INTEGRAL Mission Extension

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Mission Extension

Current Status: Nov 2018 SPC#158:

… extension for **2019-20 confirmed** & extension **2021-22 indicatively** approved.

New approach for Extensions "moving windows": 4 yrs (old standard) ➔ 5 (in 2020) ➔ 6 (as of 2022)

In 2020: need to ask for **confirmation for 2021-22** & **indicative extension for 2023-24-25**

We need to keep/have

- **Healthy Spacecraft and Payload, Efficient & Stable Science Ground Segment**
- **Science Highlights & Future Science, possible in years to come**
- **Healthy Publication Rate and Good Interest in AOs**

Mission Extension

In total, the Advisory Structure was requested to assess ten missions whose currently approved operations end on or before 31 December 2025.

Mission	2021-2022	2023-2025
Missions operated by D/SCI (in alphabetical order)		
Cluster	Confirmation	Extension
Gaia	Confirmation	Extension
INTEGRAL	Confirmation	Extension
Mars Express	Confirmation	Extension
XMM-Newton	Confirmation	Extension
Missions operated by other entities (in alphabetical order)		
ExoMars-TGO	Confirmation	Extension
Hinode	Confirmation	Extension
HST	Confirmation	Extension
IRIS	Confirmation	Extension
SOHO	Confirmation	Extension

Mission Extension: 1st Step: MEOR

Mission Extensions Operations Review (MEOR): 26-27 February 2020

An ESA internal review.

Goals:

The MEOR reviews the **technical capability** of the mission facilities **to deliver the data required for the extended mission science cases** that will be presented to the advisory structure for assessment of their science merit.

The 2020 cycle of the MEOR reviewed the capability of all proposed mission extension cases to operate for two years, i.e. the **2021-2022 time frame, corresponding to the extension confirmations**. In addition, the review carefully examined the capability of the same missions to fully deliver the required data for **a further three-year extension, i.e. the 2023-2025 time frame**.

Presentation by Spacecraft Ops. Manager, Mission Manager, Project Scientist

Instrument & Centre PIs provided info on future funding

Mission Extension: 1st Step: MEOR

Mission Extensions Operations Review (MEOR): 26-27 February 2020

Recommendations of the Board:

All missions were assessed positively and no showstoppers were identified.

Specific:

The Board confirmed that **INTEGRAL can deliver the data to achieve the expected science return** in both the confirmation (2021–2022) and extension (2023–2025) interval.

The overall platform status is unchanged since MEOR 2018, and there are no factors or anomalies identified that would limit operations before re-entry. (Status February…)

The Board also noted that the significant **sharing of resources** between INTEGRAL, XMM-Newton and Gaia at the MOC and the very similar synergy development between INTEGRAL and XMM-Newton, currently on-going at the SOC, **are excellent means to improve the cost-effectiveness of operations**.

Mission Extension: 2nd Step: AWG

Astronomical Working Group (AWG#175): 8–10 June 2020

AWG provides scientific advice mainly to the Space Science Advisory Committee (SSAC). The AWG members are scientists from the ESA Member States with expertise in the specific disciplines covered by the AWG. The chair of the working group is also a member of the SSAC.

Science Case:

- Paper prepared by IUG+PS+MM (submitted end of March); Science aspects include assessment of impact of the mission to date, a discussion of how scientific objectives previously set for 2021–2022 remain compelling and achievable with the current status of the spacecraft and, most importantly, the expected new science to be addressed through the requested extension in 2023–2025.
- Presentation prepared & given by Enrico Bozzo (Uni. Geneva), Erik Kuulkers (with inputs by IUG)

Feedback: Very well received, e.g. H/SCI-SO "a big thank you to you all! That was a very appropriate performance, and should hopefully lead to a proper set of recommendations from the WG"

AWG (and SSEWG joint) Recommendation:

- **All missions can deliver high quality science in 2021-22**, as originally presented two years ago
- **Scientific cases for the extensions in 2023-2025 are compelling**. Each mission was found to have unique and important scientific capabilities, and the WGs are convinced that they will provide world-class science over a broad range of disciplines. The WGs therefore recommend **extending operations of all missions for 2023-25**.

Mission Extension: 3rd Step: SSAC

Space Science Advisory Committee (SSAC#168): 15-16 June 2020

SSAC is the senior advisory body to the Director of Science (D/SCI) on all matters concerning space science included in the mandatory science programme of ESA. The Committee is the main interpreter of the views and needs of the European scientific community as regards access to space experimentation and data exploitation in the mandatory science programmes.

Goal:

- Confirm its previous recommendations regarding continuing operations of Cluster, ExoMars-TGO, Gaia, Hinode, HST, INTEGRAL, IRIS, Mars Express, SOHO and XMM-Newton in 2021–2022;
- recommend whether to continue the operations of Cluster, Gaia, INTEGRAL, Mars Express and XMM-Newton in 2023–2025 and to provide a scientific ranking;

Recommendation: In summary, the SSAC responded positively to all the above points. Regarding the second point, the SSAC concluded that all the missions are above the threshold required for extension of operations in the required period and ranked the missions in the following order:

- Gaia (highest),
- XMM-Newton (second),
- Cluster, INTEGRAL and Mars Express (joint third, listed in alphabetical order).

Mission Extension: 4th Step: SPC

Science Programme Committee (SPC#163): 7-8 July 2020

SPC (= one of the Council subordinate bodies; Council = organ representing the ESA Member States) is the only committee, the creation of which is explicitly provided for by the ESA Convention itself. The Council shall refer to SPC for any matter relating to the mandatory scientific programme. The SPC is following scientific projects from their selection to their execution, as well as forward-looking studies with a view to the preparation and selection of future projects.

Inputs by ESA Executive: Confirmation of the operations of seven missions (ExoMars-TGO, Gaia, Hinode, HST, IRIS, SOHO and XMM-Newton) for 2021–2022 is proposed, as well as indicative extension of the operations of the same seven missions for 2023–2025. In light of the **need to resolve the cash flow issues** the Programme is facing, the Executive is **postponing a proposal on the extension of the operations of Cluster, INTEGRAL and Mars Express to the next SPC meeting**.

SPC Decision:

Pending the resolution of the short-term financial issues of the Scientific Programme, it was decided **to postpone the decision on mission extensions** (for all ten missions) **to a future meeting** of the Committee.

Mission Extension: Next Steps

Extra-ordinary Meetings (Dates TBC):

AWG/SSEWG (14 Sep 2020), SSAC (15 Sep 2020), SPC (1 Oct 2020)

Inputs:

For INTEGRAL: SOM, PS, MM will need to prepare a **delta report to the MEOR2020 status** by early Sep 2020.
This report shall address specifically the main changes, i.e.

- Z-flip strategy implementation,
- Status of the associated failure investigation,
- Improved estimate of the remaining life time of the mission,
- Orbit control approach,
- Impact on science wrt to the original extension science case.