

GAIA-CLIM

Project overview

April 29th 2016

Peter Thorne

With thanks to Anna Mikalsen, Fabio Madonna, Karin Kreher, Jean-Christopher Lambert, Bill Bell, Joerg Schulz, Martine de Maziere



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 640276.

www.gaia-clim.eu

GAIA-CLIM in one slide

- Three year project (3/15-2/18) €6 million H2020 EO
- Aim is to improve use of non-satellite measurements to characterise, calibrate and validate satellite measurements
- 18 partners
- 7 Work packages (incl. management)
- Aims to ensure best metrological practices followed
- Makes use of Statistical, modelling and Data Assimilation tools
- Principal user outcomes a Virtual Observatory tool and documentation of gaps and remedies w/prioritisation



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 640276.

www.gaia-clim.eu

WP1: Mapping capabilities

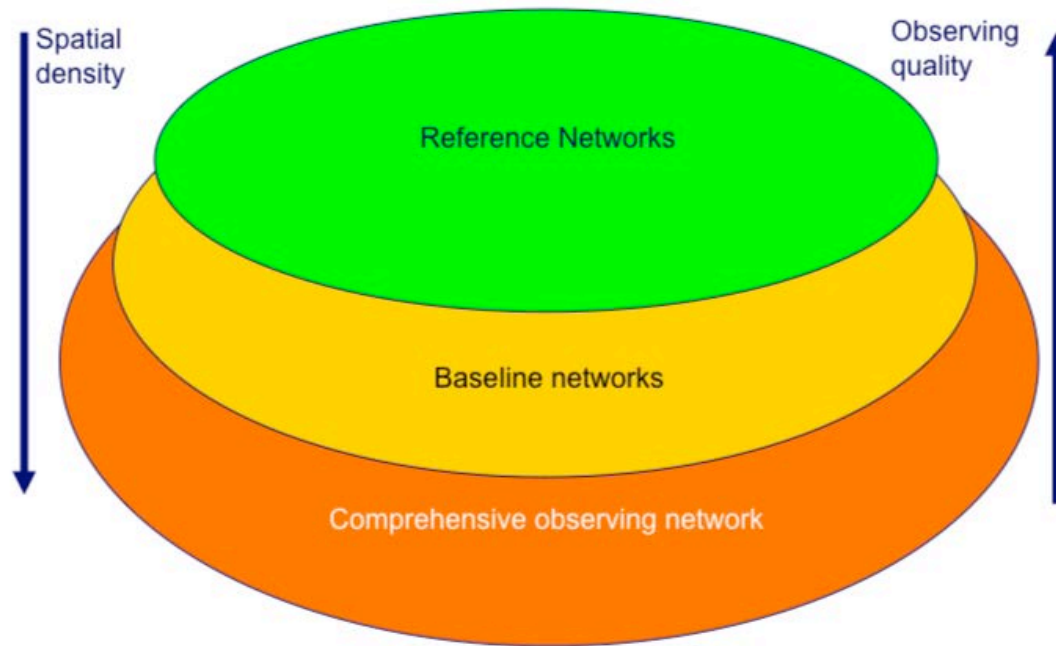
- Define tiers of data quality based upon their characteristics
- Assess existing measurement capabilities
- Map these capabilities
- Provide mapping tool to visualize the capabilities
- Assess geographical gaps in capabilities



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 640276.

www.gaia-clim.eu

A tiered system of systems approach



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 640276.

www.gaia-clim.eu

Assessing measurement maturity

- Deliverable has been recently submitted that:
 - Outlines the three tiered concept viz. the defining characteristics of measurements contributing to each tier.
 - Proposes assessment of measurement maturity against assessable metrics in the following areas:
 - Metadata
 - Documentation
 - Uncertainty characterisation
 - Public access, feedback, and update
 - Usage
 - Sustainability
 - Software (optional)



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 640276.

www.gaia-clim.eu

Within each assessment strand

- Several distinct assessment criteria
- Objectively assessable aspects of measurement system maturity
- Resulting scores align to different tiers
 - 1-2 is comprehensive type
 - 3-4 is baseline type
 - 5-6 is reference type
- Assessment likely needs mix of internal and external experts



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 640276.

www.gaia-clim.eu

Metadata	Documentation	Uncertainty charaterisation	Public access, feedback and update	Usage	Sustainability	Software (optional)	
Standards	Formal Description of Measurement Methodology	Traceability	Access	Research	Siting environment	Coding standards	
Collection level	Formal Validation Report	Comparability	User feedback mechanism	Public and commercial exploitation	Scientific and expert support	Software documentation	
File level	Formal Measurement Series User Guidance	Uncertainty Quantification	Updates to record		Programmatic support	Portability and numerical reproducibility	
		Routine Quality Management	Version control				Security
			Long-term data preservation				
Legend							
1	2	3	4	5	6	Not applicable	



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 640276.

www.gaia-clim.eu

Workshop at KNMI May 4th

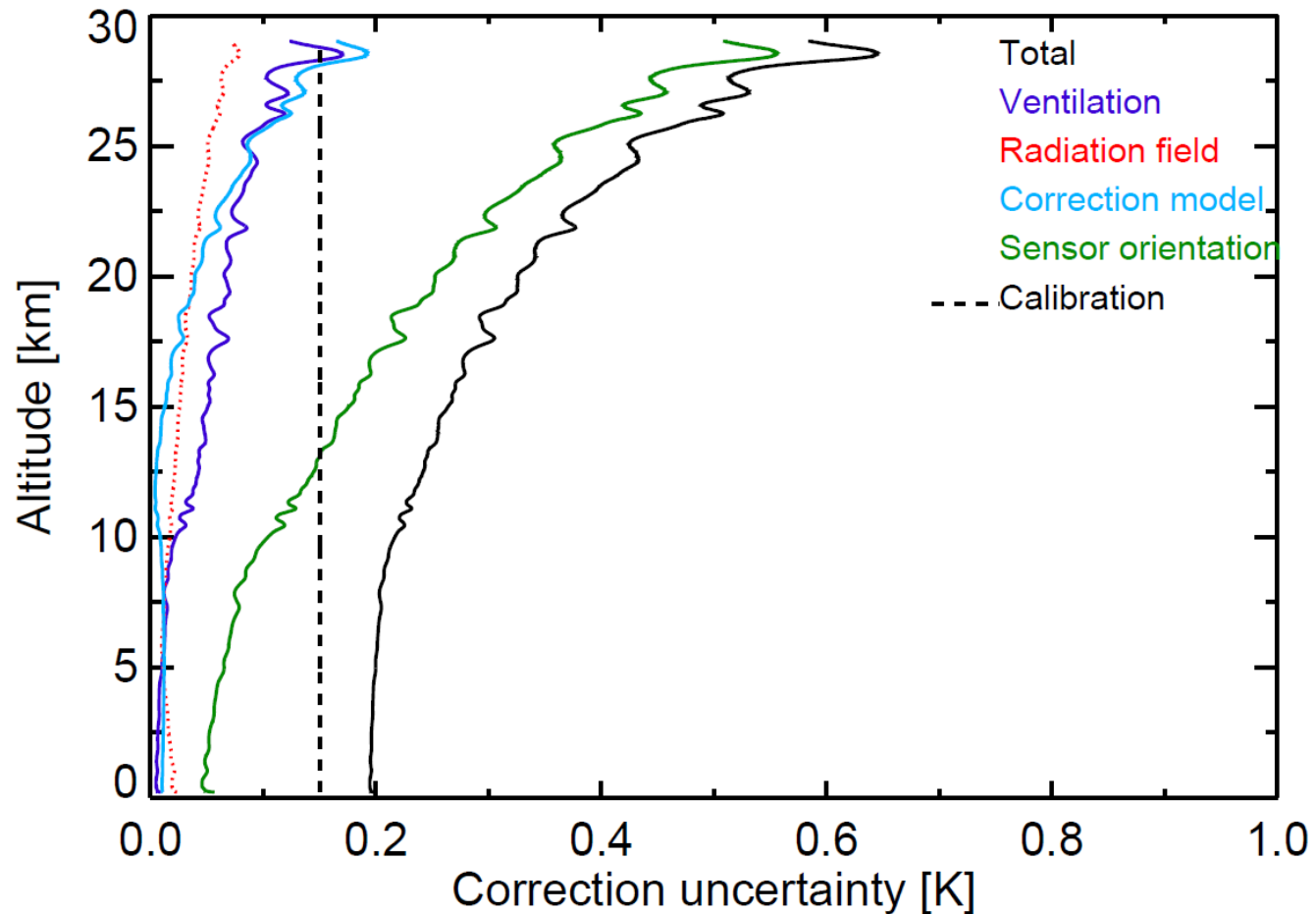
- Will attempt to complete and compare assessments of maturity for about 55 observing networks
- Feedback may yield modifications to guidance
- Outcomes shall inform the downstream uses within GAIA-CLIM
- Assessments shall be provided back to at least a subset of the networks
- Open Q. Can the assessment process provide prioritisation of development activities within networks?



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 640276.

www.gaia-clim.eu

WP2: Quantifying measurement uncertainties



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 640276.

www.gaia-clim.eu

Instruments / programme	T	q	CO ₂	CH ₄	O ₃	Aerosols	CO	HCHO	NO ₂
Pre-existing / already in process on GAIA-CLIM timescales									
Radiosondes (RS92 and various others)									
Frostpoint hygrometer sondes									
Ozonesondes									
QA4ECV project (various instruments)									
Planned in GAIA-CLIM									
Lidars									
Microwave radiometers									
FTIR / FTS									
UV/visible spectroscopy									
MAX-DOAS/Pandora									
GNSS-PW									



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 640276.

www.gaia-clim.eu

WP3: Measurement mismatch uncertainties

- Satellites and other measures will never measure the exact same volume over the exact same interval.
 - Differences in time of observation
 - Differences in horizontal geolocation
 - Differences in vertical registration
 - Differences in vertical smoothing
 - Differences in horizontal smoothing
 - Vicarious data issues such as cloud impacts if comparing to radiances in the IR spectrum.

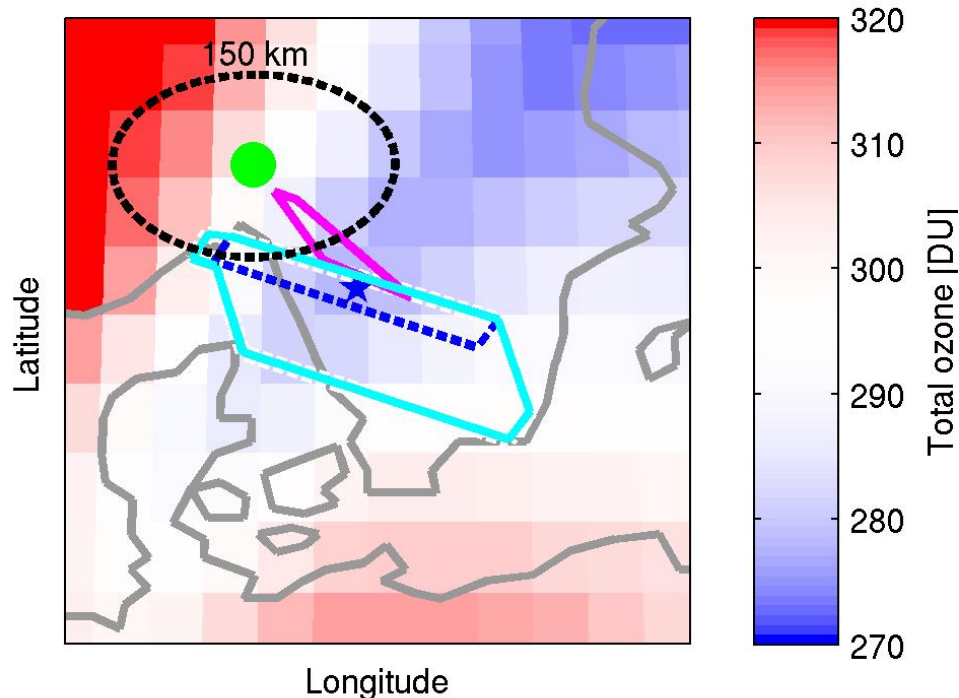


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 640276.

www.gaia-clim.eu

Horizontal smoothing examples

Co-location at Harestua, 23-Dec-2007



- Station zenith: 309.6 DU
- ZSL-DOAS footprint: 299.0 DU
- - - GOME-2A pixel: 305.6 DU
- GOME-2A full footprint: 302.2 DU



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 640276.

www.gaia-clim.eu

WP4: Use of data assimilation as integrators

- Investigate the value of use of data assimilation and reference quality measurements
 - Constrain / better understand biases in data assimilation
 - Propagate information from point measures to more regionally / globally complete estimation
 - Use in both NWP and reanalyses to be investigated



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 640276.

www.gaia-clim.eu

WP4 outcome

- GRUAN data processor to convert to level1b radiances
- http://www.gaia-clim.eu/system/files/publications/Carminati_2016.pdf
- Does it account for correlation structures though viz. Xavier's talk?
- Could help by providing NWP view on the RS92 bias?



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 640276.

www.gaia-clim.eu

WP5: Virtual observatory

- Make the outcomes of previous WPs useable and actionable (working w/NPROVS!)
 - Collocation database build
 - Availability of Level 1 (radiance) / 2 (geophys retrieval) satellite to in-situ data comparisons including uncertainties
 - Graphical display and user interface
 - Build with expectation of becoming a sustainable service



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 640276.

www.gaia-clim.eu

WP6: Outreach and gaps analysis

- User survey (completed 2015)
- Series of three user workshops
 - Italy, October 2015
 - Brussels, October/November 2016 (TBC)
 - Late 2017 (TBC)
- User workshops to gain feedback on what we have done, how to prioritise gaps identified.
- Living Gap Analysis and Impacts Document
- Final set of prioritised recommendations for future work to address key gaps (to start in 2017, deliver at project end)



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 640276.

www.gaia-clim.eu

Gaps Analysis and Impacts Document

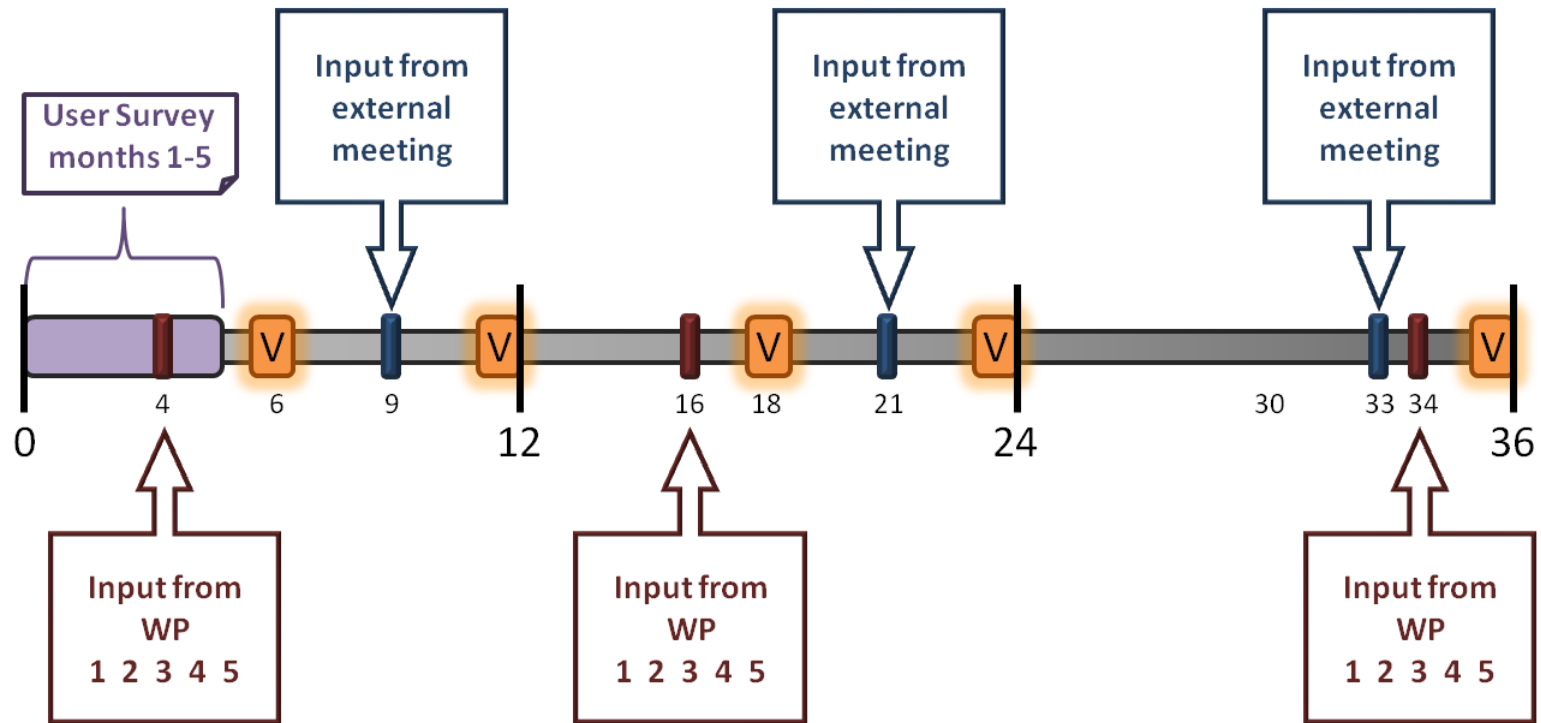
- Gaps in geographical coverage and their impacts
- Gaps in knowledge of measurement properties and uncertainties
- Gaps in understanding of the impact of measurement mismatches
- Open issues regarding how to use dynamical model and data assimilation techniques as integrators
- Issues that remain in enabling easy use of reference quality measures as cal/val tools.
- Gaps between user needs and current observational and analysis capabilities
- Consideration to the somewhat fractured nature of observing systems.
- Gaps in governance



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 640276.

www.gaia-clim.eu

Gap assessment is iterative with community



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 640276.

www.gaia-clim.eu

Input to the GAID

- We have set up a website area and feedback form that you can use to provide feedback on this document as it evolves
- The document will benefit if there is broad review by the community – this is explicitly not intended as an internal only document
- Please visit <http://www.gaia-clim.eu/page/gaid>



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 640276.

www.gaia-clim.eu

Thanks for your attention

www.gaia-clim.eu

@gaiaclim



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 640276.

www.gaia-clim.eu