1 Introduction

The GEWEX Data and Assessment Panel (GDAP) has initiated a water vapour assessment intended to quantify the state of the art of water vapour data records as well as to eventually select a data record for use by GDAP for the generation of globally consistent energy and water cycle products.

Currently an assessment plan is drafted which will be distributed to the community in late summer 2012 to gather feedback and refine the plan. The first workshop will be held in late October 2012 and the second workshop will be held in late October 2013.

2 Assessment Overview

Objectives

• Set-up validation data base with observations of high quality and long term stability.
• Characterise the quality of water vapour records through sound validation against validation data base, keeping in mind the records’ applications and requirements of GEWEX and the user community.
• Identification of critical gaps and of existing and planned data sets.

Themes

Upper tropospheric humidity (UTH) / Total column water vapour (TCWV) / water vapour and temperature profiles (WVTP)

Data records considered

Data records provided by participants and all readily available data records such as reanalysis.

Timeline

The assessment consists of two phases with an estimated duration of 1-2 years each. The first phase focuses on the validation of 3 years of recent data. The validation of long term data sets is addressed in the second phase.

3 Announcement of Second Workshop

Workshop on the GEWEX water vapour and temperature assessment

Where? When?

DWD, Offenbach, Germany

26-28 September 2012

The main objective of the workshop is to finalise the assessment plan of the GEWEX water vapour and temperature assessment and to kick off the activity.

To register for the GEWEX assessment workshop send an email to patricia.willing@dwd.de. It is foreseen to have invited presentations only. Thank you for your submission.

4 Service and Summary on Planned Activities

Exemplary service to assessment participants and the community:

• Validation data base.
• Collocated data to ease verification of retrieval improvements at participant institute.
• External validation of data sets and feedback of validation results to participants distribution of results only after consolidation and confirmation from involved participants.

5 The following activities are currently planned:

• Collection of comprehensive and complete description for the data records under consideration including their applications.
• Establishment of validation data group to advise on utilisation of ground-based observations and interpretation of results.
• Identification of fully independent validation data.
• Gather user/product requirements as reference for interpretation of validation results.

Assess quality of Level 1 data (e.g., as in Brogniez et al., 2009; Picon et al., 2003; Shi and Bates, 2011 and Sohn et al., 2000).

Other exemplary studies related to water profile retrieval quality: Divakarla et al., 2009; Fetzer et al., 2006; Hilton et al., 2009 and Ho et al., 2010.

In October 2009 the MOHAVE campaign was carried out at JPL Table Mountain. Various ground-based remote sensing and in-situ observations have been inter-compared. One focus was on lidar observations (see Fig. below).

Besides the global lidar network NDACC (JPL) the following preliminary list of validation data sets is considered to be of use to the assessment:

CFH (NOAA, FMI, DWD), ARSA RS (LMD), FTIR (e.g., MUSICA, KIT), GPS (e.g., NCAR), BSRN (AWI), CERES (NASA), RO (SMI) and more.

References:


Utilise independent data, that is, not only not assimilated but also with spatial and temporal distance to position of assimilated data.

It should be considered to prescribe common input fields such as cloud masks.

The fig. (top) was part of an analysis of the retrieval and sampling bias associated to clear sky versus all sky observations (retrieval/sampling bias). The correlation of bias against CLWP is significant in 75% of the cases. Detailed explanations can be found in Sohn and Bennartz (2008) and Mieruch et al. (2010).

Other exemplary studies related to TCWV and UTH: Brogniez et al., 2009; Moradi et al., 2010; Rundel et al., 1996 and Wagner et al., 2006. For ISCCP, see Rossow and Schiffer (1991).

In the framework of the ESA DUE GlobVapour Project an assessment of 5 IASI water vapour retrievals (DLR, DWD, EUMETSAT, NOAA, UKMO) was conducted (see Fig. below). Also below an extract of recommendations from the related report:

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Upper/free tropospheric humidity (UTH/TH) can be derived from IR and microwave observations. After applying bias corrections via the zonal mean approach, the inter-satellite biases (here: HIRS) have been largely reduced (see Figs. below).

Fig. 1: Correlation between bias in TCWV (GOME-SSM/I) and CLWP from ISCCP (Mieruch et al., 2010).

Fig. 2: Differences of inter-satellite calibrated HIRS retrieved UTH (in 100s of mm) at 30 N (top), SST and UTH anomaly in Central Pacific (bottom; both from Shi and Bates, 2011; Noaa 3.4 SST from NOAA Climate Prediction Center).

Fig. 3: Standard deviation of retrieved water vapour compared to GUAN radiosonde observations. Other exemplary studies related to water profile retrieval quality: Divakarla et al., 2009; Fetzer et al., 2006; Hilton et al., 2009 and Ho et al., 2010.

Fig. 4: Co-located/simultaneous multiple lidar, satellite, CFH and RS profiles from MOHAVE campaign.