The Weather On Demand weather forecast framework - Recent developments and outlook

Belgingur Ltd. has created a novel weather forecasting framework, called Weather On Demand – WOD, that is deployable in the cloud and on in-house hardware and which can be customised for any location world-wide at a very short notice.

The WOD framework is a distributed system for:

- Running the WRF weather model for data-assimilation and forecasts by either triggering scheduled or on-demand jobs.
- Gathering upstream weather forecasts and observations from a wide variety of sources.
- Processing data for long to medium-term storage.
- Making results available through APIs.
- Making data files available to custom post-processors.

Much effort is put into starting processing as soon as the required data becomes available and in parallel when possible.

Recent additions to the WOD system include the potential of:

- Optional use of the hybrid data assimilation techniques of the WRF Data Assimilation system [1, 2].
- Set up a multi-domain dispersion forecast of volcanic ash and gases.
- Use of the Verif [3] verification package to compare forecasts, both upstream and WOD, to observations.
- Using different sources of initial data to that of the boundary forcing data.

On-going developments focuses on the use of in-situ UAV profiles and radar data as input to the WOD data assimilation system.

We have further started experimenting with using global models, both conventional NWP models as well as novel ML models (cf. abstract no. EGU24-15614).

References:

[1] Xuguang Wang, Dale M. Barker, Chris Snyder, and Thomas M. Hamill, 2008: A hybrid ETKF–3DVAR data assimilation scheme for the WRF model. Part I: Observing system simulation experiment. Mon. Wea. Rev., 136, 5116–5131.

[2] Xuguang Wang, Dale M. Barker, Chris Snyder, and Thomas M. Hamill, 2008: A Hybrid ETKF–3DVAR Data Assimilation Scheme for the WRF Model. Part II: Real Observation Experiments. Mon. Wea. Rev., 136, 5132–5147.

[3] Nipen, T. N., R. B. Stull, C. Lussana, and I. A. Seierstad, 2023. Verif: A Weather-Prediction Verification Tool for Effective Product Development. Bulletin of the American Meteorological Society 104, 9; 10.1175/BAMS-D-22-0253.1.