

M7 down-selection approach

27 June 2023

5 M-candidates under study in Phase 0



CALICO

A Mission to Unravel Ceres' Aqueous History In Situ
A Phase-2 Proposal in Response to the European Space Agency's Call for an M-Class Mission

Lead Proposer: Axel Hagermann
Deputy Lead: Stefan Schröder
Luleå University of Technology, Kiruna, Sweden
On behalf of the CALICO Consortium

HAYDN

High-precision Asteroseismology of DeNse stellar fields
A candidate for the ESA M7 mission

PHASE-2 PROPOSAL

Lead Proposer: Prof. Andrea Miglio, andrea.miglio@unibo.it
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M-MATISSE

Mars - Magnetosphere ATmosphere
Ionosphere and Space-weather SciencE

A mission proposal in answer to the ESA M-class Call
Phase-2 (July 2022)

Lead proposer:
Beatriz Sánchez-Cano,
University of Leicester, United Kingdom

Co-Lead proposer:
François Leblanc,
LATMOS, CNRS, Sorbonne Université, UVSQ, Paris, France

Call for a Medium-size and a Fast mission opportunity in ESA's Science Programme - 2021
M-class mission to be launched around 2037 (M7)
Phase-2 proposal

Plasma Observatory

Unveiling plasma energization and energy transport in the near-Earth
plasma environment through multiscale observations

Lead Proposer: Maria Federica Marcucci

15 July 2022

Phase-II proposal for ESA Medium-class mission opportunity
(ESA Call issued on 13 December 2021)

THESEUS

Transient High-Energy Sky and Early Universe
Surveyor

Lead Proposer: Dr. Lorenzo Amati (INAF - OAS Bologna, **Italy**)
Co-Leads: Prof. Paul O'Brien (Univ. Leicester, **UK**), Dr. Diego Götz (CEA/Irfu, **France**), Prof. Andrea Santangelo (Univ. Tübingen, **Germany**), Dr. Enrico Bozzo (Univ. Geneva, **Switzerland**)
Lead of USA contribution: Dr. Miles Smith (NASA/JPL, **USA**)

- By September 2023, all the five candidate missions will have completed their Phase 0 activities
 - Phase 0 activities have been conducted in close coordination with the Proposing Teams
- The output of Phase 0 includes:
 - The draft Science Requirements Document (SciRD)
 - The preliminary definition of the mission, including the mission profile and the space segment preliminary design (platform and payload baseline), derived from the CDF mission study
 - The programmatic assessment, including technology readiness, schedule feasibility, preliminary risk analyses, and ESA estimated Cost-at-Completion (eCaC)
- Phase 0 results will be submitted to the dedicated Mission Definition Review (MDR), which closes the Phase 0 technical and programmatic activities
 - The MDR also ensures the documentation required to initiate the industrial Phase A activities are in good shape, should the mission be selected
 - The MDRs for each mission are scheduled for Week 38 and 39 (2nd half of September)

- Member states will be informed about any evolution in the payload definition resulting from Phase 0 activities
 - Baseline are the Letters of Endorsement (LoE) received at the time of the Phase 2 Proposal review last year
 - In the event of any changes, either in the payload complement or in the responsibility scheme, ESA will seek confirmation in September (7th) by the relevant Member States for support of such elements
 - International Partners will also be consulted where necessary
 - **The Proposing team should ensure that Member States are aware of any change in responsibility before they are consulted by ESA**
- A further consolidation of the implementation scheme for the down-selected missions may be required for a few elements during Phase A
 - The responsibility for all payload elements must be fully consolidated by the end of Phase A to enable the mission selection
 - **Therefore, major payload elements lacking Member State support may not be compatible with the M7 programmatic boundaries (schedule and eCaC)**
- ESA intends to fund payload critical pre-development activities for the down-selected candidate missions, as soon as possible during Phase A
 - However, the pre-condition for ESA funding is the confirmation by the relevant Member State of their intention to provide the payload element

Engagement of the proposing teams

- The proposing teams of the five candidate missions, under the coordination of the proposal Leads, have:
 - Participated directly in the CDF studies
 - Contributed to the definition of the Science Requirements Document, with the support for ESA Study Scientists
 - Assessed the implications of technical solutions on the science performance, providing inputs for the refinement of the requirements and interfaces with the scientific payload
- The proposing teams will be informed about the results of the MDR and will be key actors during the scientific evaluation process (see next charts)
- At the end of the process, detailed briefings in writing will be offered to the proposing teams (and also made available to the SPC)
 - As with all mission selections, the proposing teams will also be offered a debriefing meeting

- An independent Senior Science Committee (SSC) will be appointed by the Director of Science, and will comprise:
 - Un-conflicted members of the SSAC with competences relevant for the science themes of the M7 candidates
 - Additional experts to ensure a sufficient range of expertise and a balanced composition
- The SSC will be chaired by the Chair of the SSAC
- Only mission candidates that have passed the technical and programmatic assessment (successful MDR) will be submitted for evaluation by the SSC
- The SSC will receive the original M7 proposals together with the MDR relevant results as inputs to their evaluation process of the selectable candidate missions
- The SSC will base their ranking on the scientific merit of each mission according to a set of criteria (see next chart)

- The SSC will be asked consider the following for each mission:

1.Science value

- a. How valuable (and why) is the expected science return of the mission?

2.Scientific feasibility

- a. Can the proposed science be achieved with the proposed mission?
- b. Are there any issues that could hamper the proposed scientific return?

3.Timeliness of mission

- a. Is the M7 time frame compelling for this mission? Why?

4.Competitiveness and complementarity with other projects

- a. Are there other space- or ground-based facilities addressing similar science goals?
- b. If so, how does the proposed mission compare with them or complement them?
- c. Is the science output of the mission self-contained or does it require complementary data from other missions or from ground-based observations?
- d. What is the expected impact of the proposed mission in the relevant scientific field(s)?

5.Overall assessment of the scientific merit of the mission

- The input material to the SSC will comprise:
 - The original M7 Phase 2 proposals
 - Outcome of the Phase 0 study (MDR summary)
 - Interview with the proposing teams
 - Including a presentation of the consolidated science case and mission/payload characteristics
- The output of the SSC will comprise:
 - A report on the scientific value of each candidate mission (based on the review criteria)
 - A written recommendation to the Director of Science, with the ranking of the M7 candidates and a statement of the *scientific worthiness* for each candidate mission
- Based on the technical and programmatic feasibility resulting from the Phase 0 studies, and on the recommendation of the SSC, the Director of Science will select a sub-set (typically three) of the five candidates to proceed into Phase A

• The following dates are indicative and may change

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| • Proposing teams briefing on the down-selection process | 27 June |
| • SSC kick-off | early September |
| • Mission candidate MDR Board Meeting | 2 nd -half September |
| • SSC Meeting | 27-28 September |
| • SSC Meeting #2 & Interviews with M7 Candidates | 12-13 October |
| • SSC Final Meeting - ranking and recommendations | 18-19 October |