

Long-term Changes in Atmospheric Water Vapour

climate change initiative

→ WATER VAPOUR



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INTRODUCTION

Atmospheric water vapour (H₂O) is a key component of the **Earth's hydrological cycle**, critical in shaping the global environment and supporting life on Earth as we know it. Manifold physical processes redistribute water from the oceans to the land and involve the formation of clouds, precipitation, and extreme weather events.

H₂O is also key in constraining the **Earth's energy balance**. It is the most important natural greenhouse gas and constitutes a strong positive feedback to anthropogenic climate forcing from carbon dioxide. The H₂O feedback is critically important in understanding past and determining future climate change and its global and regional impacts.

PROJECT GOALS

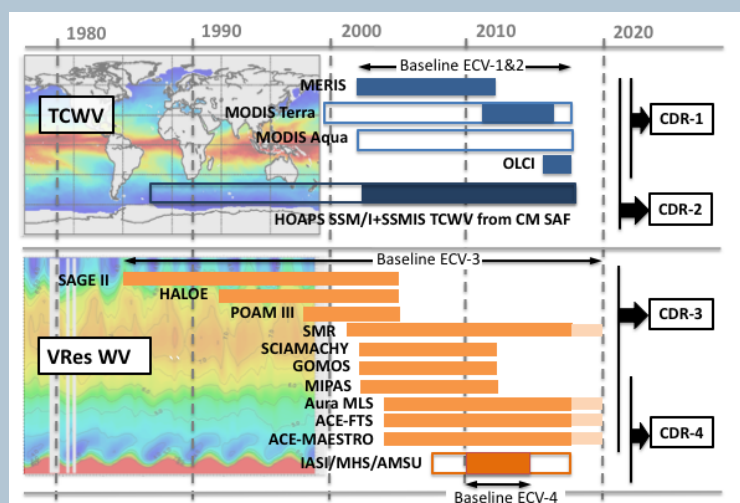
The **Water Vapour Climate Change Initiative (WV_cci)** aims at establishing climate data records (CDRs) of total column and vertically resolved water vapour for use in climate research. Specific project objectives include:

- **Producing CDRs homogeneous in space and time:**
 - ❖ total column WV over land and ocean (CDR-1 & CDR-2)
 - ❖ vertically resolved WV in the troposphere and stratosphere (CDR-3 & CDR-4)
- **Quantifying uncertainties** useful to the end users.
- **Analysing variability and trends** on different spatial and temporal scales, including consistency with theory.
- **Connecting to end users** for both the definition of user requirements and of research case studies.
- **Seeking cooperation** with ongoing activities within SPARC, GEWEX/G-VAP, GCOS, and others.

ACHIEVEMENTS TO DATE

- Established user requirements
- Near-final versions of four CDR products
- Detailed uncertainty characterisation
- Validation using various reference datasets
- Comprehensive documentation

Figure 1: Near final ESA Water Vapour CCI products. Instruments used for the construction of total column water vapour (TCWV) products over land (CDR-1) and combined land/ocean (CDR-2), and of vertically resolved (VRWV) products extending through the stratosphere (CDR-3) and troposphere/lower stratosphere (CDR-4).



Acknowledgment

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References

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Would you like to get involved?

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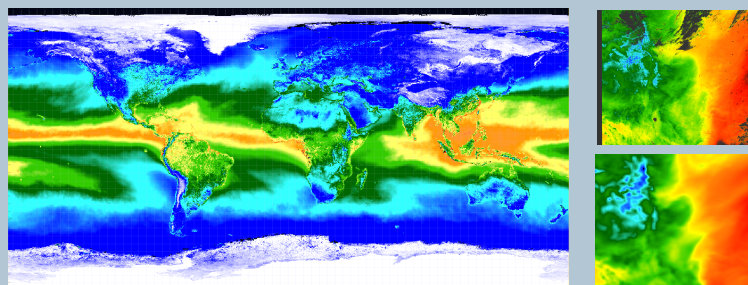
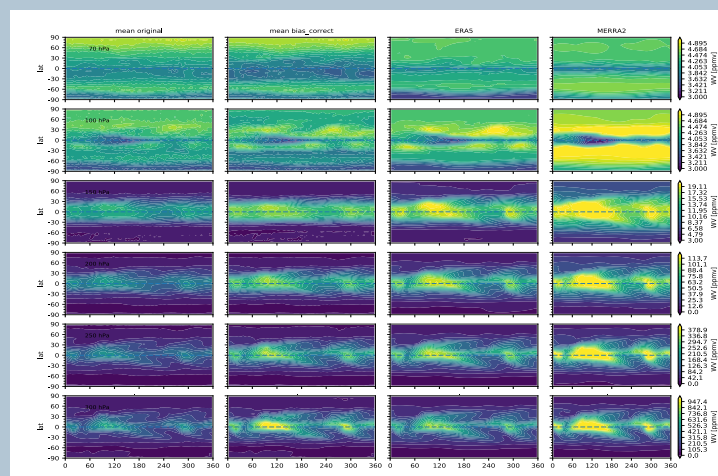


Figure 3 (left): CDR-3. Input observations (upper panels) and merged vertically resolved water vapour (VRWV) CDR-3 (lower panel) for January 2005.

Figure 4 (right): Annual mean averages at different pressure levels for original and bias-corrected CDR-4 vertically resolved water vapour (VRWV) merged from IMS, Aura-MLS, ACE-FTS, and ACE-MAESTRO with 5 deg resolution, ERA-5, and MERRA-2 for 2010-2012.



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