Mission Status Update
The spacecraft is healthy.

All instruments are working well, with the exception of the ACS TIRVIM channel, whose cryocooler can no longer bring the IR detector to working temperature.

Normal operations started again on 11 Apr 2020.
2022 Mission Objectives

SCIENTIFIC OBJECTIVES

- To search for signs of past and present life on Mars;
- To investigate the water/subsurface environment as a function of depth.

TECHNOLOGY OBJECTIVES

- Surface mobility with a rover (having several kilometres range);
- Access to the subsurface to collect samples (with a drill, down to 2-m depth);
- Sample acquisition, preparation, distribution, and analysis.
- To characterise the surface environment.
- Throttled braking engines for planetary landing;
- Russian deep-space communications stations working in combination with ESA’s ESTRACK.
ISO 3

ISO 7

Analytical Laboratory Drawer
Refillable Container
ALD FM Ultra Clean Zone
ALD FM Complete
The rover arrived at TAS-I on 20 Mar 2020.

It initially remained stored in its container. It has now been unpacked and installed in the ISO 7 clean room.

We are in the process of evaluating what items need to be maintained, replaced, or repaired.

A rover qualification acceptance review (QAR) will start soon to assess the verification of requirements.
Rover Bathtub
Carrier Module FM
Descent Module FM

ESA / Roscosmos / ExoMars / TAS-I / Lavochkin
On 8 Apr 2020, the spacecraft arrived from Cannes (FR) to Torino (IT) in an Antonov.

The project team is working on the statement of work (SOW) for the delta work to make 2022.
Progress on Trajectory and Landing
Some 2022 Landing Ellipses

- ExoMars 2020 dispersion ellipse
- Fresh craters
- Alfu = Amazonian lava flow unit
- Rb = Rounded buttes
- Fd = Fluvial deposits
- Dd = Deltaic deposits
- Vc = Volcanic complex
- LNc = Layered Noachian clays

Mamers Valles, ESA / MEX / HRSC
2022 Trajectory Analysis

**Yellow line:** Max launch escape velocity for a 10-hr injection phase.

**Red line:** Max launch escape velocity for a 15-hr injection phase.

**Purple line:** Max entry velocity 5.5 km/s.

**Green line:** Touchdown local mean solar time (LMST).

**Remarks:**
- For T1, the sooner in the day we land, the longer the cruise.
- For T1, the intersection between yellow and purple defines the allowable zone.
## 2022 Trajectories

<table>
<thead>
<tr>
<th>Case</th>
<th>Scenario 1 (T2)</th>
<th>Scenario 2 (T1)</th>
<th>Scenario 3 (T1)</th>
<th>Scenario 3a (T1)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrival</td>
<td>13 Jul 2023</td>
<td>24 May 2023</td>
<td>17 Jun 2023</td>
<td>10 Jun 2023</td>
<td></td>
</tr>
<tr>
<td>Transfer duration</td>
<td>11.5 months</td>
<td>~8 months</td>
<td>~8.5 months</td>
<td>~8.5 months</td>
<td>Scenario 1: TBC by Industry if transfer duration is acceptable.</td>
</tr>
<tr>
<td>Launch window with current committed launcher performance</td>
<td>15 days</td>
<td>17 days</td>
<td>6 days</td>
<td>12 days</td>
<td>Launch window can only cover weather effects. Any failures must be adjusted on launch pad because roll off-on takes 14 days; otherwise we would need 25 days.</td>
</tr>
<tr>
<td>Assumed launched mass</td>
<td>2900kg</td>
<td>2900kg</td>
<td>2900kg</td>
<td>2900kg</td>
<td>Might be relaxed to 28xx kg (TBC).</td>
</tr>
<tr>
<td>Escape sequence duration</td>
<td>4.5 h</td>
<td>10h</td>
<td>10h</td>
<td>10h</td>
<td>Scenarios 2, 3, 3a require increase of escape sequence duration. (OK for TAS-I/ESA but needs detailed cyclogram by KhSC).</td>
</tr>
<tr>
<td>Escape velocity</td>
<td>&lt; 4.45 km/s</td>
<td>&lt; 5.33 km/s</td>
<td>&lt; 5.33 km/s</td>
<td>&lt; 5.33 km/s</td>
<td></td>
</tr>
<tr>
<td>Launcher compatible</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Launcher inclination</td>
<td>65 deg</td>
<td>65 deg</td>
<td>65 deg</td>
<td>65 deg</td>
<td></td>
</tr>
<tr>
<td>Eclipse duration</td>
<td>&lt; 20 min</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>Scenarios 2, 3, 3a: Eclipse duration analysis requires detailed cyclogram by KnSC).</td>
</tr>
<tr>
<td>Initial station visibility</td>
<td>Poor (good from Usuda)</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
<td>Scenario 1 needs tracking station at Japan longitudes for first acquisition.</td>
</tr>
<tr>
<td>Initial Sun-SC-Earth angle</td>
<td>100 - 120 deg</td>
<td>&lt; 85 deg</td>
<td>&lt; 85 deg</td>
<td>&lt; 85 deg</td>
<td>Scenario 1 has consequences on SCC attitude at launcher separation and on survival mode attitude (feasibility TBC by Industry).</td>
</tr>
<tr>
<td>Earth-SC distance at arrival</td>
<td>2.3 AU</td>
<td>1.9</td>
<td>2.1</td>
<td>2.06</td>
<td>All scenarios: TBC data rates at max distance (70-m DSN mandatory).</td>
</tr>
<tr>
<td>Delta-V</td>
<td>Only TCM</td>
<td>Only TCM</td>
<td>Only TCM</td>
<td>Only TCM</td>
<td></td>
</tr>
<tr>
<td>Solar conjunction in cruise</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Entry velocity</td>
<td>&lt; 5.55 km/s</td>
<td>&lt; 5.55 km/s</td>
<td>&lt; 5.55 km/s</td>
<td>&lt; 5.55 km/s</td>
<td></td>
</tr>
<tr>
<td>Local time at landing</td>
<td>13:00 – 14:00</td>
<td>16:30</td>
<td>15:00</td>
<td>15:30</td>
<td>Scenario 3, 3a: SP energy is marginal. First night must be in &quot;low power&quot; mode. Scenario 2: Lander energy budget is VERY marginal.</td>
</tr>
<tr>
<td>Landing azimuth</td>
<td>45-58 deg</td>
<td>TBC, similar to 2020</td>
<td>TBC, similar to 2020</td>
<td>TBC, similar to 2020</td>
<td>Scenario 1: Requires characterisation of landing ellipses. Scenario 2, 3, 3a: Expected to be similar to 2020 launch case (TBC by ESOC).</td>
</tr>
<tr>
<td>Landing Mars Solar Longitude</td>
<td>90º</td>
<td>68º</td>
<td>78º</td>
<td>75.5º</td>
<td>All scenarios atmospheric density rate to be verified.</td>
</tr>
<tr>
<td>EDL visible from Earth (elev.&lt;10º)</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Nominal Rover mission (sols prior to GDS)</td>
<td>~179 sols</td>
<td>~282 sols</td>
<td>~204 sols</td>
<td>~211 sols</td>
<td>Scenario 1: Solar Conjunction (SC) is 3.5 months after landing. Scenario 2, 3, 3a: SC is 4–5 months after landing (more mission sols before SC).</td>
</tr>
<tr>
<td>Solar conjunction on surface (1 Nov – 4 Dec 2023)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>
Parachute Deployment Sequence

- Mortar fires 1st pilot bag
- 1st pilot inflates
- Pilot extracts supersonic parachute bag
- Supersonic parachute inflates
- Mortar fires 2nd pilot bag
- 2nd pilot inflates
- Pilot extracts subsonic parachute bag

Ø 15 m
Ø 35 m

3.8 m
93 m