Creation of a dataset of atmospheric profiles for testing MTG-IRS retrievals

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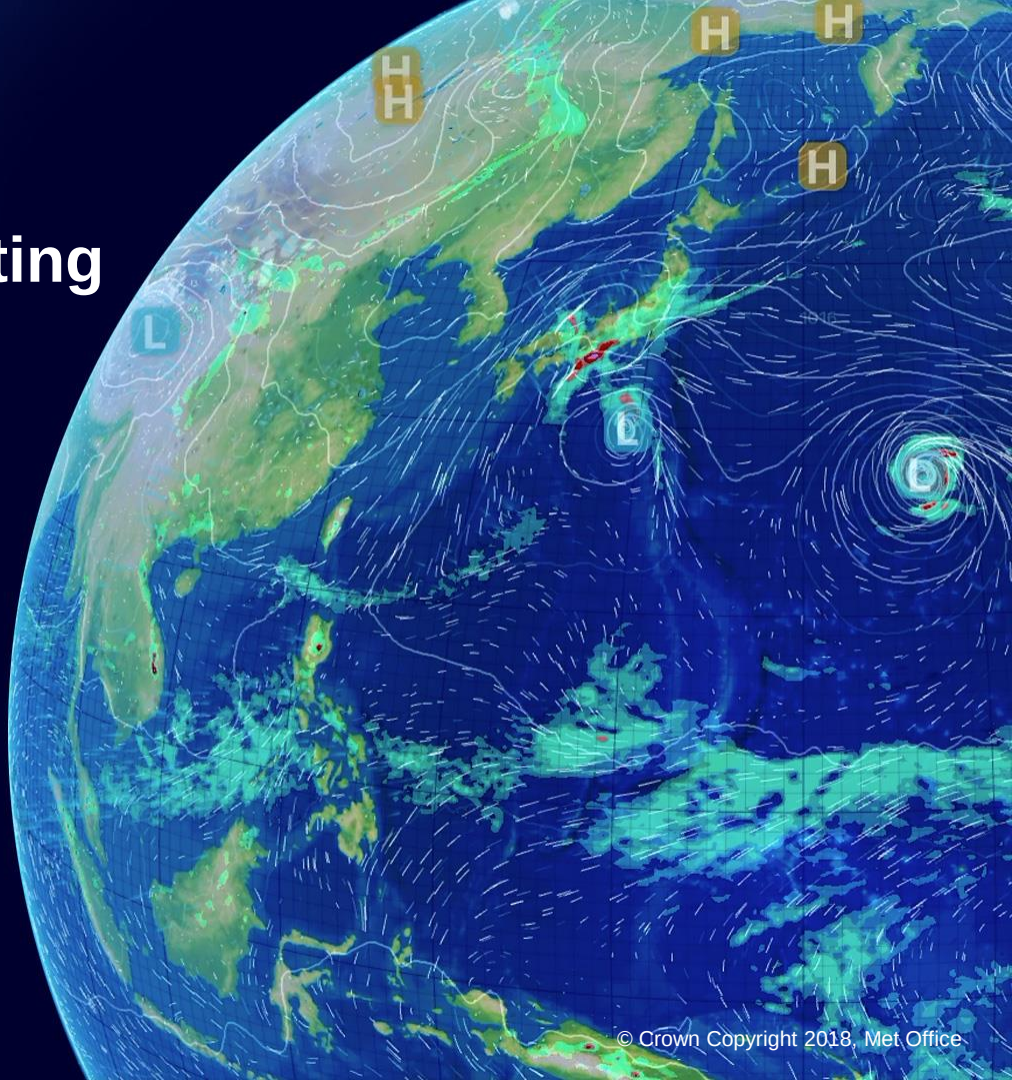

Met Office

Proposal to create a dataset for testing MTG-IRS retrievals using either a regression or NWP prior

Gap Analysis for Integrated Atmospheric ECV CLImate Monitoring

- Starting point
  - GRUAN radiosonde profiles from GAIA-CLIM project, each co-located with Met Office and ECMWF short-range forecast profiles. See http://www.gaia-clim.eu/
- Profile characteristics
  - T,q against pressure, on GAIA-CLIM pressure levels – total 310 levels. This more than resolves the vertical information available in the models
- Stations
  - All GRUAN sites that delivered data during the period 2011-2017. 26797 profiles available
  - Could optionally select profiles from LAC-4
- Forecast profiles
  - Met Office profiles available for all sonde profiles. ECMWF available for most of them

- Filtering
  - Propose to generate a filtered version of the dataset, retaining those with significant structure in the lower troposphere (of interest for nowcasting problems)
  - Do this by creating a “smoothed” profile (similar resolution to MTG-IRS) and compare with the original. Select profiles that show differences in the lower troposphere.
- Proposed use of the dataset
  - The dataset of GRUAN and model profiles would be delivered to EUMETSAT by the Met Office.
  - EUMETSAT would simulate MTG-IRS radiances from the GRUAN profiles (or a subset of them), adding realistic noise
  - Test IRS level 2 using (i) regression prior, (ii) forecast profiles as the NWP prior
  - Evaluate retrieval errors, including the ability to capture/retain high-level vertical structure of importance to nowcasting. Nowcasting users could be involved in this evaluation.

References

Carminati F, Ingleby B, Bell W, Migliniori S, 2016, An introduction to the GRUAN Processor, GAIA-CLIM Tech. Doc. http://www.gaia-clim.eu/biblio/introduction-gruan-processor .

Carminati F, Migliorini S, Ingleby B, Bell W, Lawrence H, Newman S, Hocking J, Smith A. 2018. Using reference radiosondes to characterise NWP models. In preparation for submission to AMT.