Contribution ID: **16** Type: **30 minute oral presentation**

Energy-efficient Scalable Algorithms for Weather Prediction at Exascale (ESCAPE)

Tuesday, 25 September 2018 12:00 (30 minutes)

The biggest challenge for state-of-the-art global numerical weather prediction (NWP) arises from the need to simulate complex, multi-scale physical phenomena with tight production schedules. The requirements for climate projections to produce at least 1 simulated year per day (SYPD) is very similar to existing medium-range NWP requirements. With increasing resolution and Earth system model complexity describing the land-surface, ocean, wave, and sea-ice interactions with necessary detail, there is growing concern to adequately align the development of extreme-scale application software for weather and climate services with the roadmap for extreme-scale computing capability and associated changes in the hardware architectures. Moreover, there is a need to better understand and robustly handle the uncertainty of the underlying simulated processes, potentially with hardware that itself is less reliable than we know today, or even to explicitly trade uncertainty for energy-efficiency of the simulations.

The European Centre for Medium-Range Weather Forecasts (ECMWF) is leading the H2020 programmes ESCAPE and ESCAPE-2 to foster innovation actions for developing a holistic understanding of energy-efficiency for extreme-scale applications using heterogeneous architectures, accelerators and special compute units by (a) defining and encapsulating the fundamental algorithmic building blocks ("Weather & Climate Dwarfs") underlying weather and climate services; (b) combining frontier research on algorithm development and hardware adaptation using DSLs for use in extreme-scale, high-performance computing applications, and (c), by developing
benchmarks and cross-disciplinary VVUQ for weather & climate applications. These efforts synthesize the complementary skills of global NWP with leading European regional forecasting and climate modelling consortia, university research, experienced high-performance computing centres and hardware vendors.

This talk will summarize ESCAPE outcomes while sketching the next steps towards accelerating state-of-the-art Earth-System modelling for the coming decade.

Affiliation

ECMWF

Primary authors: Dr WEDI, Nils (ECMWF); Dr BAUER, Peter (ECMWF); Dr THIEMERT, Daniel (ECMWF); Dr MUELLLER, Andreas (ECMWF); Mr DECONINCK, Willem (ECMWF)

Co-author: ESCAPE PARTNERS (ESCAPE)

Presenter: Dr WEDI, Nils (ECMWF)

Track Classification: 18th Workshop on high performance computing in meteorology