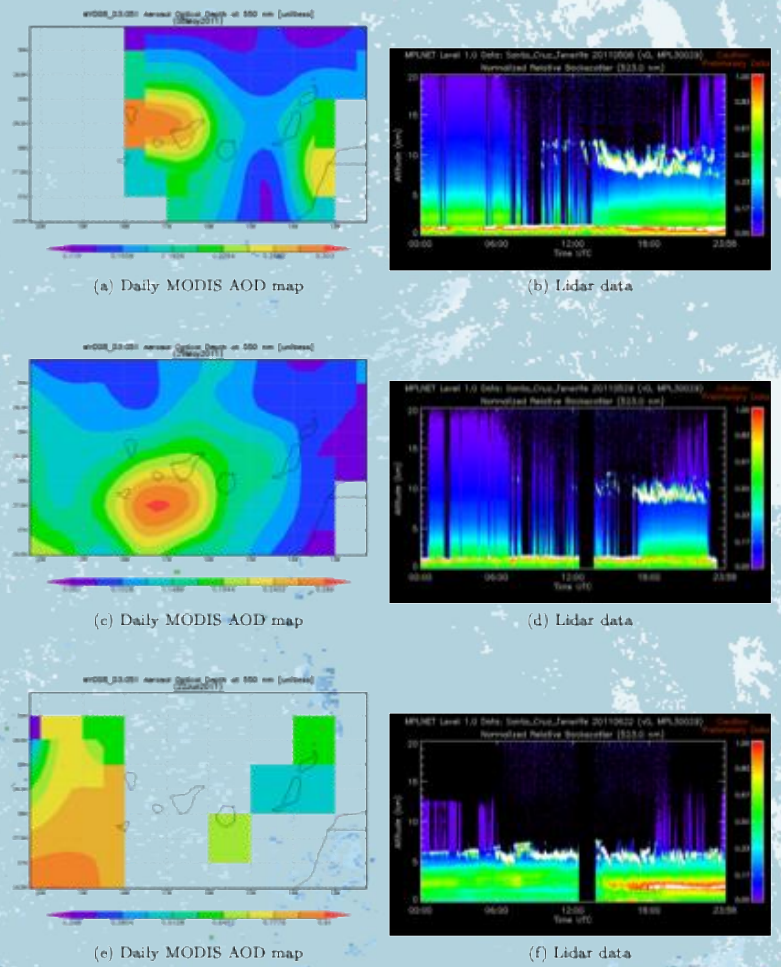
SCG activity and Support to COST Action CRIM "Climate Reference Instrument and Measurements”

Tom Gardiner, Arnoud Apituley



(a) Daily MODIS AOD map (b) Lidar data

(c) Daily MODIS AOD map (d) Lidar data

(e) Daily MODIS AOD map (f) Lidar data

Figure 2.10: Santa Cruz de Tenerife daily MODIS AOD map (left) and MPL lidar plot (right).

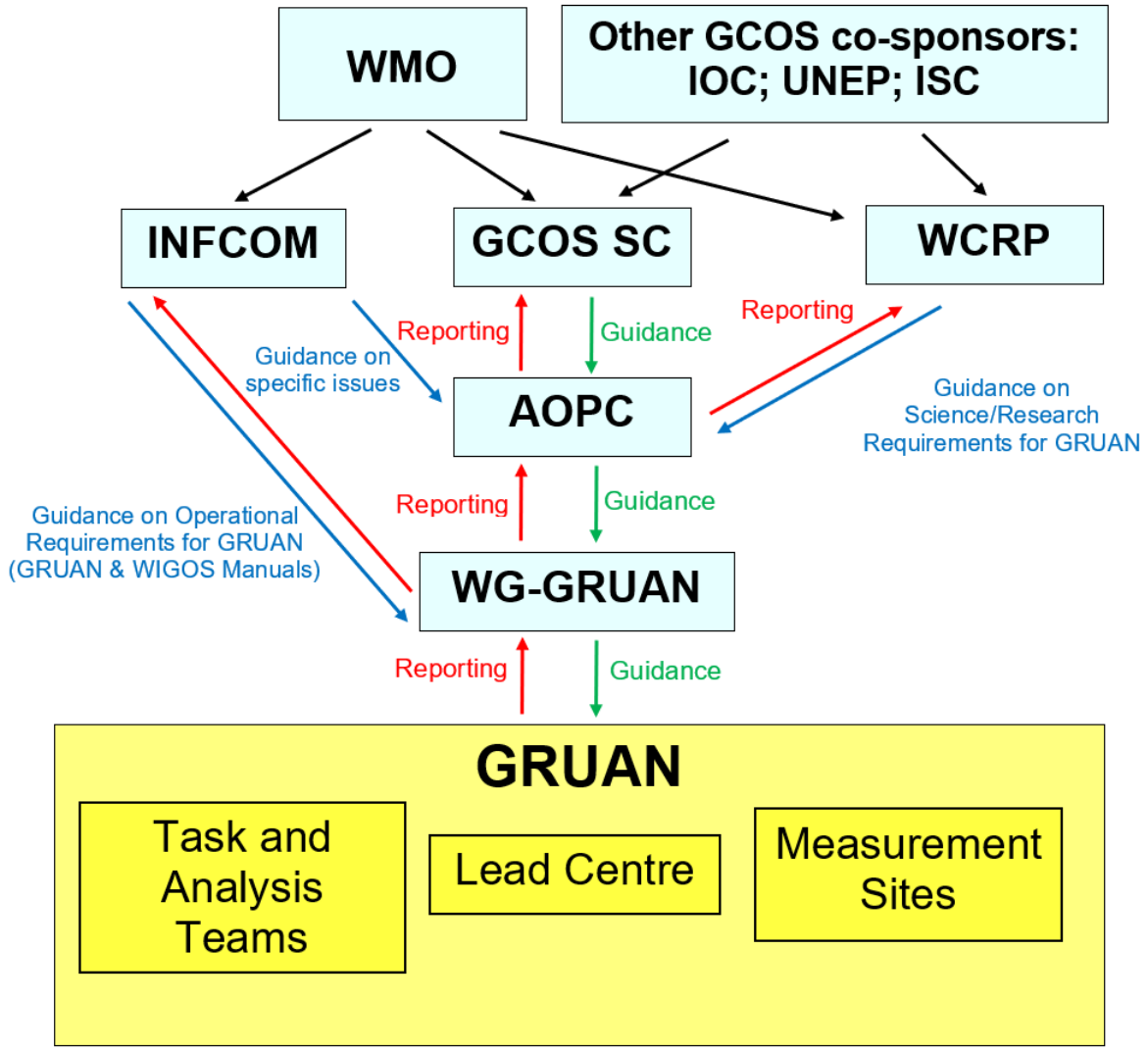
Sanders, A. F. J., de Haan, J. F., Sneep, M., Apituley, A., Stammes, P., Vieitez, M. O., Tilstra, L. G., Tuinder, O. N. E., Koning, C. E., and Veefkind, J. P.: Evaluation of the operational Aerosol Layer Height retrieval algorithm for Sentinel-5 Precursor: application to O_2 A band observations from GOME-2A, Atmos. Meas. Tech., 8, 4947–4977, https://doi.org/10.5194/amt-8-4947-2015, 2015.

- 2025-07-17 +

TROPOMI

0 Aerosol Layer Height [km] 12

+ −

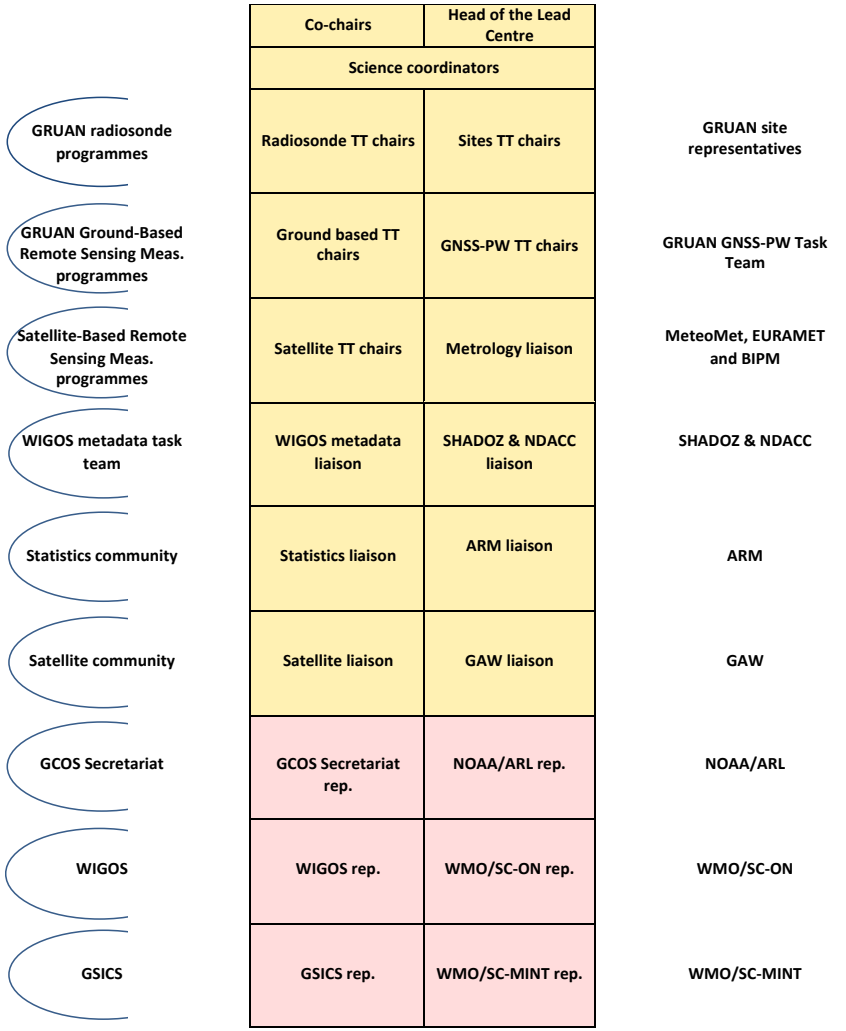


	Co-chairs	Head of the Lead Centre	
	Science coordinators		
GRUAN radiosonde programmes	Radiosonde TT chairs	Sites TT chairs	GRUAN site representatives
GRUAN Ground-Based Remote Sensing Meas. programmes	Ground based TT chairs	GNSS-PW TT chairs	GRUAN GNSS-PW Task Team
Satellite-Based Remote Sensing Meas. programmes	Satellite TT chairs	Metrology liaison	MeteoMet, EURAMET and BIPM
WIGOS metadata task team	WIGOS metadata liaison	SHADOZ & NDACC liaison	SHADOZ & NDACC
Statistics community	Statistics liaison	ARM liaison	ARM
Satellite community	Satellite liaison	GAW liaison	GAW
GCOS Secretariat	GCOS Secretariat rep.	NOAA/ARL rep.	NOAA/ARL
WIGOS	WIGOS rep.	WMO/SC-ON rep.	WMO/SC-ON
GSICS	GSICS rep.	WMO/SC-MINT rep.	WMO/SC-MINT

Source: ToR_WG_Gruan

Task

- The GRUAN Scientific Coordination Group (SCG) guides the initiation and undertaking of specific research projects in support of GRUAN operations with final aim to stimulate the usage of the GRUAN data and enhance its impact in the broadest community of potential end-users, within and outside the academy/research realm.

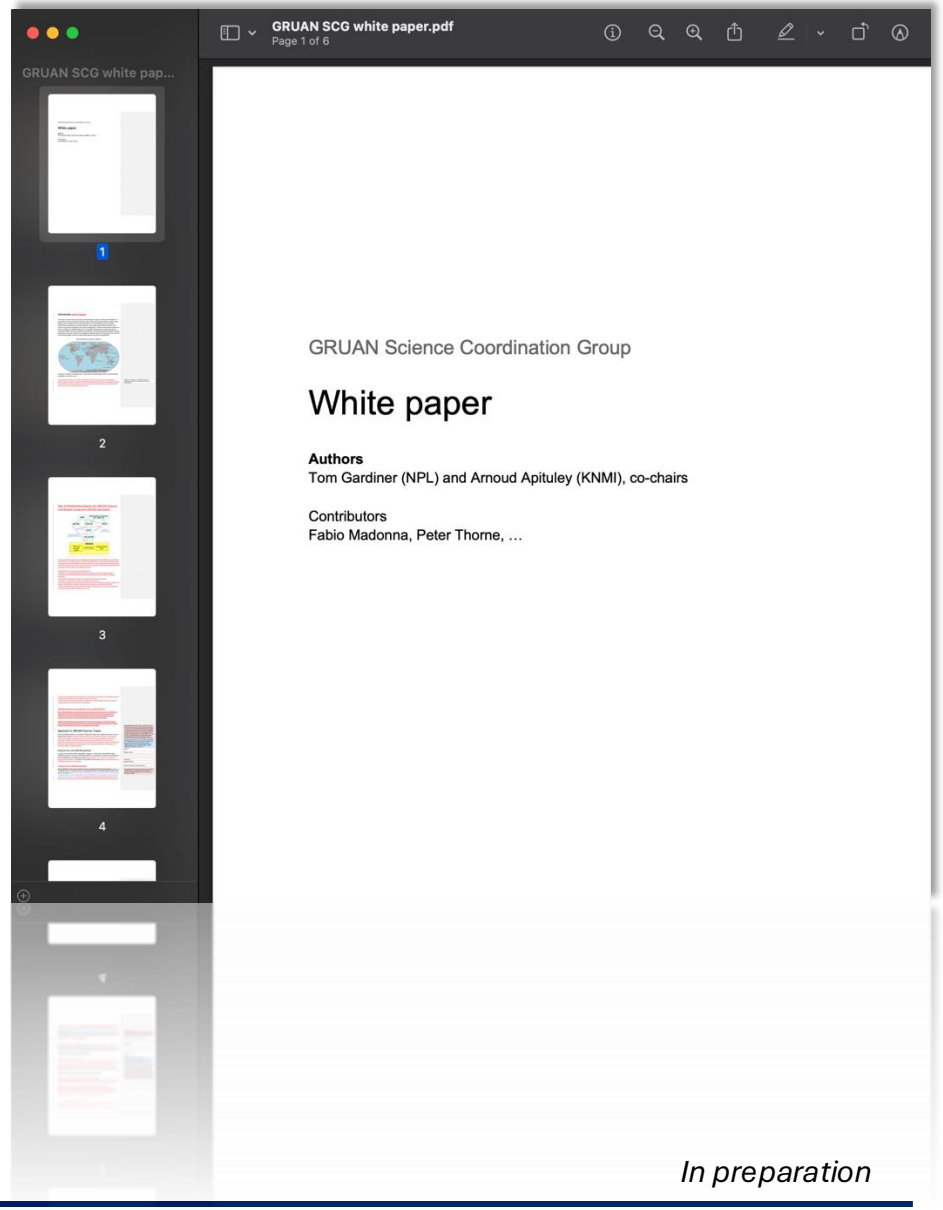


Responsibilities

- Establish and oversee the GRUAN Scientific Coordination Group (SCG) by ensuring contributions from GRUAN scientists and by selected scientists from outside the GRUAN community.
- Provide and update the description of the SCG mission and scope of work.
- Coordinate the assignment of tasks to specific SCG members.
- Monitoring progress in the assessment of scientific topics, identified by the SCG, related to the usage of GRUAN Data Products (GDPs) and the consistency among different GDPs.
- Liaise with GRUAN Task Teams to transfer relevant knowledge and encourage collaborative scientific activities across the GRUAN community.
- Oversee funding opportunities of interest for the GRUAN community and coordinate proposal initiation with the support of the GCOS Sec and the co-chairs.
- Work with the liaison representatives to engage with external GRUAN user communities to identify relevant scientific activities and challenges.

Approach

- The GRUAN network is voluntary a collaborative effort
  - Most activities shall have to rely on opportunistic funding
  - Projects from
    - non-GRUAN partners
    - GRUAN partners
- SCG co-coordinators shall
  - oversee the coordinated effort with the GRUAN community to apply for funding opportunities, and
  - coordinate the community effort to initiate proposals.
- Work from
  - Inventory or catalogue of science questions
  - Liase with/participate in Task Team meetings to fill the catalogue
  - Recommendations for future work highlighted in international reviews.



In preparation

Initial Catalogue

1. Demonstrate the value of reference networks in support of baseline/comprehensive radiosounding capabilities or other observing networks.
2. Using GDPs for estimating climate trends.
3. Demonstrate the added value of GDPs in quantifying climate indicators (e.g., QBO, tropical or full arctic amplification).
4. Using GDPs for the evaluation of atmospheric reanalysis and historical climate model simulations and for quantifying their uncertainties.
5. Assess the impact of robust uncertainties in atmospheric datasets to properly capture the magnitude of extreme weather and climate events.
6. Integration of GDPs with RTMs to support satellite cal/val including development of GDP covariance matrices.
7. Develop applications using GPDs as the backbone of a broader observing network of data using machine learning.
8. Estimate how tropospheric water vapor is affected by tropical cyclones or typhoons during the GRUAN era.
9. Impact of using GDPs in engineering hydrological models for better quantifying uncertainties in hydrologic prediction and manage risks.

Projects

- GaiaClim
- VICIRS
- CRIM
- MetCTG
- EUMETRAVES
- Copernicus C3S
- …

VICIRS_D17
Ref: EUMETSAT ITT 22/224312
Contract EUM/CO/22/4600002714/FDA
Order n°. 4500023431

VICIRS
Development of vicarious calibration tools for MWI and ICI using radiosoundings (VICIRS)

EUMETRAVES (EUMETSAT Radiosondes Validation Support for Earth-Observing Satellites)

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"Climate Reference Instrument and Measurements"

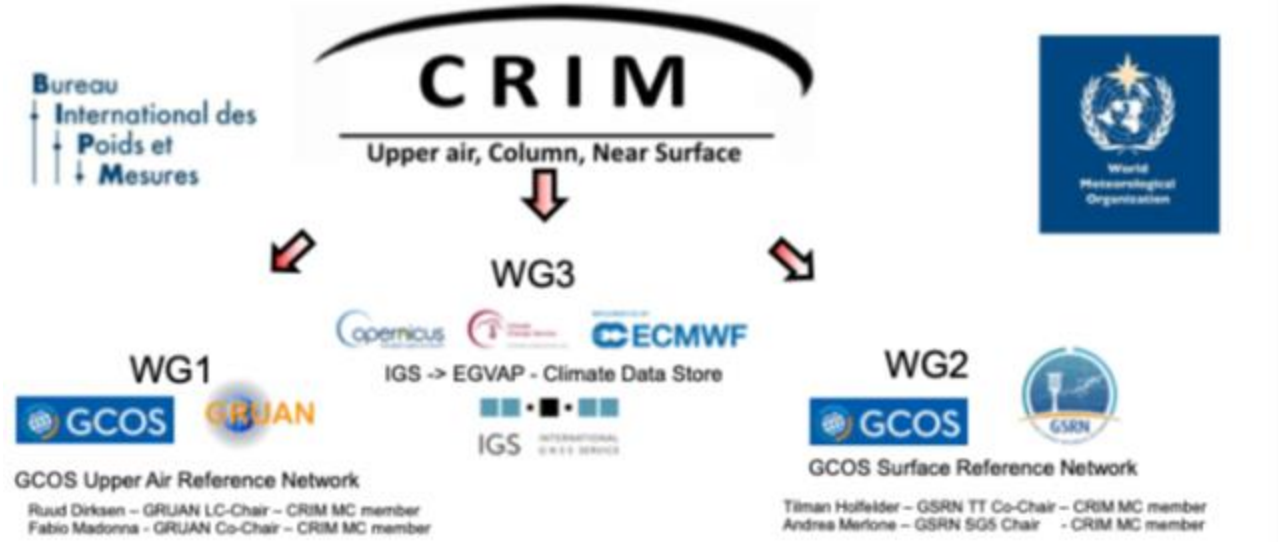
The main aim and objective of the Action is to foster collaboration and harmonisation among researchers, institutions, and stakeholders across Europe, and beyond, to enhance quality, reliability, and credibility of observational data in climate science. The final aim is to improve confidence in detecting climate trends and predicting severe events.

The key goals of CRIM are:

1. Metrological traceability to SI units
2. Uncertainty quantification and communication
3. Streamlining existing reference networks, optimising network design and coverage, and disseminating best practices
4. Capacity building and knowledge exchange
5. Engagement with stakeholders, manufacturers and end-users

Working groups

1. Enhancing upper-air radiosonde and lidar measurements for climate study
2. Metrology for near-surface climate reference sites
3. Metrology for GNSS water vapour measurements and retrievals
4. Dissemination and Knowledge transfer



Leadership

Role	Leader
Action Chair	Dr Andrea MERLONE
Action Vice-Chair	Dr Aleksandra KOWAL
Science Communication Coordinator	Dr Jonathan JONES
Grant Awarding Coordinator	Dr Laura Teresa MASSANO
WG1 Leader	Mr Arnoud APITULEY
WG2 Leader	Dr Branislava LALIC
WG3 Leader	Prof Emine TANIR KAYIKÇI
WG4 Leader	Dr Monica PROTO

Additional roles

Role	Leader
WG1 Vice Chair	Dr Ruud DIRKSEN
WG2 Vice Chair	Dr Andrea MERLONE
WG3 Vice Chair	Dr Anna KLOS
WG3 Vice Chair	Dr Karin KOLLO
WG4 Vice Chair	Dr Peter PAVLASEK
Technology Transfer Officer	Prof Fabio MADONNA

Working Group 1

Enhancing upper-air **radiosonde** and **lidar** measurements for climate study

- Traceability and quality o f upper-air radiosonde and lidar measurements
    1. Support the development of end-to-end guidelines and standardised protocols for upper-air
    2. radiosonde and lidar measurements and their processing, ensuring traceability to Sl or community standard
    3. Analyse the impact of calibration methodologies on data accuracy and consistency
    4. Provide a quality assurance framework for those measurements

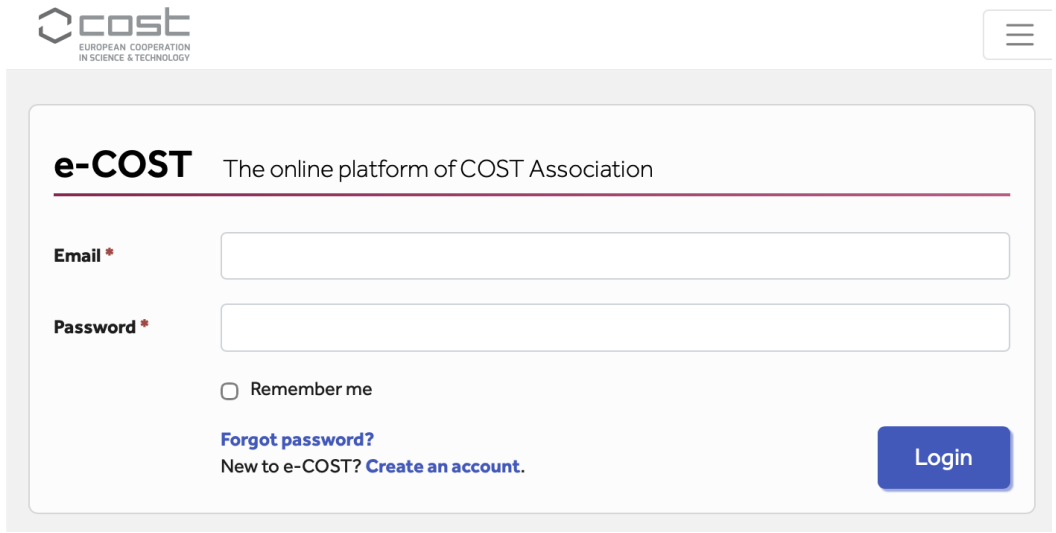
Working Group 3

Towards a better quality of GNSS-PWV

1. Estimating the quality of current GNSS-PWV values collected by single GNSS receivers.
    1. Benchmarking the GNSS processing types and GNSS stations towards a better quality of GNSS-PWVs.
    2. Create guidelines for processing the GNSS observations to meet the requirements of end-users.
2. GNSS uncertainty quantification and communication
    1. Quantifying the exact GNSS-PWV uncertainties from both instrumental and natural variability perspectives, with a detailed indication of the impact of these uncertainties on the parameters determined for weather and climate analyses.
    2. Create guidelines for communicating GNSS-PWV uncertainty.

Networking Tools

Working group membership



https://www.cost.eu/actions/CA24155/#tabs+Name:Working%20Groups%20and%20Membership

CRIM
CLIMATE REFERENCE INSTRUMENTS AND MEASUREMENTS

The Metrology for Comparable and Trustworthy Greenhouse Gas Remote Sensing Datasets (24GRD06 MetCTG) project

Project lead: Gang Li

WP leaders: Roman Ciurlyo, Ha Tran, Frank Hase, Tom Gardiner, Marc Coleman, Gang Li, Manfred Birk, Andre Butz, Rainer Stosch

MetCTG consortium(*)

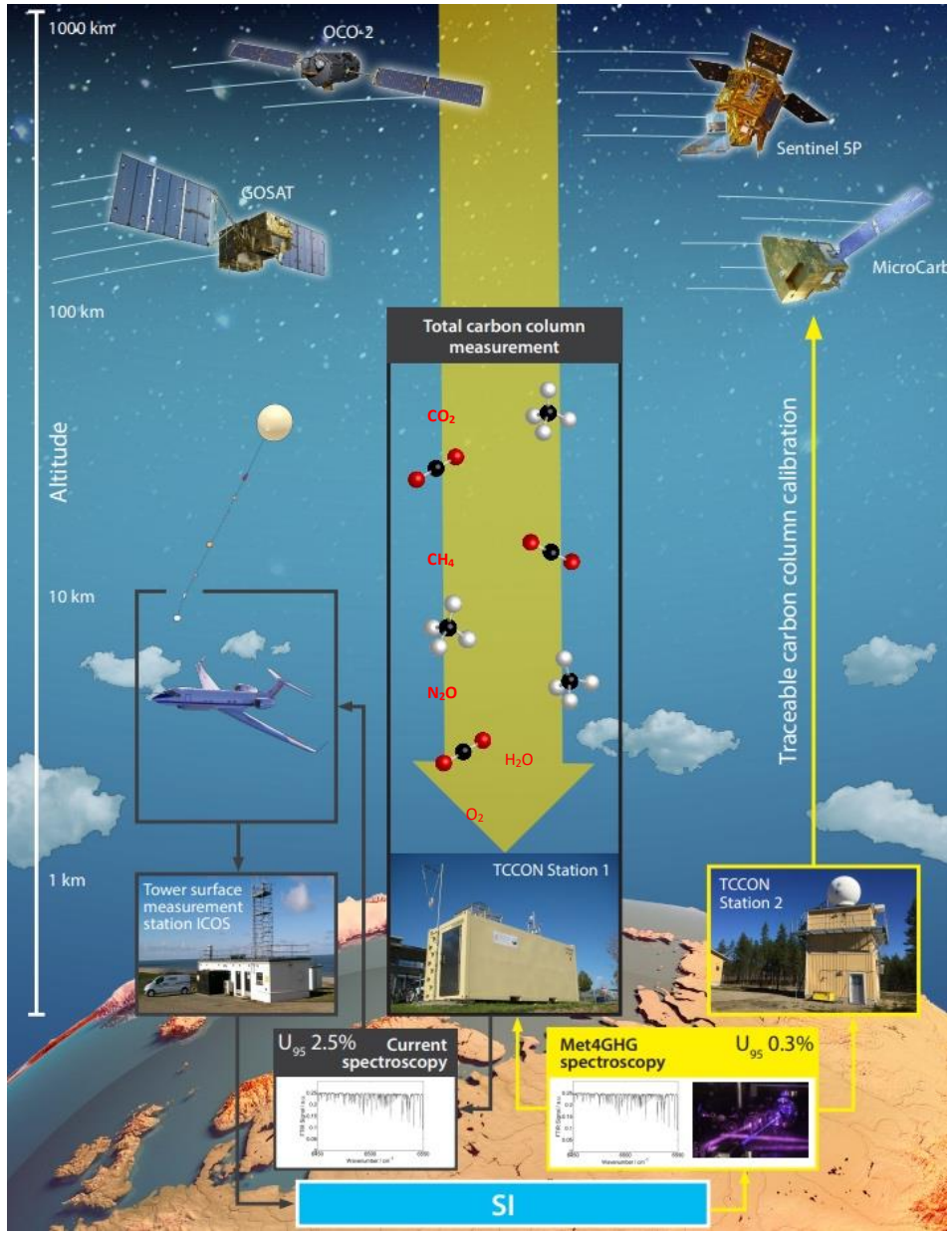
MetCTG consortium: A.Campargue, A.Butz, A. Whitehill, B.Simone, B. Tuzson, C.Monte, C.Nehrbass-ahles, C.Rennick, C. Gozonunde, D.Fiest, D.Mondelain, D.Lisak, D.Prudenzano, D.Taubert, D.Enescu, F.Hase, F.Durbiano, F.Rolle, G.Li, G.Wagner, G.Beltramino, H.Tran, H.Nasibli, H-J. Eun, J.Seppa, J.Mohn, J.Harrison, J.Chen, J.Tennyson, K-Y. Hong, L.Rosso, M. Sega, M.Birk, M.Coleman, M.Chomski, M. Gruszczynski, O.Polyansky, P.Brewer, P.Maslowski, P.Glowacki, P. Siegwolf, R.Armante, R.Ciurylo, Rigel.Kivi, R.Pearce, R.Stosch, S.Lee, S.Kassi, T.Gardiner, V.Fernicola

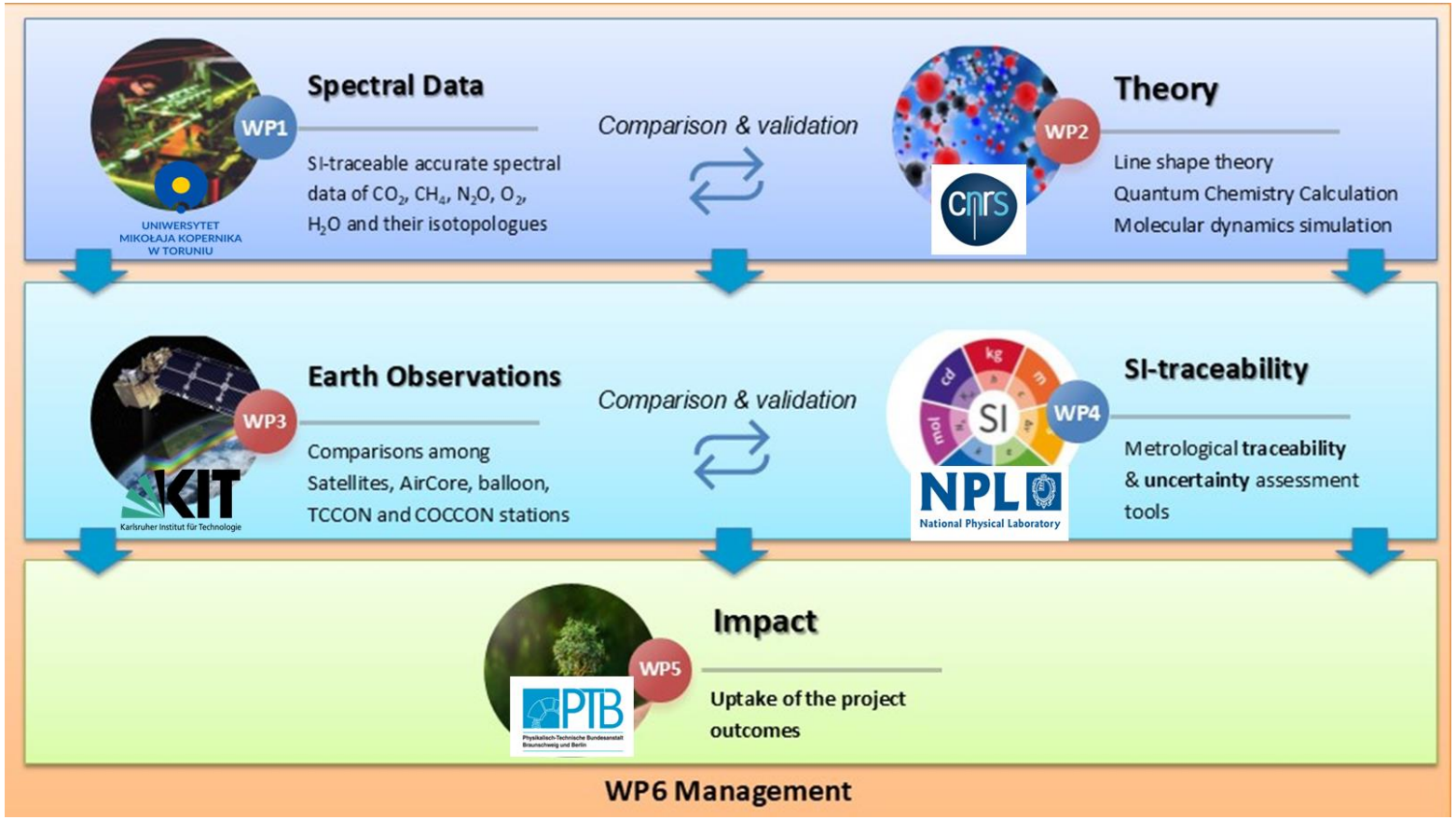
METROLOGY PARTNERSHIP | EURAMET

EUROPEAN PARTNERSHIP

Co-funded by the European Union

MetCTG Objectives and WP structure





Next steps

1. Tracking the developments and progress in ongoing projects
2. Participate in Task Team meetings
    1. Interact about potential focus areas
    2. Shared effort betweem SCG co-chairs and GRUAN co-chairs