Representing Earth Surface Processes and Uncertainties in Global Forecasting: which way to errors' reduction?

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Abstract

We all want more certainties from weather and climate prediction to better support informed decisions.

A forecast with too high uncertainty or large systematic errors would become only as useful as a climatology, persistence, or even less scientifically rigorous approaches.

However here a dilemma: traditional Numerical Weather Prediction still misses representing many bio-geo-physical processes, occurring on the Earth's surface and subsurface layers and the progressive inclusion of those, towards a more seamless approach for predicting weather and climate, is likely to increase further model variability and local uncertainties in the analysis and the forecasts.

This tendency is verifiable for both medium and extended ranges predictions where uncertainties are indeed increasing with more realistic and more complete Earth system models, trying to account for vegetation and soil types, snow and ice, and water-bodies parameterisations.

This talk will cover several examples of enhanced process representation at the interface with the ocean, sea-ice and land models of the ECMWF Integrated Forecast System and will discuss the value of horizontal and vertical resolutions and parameterisations' complexity.

In particular the value of model uncertainty representation as a function of meteorological situations will be illustrated along with the impact of systematic model errors with aid of dedicated experiments.