estec

European Space Research
and Technology Centre
Keplerlaan 1
2201 AZ Noordwijk
The Netherlands
T +31 (0)71 565 6565
F +31 (0)71 565 6040
www.esa.int

DOCUMENT

Sentinel-5 Precursor (S5P) Mission

Announcement of Opportunity

The Sentinel-5 Precursor Validation Team (S5PVT)

Prepared by	**Sentinel-5 Precursor Team**
Reference	**TBD**
Issue	**v.1.1**
Revision	
Date of Issue	**21/05/2014**
Status	**Approved/Applicable**
Document Type	**TN**
Distribution	

European Space Agency
Agence spatiale européenne

Table of contents:

1 DESCRIPTION OF THE OPPORTUNITY

The Announcement of Opportunity (AO) Call aims to engage leading expertise for the Calibration and Validation of the Sentinel-5 Precursor (S5P) in the mission validation team (S5PVT), providing independent experimental data, analysis and recommendations to critically assess the end-to-end performance of the instrument and its products

S5P will provide atmospheric composition measurements and is the first Copernicus Atmospheric Services mission to be implemented.

ESA develops the Sentinel-5 Precursor Mission in accordance with the provisions of the Declaration on the Copernicus Space Component Programme, which covers the development of a spacecraft, the accommodation of the payload, namely TROPOMI payload, a basic ground segment and the launch and in-orbit commissioning. In accordance with the Agreement between the Netherlands and ESA, the Netherlands Space Office (NSO) will provide, in the frame of the development of the Tropospheric Monitoring Instrument (TROPOMI) Instrument, the Ultraviolet-Visible-Near-Infrared (UVN) spectrometer module as a national contribution while ESA will provide the Short-Wave Infra-Red (SWIR) module. The Sentinel-5 Precursor TROPOMI payload is derived through tailoring of Sentinel-5 specifications with priority on spectral resolution, coverage, spatial sampling distance, signal-to-noise ratio and only high priority bands. More details about TROPOMI can be found in [RD-01]. It is a single-satellite mission counting as both a gap-filler and a preparatory programme covering product and applications definition for Sentinel-5 on Post-EPS.

With new sensor technology and retrieval approaches, there is the need to carefully assess the quality and validity of the generated data products, both before releasing them to the user community as well as throughout the exploitation phase of the mission. This AO for S5P is aimed at reducing the uncertainties in the S5P end-to-end system performance by thoroughly assessing all aspects of instrument performance and stability, accuracy and suitability of the data processing by comparison with independent measurements and analyses.

S5P will provide measurements of elements of atmospheric chemistry at high temporal and spatial resolution. Also, it will increase the frequency of cloud-free observations required for the study of the tropospheric variability. In particular it is expected to provide measurements of ozone (O_3), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), carbon monoxide (CO), methane (CH_4), formaldehyde (HCHO), aerosol and cloud properties

The S5P technical definition is based on Sentinel-4/5 Phase 0 studies and on complementary activities addressing such topics as suitable (small) platforms. It takes national developments into account, particularly those under the Netherlands TROPOMI programme, and iterates between design activities and requirement analyses, supported by expert groups, starting from the Sentinel-4/5 Mission Requirements Traceability Document (MRTD, [RD-02]) for the observation requirements to be met.

The key mission parameters for Sentinel-5 Precursor are a launch with Rockot within 2016, with a projected lifetime of 7 years (i.e. until Sentinel-5 to be launched on EPS-SG is operational). The orbit is sun-synchronous at 817 to 828 km altitude with a Mean Local Solar Time of Ascending Node Crossing of 13:35. S5P shall fly in loose formation with the NOAA/NASA Suomi-NPP (S-NPP) mission [RD-10]

2 LIST OF ACRONYMS

AO	Announcement of Opportunity
ATBD	Algorithm Theoretical Baseline Document
DLR	Deutsches Zentrum für Luft- und Raumfahrt (German Aerospace Center)
EPS	Eumetsat Polar System
ESA	European Space Agency
IOCR	In-orbit Commissioning Review
KNMI	Koninklijk Nederlands Meteorologisch Instituut (Royal Netherlands Meteorological Institute)
MLST	Mean Local Solar Time of Ascending
MRTD	Mission Requirements Traceability Document
NASA	National Aeronautics and Space Administration
NOAA	National Oceanic and Atmospheric Administration
NSO	Netherlands Space Office
S5P	Sentinel-5 Precursor
S5PVT	Sentinel-5 Precursor Validation Team
S-NPP	Suomi National Polar-orbiting Partnership
SRD	System Requirements Document
SWIR	Short-Wave Infra-Red
TBD	To be defined
TPM	Third Party Mission
TROPOMI	Tropospheric Monitoring Instrument
UVN	Ultraviolet-Visible-Near-Infrared
IOCR	In-orbit Commissioning Review

3 REFERENCE DOCUMENTS

The following documents provide valid background information for the activities solicited through this Announcement.

[RD-01] Veefkind, P.V. et al , 2012: TROPOMI on the ESA Sentinel-5 Precursor: A GMES mission for global observations of the atmospheric composition for climate, air quality and ozone layer applications. Rem. Sens. Environ., 120, 70-83 ; doi:10.1016/j.rse.2011.09.027.

[RD-02] GMES Sentinels 4 and 5 Mission Requirements Traceability Document, version: 1.0; EOP-SM/2413/BV-bv; 20 September 2012

[RD-03] S5P System Requirements Document (SRD) for Phases B2, C/D, E1, S5P-RS-ESA-SY-0002

[RD-04] Sentinel-5P L01B ATBD, S5P-KNMI-L01B-0009-SD

[RD-05] Sentinel-5P L01B Scientific Quality Requirements Document, S5P-KNMI-L01B-0008-RS

[RD-06] Level 2 Input/Output Data Definition - KNMI Products, S5P-KNMI-L2-0009-SD

[RD-07] Level 2 Input/Output Data Definition - DLR Products, S5P-L2-DLR-IODD-3002

[RD-08] Requirements for the Geophysical Validation of Sentinel-5 Precursor Products, S5P-RS-ESA-SY-164

[RD-09] Sentinel-5P Commissioning and CalVal Plan, S5P-PL-ESA-SY-166, version: 0

[RD-10] Suomi-NPP Mission Homepage at NASA, http://npp.gsfc.nasa.gov/suomi.html

4 SENTINEL-5 PRECURSOR MISSION OBJECTIVES AND DESCRIPTION

To support the users of the S5P mission, and in particular to support applications to this AO, the following documents have been prepared to provide a detailed description of the mission as a whole:

- Description of TROPOMI on-board the S5P satellite [RD-01]

- The Sentinel-4/-5 Mission Requirements Traceability Document (MRTD) [RD-02]. This document contains a description of the scientific context of the mission, the scientific and measurement objectives and how these are related, and an outline of the system and of the data products,

- The S5P System Requirements Document [RD-03] which translates the (scientific) Mission Requirements into (technical) requirements as orbit and attitude, instrument performance, operability, etc.,

- The S5P Level 1b Algorithm Theoretical Baseline Documents (ATBDs) provides background information about the scientific algorithms [RD-04]

- The S5P Level L01B Scientific Quality Requirements Document defines the quality requirements in order to meet the L2 product requirements [RD-04]

- The S5P Level 2 ATBDs (separate documents, per Level 2 target species), for details see list of references in [RD-8]

- The Level 2 Input Output Data Definition documents (IODDs) present and describe the input and output data of the S5P processing system [RD-06][RD-07]

- Requirements for the Geophysical Validation of Sentinel-5 Precursor Products [RD-08]

- The S5P Commissioning and Calibration and Validation Plan [RD-09]

5 OBJECTIVES OF THE OPPORTUNITY

The principal means to provide estimates of uncertainty for the end-to-end mission performance are by comparing the system outputs (NRT and off-line), to independent ground-based, airborne or satellite-based measurements, and detailed investigations of the retrieval methods applied to the target satellite measurements. The European Space Agency is announcing the opportunity for interested groups to participate in these activities. Specific areas in which the contribution of the participants is sought are:

- validation using other satellite, airborne or ground-based experiments providing independent measurements of atmospheric species' profiles, clouds and aerosols;
- experiments to assess accuracy, resolution, and stability of the TROPOMI instrument on-board S5P ;
- assessment and validation of the S5P retrieval and processing

ESA anticipates that this AO will stimulate the response from a wide cross-section of the international science community with experience in conducting field experiments and campaigns measuring atmospheric species' properties, and in geophysical research using remote sensing data. A primary objective of the AO process and its follow-up is to connect groups with field and satellite expertise, respectively, and to form an S5PVT. The AO is open to scientific and engineering groups and individuals worldwide, with group responses particularly welcome.

The ideas about the concrete needs have to be quite generic, keeping in mind that the S5P algorithm definition and processor development is an on-going task. However, the following (non-exhaustive) list of areas for investigation is expected:

- Assessment of methods / algorithms for instrument calibration
- Assessment of the effectiveness of the "geophysical corrections":
  - atmospheric correction (cloud, aerosol, backscatter,…)
  - sun illumination (day-light, eclipse)
  - importance of ground targets
- Assessment of localisation error, in particular bias and harmonics (e.g., by comparison with islands or other well behaved landmarks)
- Assessment of instrument stability
- Assessment of collocation error between S5P and SNPP
- Comparison of geophysical products with ground-based or airborne measurements (e.g., sondes)
- Comparison of geophysical products with ground-based or airborne measurements, considering scale issues ('representativity')
- Assessment of data bases used in processing
- Impact of auxiliary information used in the processing (temperature, backscatter data bases, …)
- Comparison with other space-borne sensors
- Analysis of "mixed background measurements": crossing lakes / rivers over land, coastal areas / islands over ocean

- Assessment of major error sources
- Error budget compilations

Principal Investigators (PIs) whose proposals are accepted will be invited to become members of the S5P Validation Team (S5PVT). Members of the S5PVT may expect to participate in some, or all, of the following activities:

- Integration of their proposed work within a wider scientific and technical framework, and the establishment of collaboration between specialists
- Participation in the establishment of detailed validation planning for the commissioning Phase E1 well in advance of the launch, presently planned for early-2016
- Participation in post-launch data product and retrieval algorithm validation, and on-going monitoring of satellite performance and data quality
- Participation in pre-launch rehearsal activities
- Support to ESA in the planning and execution of special satellite operations in conjunction with ground experiments
- Support to ESA in the definition, in the light of post launch experience, of reprocessing algorithms to be applied to the level 1b and 2b data
- Support to ESA in defining the exploitation validation activities for Phase E2
- Support to ESA in defining S5P/SNPP inter-comparison activities
- Support to ESA in dedicated S5PVT meetings and workshops

Members of the S5PVT will be expected to play an active role in the validation of data products. A description of their proposed contribution and experience forms part of the response to this AO.

Members of the S5PVT will have access to S5P data products starting at Level 1 up to Level 2. Also, it has to be noted that during the commissioning phase of the satellite, data access will be solely limited to the S5PVT members.

6 ORGANISATION OF ACTIVITIES

The S5PVT will be implemented along the following steps: :

1. Publication of the S5PVT AO call on the ESA EOPI Web Site
2. Submission of proposals by interested scientific groups and individuals
3. Review and evaluation of all proposals by ESA and associated experts for their quality and relevance to S5P (see section 8)
4. Confirmation by ESA on the acceptance of the proposals and invitation to participate to the S5PVT
5. Collaboration agreement between the S5PVT members and ESA

Following the evaluation of the responses to the AO and the confirmation of the selected proposals, the S5PVT will be established. The S5PVT, in conjunction with ESA, will plan and execute the calibration, validation and on-going monitoring of the S5P satellite system and data products. It is foreseen that the work of the S5PVT will require working meetings at intervals in addition to the reviews described above. It is intended that the first working meeting will be held approximately nine months before launch.

Funding of the activities solicited through this AO shall be covered by national/institutional resources. There will be no funding available via ESA.

6.1 Pre-Launch Activities (Phase D)

Prior to the satellite launch, the S5PVT will play an important part in the evolution of the S5P Validation Plan. This plan, to be consolidated in the 18 months prior to the launch, will identify the calibration and validation activities, the group or groups responsible for their implementation, their schedule, and, if needed, the related schedule of supporting satellite and/or ground segment operations. This plan and the state of readiness will be reviewed 3 months before launch at a dedicated Cal/Val Readiness Review Meeting. Further, in the frame of a pre-launch validation rehearsal, all interfaces to the validation teams will be tested.

6.2 Commissioning Phase (Phase E1)

During the commissioning phase that immediately follows the launch and is planned to last 6 months, the S5PVT will provide a first assessment of the data products, and report on instrument calibration activities where these have been performed. It may also be requested to support the check-out of the satellite-ground segment system. Note that data will not become available directly after launch, but in a staggered approach depending on the functional check-out of all space and ground segment elements. The S5PVT will provide input to the In-orbit Commissioning Review (IOCR), which will be held after completion of the commissioning phase.

6.3 Exploitation Phase (Phase E2)

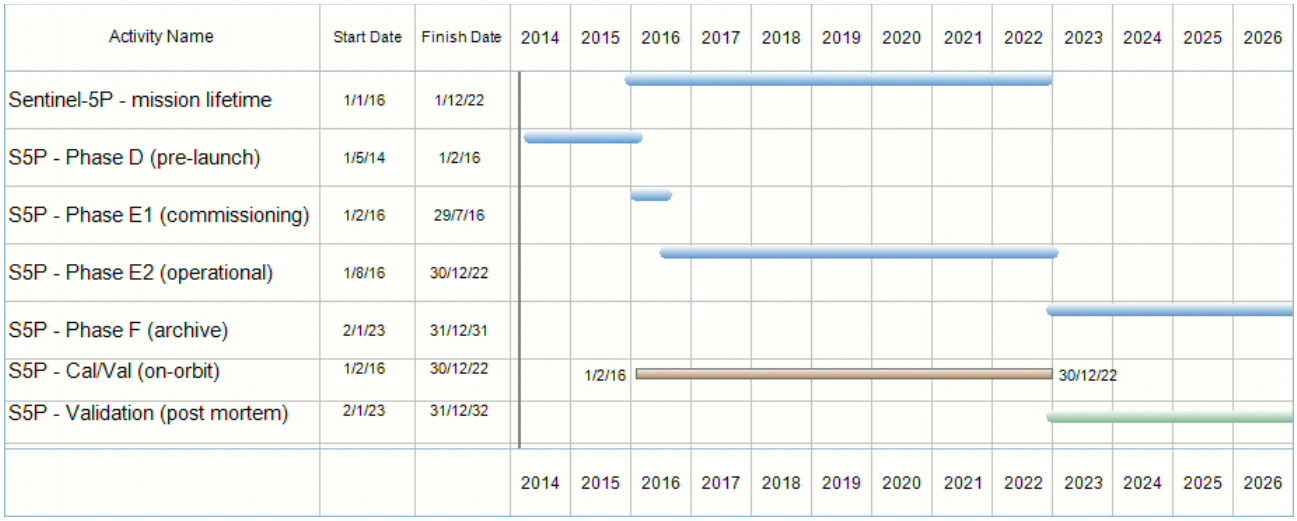
During the mission phase that follows, the S5PVT will continue to support the validation of the data products, investigations of retrieval algorithms and on-going monitoring of the instrument system and data products. In particular, the S5PVT will support the System

Performance and Retrieval Algorithm Workshop, which will consolidate the experience gained after approximately 18 months of S5P operation. A key outcome of the System Performance and Retrieval Algorithm Workshop will be a consolidated recommendation from the S5PVT as to the optimal Level 1b and Level 2b data retrieval algorithms with which to reprocess the data. The reprocessing of the entire data set is foreseen in the mission planning as TROPOMI is a new sensor.

It is anticipated that some validation activities, together with on-going system and data monitoring, may continue throughout the mission lifetime, nominally 7 years after launch. The key operational validation aspects will be covered in the frame of a S5P Mission Performance Centre, while further independent validation activities are supported in the frame of the S5PVT.

Figure 1 gives an overview over the various phases of the Cal/Val activities.

Figure 1: Sentinel-5Precursor Cal/Val Phases



7 GUIDELINES FOR PROPOSAL PREPARATION

The proposal can only be submitted in electronic form using the ESA AO Web site in a pre-defined format, see Appendix A. Detailed submission guidelines are available at:

https://earth.esa.int/aos/S5PVT

The call is open to all interested parties.

A 'fast track' evaluation is foreseen for Proposals that focus on the commissioning phase (Phase E1). Those proposals shall be labelled as 'fast track'. However, ESA reserves the right to change the 'fast track' classification if found not appropriate.

8 EVALUATION OF PROPOSALS

8.1 Evaluation Procedure

Proposals received in response to this Announcement of Opportunity will be reviewed by panels composed of:

- S5P Joint Project Team,
- S5P Mission Management, and
- Experts with widely recognised expertise in
  - atmospheric species observation techniques,
  - atmospheric composition retrieval,
  - geophysical validation and product content assessment,
  - atmospheric and climate services,
  - numerical weather prediction,
  - data assimilation,
  - and general observation techniques.

The experts will be appointed by the S5P Joint Project Team and S5P Mission Management.

8.2 Evaluation Criteria

The following criteria will be used in the evaluation of the proposals:

- relevance of the proposed project to the objectives of the S5P calibration, validation and/or retrieval activity
- contribution to the objectives of the S5P calibration, validation and/or retrieval activity
- scientific quality of the proposed activity
- background and experience of the proposers
- feasibility and probability of success
- credibility of proposed funding.

9 OVERVIEW OF AVAILABLE DATA

In support of the validation and algorithm development activities, ESA will make S5P data available to the investigators selected in response to this AO. In addition, ESA will make available data of other Earth Observation satellites where these are required in support of the validation and algorithm activities. The need for data from other satellite missions needs to be duly justified in the proposal. Such data will be made available free of charge. During the Commissioning Phase, data access will be restricted to Members of the S5PVT.

9.1 Sentinel-5 Precursor

Details of the S5P data products available to S5PVT Members are described in the Algorithm Theoretical Baseline Documents (ATBD's) [RD-04] and Input Output Data Definition documents (IODDs) [RD-06, RD-07] and are summarized in Tables 2 and 3.

Table 2: Sentinel-5 Precursor spectral ranges and performance parameters

Spectrometer	*UV*		*UVIS*		*NIR*		*SWIR*	
Band ID	1	2	3	4	5	6	7	8
Full Range [nm]	270–320		310-495		675-775		2305-2385	
Performance Range[nm]	270-300	300-320	320-405	405-495	675-725	725-775	2305-2345	2345-2385
Spectral Resolution FWHM [nm]	0.48	0.49	0.54	0.54	0.38	0.38	0.25	0.25
Spectral Sampling [nm]	0.071	0.073	0.22	0.22	0.14	0.14	0.10	0.10
Spectral Sampling Ratio	6.8	6.7	2.5	2.5	2.8	2.8	2.5	2.5
Slit Width [mm]	560	560	280	280	280	280	560	560
Spectral Magnification	0.327	0.319	0.231	0.231	0.263	0.263	TBD	TBD
Spatial Sampling at nadir [km2]	28x7	7x7	7x7		7x7	3.5x7	7x7	
Required Signal-to-noise	100-800	90-700	800-1000		100-500		100-120	

Table 3: Sentinel-5 Precursor Level 2 parameters. Note that only the "Mandatory Products" are foreseen to be provided from the S5P Ground Segment.

	Total Column	Tropospheric Column	Profile
Mandatory Products			
Ozone - O_3	Yes	Yes	Yes
Nitrogen dioxide - NO_2	Yes	Yes	No
Sulphur dioxide - SO_2	Yes	No	No
Formaldehyde - HCHO	Yes	No	No
Carbon monoxide - CO	Yes	No	No
Methane - CH_4	Yes	No	No
Aerosols *(aerosol index, layer height)*	Yes		
Clouds *(optical depth, layer height)*	Yes		
Optional Products			
UV Index	Yes	No	No
Aerosol Optical Depth AOD	Yes		
Water vapour - H_2O	Yes	No	No
Glyoxal – CHOCHO	Yes	No	No
Bromine monoxide - BrO	Yes	No	No
Chlorine dioxide - OClO	Yes	No	No
Deuterated water/water ratio - HDO/H_2O	Yes	No	No

As part of the proposal submission, applicants are requested to indicate their needs for satellite data products in terms of geographical areas but also data volumes. However, it is recognised that at this early stage in the mission, detailed understanding of the data products, and detailed campaign plans may be lacking. Consequently S5PVT Members will be required to refine their data requirements as part of the planning activity, also taking account of any constraints arising from the capabilities of the data processing and distribution facility.

The provision of data to S5PVT Members under this AO will need to satisfy the general Terms and Conditions covering Earth Observation data which are (for ESA) available at https://sentinel.esa.int/web/sentinel/sentinel-data-access and for the European Commission at http://newsletter.gmes.info/article/free-and-open-data-policy-copernicus . It is necessary for S5PVT members to satisfy these conditions (which are drawn up in agreement with member states) in order to receive data free of charge. It should be noted in particular that no data supplied in the framework of this AO may be transferred, sold or given to third parties other than approved co-investigators, without the written authorisation of ESA. Prior to receiving data, S5PVT Members will need to provide:

- confirmation of the funding of the project, where appropriate;
- confirmation of their acceptance of the Terms and Conditions for receiving the data;
- confirmation of agreement to the allocated data quantities and delivery conditions.

The Level 1b and 2b data will be available . Specification can be found in [RD 06, RD-07].

9.2 ERS

Products derived from the following instruments onboard the ERS-1 and ERS-2 satellites respectively launched in 1991 and 1995 can be made available to this opportunity:

- **Global Ozone Monitoring Experiment (GOME)**. It is a nadir-scanning ultraviolet and visible spectrometer for global monitoring of atmospheric Ozone on-board ERS-2. A key feature of GOME is its ability to detect other chemically active atmospheric trace-gases as well as aerosol distribution. More information on: https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/ers/instruments/gome

A detailed description of available ERS data products is provided at the address: https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/ers.

9.3 ENVISAT

Systematically available products derived from the following instruments onboard the ENVISAT satellite, in orbit since 1st March 2002, can be made available to this opportunity:

- **MEdium Resolution Imaging Specrometer Instrument (MERIS)**. It measures the solar radiation reflected by the Earth, at a ground spatial resolution of 300m and 1200m, in 15 spectral bands. It allows global coverage of the Earth in 3 days. All the Reduced Resolution data products will be made available to this AO, while only European coverage of Full Resolution products is envisaged for this opportunity.
- **Advanced Along Track Scanning Radiometer (AATSR)**. AATSR data have a resolution of 1 km at nadir, and are derived from measurements of reflected and emitted radiation taken at the various wavelengths. This instrument is designed to measure Sea Surface Temperature (SST) to the high levels of accuracy and precision requirement for the monitoring and detection of climate change.
- **Michelson Interferometer for Passive Atmospheric Sounding (MIPAS)**. It is a Fourier transform spectrometer for the measurement of high-resolution gaseous emission spectra at the Earth's limb. It operates in the near to mid infrared where many of the atmospheric trace-gases playing a major role in atmospheric chemistry have important emission features.
- **Global Ozone Monitoring by Occultation of Stars (GOMOS)**. It is the newest ESA instrument aiming at ozone monitoring. It is a tool to provide altitude-resolved global ozone mapping and trend monitoring with very high accuracy, as needed for the understanding of ozone chemistry and for model validation.
- **SCanning Imaging Absorption SpectroMeter for Atmospheric CHartographY (Sciamachy)**. Its primary mission objective is to perform global measurements of trace gases in the troposphere and in the stratosphere.

A detailed description of available ENVISAT data products is provided at the address: https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/envisat

9.4 Third Party Missions

ESA uses its multi-mission ground systems to acquire, process, archive and distribute data from other satellites - so called Third Party Missions (TPM). The data from these missions is distributed under specific agreements with the owners or operators of the mission, following the ESA Data Policy

- **ACE (Atmospheric Chemistry Experiment)**. ACE is a Canadian-led satellite mission that provides measurements leading to an improved understanding of the chemical and dynamical processes that control the distribution of ozone in the stratosphere. The ACE instruments are a Fourier transform infrared spectrometer, a UV/visible/near IR spectrophotometer and a two-channel solar imager, all working in solar occultation mode. ACE was successfully launched by NASA on August 12, 2003. Since June 2005 ESA is receiving data acquired by the Canadian SCISAT (ACE) satellite.
- **ODIN**. The Odin satellite is a new observatory in mm/sub-mm wave spectroscopy. Measurements in the wavelengths of 0.5 - 0.6 mm and 2.5 mm. These contain emission lines from molecules such as water vapour, molecular oxygen, ozone and carbon monoxide which are important for the study of atmospheric processes as well as for the study of astronomical objects. Complementary information on the Earth's atmosphere comes from spectral lines at UV and VIS wavelengths.
- **EPS MetOp (EUMETSAT Polar System Meteorological Operational satellite programme)**. MetOp data from the following instruments are offered in the frame of this opportunity: IASI, ASCAT, GOME-2, AVHRR, AMSU-A1, AMSU-A2, HIRS and MHS. Detailed information regarding MetOp instruments can be found at http://www.esa.int/esaLP/LPmetop.html. Further details on access to MetOp data will be communicated to selected PIs at a later stage.
- **AQUA OMI**. Available data are available either via TEMIS (http://temis.nl) or NASA (http://disc.sci.gsfc.nasa.gov/Aura/data-holdings/OMI). In addition, OMI station overpass data are publicly available from AVDC. Please see http://avdc.gsfc.nasa.gov/index.php?site=2045907950
- **GOSAT**. TANSO-FTS (Thermal And Near infrared Sensor for carbon Observation - Fourier Transform Spectrometer and TANSO-CAI (Thermal And Near infrared Sensor for carbon Observation - Cloud and Aerosol Imager) can be made available. In addition to the already available GOSAT level 1 and 2 data, the following GOSAT CAI and FTS Level 3 products can be made available, namely GOSAT TANSO-CAI L3 global radiance distribution, GOSAT TANSO-CAI L3 global reflectance distribution (clear sky), GOSAT TANSO-FTS L3 CH_4 global distribution (SWIR) and GOSAT TANSO-FTS L3 CO_2 global distribution (SWIR).

A detailed description of data products available via the ESA TPM scheme is provided at the address: https://earth.esa.int/web/guest/missions/3rd-party-missions/overview

In addition to the ESA Third Party Missions, the use of SNPP data is encouraged for the assessment of the geolocation error between S5P and VIIRS and the intercomparison of geophysical products of the two missions.

10 REPORTING

The progress and accomplishments of the proposals selected through this Announcement will be monitored by ESA. All selected projects will be required to submit periodic progress reports describing the status of their project and to prepare a final report at the end of the project period, in accordance with a given format to be defined by ESA. Recommendations for improvements in the system, e.g. processor updates, would be of particular importance. PI's may also be asked to present results or part of their results at a limited number of specialised workshops to be organised by ESA.

A key aspect of the Opportunity is that no data or products used or produced in the framework of any of the tasks, nor the scientific results derived thereof, shall be disseminated to external entities prior to approval by ESA.

Confidentiality can be requested when the proposal is submitted and should be supported by adequate justification. Confidentiality will be guaranteed during the course of the evaluation process. ESA, however, retains the right to, under any circumstances, use project data products at its discretion for any further data processing and/or data exploitation purposes.

Results of projects must also be provided in computer readable form to be defined by ESA, so that they may be made available to other users.

11 AO TIME TABLE

Release of the call (opening of Submission Website)	01 June 2014
Closing of the call (closing of Submission Website)	01 October 2014
Notification of 'fast track' evaluation results to PIs	01 December 2014
Notification of the evaluation results to PIs	31 January 2015
First S5PVT Workshop	July 2015
Start of ESA data delivery to accepted PIs	TBD (expected about 6 weeks *after* launch)
Projects completion (final reports)	Summer 2023

12 REQUESTS FOR INFORMATION CONCERNING THE AO

Further information regarding this Announcement may be found on the Web site dedicated to the S5P Announcement of Opportunity (https://earth.esa.int/aos/S5PVT) and can also be obtained from the EO Help Desk:

EO Helpdesk	EO User Interface http://eosupport.eo.esa.int/
ESRIN	email: eohelp@esa.int
Via Galileo Galilei – CP 64	Tel: +39 06 941 80 777
00044 FRASCATI	
ITALY	

APPENDIX A OUTLINE OF AN S5PVT AO PROPOSAL

Validation Project Title and acronym	Short title and acronym if relevant.
S5PVT Lead team member name and address	Contact details (First name – Last name – Affiliation – Email) of the S3PVT Lead team member
Support team-member names and addresses	Information (First name – Last name – Affiliation - Email) about each person involved in the proposal
Description of the team	Summary of the team composition and its strength.
Executive Summary of activity	Include: problem to be addressed, team description, approach taken and expected outcomes.
Introduction and Background	Relevance of the proposed activity to the objectives of S5P validation and/or retrieval activity
Statement of the validation activity	Clear statement of the problems to be addressed by the team in relation to S5P verification and validation. The statements shall include clear links to relevant S5P requirements
Aim and Objectives	Single aim statement and supporting objectives to reach the aim
Scientific Approach	Overview of the top-level approach taken
Scientific Methodology	Describe the proposed methodology to perform the work (e.g., field experiments, availability of and interdependencies from other data sources, infrastructures, etc.). Emphasis should be placed on the independent character of the validation.
Data	General overview of data requirements
S5P Data required	Please explain which S5P data products are required and why including a timeline and a rough order of magnitude for data volume to be provided. Statement of the validation activity
Third Party Mission (TPM) Data required	Access TPM data products, area of interest and timeline (rough order of data volume to be provided)
Other EO data	Please list any other EO data you plan to use
Validation Data to be collected	Summary of in situ and other validation data that will be collected during the project
Expected Results and outcomes from the work	Clear statements of expected outcomes from the activity
Planning and Reporting	Summary overview of planning and reporting for the project

Proposed schedule	Please provide a schedule for the project starting before the Mission launch
Availability of (e.g. national) funding	Please describe funding that you plan to use for this activity
Tools	Please list any supporting tools and processing software: processors, toolboxes, on demand processing infrastructure, network, interfaces, access to other than S5P data for validation activities.
Collaborative benefit derived from participation as S5PVT member	Please explain the benefits that you see to being part of the S5PVT.
Feedback to Agencies	Summary of expected results to be reported to on regular basis in shape of reports, cal/val data, feedback to QWG and attendance to validation meetings.
Fast Track	Label proposals which are expected to start during (or focus on) the commissioning phase (Phase E1)