



NASA'S JOURNEY TO

MARS

Human Landing Sites Study (HLS2) Group Discussion

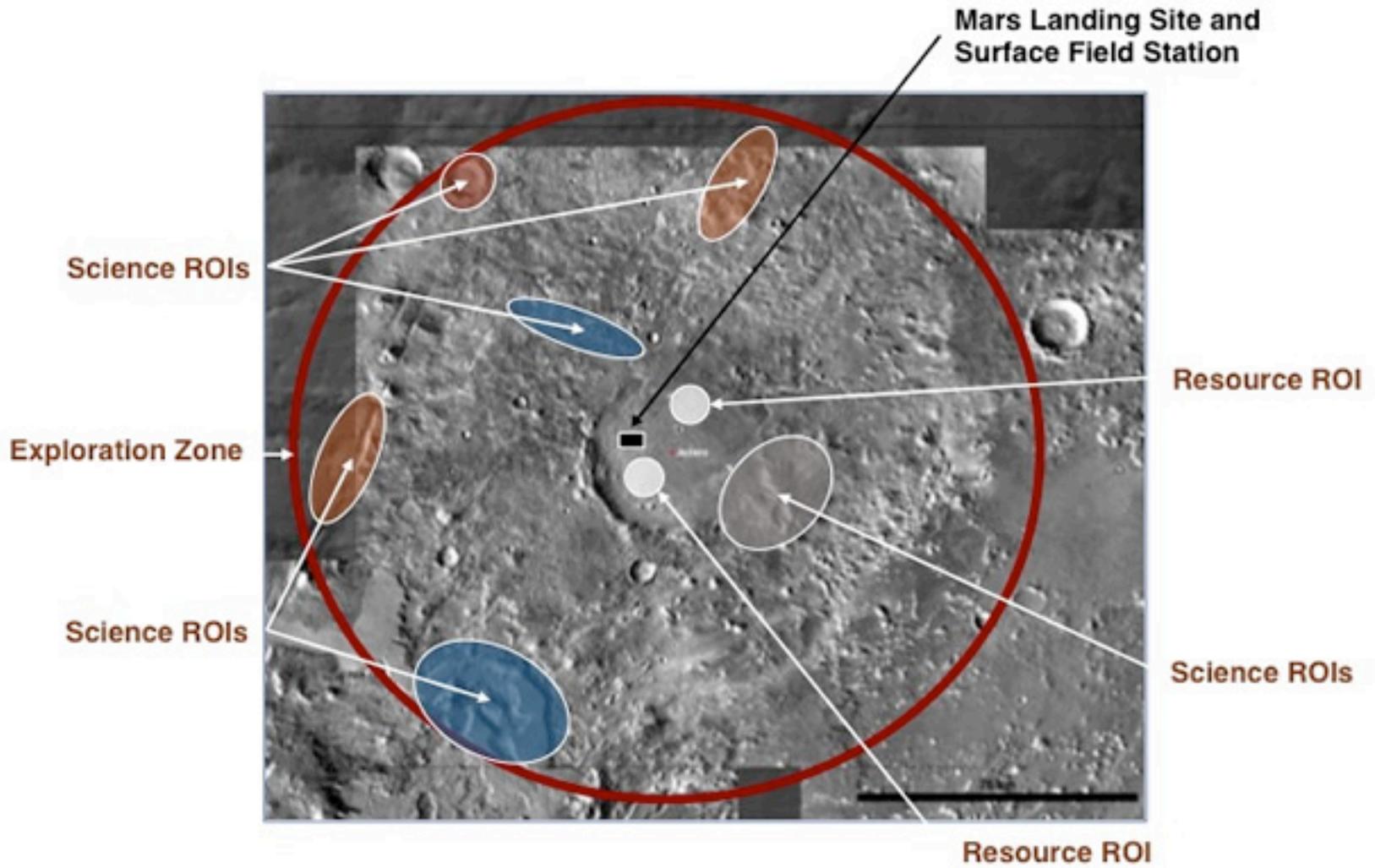
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Agenda

- Precursors
- Lessons learned and path forward
 - EZ concept
 - MRO imaging
 - Dialogue
 - Next step analyses
 - This workshop
 - The next workshop
- Reference EZs
- Prototype EZs
- General Discussion

Exploration Zone Layout Considerations



MRO Targeting

- Each EZ can propose up to three targets for future MRO imaging
- These requests will be tagged as HLS2 requests
- You will prioritize your three choices
- Data will be collected on an as-possible basis
- Realistically you will probably get your top choice imaged within 12 months

Dialogue

- Most important result of this workshop
- Particularly between the science/ISRU/mining communities
- Several occasions where people with mining experience made polite statements about realities of extraction of resources
- How can we facilitate this dialogue?
 - ICEM-AG
- Specialized resource workshops
 - E.g. poly hydrated silicates
- What more details about human exploration capabilities (e.g. EMC) would be helpful?

Next Step Analyses

- What analyses need to be done to improve our understanding of the EZs to a level that merits another workshop?
 - Don't forget the current data
 - Need to define a standard nomenclature
- Realistic appraisal of resources?
- Trafficability analysis between HS, and ROIs?

This Workshop

- What should be kept more or less intact, what should be changed, what should be added, what should be removed, what was missed?
- Are the current EZ criteria adequate/realistic?
- Thoughts on the rubric?
- Comments on the requested feedback?

Next Workshop

- What should be the goal of the next workshop?
- What level of analyses need to be conducted before we have next workshop
 - Need new data too, or just analysis?
 - Are the current criteria adequate/realistic?
 - Need to validate your green dots
- How much time do you need before we have the next EZ workshop?

Backup

MARS

Workshop Statement

Outline and Questions (1 of 3)

- EZ Concept “existence proof”
 - What is the collective opinion regarding the viability/value of the EZ concept in describing and assessing human exploration on Mars?
 - What changes should be made to the EZ criteria distributed prior to the workshop (including rationale for the change)?
 - Are there any compelling reasons to go to sites above 40 degrees latitude? Above 30 degrees latitude?
- Data Collection
 - Potential targets for the Mars Reconnaissance Orbiter (MRO) – assembled from EZ presentations (maybe prioritized but not filtered) plus group discussion
 - Ground truth – identify needs or opportunities for surface assets to collect data that can be compared to orbital data that will assist in selecting human landing site(s)
 - New data types needed (i.e., never collected before) that will assist in selecting human landing site(s) – assembled from EZ presentations plus group discussion
- Data Analyses
 - Analyses needed to improve understanding of proposed EZs – assembled from EZ presentations and used as input for proposed EZ Analysis AO
 - Non-site specific analyses of existing data (or new data as it arrives) – e.g., additional and/or refined analyses of data associated with potential regional or global distribution and concentration of resource related material

Workshop Final Statement

Outline and Questions (2 of 3)

- EZ selection process (i.e., this workshop, including the steps preceding it and proposed steps after, such as follow-on workshops) improvement recommendations
 - What should be kept more or less intact, what should be changed, what should be added, what should be removed, what was missed?
- Reference EZs
 - Discussion of which EZ(s) (if any) would make good “stressing cases” for assessment purposes
 - Features that envelop all of the sites (e.g., max latitude, max altitude, etc.)
 - Specific locations that can be used to test concepts of operation and/or hardware/technology options . For example:
 - A high latitude site with shallow ice potential – how would the ISRU community deal with it?
 - A hydrated mineral site – how would ISRU community deal with it?
 - Recurring Slope Lineae (RSL) site – how would the science community deal with it given planetary protection guidelines/constraints?)
- Consolidated summary of Site Selection Criteria “Rubric”
 - Assembled from all of the presentations (the “rubric” was one of the requested items in the presentation template)
- What should be the focus of the next workshop and how much time should be allowed until this workshop is held?

Workshop Final Statement Outline and Questions (3 of 3)

- Other
 - Is an ISRU/Civil Engineering Analysis Group equivalent of MEPAG/LEAG/SBAG needed?
 - Collect rationale during group discussion
 - What other recommendations do Workshop participants have to improve / accelerate our ability to pick a human landing site / Exploration Zone?
 - Anything else that the group wants to discuss that is not covered by the previous items