

Fix an indexing bug in H2O, CO, O3, TATM lite products that caused a fraction of targets to be skipped and a fraction of targets to be included twice.

Version v04: September, 2012 (L2v005_Litev004)

Update grid pressure value to be consistent with target pressures

All v5 data processed after 2005

CO2 added fields for matching CarbonTracker values (version CT2011): ct_pressure, ct_co2, ct_latitude, ct_longitude, ct_yearfloat

Version v05: September, 2012 (L2v005_Litev005): complete TES dataset for GS

Updated CH4 RTVMR to use the corrected CH4 results and move original results to original_species, and put N2O corrected CH4 values into "species". The N2O prior is now corrected by the formal R13 climatology.

Version v06: November, 2012 (L2v005_Litev06): complete TES dataset

Complete TES dataset (through present)

Updated HDO files: add separate entries for H2O and HDO profile values. Intersperse fill rather than putting fill all at the front. So HDO always starts at index 0 and H2O always starts at index 17.

Added fields ct_co2, ct_co2_ak, ct_pressure, etc. to TES CO2 products. These are the CT2011 CO2 fields matching TES locations. Ct_co2_ak has the TES observation operator applied and is on TES pressure levels. Other quantities are on the CT2011 native pressure grid. Added fields for bias correction: bias_global, bias_time, bias_2010, bias_spatial to represent bias corrections from the different sources for each observation. Added ncep_temperature and ncep_pressure with matching NCEP temperature values.

Version v07: Sept, 2013 (L2v005_Litev07): complete TES v5 dataset.

Updates for CO2 fields to set species to corrected CO2 values and CarbonTracker fields to CT2011oi.

Version v08: Sept, 2013 (L2v006_Litev08):

HDO bias updated (see HDO section). HDO: take out fields HDO and H2O. Use the stacked "species" field to get HDO and H2O. Add field HDO_H2O, which is a duplicate of field species.

Add species CH3OH and HCOOH which have same fields as NH3 (v006 TES output only).

O3IRK update mapping to fix NaN's

Change YYYYMMDD variable to *not* contain day fraction

Version v09:

Change GlobalSurvey to GlobalSurveyFlag.

B.6 References

Herman, R. L., J. E. Cherry, J. Young, J. M. Welker, D. Noone, S. S. Kulawik, and J. Worden, Aircraft validation of Aura Tropospheric Emission Spectrometer retrievals of HDO / H₂O, *Atmos. Meas. Tech.*, 7, 3127-3138, 2014, <https://doi.org/10.5194/amt-7-3127-2014>.

Kulawik, S. S., J. R. Worden, S. C. Wofsy, S. C. Biraud, R. Nassar, D. B. A. Jones, E. T. Olsen, R. Jimenez, S. Park, G. W. Santoni, B. C. Daube, J. V. Pittman, B. B. Stephens, E. A. Kort, G. B. Osterman, and the TES and HIPPO teams: Comparison of improved Aura Tropospheric Emission Spectrometer (TES) CO₂ with HIPPO and SGP aircraft profile measurements, *Atmos. Chem. Phys.*, 13, 3205-3225, doi:10.5194/acp-13-3205-2013, 2013.

Kulawik, S. S., D. B. A. Jones, R. Nassar, F. W. Irion, J. R. Worden, K. W. Bowman, T. Machida, H. Matsueda, Y. Sawa, S. C. Biraud, M. L. Fischer, and A. R. Jacobson, Characterization of Tropospheric Emission Spectrometer (TES) CO₂ for carbon cycle science, *Atmos. Chem. Phys.*, 10, 5601-5623, 2010.

Payne, V. H., S. A. Clough, M. W. Shephard, R. Nassar, and J. A. Logan, Information-centered representation of retrievals with limited degrees of freedom for signal: Application to methane from the Tropospheric Emission Spectrometer, *J. Geophys. Res.*, doi:10.1029/2008JD010155, 2009.

Worden, J., S. Kulawik, C. Frankenberg, V. Payne, K. Bowman, K. Cady-Peirara, K. Wecht, J.-E. Lee, and D. Noone, Profiles of CH₄, HDO, H₂O, and N₂O with improved lower tropospheric vertical resolution from Aura TES radiances, *Atmospheric Measurement Techniques*, 5, 397–411, 2012, doi:10.5194/amt-5-397-2012, February 20, 2012.