Contribution ID: **43**   Type: **Oral presentation**

Emulation of gravity wave parameterisation in weather forecasting

Wednesday, 7 October 2020 12:30 (30 minutes)

The rise of machine learning offers many exciting avenues for improving weather forecasting. Possibly the lowest hanging fruit is the acceleration of parameterisation schemes through machine learning emulation. Parameterisation schemes are highly uncertain closure schemes necessitated by the finite grid-spacing of weather forecasting models. Here we assess the challenges and benefits of emulating two parameterisation schemes related to gravity wave drag in the IFS model of ECMWF. Despite the similar structure of these schemes we find that one poses far greater challenge to build a successful emulator. After successful offline testing we present results coupling our emulators to the IFS model. In coupled mode the IFS still produces accurate forecasts and climatologies. Building on this we use our emulator in the data assimilation task, leveraging that tangent-linear and adjoint models of neural networks can be easily derived.

Thematic area

1. Machine Learning for Model Identification and Development - Including Model identification, Fast Emulation of Parameterisations, Data driven Parameterisations

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Session Classification: Session 4 (cont.) and Session 5: ML for Product Development and ML for Model Identification and development

Track Classification: ECMWF-ESA Workshop on Machine Learning for Earth System Observation and Prediction