

High resolution forecast error with reduced precision

Nils P. Wedi, Peter Dueben, Filip Vana, Andreas Mueller
European Centre for Medium Range Weather Forecasts, Reading, UK

January 13, 2017

We report on recent experimentation towards improved scalability of high resolution simulations with the Integrated Forecast System of the European Centre for Medium-Range Weather Forecasts (ECMWF). A significant step towards further savings both in terms of throughput and speed-up is provided by the impact on simulations if numerical precision is selectively reduced in $O(1\text{km})$ high resolution simulations from double to single precision. The impact on the forecast is investigated in global simulations at different resolutions. The computational cost of increasing horizontal resolution and the savings resulting from single precision are compared to other computational cost drivers arising from increasing model complexity, e.g. through coupling of ocean waves, and including the ocean circulation and its interaction with the atmosphere. The error characteristics of increasing complexity and reducing precision are illustrated with global simulations for the Med-icane Trixie, a rare, high-impact weather event in the Mediterranean with a tropical-like cyclone structure that was observed in October/November 2016.