



Human Exploration and Operations Mission Directorate Status

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November 1, 2011





- **Human Exploration and Operations Status**
- **International Space Station**
- **Launch Services Program**
- **Exploration Systems Development Division**
- **Commercial Space Transportation**
- **Space Life and Physical Sciences Research and Applications**
- **Advanced Exploration Systems**
- **Space Communication and Navigation**
- **Strategic Analysis and Integration Division**
- **Summary**

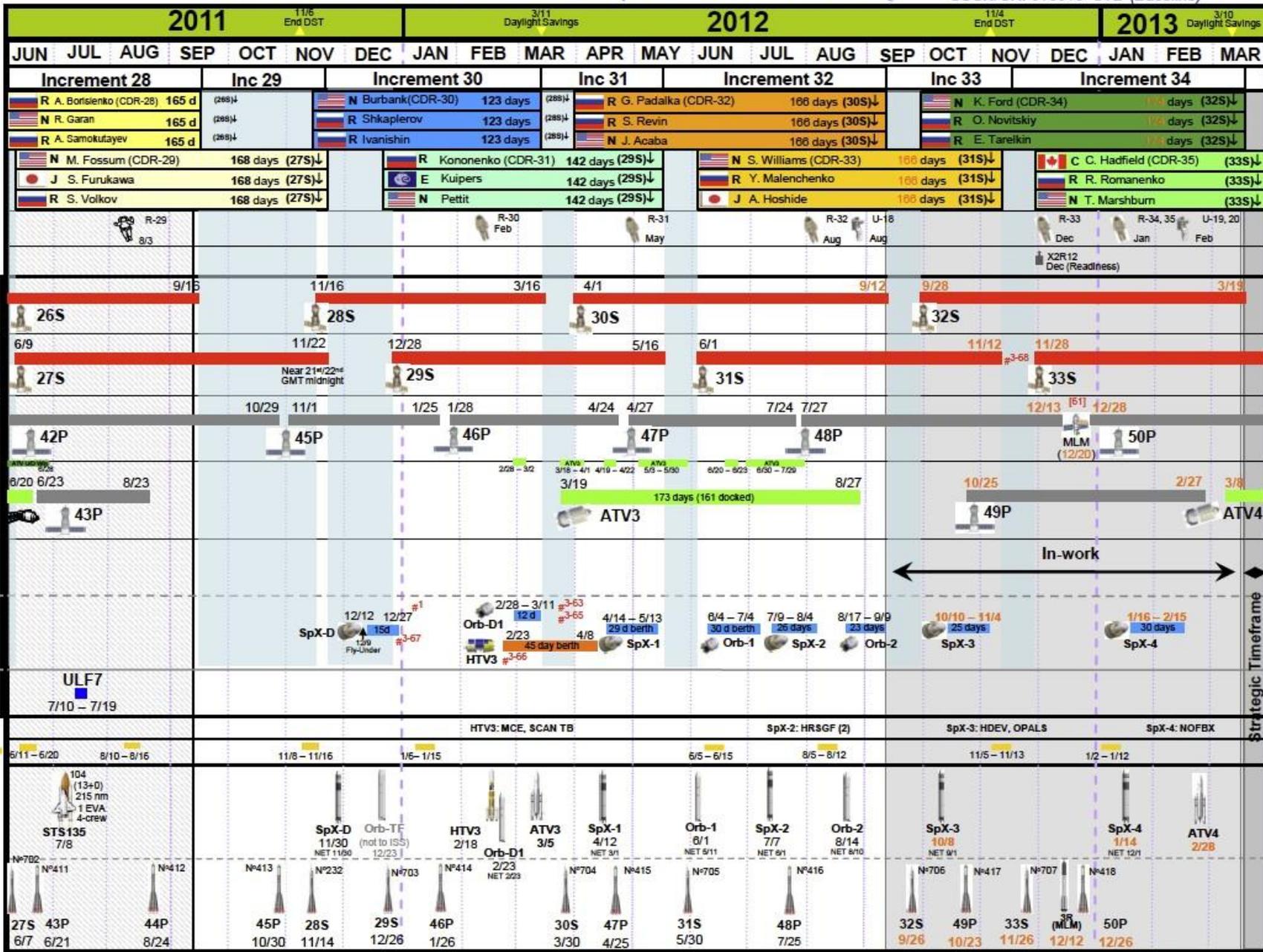


For current baseline refer to
SSP 54100 IDR D Flight Program

Flight Program Working Group (FPWG)

Crew Rotation and Port Utilization Graphic – For Reference Only

NASA Official: John Coggeshall
Prepared by: Scott Paul
Chart Updated: Sep. 15th, 2011
SSCN/CR: 013010-STD (Baseline)



Port Utilization

Strategic Timeframe



- **Awarded a cooperative agreement to a non-profit organization for the management of national uses of ISS (P.L. 111-267)**
 - Awarded to the Center for the Advancement of Science in Space (CASIS)
 - <http://www.iss-casis.org>
- **Signed a Space Act Agreement with Arizona State University's Biodesign Institute for vaccine R&D**
- **Using DEXTRE, demonstrated the robotic exchange of a Remote Power Control Module (RPCM), entirely under ground control from Canada**
 - Delivered test equipment to support the Robotic Refueling Demonstration (RRM)
- **Completed assembly of ISS and prepositioned numerous logistics and spares for the post-Shuttle era**
- **Followed investigation and conducted independent review to confirm Roscosmos' findings of the cause of the failed Soyuz rocket launching Progress 44P cause and return to flight recovery plan**

Launch Services Program Manifest



FPB Approved 6/28/2011 Release 8/1/2011, Rev. 1	FY11				FY12				FY13				FY14				FY15				FY16				FY17			
	Q1	Q2	Q3	Q4																								
Small Class (SC)																												
Athena I																												
Falcon 1																												
Pegasus XL (P-XL)																												
Taurus XL (T-XL)																												
Medium Class (MC)																												
Athena II																												
Delta 732X (D3), 792X (D)																												
Delta 792X H (DH)																												
Falcon 9 (F9)																												
Intermediate (IC) / Heavy Class (HC)																												
Atlas V (AV)																												
Falcon 9 (F9)																												
LSP ADVISORY ROLE																												
NASA COTS (Info only) (Managed by JSC)																												
Vehicle Unassigned																												

- △ = SCIENCE
- = SPACE OPERATIONS
- ER = EASTERN RANGE-CCAFS
- W = WALLOPS LAUNCH
- * = MISSION UNSUCCESSFUL
- A = ATP'd
- = EXPLORATION SYSTEMS
- ◇ = DOD REIMBURSABLE
- K = KWAJALEIN
- WR = WESTERN RANGE-VAFB
- UR = UNDER REVIEW
- C = CubeSat

Launch Services Program Status



- **Successfully launched Aquarius/SAC-D, an Earth observatory that included collaboration with Argentina, on June 10**
 - Delta II commercial launch service with NASA/LSP oversight/insight
- **Successfully launched Juno, an interplanetary mission to Jupiter, on August 5**
 - Atlas V commercial launch service with NASA/LSP oversight/insight
- **Successfully launched GRAIL, a mission to the Moon, on September 10**
 - Delta II commercial launch service with NASA/LSP oversight/insight
- **LSP has successfully “on-ramped” an additional launch vehicle on the NASA Launch Services (NLS) II Contract**
 - NLS II is an indefinite delivery, indefinite quantity contract with an annual on-ramp capability to allow new entrants and additional launch vehicle configurations an opportunity to propose
 - Delta II (limited ULA inventory) was successfully on-ramped September 30
 - Additional proposals are still being evaluated



- **Orion named Multi-Purpose Crew Vehicle (MPCV) on May 24, 2011**
 - The first of three Ground Test Article configuration #3 (crew module, launch abort system, service module fairings) acoustic tests was completed at the Lockheed Martin facility in Colorado
 - Engineers conducted the first test as part of Phase 1 of the Orion MPCV boilerplate test article at NASA's Langley Research Center, on October 18. The next high impact drop test is scheduled for October 27.
- **Space Launch System (SLS) decision announced on August 14, 2011**
 - NASA released the acquisition overview for the Space Launch System (SLS) on September 22
 - J2-X 500 second firing at Stennis Space Center occurred on October 25
- **21st Century Ground Systems:**
 - The Fixed Service Structure/Rotating Service Structure (FSS/RSS) demolition project at Launch Pad 39-B is officially complete. The final inspection occurred on September 13

Orion MPCV Progress



Water Landing Tests



Recovery Operations Testing



Acoustic Chamber Testing



Parachute Testing



Pad Abort 1 Flight Test

SLS Progress



DM-3 static test conducted



J-2X 50-Second Engine Test



J-2X 40-Second Engine Test

Commercial Spaceflight Development Status



- **In the six months since the Commercial Crew Development Round 2 partners were selected, 21 of the 57 planned milestones were completed.**
 - The Sierra Nevada Corporation completed their functional Vehicle Avionics Integration Laboratory (VAIL), which will be used to test Dream Chaser computers and electronics in simulated space mission scenarios
 - Blue Origin LLC successfully completed two technical reviews
 - Space Exploration Technologies (SpaceX) successfully completed a Preliminary Design Review (PDR) of their Launch Abort System propulsion components.
 - United Launch Alliance completed a Design Equivalency Review (DER)
 - Boeing successfully completed a major testing milestone for the air bags used to land their capsule
- **NASA and ATK form new partnership**
 - Entered into a new agreement for collaboration on the development of ATK's commercial Liberty launch system as part of Commercial Crew Development Round 2 activities
 - The agreement is an unfunded Space Act Agreement (SAA) which means no money will exchange hands, but each party will benefit



- **Commercial Cargo**

- SpaceX

- NASA is evaluating SpaceX proposal to combine the objectives of Demo Flight 2 and 3 into one mission
 - Schedule for next mission is under review but is likely to happen within the next 2 to 3 months

- Orbital

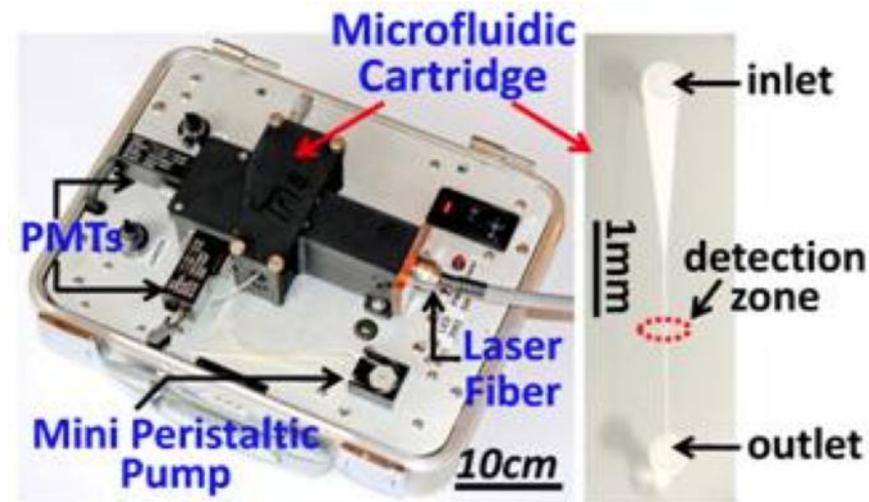
- Wallops launch pad nearing completion
 - Schedule slip for Maiden test flight for Taurus 2 recently announced
 - ISS Demo Mission to follow 2-3 months following Maiden test flight

Space Life and Physical Sciences Research and Applications Status



- **Blood Counter In-A-Box, delivered for on-blood analysis (October 2011)**

- A light-weight blood-analysis prototype that performs multiple blood analyses in space and for inclusion in the medical kits aboard the International Space Station and Orion
 - Evaluate, count and identify different types of blood cells from only one drop of blood (~5 microlitre)
- Blood analysis is one of the best tools for monitoring astronaut health and physiologic changes due to microgravity and radiation exposure
- Merits of this technology include: light weight, long (space) shelf life and minimal reagent consumables are suitable for space use, and the prototype box was validated for use in microgravity in a Zero-G flight test



- **Shear History Extensional Rheology Experiment II (SHERE II) completes planned operations, August 2011**
 - Objective: To investigate of the effect of preshearing on the stress/strain response of a model filled viscoelastic suspension (consisting of inert rigid non-Brownian microspheres dispersed in a dilute polymer solution) being stretched in microgravity
 - The properties of polymer solutions are often complex. In simple terms, they're often stretchy, sticky, possessing properties that make them useful in nature and in technology.
 - Completed planned operations in late August and data is now being analyzed. Microgravity allows for the examination of the behavior of polymeric fluids under nearly pure stretching flows.

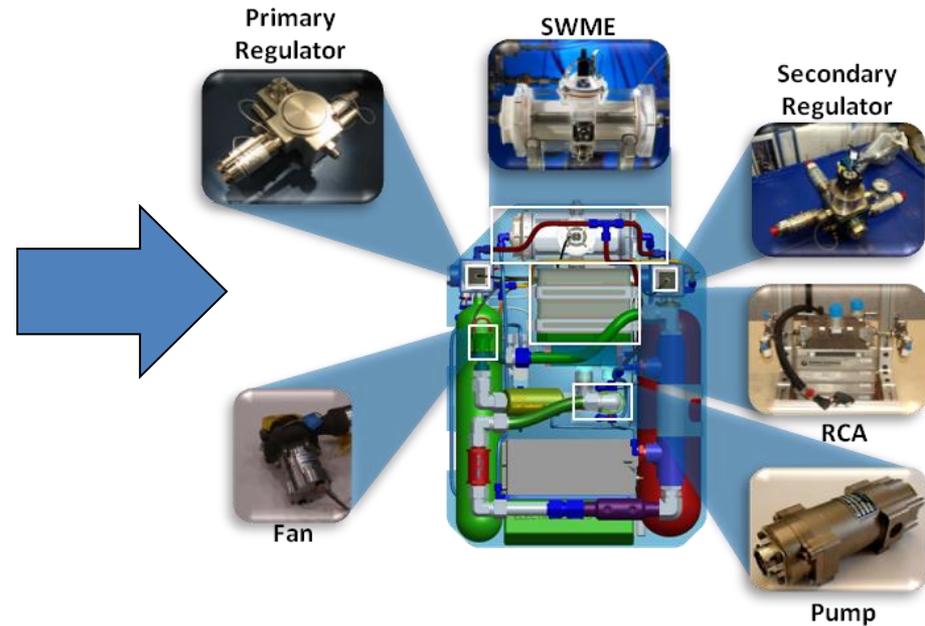
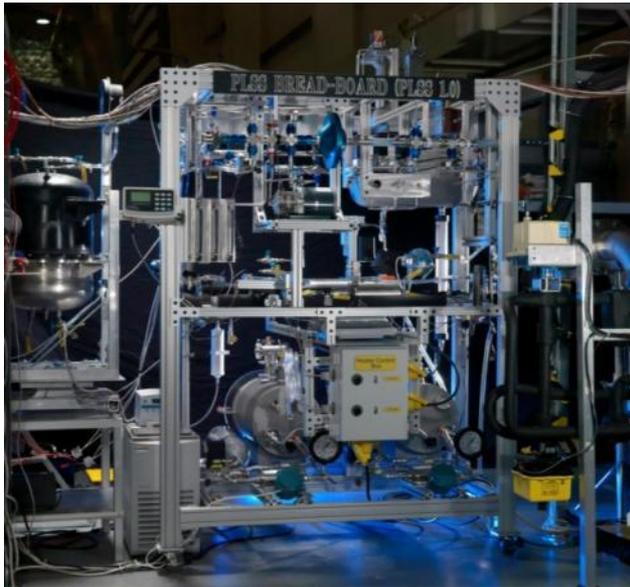


SHERE
hardware
in GBX



SHERE
flight
hardware

Breadboard Testing of Portable Life Support System for Advanced Spacesuit

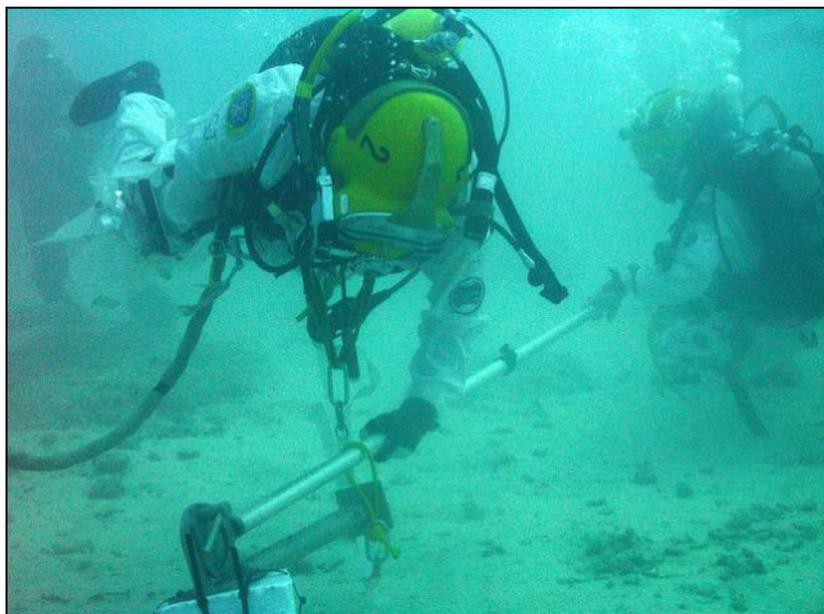


- The EVA project completed breadboard testing of a Portable Life Support System (PLSS) for an advanced spacesuit
- The PLSS breadboard includes three new technology components
 - Rapid Cycle Amine unit for removing carbon dioxide
 - Suit Water Membrane Evaporator to provide cooling
 - Primary Variable Oxygen Regulator to control suit pressure
- The breadboard PLSS will be packaged into a backpack and tested in a vacuum chamber

Advanced Exploration Systems Status



NASA Extreme Environment Mission Operations (NEEMO-15)



- The NEEMO-15 mission was conducted from October 20-24 at Key Largo, Fla.
- This underwater test simulated mission operations on a low-gravity asteroid. Various methods for anchoring astronauts to an asteroid and jet packs for translating during EVA were demonstrated.
- The NEEMO mission was ended early because of an approaching hurricane.

Advanced Exploration Systems Status

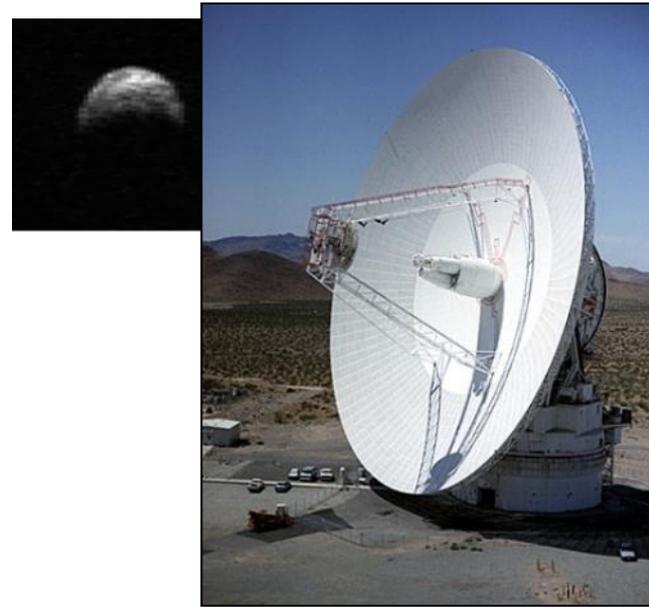
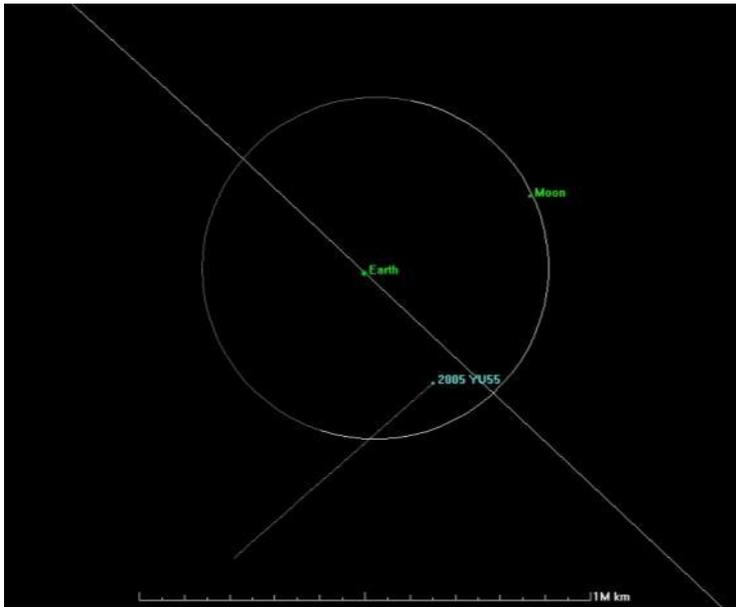


Radiation Assessment Detector on Mars Science Laboratory



- The Radiation Assessment Detector (RAD) will be launched on the Mars Science Laboratory (MSL) mission on November 25
- RAD is integrated with the MSL rover, and will characterize the radiation environment on the surface of Mars. RAD will also take measurements of galactic cosmic rays during interplanetary cruise.
- Understanding the Mars radiation environment is important for determining the risks of radiation exposure for future human missions

Goldstone Radar Imaging of Asteroid 2005 YU55



- Goldstone radar will image asteroid 2005 YU55 during its closest approach to Earth on November 8.
- This asteroid is 400 m in diameter, and it will pass within 0.85 lunar distance from Earth.
- Radar imaging is used to determine the size, shape, spin rate, and surface properties of candidate asteroids for human missions.

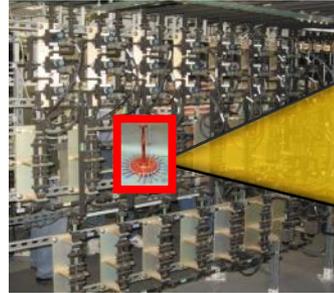
Space Communication and Navigation Status



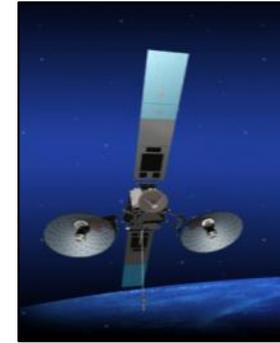
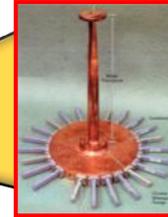
DSN Aperture Enhancement – Before



DSN Aperture Enhancement – After



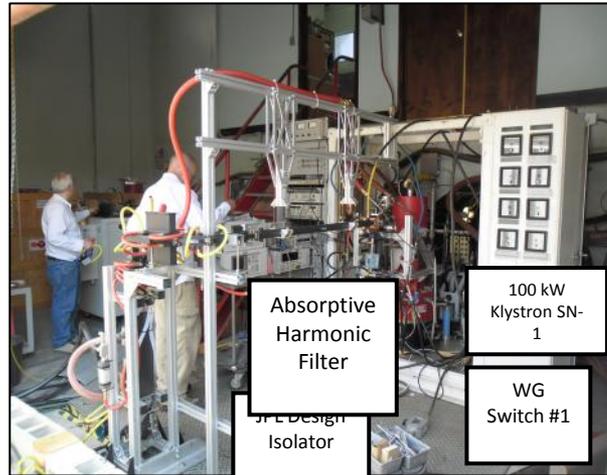
SGSS SRR completed



TDRS-K development progressing; spacecraft finishing thermal vac testing



SCaN tested with a flight to the ISS on HTV-3 in June 2012



Absorptive Harmonic Filter

100 kW Klystron SN-1

WG Switch #1

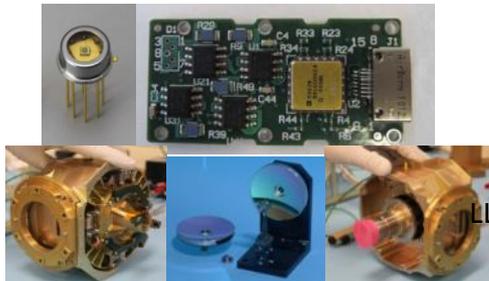
JPL Design Isolator



Prototype 100 kW Klystron testing



McMurdo upgrades completed



LLCD CDR completed

Space Communication and Navigation Status



Patrick AFB Color Guard conducting final MILA flag folding ceremony



Despite aging and obsolescence issues, SCaN continues to successfully support NASA and non-NASA missions at proficiency higher than commitment



NASA hosts the Space Frequency Coordination Group in June 2011



Ongoing succession planning and infusion of new blood.
GRC Interns complete internship



8th PNT Advisory Board meeting in June 2011 (next one on Nov 9-10, 2011)

Strategic Analysis and Integration Division Status



- **The Global Exploration Roadmap was released in September**
 - The first version of the GER reflects consensus of 12 agencies that human exploration will be an international endeavor
 - The GER was endorsed by Senior Agency Managers in August 2011
 - It reflects current policies and plans of participating agencies
 - A second iteration is planned for late 2012
- **NASA will host a three-day Human Space Exploration Community Workshop in San Diego starting on Monday, November 14.**
 - The agency will introduce the International Space Exploration Coordination Group's Global Exploration Roadmap during the event
 - This event will be webcast, more information available at <http://www.nasa.gov/exploration/about/isecg/ger-workshop.html>





Questions?

