturbations by other planets like Jupiter concentrate the debris.

Ashlee: Seen three in the past 45 min in PA. I also seen an amazing shower about 9-10 years ago that only occurs every so many years. Any idea what they were named?

Bill: Believe that was the 2001-2002 Leonids.

Jesse: Why is dawn a good time for watching meteors?

Bill: Because the Earth is turning into the direction of its motion, and we get hit by more stuff in the front.

NASA\_Science: I SAW ONE I SAW ONE!!!! WHOOOOHOO

Bill: Nice. 😊

Kin: I have yet to see one, but how fast do they streak across the sky, Im guessing a second or two.

Bill: That's about right.

emmitt: What is the name of the comet?

Bill: Perseids come from debris from Comet Swift-Tuttle.

Eagle: Is it possible to see the Perseids again the dawn from day 13 to day 14?

Bill: Yes, but tonight is the peak. You can see Perseids for about another week, but the rates won't be as high as tonight.

Marc: Didn't hear any "bip", though saw two or three meteors. Does that mean that only bigger meteors are likely to generate bips on the radio receiver ?

Bill: Yes, they are.

Janet: Keep those questions coming!

mcaramb: Yeah, the moon and also the haze. Really poor seeing here in Louisiana. It's not the Perseid's fault :)

Bill: They're victims. ☺

\_Elin\_liu: we watched a meteor. it shooted and dissappered quickly. it's amazing! we saw 2 bright stars in the east which we mistakenly thought it was venus. what are they?

Bill: One is Jupiter -- not sure about the second one right now...

Sassy: Will we be able to see the Perseids next year without the interference of the moon?

Bill: Yes, next year will be more favorable.

AZstargazer: Yippee! Just saw one on the live feed! It's cloudy outside, so the live stream is better than nothing!

Bill: Glad you saw it there. Also, check on some other links that we've found:

<http://www.nasa.gov/connect/chat/allsky.html>

Lisa: Saw one in CT despite the bright, full moon. Thanks for the advice and encouragement.

Bill: Very welcome. Patience is rewarded!

emmitt: With a fullish moon in Indiana and moderate cloud cover with fast moving clouds, what direction, time, and likelihood will I be able to see more Perseids? My fiancée is dying to see one because I saw one streak in the NNE sky of Lafayette at app. 3:30 am

Danielle: With clouds it's hard to say. We've had some wispy clouds here and still managed to see meteors through them. The Perseid radiant is still climbing higher in the sky, so you should still be able to see Perseids til sunrise.

NASA\_Science: Which camera has the best view of the most meteors?

Bill: We're seeing some good meteors on our embedded Ustream feed.

DJ\_SEQUENCER: IS THERE AN EXACT TIME FOR THIS SHOWER?

Bill: You can see Perseids for about another week, but the peak is tonight.

emmitt: What is the difference between a fireball and a meteor

Danielle: A fireball is a very bright meteor. A meteor is usually called a fireball if it's brighter than the planet Venus.

emmitt: In what direction am I able to see the ISS? I believe I've been watching it in the northern most sky in regards to Purdue Uni

Bill: It will vary depending on your location -- try this link: [www.heaven-above.com](http://www.heaven-above.com).

Curiosity: I enjoyed a lot with you today, thank you to make sciences and technologies so close and accessible for all :)

Bill: Glad you enjoyed it!

FlowerGirl: Off to tuck in my nephew and get some rest my self. Thank you for this great experience. He really enjoyed it and told me to tell the austronauts (astronomers) in the computer goodnight ^\_^.

Bill: ☺ Sweet dreams.

Alayna: does your all sky camera have a live feed?

Danielle: No, not at the moment. But we've been posting images from it on the Twitter page of MeteorScientist.

INGjv: I've seen some nice meteors in PA in the last hour or so too. I saw that you said the perseids are predicted to be a better show in 2016, why is that? Is it just the moon that will be different?

Bill: No, because Jupiter and Saturn's gravity will tug the Perseid's trail closer to Earth.

Eric\_M.: I saw none because it was very cloudy, here in Europe (it's morning here, right now). Will there be as many tonight?

Bill: You can still see Perseids for about a week, but the rates will diminish after tonight.

Philiiiiip: What are the best meteor showers to try and watch for us in the northeast US?

Bill: Perseids and Geminids.

Moon\_Boots: Swift-Tuttle comes around every 133 years, right? When will it be back?

Bill: July of 2126.

Bill: Just saw a top-to-bottom meteor streak by on the feed. 4:04 EDT.

Kim: does anyone remeber the big fireball that hit in canada in 08??

Danielle: Are you thinking of the Buzzard Coulee meteorite perhaps? The fireball was reported by people in Alberta, Manitoba, and Saskatchewan, from what I recall.

Shiranui: Poor viewing conditions here in the California Bay Area too :\

Bill: The Ustream feed will help...

Theperson: Do you know how old the debris that's hitting earth right now is?

Bill: About 1,000 years old.

Moon\_Boots: Do you still watch outside? Or do you always watch on cameras now?

Danielle: When we are holding a webchat we have to watch on cameras. I plan to go outside after the chat to see some for myself though! 😊

Kin: Hey, I'm having a little trouble, The only recognizable object in the night sky for me is Jupiter, so I'm not sure where to look, The moon is to the left of it.

Bill: Look straight up.

moonchild: is this a live feed on the website?

Danielle: Yes, it's a live feed.

Shubham: At about what degree from the horizon will the meteors appear

Bill: They can appear anywhere in the sky.

\_Elin\_liu: we saw some faint stars moving quickly. Are they Satellites?

Bill: Possibly.

Gaurav: Can I see Meteors on August 13-14 Night?

Danielle: Yes, if you've got clear weather

Marc: What's the average size of these meteors we see passing through the sky? I mean smaller ones.

Bill: They range in size from less than a millimeter up to several centimeters. In terms of imperial units, range from fractions of an inch all the way up to a couple of inches.

dragon122119: did the shower end?

Bill: It will go on until sunrise -- and the shower will continue for about another week.

tony: it's 4am here in NC and the clouds have moved in. No visible stars.

Danielle: Sorry to hear it. 😞

dragon122119: What is the name of the comet that this debree is coming from?

Danielle: Comet Swift-Tuttle

House043: Went outside for a little while but the sky is plastered with clouds, I'll stick with the live feed :] thank you guys so much for this!

Bill: Glad it was helpful!

Ravi: When will we see Hailey's Comet?

NASA\_Science: What would happen if two meteors collided?

Bill: They would both disintegrate!

David: I know you've answered this once before but I can't go back far enough in the chat. What is the name of the brightest star in the field of view? (above center)

Bill: That's Alrai in constellation Cepheus.

moimeme: saw a few in NW IN--grandkids sound asleep -- too bad -- going out to try and catch a few more before sleep thx for the feed and chat this is awesome- sighs should have studied the stars

Bill: You are very welcome!

juliojulitojuly: I want to make a wish...let me see one at least...please twinkle twinkle lil star ':-D

Bill: Hope you get your wish!

Hogknuckle: What kinds of data are you collecting about the meteor shower? How will you use it?

Bill: Measuring speeds, orbits, how high they burn up, will help us constrain their densities and compare our shower forecasts to the actual events.

Moon\_Boots: When will Swift-Tuttle be back? Will it leave more debris each time and will it leave debris in the same area each time it goes by? Or was that from a one time event?

Danielle: It will be back in 2126. It will again shed debris as it gets closer to the Sun.

Sassy: I noticed a question about the next comet we would be able to see from the northern hemisphere. Could you tell me the name again, when we will be able to see it, time, best viewing, etc.? Thank you

Bill: Comet Elenin should be visible in October.

Alayna: just saw another on the feed at about 1:08 am PST, thanks for this guys!

Bill: Very welcome!

P3ns317: If the sun rises at 6:30 what time will we stop seeing them because it lite up the sky?

Bill: Twilight begins about one hour before sunrise. The last Perseid we saw a couple of days ago was at 5:15 a.m. local time.

2Tiggers: If we go to sleep and Watch at 5am, will it be better for us to SEE?

Danielle: You have to be careful... you don't want to run into twilight or sunrise by waiting too late.

Moon\_Boots: Does Swift-Tuttle leave debris in the same place each time it passes?

Bill: No, because the comet leaves debris in its orbit and the orbit is changing due to gravitational influences of the planets and outgassing from the comet.

kimberlyw93: About how many more hours until we see the Perseids at their peak? By the way it's cloudy in Arizona, so thanks for providing this live feed, I've spotted some meteors luckily! :)

Bill: Tonight is the night. Tomorrow the rates will be down.

laura\_j.: Saw a few good ones up here just outside Toronto, Canada, even with the moon and the clouds. Unfortunately, clouds started to roll in just at the peak. Oh well, moonlit clouds are a beautiful sight themselves! Can't wait for the Leonids. Thanks to all for this amazing opportunity.

Bill: Thank you for being here.

tammy: Watched in Delaware for about an hour and a half...probably saw 10. It was cool but not like the one I saw probably 20 years ago. Too bad the moon is so bright tonight! Thanks so much NASA for such an awesome job! :)

Danielle: Yeah, the Moon can be very inconvenient sometimes! Thanks for joining us, Tammy!

stephen: :) thanks for evry thing tonite. I learn a lot! hope to see you in december for the geminids.....

Bill: See you in December!

Asma: It's daytime here in Dubai and of course there's no way we can see anything, even if it was night time, thanks to the city lights!.. But thanks to you guys we can see the meteors in this live stream, you're doing a fantastic job! :)

Bill: Thank you -- glad the feed is helpful!

Madalina: Is it possible that we see a meteor flying from down to up? (my friend said he saw one and I don't believe it)

Bill: I don't think so. If it was a meteor, it wasn't a Perseid.

christian: is it worth it to go outside because its 50\* farenhieght out there

Danielle: Really, it's up to you! I know Bill likes to observe from the comfort of the indoors. ☺

Gaurav: Why do we see them in August every Year?

Bill: Because that's when the Earth comes close to the comet's orbit, where the debris is.

Moon\_Boots: Never thought I'd HEAR a shooting star! This is pretty cool, you know!

Bill: Yes, it is -- thank you.

yaman: How large are the comet Swift Tuttle?

Bill: 10 miles across.

michelle: dumb question, but can stars move around in a circular fashion? because I just saw a bright dot that moved like that for a while within a small area, than stood still.

Bill: No, that wouldn't be a star.

Marc: The perseids are due to the trail of the Swift-Tuttle comet. This comet comes back every 133 years, and you said (Bill) that those débris we see in the sky tonight are about 1000 years old. I don't understand the calculation.

Bill: It's not as simple as the period of the comet's orbit. The meteors move independently of the comet in their own orbits and we can model these orbits to get some idea of when they were ejected from Swift-Tuttle. Tonight is the traditional Perseid peak and that material appears to have been ejected around a millennium ago. One of the mistakes we made with the Leonids in the past century was to assume we'd get meteor storms every 33 years. It doesn't work that way. Simple multiples of orbital periods are not a good way to figure out meteor showers.

Alice: this is going to come back next year, yes?

Bill: Yes, Perseids in August 2012.

jojo\_dancer: i am in middle tn what would be the best direction to look at?

Bill: Look straight up.

almanor: Can a fireball explode?

Bill: It can disintegrate and release a lot of energy. This is kind of like an explosion.

David: Are there any newly discovered comets that may leave a debris field in which Earth will pass through?

Bill: I'm not aware of any.

Alec: Saw a fireball near the Moon, really amazing. Are any comets visible now?(with a telescope)



Bill: Comet Garradd is visible in a pair of binoculars or a small telescope.

Melanie\_Marshall: It is cloudy in Michigan tonight so the live feed is nice to view ... thanks ... if it clears where should we look to view the spacestation?

Bill: Try this link: [www.heavens-above.com](http://www.heavens-above.com)

tom145: wasn't that the comet that broke up and was sucked in by Jupiters gravity a few years back?

Bill: That was SL9 Shoemaker-Levy -- no relation.

Chris: What magnitude do these Perseids have?

Bill: On the live feed, you're seeing meteors third magnitude and brighter.

mcaramb: (oakgrove) Activity is picking up again!

Bill: Great, Mike!

matt: What is the brightest star in the night sky?

Bill: Sirius, at magnitude -1.4.

fdnyBob: i saw a hige bright ball streak across the sky..it has a tail on it too...could that have been comet swift tuttle? it was much bigger then these meteors im seeing now. ?

Bill: No, you saw a fireball. Comet Swift-Tuttle is out beyond Saturn right now...

Gaurav: What is area at which the camera is looking at?

Bill: Constellation Cepheus.

MCMiller: Do comets shrink, grow or just stay the same size as they are making their orbit?

Bill: Comets lose yards off their surface each time they pass close to the sun, so they shrink with time.

Nethek : How often does this shower happen?

Bill: Every year in mid-August.

Mass: What did the space station look like when it moved across the sky and did it go from NorthEast to South? Would it have a large smoke trail like a plain. Wondering if that's what I saw.

Bill: No, it would look like a bright star slowly moving across the sky.

Bill: Great meteor on the feed, 4:27 AM Eastern.

Klak: Thanks so much for your advice! It's been great seeing the Perseids both outside (even on a slightly cloudy time, eh?) and on the Ustream. Now I'm going to sleep. Thanks a lot!

Bill: Very welcome!

laura\_j.: Hey, I saw something that looked like a star move around in a little circle like that too.  
hmmm....if it's not a star, then what is it?

Bill: Hmm...have no idea.

Moon\_Boots: Do we have to worry about fireballs or is that too random to predict?

Bill: You don't have to worry about Perseid fireballs. Fireballs caused by material from asteroids can make it to the ground and damage property. At this time, we can't predict such events.

jess: will a meteor hit the moon???

Bill: Meteors hit the moon all the time.

A\_Pokharel\_: Does this event happen every year on August ?

Bill: Yes, it does.

tom145: where do i look in northeast pennsylvania?

Bill: Look straight up.

jess: when will there be a asteroid to come close to earth???

Bill: This November, an asteroid will pass between Earth and the moon.

michelle: is the meteor shower in oct, the draconid (?) going to be destructive/reach the ground?

Bill: No, Draconids also burn up high in the atmosphere. They're pieces of comet Giacobini-Zinner.

Jordan\_Harden: when you say live feed, you mean the one on the marshal cam correct?

Bill: Yes, that's right. There are also others on this page: <http://www.nasa.gov/connect/chat/allsky.html>

Alayna: is the ISS expected to pass the live feed? and when?

Bill: No, ISS won't be on our live feed, as it's pointed north.

Jordan\_Harden: What is the largest expected meteor shower of this year? Also, which is the largest ever filmed?

Bill: Largest this year will be Draconids on Oct. 8, visible from Europe. Largest ever filmed -- no idea...

michelle: is the craters on the moon caused by meteors?

Bill: Most are caused by small asteroids striking the moon about 4 billion years ago. Small ones, less than a yard across, are produced all the time by small meteors like you see in the skies above.

fdnyBob: Intermis of the ISS..you said it will move slow across the sky...will it be moving with any sort of speed? or move like how a star would move?

Bill: ISS will traverse the sky in about 5 minutes, so it will move MUCH faster than the stars.

Eagle: How many meteors can be seen every hour?

Bill: Tonight, about 20-30.

Christian: Would you be able to see Perseids from Space?

Bill: Yes. We have video of Perseids taken from the space shuttle.

hammerhead: Saw another beauty. Is there a reason the camera is facing north? And not any other direction?

Bill: The camera faces north to avoid interference from the moon...

yaman: Thanks guys for hosting this chat event. It's pretty cool to be able to talk to and learn from you guys. Really appreciate it -- it was great.

Bill: Thanks for being here.

Moon\_Boots: Do you still get to watch this outside? or do you usually watch on the cameras?

Bill: I like to sleep, so I usually watch the camera video.

michelle: do we see the twinkles of the star immediately as it happens? also what causes the twinkle?

Bill: Twinkling is caused by the atmosphere moving, which distorts the light from the star -- and yes, you see it immediately as it happens because the atmosphere is right above you.

quantum111: i couldnt really seen any from where i was... was your show a flop as well

Bill: We saw quite a few on our live feed.

jess: and whats the name of the astrid that will pass by the earth???

Bill: Asteroid 2005 YU55

tom145: just saw about 20 in just a few minutes time, slow moving, what is the bright planet in the heavens tonite?? jupiter or saturn?

Bill: That's Jupiter.

A\_Pokharel\_: When will can be seen the next shooting stars event ?

Bill: Draconids on Oct. 8, seen from Europe.

Jordan\_Harden: What are we hearing on the Marshall stream? Is it a sound based detection system like in El Paso? That makes whistle noises and ringing hums depending on what is passing the field?

Bill: That noise you hear is from a radio receiver tuned to distant TV stations. When you hear something that sounds like a blip or bleep, that's a meteor scattering the radio waves back to the receiver. This is a simple meteor radar.

Janet: Great questions tonight!

MFisher: Bill are you folks from Nasa right?

Bill: Yes, Marshall Space Flight Center.

hurricaneZack23: How many meteors per hour can the US expect with the Draconids since the peak occurs when it will be dark overseas?

Bill: We won't see any significant Draconid activity in North America.

albi: Can I see this Draconids meteor on Oct. 8 from Kosovo, Europe ??

Bill: Yes, you can.

jade15: Has anyone seen the Perseid meteor shower yet?

Danielle: Yep! It's going on now.

Timmy: I've seen about 40 or so tonight. I'm in southern Maine.

Bill: You've had a good night of viewing!

MFisher: Bill has anyone at Nasa or that you know of done any credible research on utilizing asteroid or "outer space" material for gathering resources for us here on Earth?

Bill: There have been studies, but none have shown that this would be cost-effective.

Christian: Could you give me a link to the Perseids video taken from the Space Shuttle please?

Danielle: I don't know that it's posted online, sorry.

tom145: when is the next big comet due in the skies? on the scale that Hyakutake was, that was spectacular!

Bill: Have no idea -- Comet Hyakutake was a newly discovered, long-period comet and such critters are not predictable! Hopefully one will show up soon.

Alayna: will the video from the ISS ever be posted online?

Bill: We'll check and see...

davy: can the ISS see this as well? It would be pretty cool to see it entering earth's atmo and burning up

Danielle: When the ISS is over parts of the Earth that are in night and that can see the Perseid radiant, then yes.

jade15: Im in Los Angeles, California...will I be able to see it

Danielle: Yes, if the weather is clear.

David: What is the difference between a meteor and a meteoroid?

Bill: A meteoroid is a small piece of ice or rock out in space -- a meteor occurs when the meteoroid burns up in the atmosphere.

Bill: VERY nice meteor just passed left to right on the feed, near the top of the frame. 4:46 AM. EDT.

webkid94: what was that thing that flew to the upper right side of the live stream?

Bill: That was a meteor!

Moon\_Boots: Do you study the noise from the receiver? I mean besides the bleeps?

Danielle: We can calculate meteor rates from the audio, but we can't distinguish between Perseid meteors and any other meteors.

michelle: how long does it take the light from the stars to reach us? is it possible that by the light reach the earth, some of the stars don't exist anymore?

Bill: Closest star outside the sun is 4 light years away, so takes four years for light to reach us. Other stars are much farther away and light takes thousands of years to reach us -- so it's possible that some stars will have gone extinct by the time their light gets to us.

House043: Beautiful one @3:46

Bill: Yes, it was!

john: Well that was epic, as the ISS was visible a meteor passed it, also is the ISS at risk of being hit by any of these?

Danielle: The ISS is heavily armored against debris.

Klindar: That meteor in the video wasn't a Perseid right? Going the wrong way?

Bill: Yes, it was going the wrong way.

Alayna: that was long and kind of slow, how big would you have estimated it to be?

Bill: No idea -- I'd have to analyze the video, and that takes awhile.

mcaramb: Bill, do you collect meteorites? If so, what's your favorite piece?

Bill: No, I leave that to others.

EXTREMEmp: Well, that concludes my viewing of the meteor shower. Can't stay up any longer! Saw 8 from my driveway and they were great! I'm in Baton Rouge, LA. 1 of them had a fuzzy orangey tail to it but it was short lived. The others were bright bright white and lasted a bit longer. One made a short 1 mm curly cue pattern. Was very cool.

Bill: Glad you had a good show.

INGjv: is there any evidence of ancient civilizations noticing the Perseid Showers? We know they studied the constellations, were any peoples able to predict meteor showers?

Bill: The Chinese recorded the Perseids, but no one attempted to predict them.

A\_Pokharel\_: Why do the Perseides fall down in this moment of the year ? Has the Earth entered a place on its orbit where there are always pieces from Swift-Tuttle and now they are attracted by our planet's gravity ?

Bill: Earth passes close to the orbit of Swift-Tuttle at this time every year and encounters the debris it left behind.

dryhurstroberts: is Brooke here?

Bill: She is. ☺

NJudy: Saw 2 here in NJ in last 20 minutes, had to go down & look outside to see if I could view it live. One was very bright with what looked like a tail, is that a fireball?? And what's makes it that vs. just a meteor? Light clouds rolling in now though. Just so happy I got to see what I did!

Bill: Yes, it was a fireball, which is a bright meteor -- brighter than the planet Venus.

Moon\_Boots: what about the noise between the meteors? is there any other information to be gained from the noise besides about meteors?

Bill: No.

mcaramb: Hey EXTREME! WE're right down the road in Prairieville! Check out our site:

<http://www.oakgroveobservatory.com>

Bill: A great site!

barnwell: do we know where the iss is at present and in what direction should we look. from south carolina

Bill: Try this link: [www.heavens-above.com](http://www.heavens-above.com)

jakzak: when will the perseids fall till

Bill: You can view them for about another week, but rates will diminish after tonight.

tom145: despite the full moon I think it was a respectable show!!

Bill: It turned out pretty well -- seen some nice activity on the live feed!

NJJudy: Thanks Bill!! This was so very fascinating!! It made it so much more interesting, as I'm usually looking at these alone while my family sleeps! I look forward to the next meteor shower hopefully with you again! :-) It's nice to have such knowledgable company!

Bill: It's great to have such good questions!

laura\_j.: Well, it's way, way, way past bed time, but I just have one more question. I have never seen a fire ball, or any of the really bright and colourful meteors that other people talk about. Is it just because I'm near a big city and there's some light pollution?

Bill: Has nothing to do with being near a big city -- you just haven't been outside at the right time. Fireballs are very bright, and you can see them from almost anywhere.

Christian: Thanks for this great night. Bye folks!

Bill: Thanks, Christian!

tom145: when is the next big event for north america?

Bill: The Orionids will be the next decent shower, but the moon will also be a factor...

Eagle: What is the expected rate for tomorrow?

Bill: maybe 10 per hour...

manny: is there any direction one should be facing to see them?

Bill: Look straight up.

fdnyBob: Whats the chances of these meteors hitting a plane in the sky? after watching this beautiful shower..and seeing a few high planes..couldnt help but wonder...

Bill: Probability is extremely low, but it is possible.

stargazer: I got a question.. is it already over? some people said that it starts at 3am PST.

Bill: The chat is, but the shower isn't -- you can see Perseids for about another week, at lower rates...

Kim\_S.: Thanks for the show, you guys. It was really cool of NASA to do this. I learned so much that I'll pass onto others.

Bill: Thank you for being here.

rcross: just wanted to say that the curiosity or kids is alive and well. My nephew made me promise to wake him up to watch the meteor shower and we just came back in

Bill: That's good to know. Now go to bed! It's late. ☺

rcross: will the moon be a problem for the leonids?

Bill: Yes, unfortunately.

tom145: what is the addy for the live cam feed Bill?

Bill: It will be here on this page, embedded, at least over the weekend. Other links here:  
<http://www.nasa.gov/connect/chat/allsky.html>

Janet: Thanks to all of you for all the great questions, and thanks to our guest experts, Bill, Danielle, and Rhiannon. Our chat is now closed, but check back for a posted transcript on Aug. 19. Have a great weekend!

NASA\_Science: Thanks Bill and the other chat experts for answering our questions. I learned a lot of fascinating things like how fast an meteor travels. It was fun staying up with you guys. I will see you next year!!!! BYE!!!!

Bill: You're very welcome.

Bill: Hey everyone, we're about to shut things down. Can't tell you how much we appreciate all the participation and great questions. Check back on Aug. 19 for a transcript of tonight's chat. Have a terrific rest of the evening!

Lakshmi: From Hong Kong, thanks so much. With so many city lights, we practically don't see the stars most days..bravo NASA:)

Bill: Thank you, Hong Kong!

Jordan\_Harden: Will hte camera remain online after the chat ends?

Bill: Yes, we'll leave it up over the weekend.

kimberlyw93: I'd also like to thank Bill, Danielle, Janet, and Rhiannon for answering our questions and providing us this live feed! Very exciting to watch with you all. :)

Bill: Thank you so much -- glad to be here.

Darkwolfe: I enjoyed watching the feed, the conversations and learning from you guys, thanks to you all from little Connecticut :)

Bill: Have a good night, Connecticut. :)



EXTREMEmdp: where is this video that we can view that has a recorded meteor on it from tonight?

Bill: Just click the Ustream player and it will take you to the main page. The recorded videos will be on the right side of the page.

NASA\_Science: :)

Bill: Have a good night, NASA\_Science!

Julio: We follow you from Venezuela and appreciate your Hosting

Bill: Hello, Venezuela -- thanks for being here.

Hibson: I wanted to say a big thank you from Oregon :)!

Bill: Thank you, Oregon, for being here.

House043: This was a fantastic night and you all, especially Bill, were so wonderful :) Thank you and good Night

Bill: Thank you -- and thank everyone. Good night!