



**Seventh workshop
on the
GEWEX water vapor assessment**

Workshop summary

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Deutscher Wetterdienst
Wetter und Klima aus einer Hand



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1. Overview

The GEWEX Data and Assessments Panel (GDAP) has initiated the GEWEX Water Vapor Assessment (G-VAP) in 2011. The major purpose of G-VAP is to quantify the state of the art in water vapour products being constructed for climate applications, and by this supports the selection process of suitable water vapour products by GDAP for its production of globally consistent water and energy cycle products. Workshops are carried out on an annual basis to discuss recent findings, to further refine the plan and to implement new activities as well as to draft and consolidate the assessment reports. The 7th G-VAP workshop was hosted by the National Centre for Earth Observation (NCEO) at the University of Leicester, Leicester, UK and took place at the Fielding Johnson Building, First Floor Council Suite Room on the University of Leicester campus on 25 and 26 October 2017. Approximately 20 participants from research institutes, universities and SME (Small and Medium-sized Enterprises, CUNY, FU Berlin, LMD, Maynooth U, MPI-C, RAL, SSE, UCAR, U. Cologne, U. Leicester, LATMOS/U Versailles St Quentin, from weather services (AEMET, DMI, DWD, NOAA), from the ground-based and in-situ measurement communities (Maynooth U) as well as from space agencies (DLR, ESA) attended the workshop. A list of participants, their affiliations and email addresses are given in Appendix D. The presentations of the 7th G-VAP workshop are available at www.gewex-vap.org.

The main objectives of the 7th meeting were to

- Present and discuss updates on water vapour data records and associated retrievals,
- Present and discuss results from the analysis and characterisation of water vapour products,
- Present and discuss status of output from G-VAP:
 - G-VAP publications,
 - WCRP report on G-VAP,
- G-VAP phase 2: discuss and agree on scope, objectives, procedures and major scientific activities for future analyses within G-VAP.

The workshop started with a few introductory presentations on G-VAP and on the objectives of the current meeting. After presentations on the GAIA CLIM Virtual Observatory, calibration & validation activities at the U Leicester, and quality analysis of microwave sounder observations, data records and related validation results were presented. It followed a series of talks related to the analysis and characterisation of water vapour products. The remainder of the workshop concentrated on potential future directions of G-VAP. Related presentations included contributions from GAIA CLIM, GHRSSST, GPS RO and G-VAP. Such future directions have been discussed and agreed upon, are summarised in this report and will form the basis for an updated assessment plan.

The main outcomes of the 7th workshop are summarized as follows:

- It was consensus to continue G-VAP with unchanged scope, objectives, procedures, variables, reporting, and governance.

- Core activities will be continued to provide a sustained service to the community.
- It was agreed to prepare a second WCRP report in roughly three years from now.
- New science activities have been discussed and defined. Science teams will work on these topics and the overall goal is to publish peer-reviewed papers by 2020.
- L. Shi stepped back from co-chairing.
- The establishment of a project office (with a part funded person) would be beneficial to the ongoing and future efforts of G-VAP (e.g., following GHRSSST example).

G-VAP is a community effort. In order to continue to be successful the community is encouraged to participate. Please contact the co-chairs or activity leaders if you want to take responsibility, to carry out dedicated analysis or to provide data.

The full list of G-VAP recommendations is given in Appendix B. The list is taken from the WCRP report on G-VAP. New/continued activities together with responsible persons are provided in Table 1. Housekeeping activities from this and all other open activities from last workshops are recalled in Table 2 and Appendix A, respectively.

2. Background

The 7th GVAP workshop builds upon six previous workshops held on an annual basis since 2011. The 1st workshop was hosted by the European Space Agency's European Space Research Institute (ESA-ESRIN) with support from the ESA DUE GlobVapour project in March 2011. This workshop set the general framework for the assessment by agreeing on variables, data records and general procedures to be considered. The workshop summary was published in the GEWEX Newsletter¹. The 2nd workshop, hosted by Deutscher Wetterdienst and EUMETSAT's Satellite Application Facility on Climate Monitoring (CM SAF) in September 2012 aimed at the consolidation of the G-VAP strategy and the technical implementation. The results of the 2nd G-VAP workshop were presented to the first GDAP meeting in Paris, October 2012, where further recommendations were received. The major outcomes of the 2nd workshop and feedback from the first GDAP meeting have also been summarized in the GEWEX Newsletter². Results from these workshops and feedback from GDAP were used for setting up the G-VAP assessment plan.

Additionally, the following workshops have been carried out:

- 3rd workshop, CSU, Fort Collins, CO, USA³
- 4th workshop, FU Berlin, Berlin, Germany
- 5th workshop, U Wisconsin, Madison, WI, USA⁴
- 6th workshop, EUMETSAT, Darmstadt, Germany

¹ <http://www.gewex.org/resources/gewex-news/>

² <http://www.gewex.org/resources/gewex-news/>

³ <http://www.gewex.org/resources/gewex-news/>

⁴ <http://www.gewex.org/resources/gewex-news/>

It was consensus at the 5th and the 6th workshop to continue G-VAP beyond the finalisation of the WCRP report on G-VAP. GDAP supports this continuation as confirmed at the GDAP meeting in Washington, D.C., USA on 29 November – 01 December 2016.

The 7th workshop was hosted by NCEO at the U Leicester. Based on discussions and results from the 7th workshop the assessment plan will be updated. However, scope, objectives and general procedures will not be changed. The assessment plans are, and will be available at the G-VAP webpage (www.gewex-vap.org).

3. Major results

After J. Remedios welcomed the participants of the 7th workshop, M. Schröder gave an overview on G-VAP and summarised results from G-VAP's first phase. Among others, the scope, objective, science questions, variables, and overall procedures of G-VAP have been recalled. It was shown that break points are not only a function of data record and region but also of parameter, i.e., breaks in specific humidity may not be present in temperature and vice versa. The overview on available water vapour data records, the G-VAP data archive, the G-VAP recommendations, the WCRP report on G-VAP and the G-VAP papers in peer-reviewed journals are major output from G-VAP and were briefly introduced.

P. Thorne continued with an introduction to the GAIA CLIM Virtual Observatory. Among others, the VO is designed for use in the validation of satellite Level 1 and Level 2 data. Topics like traceability, collocation uncertainty and uncertainty from sampling and smoothing have been addressed. It was discussed that inclusion of additional data should be fairly straightforward, that analysis in cloud-free scenes is in principle possible, and the utilisation of weighting functions is recommended. Only very few data records maybe considered as fiducial data records, and it was noted that the term fiducial record is not officially assigned by any entity. The VO will potentially be sustained by EUMETSAT with C3S funding. T. Trent's presentation on calibration & validation activities at the U Leicester then followed. The stability assessment of the HIRS data record (still) exhibits inhomogeneities at the change from HIRS/2 to HIRS/3. Results from comparisons of AIRS V6 data, relative to the characterised radiosonde archive from U Leicester, report an observed free tropospheric wet bias. A brief introduction to FIDUCEO was given which included an overview of the whole project along with details on the upcoming FIDUCEO FCDR beta user workshop in February 2018. Finally, a short overview on the new frame work being designed for the inter-calibration of IR satellite records was given. This work focuses on the inclusion of all sources of uncertainty, and the preservation of correlation structures within those uncertainties. Johnny Luo recalled the relevance of UTH in the Earth's energy budget, showed results from various approaches to inter-calibrate SSM/T-2 data and showed results from comparisons to MOZAIC data. The latter exhibits a large scatter and inter-satellite differences seem to be in the order of 1-3 K. It was noted that such differences have a significant impact on UTH quality.

Updates on water vapour data records were given by J. Nielsen (GPS RO from ROM SAF), R. Siddans (IASI/AMSU/MHS), S. Casadio (AIRWAVE) and C. Borger (GOME/SCIAMACHY/GOME-2). The talks included results from evaluation and partly also

from analysis. A GPS RO CDR will be available from ROM SAF in early 2018. The decline in number of COSMIC profiles was noted. It was discussed that GPS RO data can be included in G-VAP on reduced spatial resolution and may serve as reference on stability. A collocation tool applicable to GPS RO, polar orbiter and ground-based observations, developed by EUMETSAT might be of interest to G-VAP, in particular the activity on using GPS RO to assess the quality of profile data records over stratus regions. It was discussed how to showcase the benefit/need of diurnal cycle sampling at global scales by GPS RO for NWP, climate analysis and others. RAL reprocessed IASI/AMSU/MHS Level 2 profile data which can be made available. Future plans include reprocessing of Metop-B, the development of a NRT service, an extended applicability to CrIS and AIRS and potentially the provision of Level 3 data. S. Casadio introduced the newly available AIRWAVE 2. Among others, G-VAP results triggered the development of an improved retrieval. Recent validation results exhibit improved quality, with cloud masking being the main uncertainty source. It is work in progress to retrieve water vapour also over land. C. Borger introduced the new global GOME-Evolution Climate and GOME-Evolution A3 products. Validation results show a stability of the Climate product of $\leq 1\%$ /decade while the A3 product exhibits overestimations at large TCWV values.

Presentations related to the analysis and characterisation of water vapour products included contributions from B. Ho, X. Calbet, A. Radovan, H. Brogniez/L. Picon, and C. Böhm. B. Ho presented results on the impact of sampling on the retrieval uncertainty and the sampling bias in rainy conditions using TCWV data from SSM/I with COSMIC data serving as reference. A positive (wet) retrieval bias was found for cloudy and precipitating conditions. X. Calbet demonstrated consistency between IASI and GRUAN observations during night using LBLRTM and reported a dry bias of +2.5%RH in GRUAN data during daytime soundings. Key contributor to collocation uncertainties at scales below 0.7 km is turbulence and efforts started to estimate this uncertainty. Key station is Manus which will be discontinued. Thus, future efforts will consider observations by CrIS and other sensors. Both talks include a list of future activities. A. Radovan discussed atmospheric rivers and polar lows and introduced the ALOUD and MOSAiC projects. The latter will provide reference data in the Arctic. H. Brogniez and L. Picon discussed relevant temporal and spatial scales of water vapour observations for climate studies. Using vertical velocities at 500 hPa and FTH data it was found that daily (and not monthly) scales need to be considered for climate model evaluation. By analysing moments of the underlying PDF it was shown that moistening during MJO is caused by detrainment while drying is caused by extra tropical intrusions. C. Böhm talked about the variability of water vapour over Germany and water vapour transport into the Atacama desert.

M. Schröder presented the status and last steps to finalise the G-VAP report and to prepare and submit the publications on the G-VAP overview and the G-VAP data archive. While the latter is practically ready for submission, the abstract on the G-VAP overview paper was accepted by BAMS. The structure and overall content of the BAMS paper was presented and accepted. The review process of the WCRP report has been finalised. Currently, the last sectional report is implemented and the publication process via WCRP has been initiated.

The remainder of the workshop focused on future directions of G-VAP. In his talk on potential future directions from a Radio Occultation perspective R. Kursinski gave an update on comparisons of PDFs of various products to those from GPS-RO data and a list of future efforts. It was noted that FPH, e.g., operated at Azores might help to increase confidence in the peak at small values. Also, the quality of radiosonde data is reduced if the transition from wet to dry occurs too fast and at small values in general. He addressed super-refraction and uncertainty estimation and presented upcoming opportunities such as combined GPS RO+MLS products and upcoming (candidate) missions with focus on ATOMMS. The development and provision of a PDF based climatology of satellite-based radio-occultation data was briefly discussed. The discussions are ongoing. Gaps in ability to use non-satellite measurements to characterise satellites and resulting recommendations were discussed by Peter Thorne. Major outputs from the GAIA CLIM project are the Gaps Assessment and Impacts Document, the online catalogue of gaps, both together with remedies, and recommendations, all available online at www.gaia-clim.eu. GAIA CLIM is now in the process of discussing both the gaps and the recommendations to gain feedback from the community, in particular also from G-VAP. In his presentation questions have been provided and all participants are asked to provide feedback to GAIA CLIM. Gary Corlett introduced GHRSSST and outlined how this international thematic climate community was build. GHRSSST consists of a science team and four technical advisory groups on thematic topics. Core elements are the data assembly centre which allows access to various SST products through a distributed system, community tools for validation and analysis and dedicated outreach activities such as training and education. Key to the success of GHRSSST was the establishment of a funded project office.

M. Schröder gave an overview presentation on general aspects of G-VAP phase 2. It was emphasised that G-VAP is a community effort and can only continue to be successful if the community is active, takes responsibility and carries out dedicated analysis. It was consensus to continue G-VAP by keeping scope and objectives, science questions, methodologies/approaches (extended by new activities), variables, reporting to GDAP, webpage (with updates, in particular the overview on available data records), governance (in particular under the umbrella of GEWEX) and by updating the G-VAP data archive in parallel to report release. The majority of the aspects have been shown in the G-VAP overview presentation. It is noted that the provision of data is not a priority activity. However, as long as resources and technical as well as legal constraints permit, the service will be continued. WCRP report drafting will be carried out as before. that However, the next report will be finalised in ~3 years, i.e., end of 2020/early 2021. The workshop series will continue with unchanged organisation. However, it was decided to reduce the frequency and in addition biannual telecons will be organised by the co-chairs. At these telecons the status, outlook, dependencies across activities and new ideas will be discussed with the major purposes to keep in touch and the discussion and exchange lively. Basis will be summaries per activity (1-2 slides), provided to co-chairs by activity leaders. Participants should be the co-chairs and all activity leaders and co-chairs and activity leader might invite additional participants. However, for practical reasons the number of participants should be limited.

At the workshop L. Shi announced that she has to step back from co-chairing due to workload. The co-chair and all participants thanked L. Shi for her support and co-chairing. She will continue to participate and to carry out inter-comparisons and analysis using UTH/FTH data. It was proposed to have three instead of two co-chairs and that it is more practical to have a leading co-chair, i.e., in practice a chair and vice-chair(s). It can be an option to divide such responsibility per theme/topic/activity (e.g., UTH) though.

It was then discussed how to organise new activities. It was agreed to define science activities with the goal to publish results in peer-reviewed literature prior to the drafting of the WCRP reporting and in time for potential consideration by IPCC authors. Consequently, the papers need to be submitted in January 2020 and published in ~mid-October 2020. Whenever adequate, GEWEX/G-VAP should be mentioned in the title. In any case G-VAP, and with this GEWEX should be briefly introduced preferably in the introduction. Besides new activities core activities will be continued in order to provide a sustained service to the community, among others allowing a sustained and frequent overview on quality between versions. G-VAP activities will be organised and executed in (small) teams. The teams will carry out telecons or meetings when feasible, organised by the activity leader. The activity leader will organise a summary presentation at G-VAP meetings when feasible as well as the summary for the WCRP report on G-VAP phase 2. The science activities will primarily be defined at G-VAP workshops in exchange with GDAP. However, they can also be introduced at any time via email to the co-chairs. It was emphasised that though the analysis is on voluntary basis such activities are understood as commitments. All activities will be included in the assessment plan, which is publically available at the G-VAP webpage.

The following sources for new activities have been discussed: WCRP Grand Challenges, activities leading to improved reliability of IPCC statements related to water vapour, outreach to e.g. UTCC and to SPARC, GAIA CLIM gap analysis, feedback from GDAP/GEWEX, own ideas which relate to the G-VAP scope, maybe also directed towards applications and in particular G-VAP recommendations. More detailed discussions about future scientific activities were based on a presentation on feedback from GDAP and on G-VAP recommendations with G-VAP as receiver. A series of continued and new activities have been discussed and agreed upon. These are summarised in Table 1. As an example the analysis of a potentially existing cloudy sky bias was discussed. Background is that microwave based retrievals either avoid areas affected by strong scattering or, likely, are affected by increased uncertainty. The potential presence of a bias between cloudy and rainy+cloudy skies will be analysed and this bias will be put into perspective of already observed increased retrieval uncertainties. It was noted that the deadline for proposing IPCC co-authors was on 27 October 2017 and that WCRP has the right to propose IPCC co-authors. A new section on the hydrological cycle will be included and a satellite expert from the G-VAP community might be an adequate candidate to contribute to this section. Potentially in view of short notice and in view of extensive additional workload no volunteer raised the hand, though certainly of relevance and interest. Instead it was agreed to invite an IPCC co-author to the next G-VAP workshop and to gather relevant publications and bring this to the attention of IPCC authors via G-VAP co-chairs.

The new activities listed in Table 1 and Table 2 were agreed upon.

Table 1: List of new/continued activities. The activity is led by the underlined person. (R) indicates a link to a G-VAP recommendation. Cont'd = continued. Final results need to be summarised and provided as input to the next WCRP report on G-VAP, planned to be finalised in fall 2020.

Theme	Activity	Team	Comment	Until
Intercomparison, analysis	Continue intercomparison, homogeneity and trend estimation (TCWV, profiles) using existing G-VAP tools and updated data records, focus on gridded monthly data (R)	<u>M. Schröder</u>	Potentially refine analysis by considering redefined regions	Cont'd, fall 2020
Intercomparison	Continue intercomparison and quality analysis of UTH products (R)	<u>L. Shi</u>		Cont'd, fall 2020
G-VAP data archive	Provide gridded GPS RO data and include it in G-VAP analysis (R)	J. Nielsen, S.-P. Ho, M. Schröder	Grid might have lower spatial resolution: compare to all-sky, ensemble mean and trends on reduced grid	Summer 2018
Validation, analysis	Assess quality and carry out intercomparisons and analysis at regions and periods characterised by consistent atmospheric conditions (e.g., subsidence regions, stratus regions, tropical convection,...) (R): Define regions of consistent atmospheric conditions (as input for PDF, stratus and convection analyses and refined (continued) intercomparison) Analyse quality of profile data records over stratus regions using GPS RO (and potentially other) as reference and including filtering of super retraction in GPS RO data	<u>M. Schröder</u> , R. Kursinski, S.-P. Ho, J. Nielsen, J. Luo, H. Brogniez, L. Picon <u>S.-P. Ho</u> , J. Nielsen, M. Schröder, R. Kursinski	consider using data from ARM Azores station	next telecon (~June 2018) Cont'd, fall 2020 Cont'd,

	Discuss and potentially carry out joint UTCC/G-VAP analysis of upper tropospheric humidity in vicinity of deep convection and anvil clouds Analyse FTH variability in subsiding regions & compare to GPS-RO. Focus on the higher moments of the PDFs.	<u>J. Luo</u> , M. Schröder, H. Brogniez L. Picon, H. Brogniez, M. Schröder	consider the use of MW estimates of UTH	fall 2020 Cont'd, fall 2020
Validation	Intercompare water vapour profile data records at certain pressure levels using PDF analysis and instantaneous data (R)	<u>E. R. Kursinski</u>	Include 326 hPa to provide support to MLS and wider UTLS community	Cont'd, fall 2020
Validation	Assess and potentially achieve consistency between reference observations (R)	<u>X. Calbet</u> , R. Preusker, T. Trent	Consistency between CrIS, OLCI and GRUAN; estimation of collocation uncertainty, uncertainties from radiative transfer	Cont'd, fall 2020
Validation	Assess and potentially characterise the difference between observations in all sky, cloudy sky and clear sky observations (R)	<u>S.-P. Ho</u> , M. Schröder		Cont'd, fall 2020
Outreach	Showcase the benefit/need of diurnal cycle sampling at global scales by GPS RO for NWP, climate analysis and others	<u>UCAR, SSE, and IROWG</u>	Literature review, potentially dedicated analysis	Cont'd, fall 2020
Outreach	Liaise between SPARC, G-VAP and CCI+* (R)	<u>M. Schröder</u> , E. R. Kursinski	include W. Read and M. Hegglin in the loop * if funded	Cont'd
Outreach	Establish link to IROWG	E. R. Kursinski, J. Nielsen, S.-P. Ho		Cont'd
Outreach	Establish link to GEWEX PROES on UTCC	<u>J. Luo</u> , M. Schröder		Cont'd
Outreach	Provide feedback to GAIA	<u>ALL</u>	See P.	Dec

	CLIM on gaps and recommendations		Thornes talks and section 3	2017
Model Assessment/Evaluation	Use G-VAP gridded TCWV archive in first assessment of UK Earth System Model (UKESM) TCWV. Envisaged study at this time would be focused on extreme TCWV events present in the model.	<u>T. Trent</u>	Work carried out under NCEO	Dec 2018

Table 2: List of housekeeping activities.

Activity	Responsible	Comment	Until
Prepare MoM and provide talks	<u>M. Schröder</u>		Mid November
Update web page (a.o., agenda, talks, data record overview)	F. Fell, M. Schröder		December 2017
Propose new scientific activities to co-chairs	<u>ALL</u>	To be presented at June 2018 telecon	April 2018, cont'd
Organise telecon meeting	<u>Co-chairs</u>		June 2018
Assess potential to include G-VAP data archive into obs4MIPS	<u>M. Schröder</u> , J. Luo	via WDAC or PROES, contact PIs	April 2018
Update assessment plan according to decisions from 7 th workshop and the above activities and publish on web page	<u>M. Schröder</u>	Include links to existing definitions of terms like uncertainty and validation	February 2018
Gather overview of publications of relevance to IPCC and provide overview to IPCC authors	<u>Co-chairs</u>		May 2019 (at 8 th workshop)
Invite IPCC authors on chapter on the hydrological cycle to the next G-VAP workshop	<u>Co-chairs</u>		Summer 2018

4. Conclusions

The 7th G-VAP workshop was hosted by NCEO at the University of Leicester, Leicester, UK and took place at the Fielding Johnson Building, First Floor Council Suite Room on the University of Leicester campus on 25 and 26 October 2017. Approximately 20 scientists from all over the world participated and nearly everybody contributed with a presentation. The presentations were very interesting and relevant to G-VAP and triggered intense, valuable and constructive discussions.

G-VAP will be continued with unchanged scope, objectives and overall procedures. Core activities will be continued to provide a sustained service to the community and new science activities have been discussed and defined. Science teams will work on these topics and the

overall goal is to publish peer-reviewed papers by 2020. It was agreed to prepare a second WCRP report in roughly three years from now.

The community is encouraged to take over responsibility and inform co-chairs on their willingness to commit additional activities.

It is recommended that the ROM SAF considers to contribute to the activities on “develop and provide PDF based climatology of satellite-based radio-occultation data” and on “assess quality and carry out intercomparisons and analysis at regions and periods characterised by consistent atmospheric conditions”.

The next workshop will take place at AEMET, Madrid, Spain tentatively in May 2019.

Appendix A List of open activities from previous workshops

The list has been updated according to progress and decisions from G-VAP workshops.

Closed activities have been removed from the list.

Activity	Responsible	Comment	Until
Prepare draft of overview paper and distribute among authors	M. Schröder		January 2018

Appendix B List of recommendations.

The list given below is a copy from the WCRP report on G-VAP which has recently been submitted for publication to WCRP. The list of recommendations has not been updated at the 7th workshop.

- **CGMS, Space Agencies:** Improve upon current satellite profiling capabilities with goals of providing high precision and long term stability, with sufficient vertical resolution, complete, unbiased global sampling and independency of models.
- **CGMS, Space Agencies:** Dedicated validation archive for all water vapour sensors, also including ship based RS.
- **CGMS, WMO, GRUAN:** Aim at the sustained generation and development of a stable, bias corrected multi-station radiosonde archive including reprocessing of historical data.
- **CGMS, WMO:** Achieve consistency among reference observing systems and sustain corresponding services.
- **WMO, GCOS:** Oppose and balance user, scientific and product requirements with focus on climate analysis.
- **Space Agencies:** Need for continental high quality satellite data records.
- **Space Agencies:** Need for inter-calibrated radiance/brightness temperature data records and homogeneously reprocessed instantaneous satellite data records.
- **Space Agencies, GEWEX:** Provide water vapour transport product in order to analyse atmospheric dynamics and to evaluate the constancy of relative humidity.
- **Space Agencies, PIs:** Develop and provide PDF based climatology of satellite-based radio-occultation data.
- **Space Agencies, PIs:** Provide averaging kernels, a priori state vectors and associated error covariance matrices together with the release of profile products.
- **Space Agencies, PIs, G-VAP:** Estimate and provide uncertainty information and assess uncertainty estimates, also as function of total amounts and other dependent parameters.
- **Space Agencies, PIs, G-VAP:** Improve stability of long-term data records and (re)assess improvement in stability.
- **Space Agencies, PIs:** Provide information on input to data records such as precise start and stop dates and number of observations as function of time and input data type.
- **GEWEX, SPARC, G-VAP, WAVAS:** Joint WAVAS and G-VAP analysis of data records covering the upper troposphere and lower stratosphere using the same methodology.
- **GRUAN:** Include station over tropical land.
- **GRUAN:** Reassess the uncertainty estimates at large humidity values.
- **GRUAN:** Provide estimates of the correlation uncertainty between levels or guidance on how to compute it from information already available (ideally the covariance matrix of uncertainties is provided).
- **GEWEX:** Continuous support to G-VAP, beyond acceptance of first report.
- **G-VAP, Space Agencies, PIs:** Enhance quality analysis of profile data records over open ocean, in particular over high pressure areas/subsidence areas and stratus.
- **G-VAP, Space Agencies, PIs:** Analyse differences between observations under all-sky as well as cloudy and clear sky conditions.
- **G-VAP:** Reassess the TTD of humidity profile data by taking into account the vertical resolution and sensitivity and the characteristics of the PDF at certain levels/layers.
- **G-VAP:** Assess the joint effect of orbital drift, clear sky sampling/bias and the diurnal cycle of clouds on biases and how this might change with climate change.
- G-VAP supports the ITSC-20 recommendation on the reinstallation of the TPW ARM station.
- G-VAP supports the ITSC-20 initiative to collect SRF data in common format.
- G-VAP supports the concluding remarks from the Joint workshop on uncertainties at 183 GHz.



G-VAP – Workshop

25 - 26 October 2017

Agenda

Venue:

**University of Leicester,
hosted by the National Centre for Earth Observation
Fielding Johnson Building, First Floor Council Suite Room
University of Leicester campus
Leicester, United Kingdom**

***Version 1.0
23 October 2017***

Wednesday, 25th Oct 2017

- 09:00 – 09:10 Welcome
Remedios
- 09:10 – 09:20 Overview on G-VAP
Schröder, Shi
- 09:20 – 09:30 Aims of meeting
Schröder, Shi
- 09:30 – 09:50 G-VAP – final results from “phase 1”
Schröder, all
- 09:50 – 10:20 Comparing reference grade fiducial non-satellite data to satellites: The GAIA-CLIM Virtual Observatory facility
Thorne

Discussion

10:30 – 11:00 Coffee break

- 11:00 – 11:20 Calibration/validation activities at the University of Leicester
Trent
- 11:20 – 11:40 Comparison of 183-GHz Radiances from SSM/T-2 and AMSU-B
Luo

Discussion

12:00 – 13:30 Lunch break

- 13:30 – 15:30
(15 minutes each) Tropospheric specific humidity climate data record derived from multi-mission GPS Radio Occultations
Nielsen
- An updated IASI/AMSU/MHS retrieval scheme for water vapour
Siddans
- Current status and future evolution of AIRWAVE algorithm
Casadio
- Current status of GOME/SCIAMACHY/GOME-2 TCWV data
Borger

Discussion

15:30 – 16:00 Coffee break

- 16:00 – 17:30
(15 minutes each) COSMIC TPW to identify and correct TPW derived from SSM/I under clear/cloudy/precip skies
Ho

On the estimation of the collocation uncertainties of sondes versus satellites using the inherent small scale variability of water vapour in the atmosphere
Calbet

Water vapor in the Arctic: Future plans and mosaic
Radovan

Discussion

17:30 Adjourn

Dinner at Kayal (own expense)

Thursday, 26th Oct 2017

09:00 – 10:30 (15 minutes each) A discussion on the relevant temporal and spatial scales of water vapour observations for climate studies
Brogniez

Water vapour variability: Importance of transport
Böhm

G-VAP phase 2
Schröder

Discussion

10:30 – 11:00 Coffee break

11:00 – 11:15 Potential future directions from a radio occultation perspective
Kursinski

11:15 – 11:45 A formal assessment of gaps in our capability to use non-satellite data to characterise satellite data and ensuing recommendations
Thorne

Discussion

12:30 – 14:00 Lunch break

14:00 – 14:20 Building International Thematic Climate Communities, a GHRSSST example
Corlett

14:20 – 14:40 G-VAP recommendations
Schröder

14:20 – 16:00 Discussion on future directions and activities
Schröder, Shi, all

Discussion

16:00 – 16:30	Coffee break
16:30 – 17:00	Wrap-up, next meeting
17:00 – 17:30	AoB
17:30	Expected end

