User Guide for Solar Orbiter / Metis Investigation
Data Products and Publication Policy

Version 3.0 — May 27, 2022

This document is developed and updated by the Metis team to provide a reference guide for users of Metis data. This is a “living document” that will be updated as necessary, such as when new data products are developed.

1 Introduction

1.1 Overview of Metis

The Metis instrument aboard Solar Orbiter spacecraft is an externally occulted coronagraph designed to take images of the solar corona in two channels: VL linearly polarized broadband (580-640 nm) and UV narrowband HI Ly-α (121.6 nm). The telescope FoV covers the full corona from 1.6° to 2.9° from disk center.
The primary data products are UV images, VL polarized brightness (pB) images, VL total brightness (tB) images, and VL fixed polarization (FP) images. Secondary data products are low latency UV and VL images, VL light curves and cosmic ray log matrices.
These data will provide direct and indirect estimates of electrons and hydrogen coronal densities and their fluctuations, solar wind velocities, high cadence imaging of the evolution of coronal transients, and the F-corona. Additional targets observed for scientific and calibration purposes include planets, comets, and stars.
The current baseline for all RS Solar Orbiter instruments, including Metis, is to observe inside Remote-Sensing dedicated windows except for specific targets of opportunities, such as UV stars, comets or special reciprocal positions with other spacecrafts (conjunctions, quadratures, etc.).
Metis will also run a synoptic program throughout most of Solar Orbiter orbit.
The data product availability will start during the Nominal Mission Phase (NMP).
The planning for the operations takes place with the following steps:

- Mission Level Planning (MLP): planning of a full orbit at science level, performed 6 months in advance during Science Working Team meetings (SWT)
- Long Term Planning (LTP): detailed science planning for three months intervals, performed three months in advance during Science Operation Working Group meetings (SOWG)
- Short Term Planning (STP): sequences to be uploaded (Instrument Observation Request – IOR), performed three weeks ahead of observations start
- Very Short Term Planning (VSTP): final adjustments with no impact on budgets, performed a few days before the observations start.

More information about the Metis experiment, the team and the data are available through the Metis webpage: http://metis.oato.inaf.it.

1.2 Data Providers and contact information

The PI coordinates the Metis Team, composed of the Co-PIs, Co-Is, associate scientists and key persons, with knowledge of the instrument and expertise in operations planning.
The Metis team develops the observing program and prepares the resulting commands that meets weekly to discuss and develop the observing program for each orbit according to the scientific plan devised during the SWT.
Metis co-investigators lead topical teams (see Appendix A) to coordinate data analysis and suggest science planning relative to specific topics.

Questions regarding the use or interpretation of these data may be directed to the individuals listed below.

Marco Romoli (marco.romoli@unifi.it)	Principal Investigator (PI)
Giampiero Naletto (giampiero.naletto@unipd.it)	Experiment Manager
Silvano Fineschi (silvano.fineschi@inaf.it)	Experiment Scientist
Gianalfredo Nicolini (gianalfredo.nicolini@inaf.it)	Instrument Scientist
Vincenzo Andretta (vincenzo.andretta@inaf.it)	Operations Scientist
Daniele Spadaro (daniele.spadaro@inaf.it)	Scientific Team Coordinator
Luca Teriaca (teriaca@mps.mpg.de)	Metis Co-PI
Petr Heinzel (pheinzel@asu.cas.cz)	Metis Co-PI
Ester Antonucci (ester.antonucci@inaf.it)	Former Metis PI

1.3 Data Use Policy

The Metis data produced during the Nominal Mission Phase (NMP) are made available freely and without restrictions to all parties and for all purposes after three months from the science telemetry download. Data acquired during the Commissioning and Cruise Phase (CP) are available upon request.
This is fully consistent with ESA's open data policy.

As part of the development of collaboration with the broader solar and heliophysics community, however, Metis mission has defined some rules to govern how Metis instrument data should be used.

The rules will apply starting from the beginning of the NMP.

First result publication and relevant «first» publications related, for example, to first minimum perihelion (4/2022 @0.32AU) and first high heliolatitude (2/2027 -25 deg) shall have the PI as a first author, the contributors, the Metis Core Team (see Appendix B) and Co-Is (see Appendix B) as co-authors, and acknowledgments as given in Appendix C.
A provisional list of "first" and "relevant" publications with authorship policy is given in Appendix D.

1.3.1 Restricted use of Metis data

The Metis Team has the privilege to use Metis data from Cruise Phase (CP) and from the Nominal Mission Phase (NMP) before they become publicly available in the Solar Orbiter Archive (SOAR), but everyone is invited and welcome to collaborate with the team.

Four categories of publications and conference communications are defined.
The contribution should be communicated to the PI that in coordination with the scientific team Coordinator will assign the category of the paper.

1. “First” and “relevant” results (core papers)
2. Other papers subject to peer-to-peer review
3. Papers on proceedings
4. Contributions to conference

It is requested that Metis team scientists adhere to the following guidelines:

1. Core papers should include the Metis Core Team as co-authors and acknowledgments provided in Appendix C.

2. First Publications of each topical team should include the Metis Core Team as co-authors and acknowledgments provided in Appendix C.

3. Metis papers should include for the first year of the NMP the PO and the STP operation team (as defined in Appendix B) in the list of authors. From 2023, other papers should include the operations team for the planning period the data belong to.

4. Papers led by other instrument teams should include the STP operations team, in addition to the contributors from the Metis team.

5. In case of participation to conferences, contributions authorship should contain the authors that contributed to the work and “and the Metis Team”. Authorship will be defined if a proceedings paper is requested according to point 3 of this list.

6. First author of Metis publication should request approval of the author list by the PI and the scientific team Coordinator.

7. The PI requests that all publications using Metis data should:
    - be sent to the PI after submission to keep record of Metis publications
    - acknowledge the sources of data used in all publications, presentations, and reports by mentioning the correct DOI of the dataset used in the paper
    - add to the acknowledgments the text given in Appendix C
    - cite the instrument paper (Antonucci et al., A&A, 2019)

8. In case of any doubt about the instrument, users are encouraged to contact the PI to discuss the appropriate use of instrument data or model. Metis team should facilitate this process, serving as the contact point between PI and users in most cases.

9. Low latency data are not intended for science analysis or publication and should not be used for this purpose.

1.3.2 Public Metis data from SOAR

Three months after the NMP data are downlinked to the ground and processed they are released to the public and are available through the Solar Orbiter SOAR (http://soar.esac.esa.int/soar) and can be freely used.

The PI recommends that scientists adhere to the following guidelines:

1. All publications using Metis data should:
   - be sent to the PI after submission to keep record of Metis publications
   - acknowledge the sources of data used in all publications, presentations, and reports mentioning the correct DOI of the dataset used in the paper
   - add to the acknowledgments the text given in Appendix C.
   - include the members of the operations team (as defined in Appendix B) involved in the acquisition of data in the list of authors
   - cite the instrument paper (Antonucci et al., A&A, 2019)

2. In case of any doubt about the instrument, users are encouraged to consult with the PI to discuss the appropriate use of instrument data or model. Metis team should facilitate this process, serving as the contact point between PI and users in most cases.

3. Low latency data are not intended for quantitative analysis and therefore they should not be used for scientific purposes.

2 Accessing the Data

2.1 Universal access from anywhere

Three months after the data from an orbit are downlinked to the ground and processed, and starting from the NMP, they are released to the public and are available through the Solar Orbiter SOAR (http://soar.esac.esa.int/soar).

2.2 Data Formats/Products

Metis makes several data products available in FITS format:

Level 0: uncalibrated data (units of DN) obtained from telemetry packets, that are decompressed and formatted in standard FITS format. (The metadata contain only the information that is available from the telemetry packet headers.)
Level 1: uncalibrated data (units of DN). (The metadata contain extra engineering data from housekeeping telemetry packets and scientific coordinate systems (WCS) keywords.)
Level 2: calibrated data (physical units). (Corrections for bias, dark current, flat-field, and vignetting, exposure normalisation, pointing, and radiometric calibration are applied). They consist of primary science data: UV images; VL Stokes parameters, total/polarised-brightness images, polarisation angle/fraction and secondary science data: light curves and cosmic ray log matrix.
All the available orbital and attitude information is used and coordinates expressed in scientific coordinate systems (WCS).
Level 3: science data derived from L2 data, (Movies, Carrington maps; and data obtained

after scientific analysis, i.e., electron-density maps, solar-wind outflow velocity maps.)

Level 2 data release is made public and will start within the beginning of the NMP (> Nov 2021). Level 0 and 1 data will be available upon request.

In most circumstances, we recommend use of the Level-2 or Level-3 data products for essentially all scientific analyses, both qualitative and quantitative.

2.3 File naming conventions and FITS header definition

All Metis image data are in the FITS file format.
FITS naming convention is described in the document SOL-SGS-TN-0009 *Metadata Standard*, available from the SOC Confluence pages:
https://issues.cosmos.esa.int/solarorbiterwiki/display/SOSP/Solar+Orbiter+SOC+Public

The FITS image file contains an ASCII header followed by the binary image data. The header consists of keywords followed by the value. The content of the header is described in the document METIS-OATO-SPE-021 *Metis Data Product Description Document,* available from the Metis webpage.

2.4 Revision Management

The data product version number (VX in the FITS file name) indicates how many times the product has been generated. Modifications to processing software, changes to calibration or other input files, and header (metadata) changes are all examples that would cause the version number to increase. Data entry errors, transmission problems or other types of failures may also cause a product to be re-released and thus have the data product version number incremented. The data product version is tracked by the VERSION keyword in the FITS header and indicated in the filename. Version zero (V0) in the filename indicates a quick-look data product; its VERSION number in the header may increment but the quick-look filename will not change.

2.5 Computer setup

The FITS image files conform to the CCSDS standard, and so are readable through many different systems. The traditional system for us has been the Interactive Data Language (IDL). If using IDL, make sure to compile the appropriate Solarsoft libraries. Information on solarsoft is available at https://sohowww.nascom.nasa.gov/solarsoft/. Python is also a capability that can be used. There are also two stand-alone applications that are very useful for viewing FITS images, DS9 and Jhelioviewer.

2.5.1 IDL

To read and process Metis images, use the IDL procedures in the Metis tree in the Solarsoft directory.
A Metis package will be made available to be included in the Solarsoft library.

2.5.2 Python

The Astropy Python library contains a suite of procedures that can be used to read, analyze, and visualize Metis images. Numerous tutorials, documentation, and code examples can be found on the Learn.Astropy website, located at https://learn.astropy.org.
In addition to that, SunPy is the community-developed, free and open-source solar data analysis environment for Python (https://sunpy.org).
A Metis package will be made available to be included in the SunPy library.

2.5.3 JHelioviewer

A useful tool for visualizing solar images of various types is JHelioviewer. It also a free, standalone application. For more information visit their website http://www.jhelioviewer.org. It is particularly useful for combining images of different spatial coverage such as EUV or magnetogram images of the solar disk with coronal imagery.

2.5.4 SAO Image DS9

Another useful tool to view the FITS files in a standalone mode, SAO Image DS9 is a very useful tool. Download instructions and the user manual are available at https://sites.google.com/cfa.harvard.edu/saoimageds9. It is a general astronomical imaging and data visualization application. DS9 is a free, stand-alone application supporting FITS images and binary tables, multiple frame buffers, etc. You can manipulate the images by zooming and changing the color table and see the FITS header.

3 List of acronyms

ASI	Italian Space Agency
AU	Astronomical Unit – the mean distance of the Earth from the Sun
ESA	European Space Agency
ESAC	European Space Astronomy Centre
ESOC	European Space Operations Centre
F-corona	Fraunhofer Corona – scattering of photospheric light by dust
FITS	Flexible Image Transport System
FOV	Field of View
FSW	Flight SoftWare
HGA	High Gain Antenna
IDL	Interactive Data Language
INAF	National Institute for Astrophysics, Italy
IOR	Instrument Observation Request
JH	JHelioviewer
K-corona	Kontinuerlich Corona – scattering of photospheric light by electrons
L1, L2, L3	Data Processing Levels
LTP	Long Term Planning
MLP	Mission Level Planning
MOC	Mission Operations Center (at ESOC)
MPPU	Metis Power and Processing Unit
NMP	Nominal Mission Phase
NASA	National Aeronautics and Space Administration
OBSW	On board Software
OBT	On Board Time
OS	Operative System
PI	Principal Investigator
PO	Project Office
RS	Remote Sensing
RSW	Remote Sensing Window
S/C	Spacecraft
SOC	Spacecraft Operations Center (at ESAC)
STP	Short Term Planning
VO	Virtual Observatory
VSO	Virtual Solar Observatory
VSTP	Very Short Term Planning
WCS	World Coordinate System

Appendix A – Metis Topical Teams

- TT1 - Wind diagnostics (R. Susino, INAF-OATO, Italy)
  - Electron density (and electron temperature) (S. Fineschi, INAF-OATO, Italy)
  - Hydrogen density (J.C. Vial, IAS, France)
  - Wind velocity with Doppler dimming (R. Susino, INAF-OATO, Italy)
- TT2 - F-corona (F. Landini, INAF-OATO, Italy)
- TT3 - Combined synoptics (L. Teriaca, MPS, Germany)
- TT4 - Helium Diagnostics (V. Andretta, INAF-OACn, Naples, Italy)
- TT5 - Image enhancements (F. Frassetto, CNR/IFN, Padua, Italy)
- TT6 - Solar Wind (D. Telloni, INAF-OATO, Italy)
- TT7 - Large scale magnetic configuration and evolution, Streamers and pseudo-streamers (L. Strachan, NRL, USA)
- TT8 - CMEs, prominence eruptions and blobs (P. Heinzel, AIAS, Czech Republic)
- TT9 - Coronal shocks, particle acceleration (G. Zimbardo, UniCal, Italy)
- TT10 - Plasma density fluctuations and waves (G. Nisticò, UniCal, Italy)
- TT11 - Flux emergence, magnetic field reconnection, coronal heating, flares (F. Reale, UniPa, Italy)
- TT12 - Modelling of CME propagation/evolution in corona and solar wind in connection with space weather (A. Bemporad, INAF-OATO, Italy)
- TT13 - Cosmic Rays (C. Grimani, UniUrb, Italy)
- TT14 - Sun grazing comets and other solar system bodies (V. Da Deppo, CNR/IFN, Padua, Italy)

Appendix B – Metis Core Team and Operations Team

Project Office, Co-PIs

Marco Romoli	PI	marco.romoli@unifi.it Dip. di Fisica e Astronomia, Università di Firenze Via Sansone 1, 50019, Sesto Fiorentino (FI), Italy
Vincenzo Andretta	Operations Scientist	vincenzo.andretta@inaf.it INAF – Osservatorio Astronomico di Capodimonte Salita Moiarello 16, 80131, Napoli, Italy
Ester Antonucci	Former PI	ester.antonucci@inaf.it INAF – Osservatorio Astrofisico di Torino Via Osservatorio 20, 10025 Pino Torinese (TO), Italy
Vania Da Deppo	Optics Scientist	vania.dadeppo@pd.ifn.cnr.it CNR – IFN Via Trasea 7, 35131 Padova, Italy
Silvano Fineschi	Experiment Scientist	silvano.fineschi@inaf.it INAF – Osservatorio Astrofisico di Torino Via Osservatorio 20, 10025 Pino Torinese (TO), Italy
Petr Heinzel	Co-PI	petr.heinzel@aus.cas.cz Academy of Science of the Czech Republic Fričova 298, 251 65 Ondřejov
Daniel Moses	Co-I	dan.moses@nasa.gov NASA Headquarters, Washington DC 20546-0001, USA
Giampiero Naletto	Experiment Manager	giampiero.naletto@unipd.it Dip. di Fisica e Astronomia, Università di Padova, Via F. Marzolo, 8 - 35131 Padova, Italy
Gianalfredo Nicolini	Instrument Scientist	gianalfredo.nicolini@inaf.it INAF – Osservatorio Astrofisico di Torino Via Osservatorio 20, 10025 Pino Torinese (TO), Italy
Daniele Spadaro	Scientific Team Coordinator	daniele.spadaro@inaf.it INAF – Osservatorio Astrofisico di Catania, Via Santa Sofia 78, 95123 Catania, Italy
Marco Stangalini	ASI Project Manager	marco.stangalini@si.it ASI Via del Politecnico, 00133 Roma, Italy
Luca Teriaca	Co-PI	luca.teriaca@mps.mpg.de Max Planck Institute for Solar System Research, Justus-von-Liebig-Weg 3, 37077 Göttingen, Germany

Co-Is, Associate Scientists, and Key Persons

Lucia Abbo	Associated Scientist	lucia.abbo@inaf.it INAF – Osservatorio Astrofisico di Torino Via Osservatorio 20, 10025 Pino Torinese (TO), Italy
Alessandro Bemporad	Co-I	alessandro.bemporad@inaf.it INAF – Osservatorio Astrofisico di Torino Via Osservatorio 20, 10025 Pino Torinese (TO), Italy
Aleksandr Burtovoi	Associated Scientist	aleksandr.burtovoi@inaf.it INAF – Osservatorio Astrofisico di Arcetri Largo Fermi 5, 50125 Firenze, Italy
Gerardo Capobianco	Associated Scientist	gerardo.capobianco@inaf.it INAF – Osservatorio Astrofisico di Torino Via Osservatorio 20, 10025 Pino Torinese (TO), Italy

Giuseppe Capuano	Associated Scientist	giuseppe.capuano@inaf.it Dip. di Fisica e Astronomia, Università di Catania, Via S. Sofia 64, 95123 Catania, Italy
Chiara Casini	Associated Scientist	chiara.casini@pd.ifn.cnr.it CNR – IFN Via Trasea 7, 35131 Padova, Italy
Marta Casti	Associated Scientist	marta.casti@nasa.gov Catholic University @ NASA – GSFC, Maryland, USA
Paolo Chioetto	Associated Scientist	paolo.chioetto@pd.ifn.cnr.it CNR – IFN Via Trasea 7, 35131 Padova, Italy
Alain Jody Corso	Associated Scientist	alain.corso@pd.ifn.cnr.it CNR – IFN Via Trasea 7, 35131 Padova, Italy
Yara De Leo	Associated Scientist	yara.deleo@mps.mpg.de Max Planck Institute for Solar System Research, Justus-von-Liebig-Weg 3, 37077 Göttingen, Germany and Dip. di Fisica e Astronomia, Università di Catania
Michele Fabi	Key Person	michele.fabi@uniurb.it Dip. di Scienze Pure e Applicate, Università di Urbino, Via Santa Chiara, 27, 61029 Urbino, Italy
Federica Frassati	Associated Scientist	federica.frassati@inaf.it INAF – Osservatorio Astrofisico di Torino Via Osservatorio 20, 10025 Pino Torinese (TO), Italy
Fabio Frassetto	Co-I	fabio.frassetto@pd.ifn.cnr.it CNR – IFN Via Trasea 7, 35131 Padova, Italy
Silvio Giordano	Associated Scientist	silvio.giordano@inaf.it INAF – Osservatorio Astrofisico di Torino Via Osservatorio 20, 10025 Pino Torinese (TO), Italy
Catia Grimani	Co-I	catia.grimani@uniurb.it Dip. di Scienze Pure e Applicate, Università di Urbino, Via Santa Chiara, 27, 61029 Urbino, Italy
Salvo Guglielmino	Associated Scientist	salvo.gugliemino@inaf.it INAF – Osservatorio Astrofisico di Catania, Via Santa Sofia 78, 95123 Catania, Italy
Giovanna Jerse	Co-I	giovanna.jerse@inaf.it INAF – Osservatorio Astronomico di Trieste, Via G.B. Tiepolo 11, 34143 Trieste, Italy
Federico Landini	Co-I	federico.landini@inaf.it INAF – Osservatorio Astrofisico di Torino Via Osservatorio 20, 10025 Pino Torinese (TO), Italy
Alessandro Liberatore	Associated Scientist	alessandro.liberatore@inaf.it INAF – Osservatorio Astrofisico di Torino Via Osservatorio 20, 10025 Pino Torinese (TO), Italy
Enrico Magli	Co-I	enrico.magli@polito.it Politecnico di Torino, Corso Duca degli Abruzzi 24, 10129 Torino, Italy
Giuseppe Massone	Co-I	giuseppe.massone@inaf.it INAF – Osservatorio Astrofisico di Torino Via Osservatorio 20, 10025 Pino Torinese (TO), Italy
Mauro Messerotti	Co-I	mauro.messerotti@inaf.it INAF – Osservatorio Astronomico di Trieste, Via G.B. Tiepolo 11, 34143 Trieste, Italy
Maurizio Pancrazzi	Co-I	maurizio.pancrazzi@inaf.it

		INAF – Osservatorio Astrofisico di Torino Via Osservatorio 20, 10025 Pino Torinese (TO), Italy
Maria G. Pelizzo	Co-I	maria.pelizzo@dei.unipd.it CNR-IEIIT via Gradenigo 6/B - 35131 Padova, Italy
Paolo Romano	Associated Scientist	paolo.romano@inaf.it INAF – Osservatorio Astrofisico di Catania, Via Santa Sofia 78, 95123 Catania, Italy
Giuliana Russano	Associated Scientist	giuliana.russano@inaf.it INAF – Osservatorio Astronomico di Capodimonte Salita Moiarello 16, 80131, Napoli, Italy
Clementina Sasso	Co-I	clementina.sasso@inaf.it INAF – Osservatorio Astronomico di Capodimonte Salita Moiarello 16, 80131, Napoli, Italy
Udo Schühle	Co-I	udo.schuehle@mps.mpg.de Max Planck Institute for Solar System Research, Justus-von-Liebig-Weg 3, 37077 Göttingen, Germany
Thomas Straus	Co-I	thomas.strauss@inaf.it INAF – Osservatorio Astronomico di Capodimonte Salita Moiarello 16, 80131, Napoli, Italy
Roberto Susino	Co-I	roberto.susino@inaf.it INAF – Osservatorio Astrofisico di Torino Via Osservatorio 20, 10025 Pino Torinese (TO), Italy
Daniele Telloni	Co-I	daniele.telloni@inaf.it INAF – Osservatorio Astrofisico di Torino Via Osservatorio 20, 10025 Pino Torinese (TO), Italy
Michela Uslenghi	Co-I	michela.uslenghi@inaf.it INAF – IASF Milano, Via Alfonso Corti 12, 20133 Milano, Italy
Cosimo A. Volpicelli	Key Person	cosimo.volpicelli@inaf.it INAF – Osservatorio Astrofisico di Torino Via Osservatorio 20, 10025 Pino Torinese (TO), Italy
Luca Zangrilli	Associated Scientist	luca.zangrilli@inaf.it INAF – Osservatorio Astrofisico di Torino Via Osservatorio 20, 10025 Pino Torinese (TO), Italy
Paola Zuppella	Co-I	paola.zuppella@pd.ifn.cnr.it CNR – IFN Via Trasea 7, 35131 Padova, Italy

Operations Team:
The operations team includes, for each RSW, the planners and the data validators, and are listed below (the publication policy described in Sec. 1.3 applies to the members of the operations team listed in the columns under Short term planning):

CRUISE PHASE				
LTP period	**Long term planning**	**Short term planning / IOR writing**	**IOR validation**	**Data verification and validation**
LTP01* (June 2020)	Andretta Spadaro	Sasso Susino	Nicolini Pancrazzi	Andretta
LTP02* (July-December 2020)	Andretta Spadaro	Sasso Susino	Nicolini Pancrazzi	Andretta
LTP03* (January-June 2021)	Andretta Spadaro	Landini Sasso Susino	Nicolini Pancrazzi	Andretta Jerse
LTP04* (July-September 2021)	Andretta Spadaro	Landini Jerse	Nicolini Pancrazzi	Burtovoi Capuano Giordano Guglielmino Liberatore Romano Russano Sasso Susino Zangrilli
LTP05* (October-November 2021)	Andretta Spadaro	Landini Sasso Susino Jerse Frassati	Nicolini Pancrazzi	Burtovoi Capuano Giordano Guglielmino Liberatore Romano Russano Zangrilli
NOMINAL MISSION PHASE				
The operation team is defined by STP in the table: NMP Operation Team				

(*) In case the UV data of the cruise phase are used, include Teriaca, Uslenghi, De Leo, Andretta (and Russano for LTP05)

Appendix C - Acknowledgments

Short version for Science papers:

Solar Orbiter is a space mission of international collaboration between ESA and NASA, operated by ESA. Metis was built and operated with funding from the Italian Space Agency (ASI), under contracts to the National Institute of Astrophysics (INAF) and industrial partners. Metis was built with hardware contributions from Germany (Bundesministerium für Wirtschaft und Energie through DLR), from the Czech Republic (PRODEX) and from ESA.

Long form for Acknowledgements in core papers:
Solar Orbiter is a space mission of international collaboration between ESA and NASA, operated by ESA. The Metis program is supported by the Italian Space Agency (ASI) under the contracts to the National Institute of Astrophysics (INAF): Accordi ASI-INAF N. I-043-10-0 and Addendum N. I-013-12-0/1, Accordo ASI-INAF N.2018-30-HH.0 and under the contracts to the industrial partners OHB Italia SpA, Thales Alenia Space Italia SpA and ALTEC: ASI-TASI N. I-037-11-0 and ASI-ATI N. 2013-057-I.0. Metis was built with hardware contributions from Germany (Bundesministerium für Wirtschaft und Energie (BMWi) through the Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)), from the Czech Republic (PRODEX) and from ESA.

In case Ester Antonucci is not in the list of authors add:
Metis team thanks the former PI, Ester Antonucci, for leading the development of Metis until the final delivery to ESA.

Appendix D – Tentative list of most relevant publications

“First” Metis papers include all names (Co-Is included)
First light (Solar Orbiter First results Issue 1)
First perihelia (25/3/22 0.32au, 12/10/22, 0.292au)
First out-of-ecliptic (2025)
First in-flight calibration

Author list: PI, paper authors, PO, Metis Core Team + full list of Co-Is
Long form for acknowledgments (Appendix C)

Instrument calibration papers (lead by a Team member)
On-ground calibrations
In-flight calibrations

Author list: paper authors, Metis Core Team
Long form for acknowledgments (Appendix C)

Relevant first Proceedings (lead by a Team member)

Author list: paper authors, Metis Core Team
Short form for acknowledgments (Appendix C)

First TT papers

Author list: TT Leader, paper authors, Metis Core Team
Long form for acknowledgments (Appendix C)

Science papers

Author list: Paper authors, (Metis Operations Team – see Appendix B)
Short form for acknowledgments (Appendix C)

Instrument papers

Author list: Paper authors
Short form for acknowledgments (Appendix C)