INTERNATIONAL MARS ICE MAPPER (I-MIM)

Mission Concept Phase 2

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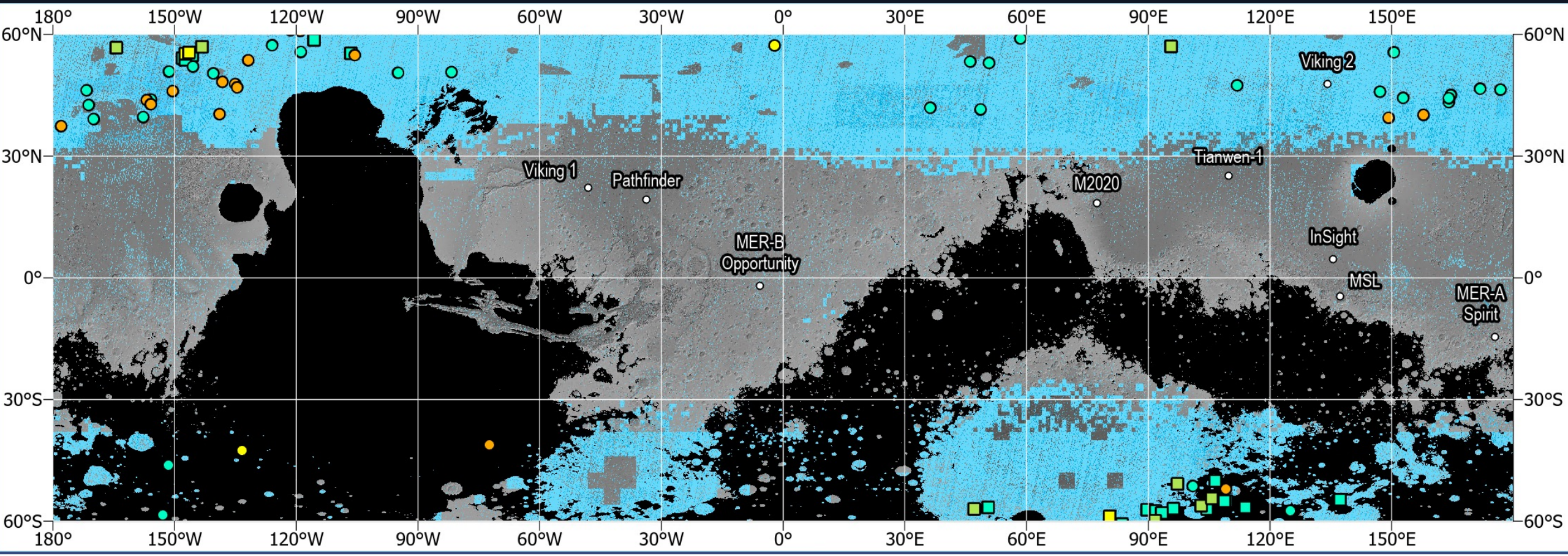
Water Ice on Mars



: **Regions with High Subsurface Ice Consistency within 1 to 5 m depth**

: **+1km MOLA Elevation Mask** (assumed EDL constraint)

Fresh Ice Exposing Impact Craters

- Yes
- Probable
- Possible

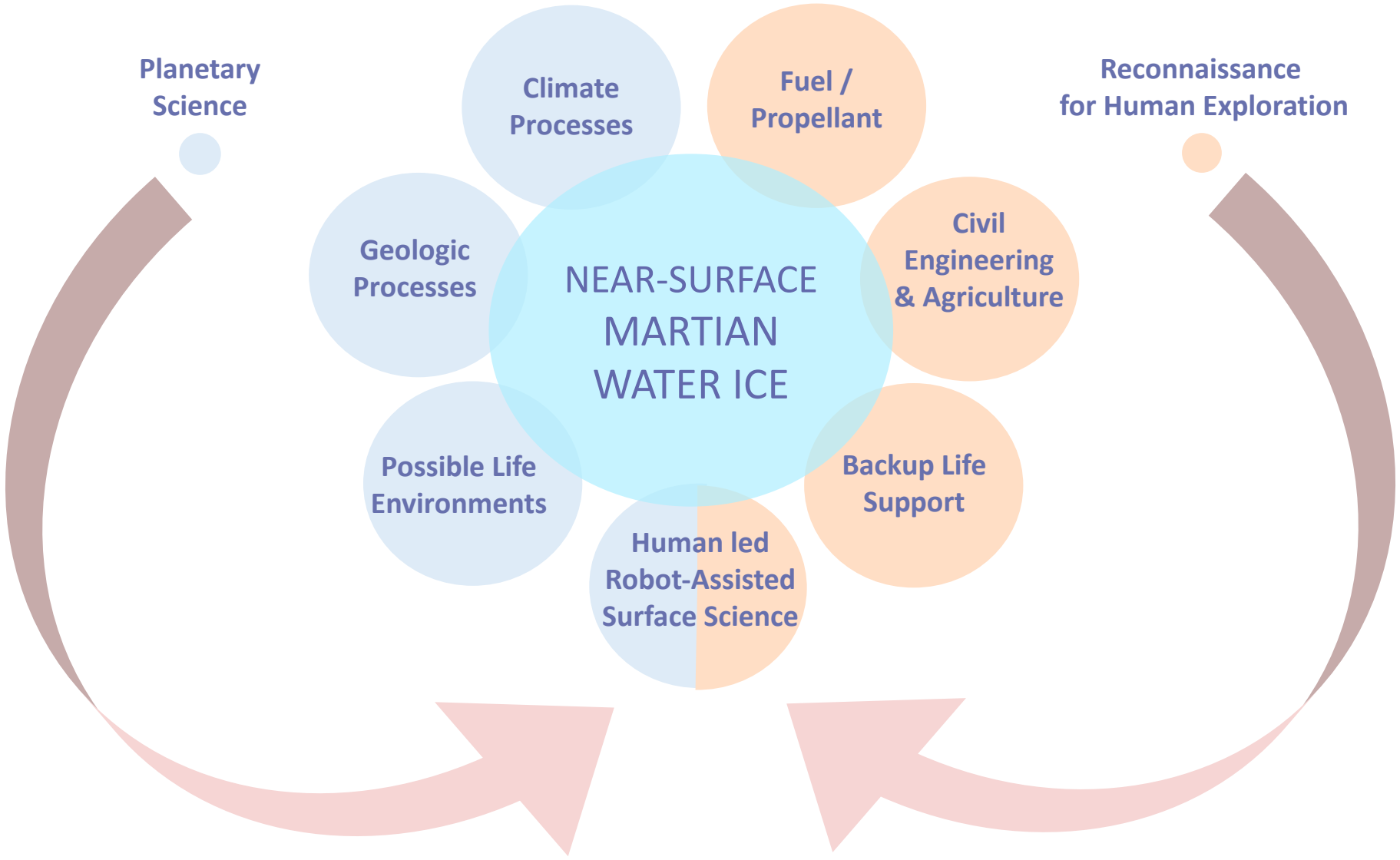
Icy Scarps

- Confirmed
- Confirmed but Marginal
- Probable

To explore maps, visit: https://ammos.nasa.gov/marswatermaps

IMPORTANCE OF SUBSURFACE ICE

Ice detection advances international scientific and human exploration objectives



INTERNATIONAL MARS ICE MAPPER – CONCEPT STUDY TEAM

ASI, CSA, JAXA, and NASA working collectively since 2019 to define mission concept

I-MIM Mission Concept

3 FLIGHT ELEMENTS, 1 INTEGRATED MISSION: HIGH ROI AT LOW COST FOR EACH PARTNER

ELEMENT 1 (E1): ORBITER — JAXA

- SAR/SAR Sounder — CSA
- VHF Sounder — ASI
- Submillimeter Sounder — JAXA
- Telecom Subsystem — ASI
- Large Deployable Reflector — ASI

ELEMENT 2 (E2): DEMONSTRATION LANDER — JAXA

- Science Payload TBD

ELEMENT 3 (E3): SMALLSAT — NASA

- High-resolution Imager — NASA

LAUNCH + DELIVERY — NASA

GROUND SYSTEMS

- DSN Support — NASA
- Science Team — CSA
- Spacecraft Operations — JAXA

SYNERGIES:

- Fundamental Science
- Science for Human Exploration

INFRASTRUCTURE:

- High-volume DTE
- Relay for Orbital & Surface Assets

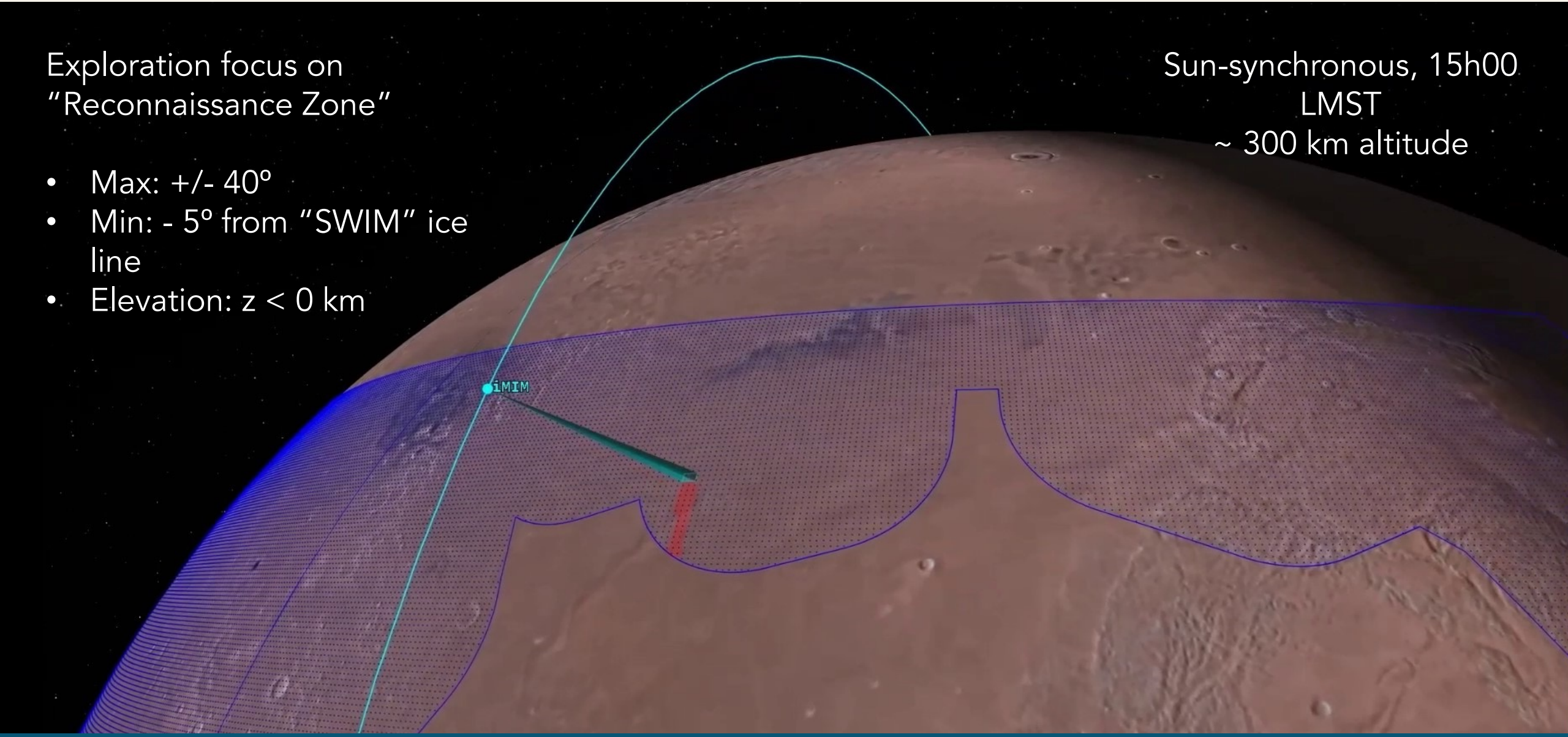
I-MIM OBSERVATIONS

Reconnaissance focused on mid-latitudes; quasi-circular polar orbit enables science investigations globally

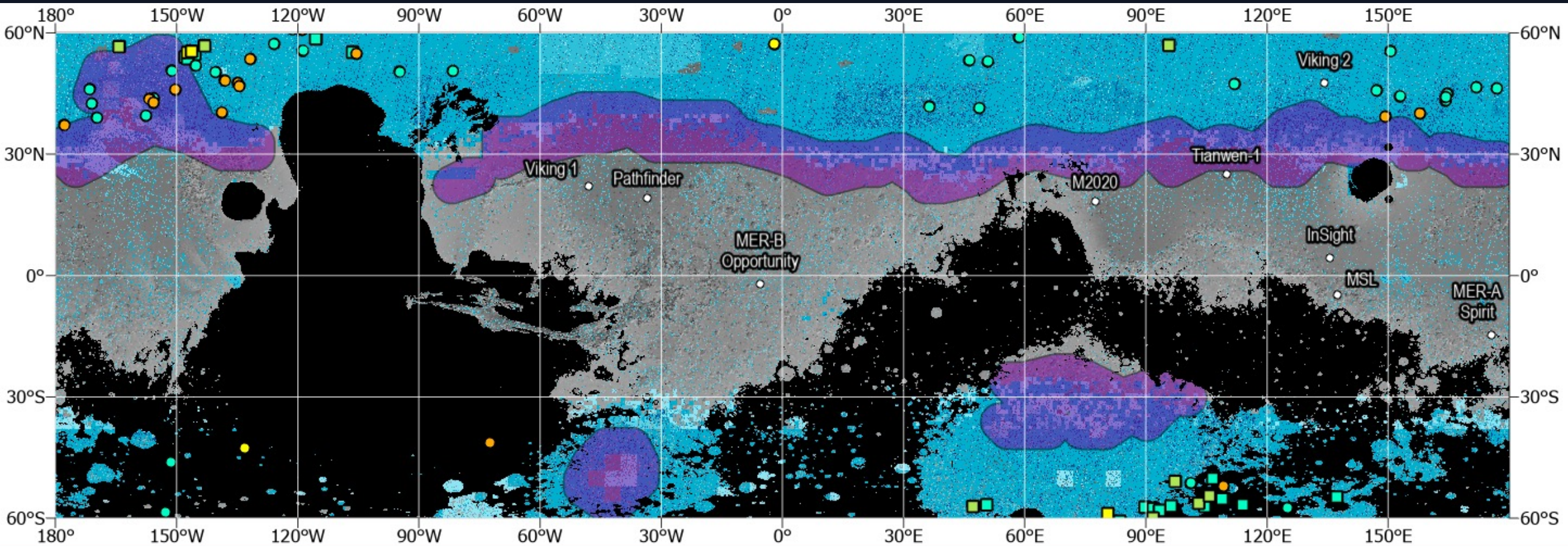
Exploration focus on "Reconnaissance Zone"

- Max: +/- 40º
- Min: - 5º from "SWIM" ice line
- Elevation: z < 0 km

Sun-synchronous, 15h00 LMST
~ 300 km altitude



Water Ice on Mars: Recon Zone



: Regions with High Subsurface Ice Consistency within 1 to 5 m depth

: Potential High Priority Radar Targeting Zones

: +1km MOLA Elevation Mask (assumed EDL constraint)

Fresh Ice Exposing Impact Craters

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MEASUREMENT DEFINITION TEAM

Competitively selected group from 10 countries evaluated SAR payload concept against mission objectives

https://go.nasa.gov/imim_mdt

Key Conclusions

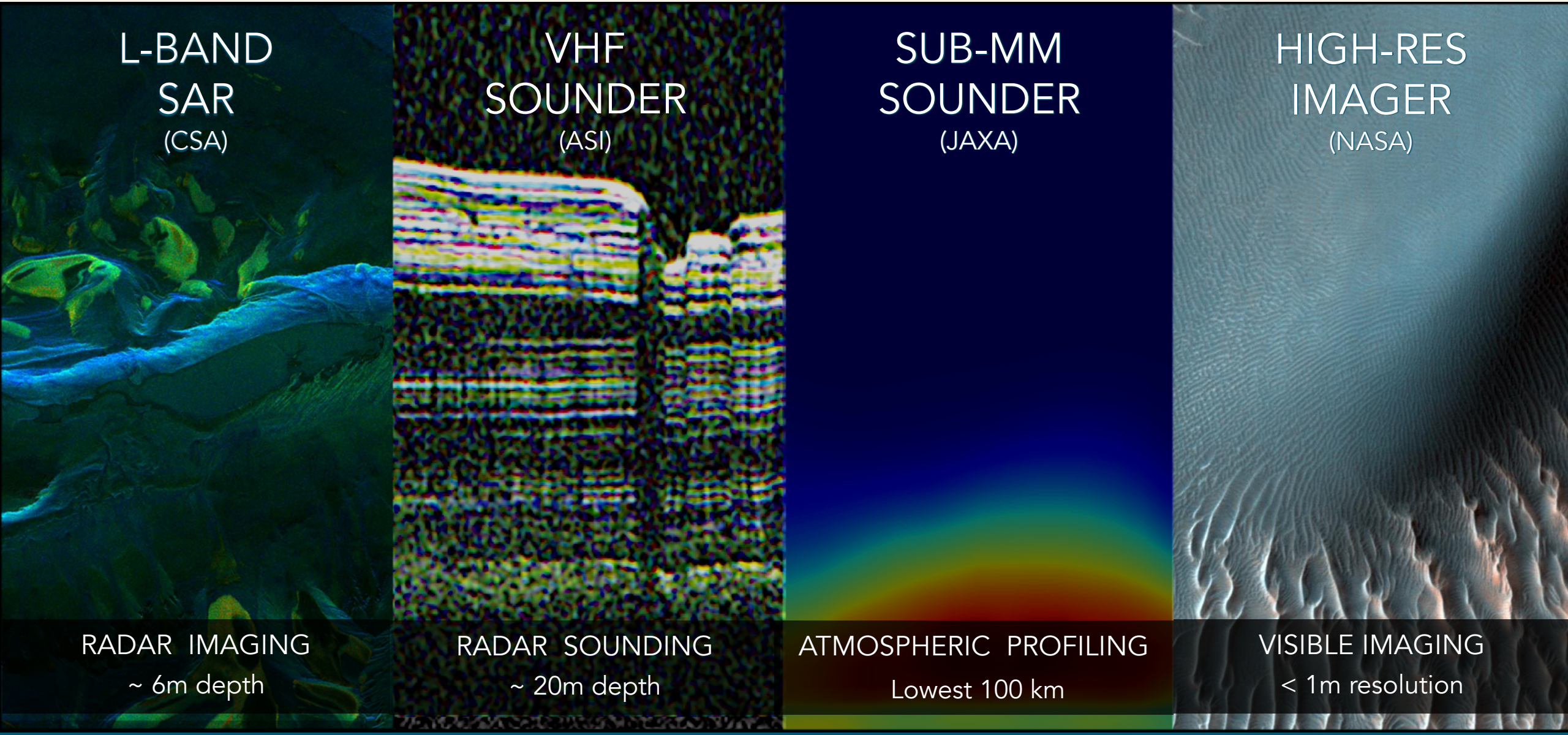
- The SAR payload would provide a unique capability at Mars and would acquire essential information to prepare for human exploration
- The science and reconnaissance goals as stated are achievable with the payload concept provided
- High priority additional payloads would enhance the mission's scientific return

Recommendation

- Agency partners should continue to pursue development of I-MIM as a key element in the future exploration of Mars.

INSTRUMENTS

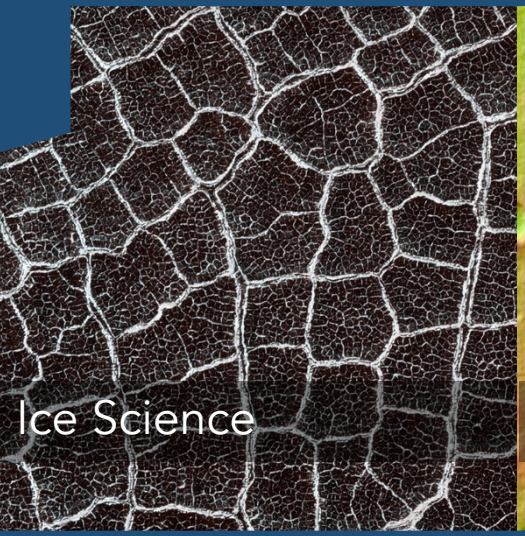
Concept Phase 2 includes SAR core payload + recommended instruments from Measurement Definition Team

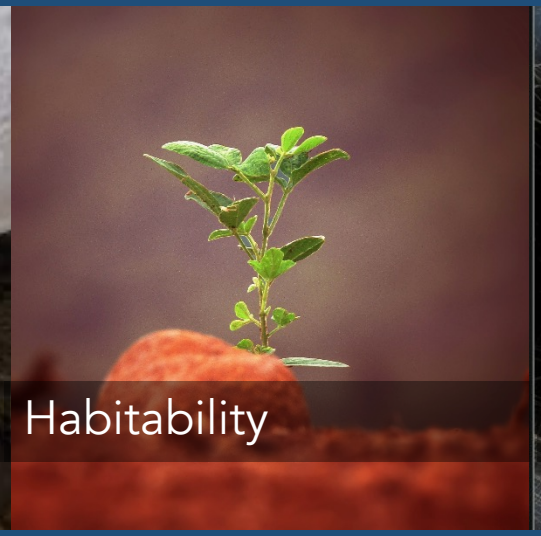


OPPORTUNITIES FOR INTERNATIONAL SCIENCE COMMUNITY

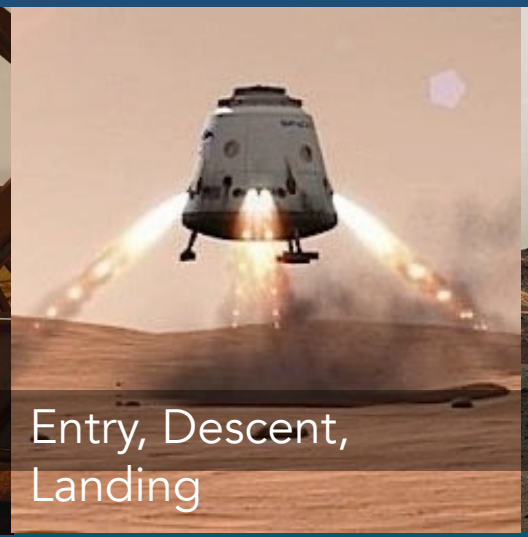
Aim is to open the mission science team to worldwide competition; numerous themes of interest

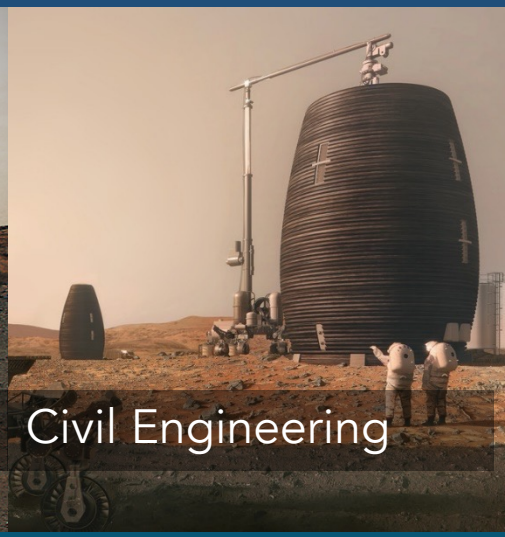
FUNDAMENTAL SCIENCE





HUMAN EXPLORATION





POTENTIAL BENEFITS OF I-MIM

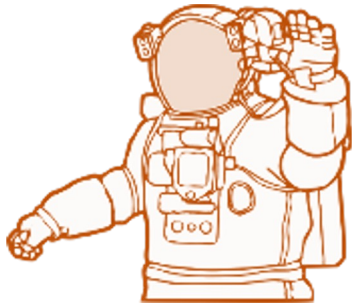
The mission would serve a variety of programmatic and technical goals

DECADAL-CLASS SCIENCE

- Conduct scientific investigations to address international community priorities

CRITICAL INFRASTRUCTURE REFRESH

- Supplement existing communications and high-resolution imaging assets



MOON-TO-MARS PREPARATION

- Produce critical datasets required for human-led science, EDL, ISRU, and civil engineering

LOW-COST MISSION OPPORTUNITIES

- Provide pathway to advance Mars exploration in conjunction with MSR