2nd IS-ENES Workshop on HPC

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EC-EARTH

Earth System Model originating from ECMWF's weather prediction model, IFS.

Objectives:

- Study earth system feedbacks, and
- Interannual to multi-decadal climate fluctuations and predictability
- Advanced modelling tool for climate scenarios

Model Architecture

(Standard) Components in EC-Earth 3

- Atmosphere (IFS cycle 36r4 + modifications)
- Ocean (NEMO 3.3.1 + updates + modifications)
- Sea Ice (LIM3 + modifications)
- Coupler (OASIS3)

Model Architecture

... more components

- Vegetation (LPJ-GUESS)
- Atmospheric Chemistry (TM5)

Configurations

- Coupled and uncoupled Atmosphere/Ocean
- Atmosphere grids:
  - T159/**255**/**511**/799 with 62/**91** levels
- Ocean grids
  - ORCA**1**/**025** with 46/**75** levels
- Sea ice model:
  - LIM2/**3** with **single**/multi-category thickness
- Portable code and flexible configuration
  - Many Linux-based HPC
  - National facilities, ECMWF, PRACE Tier 0/1

Performance Analysis

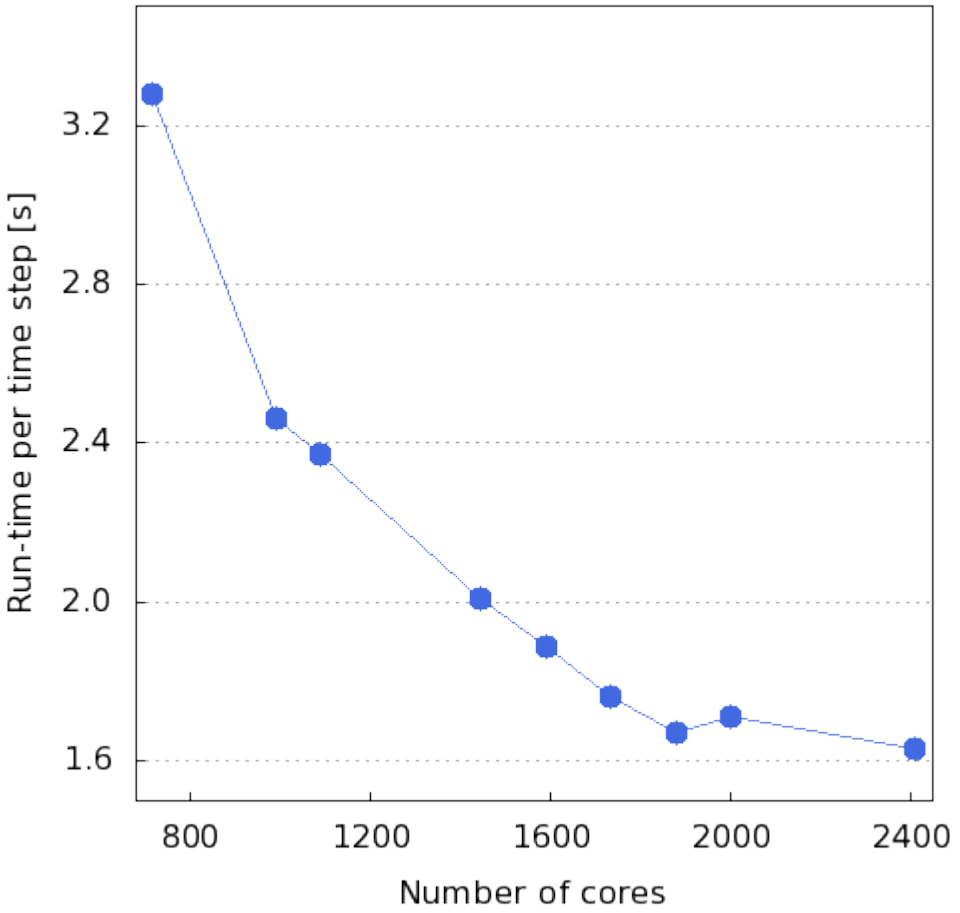
- Timing output from model
- “Simple” profiling
- “Advanced” tools

- Components vs coupled model

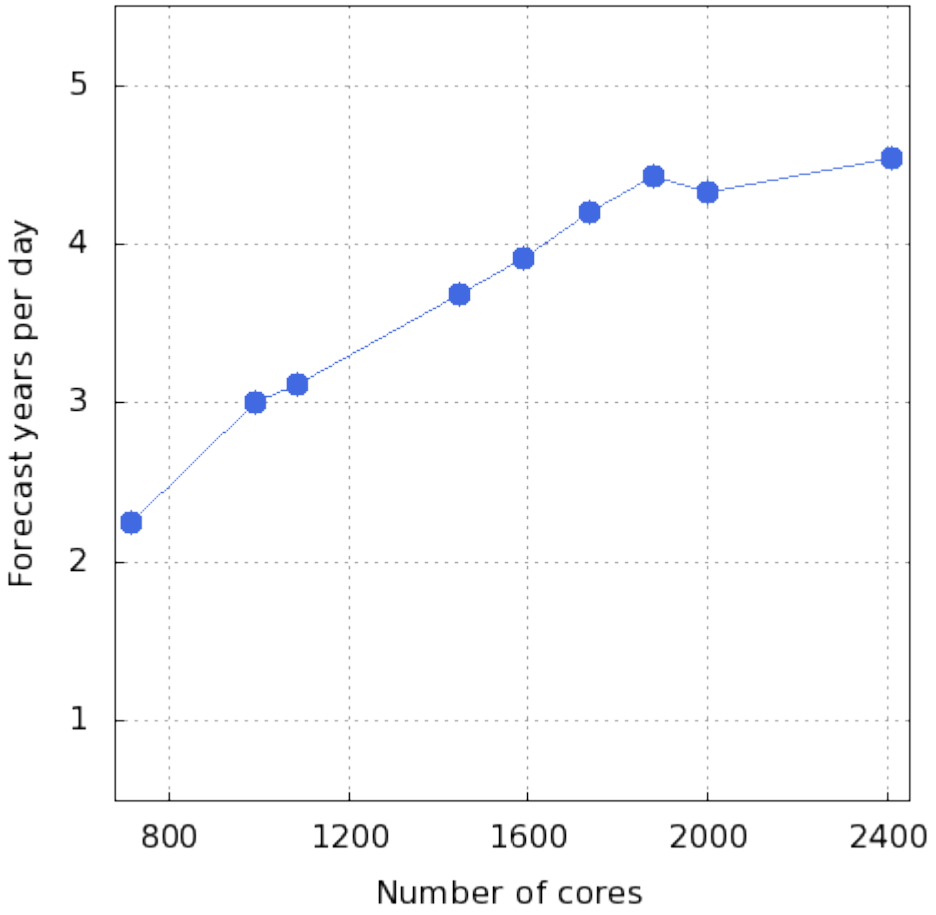
Performance Analysis

- A (crude) test of EC-EARTH 3performance and scalability was performed
- HighRes configuration (T511L91-ORCA025L75)
- Cray system – Tier-1 resource (AMD processors, Intel compiler and MPI)
- No *substantial* (extra) output
- More or less random sampling of the test space

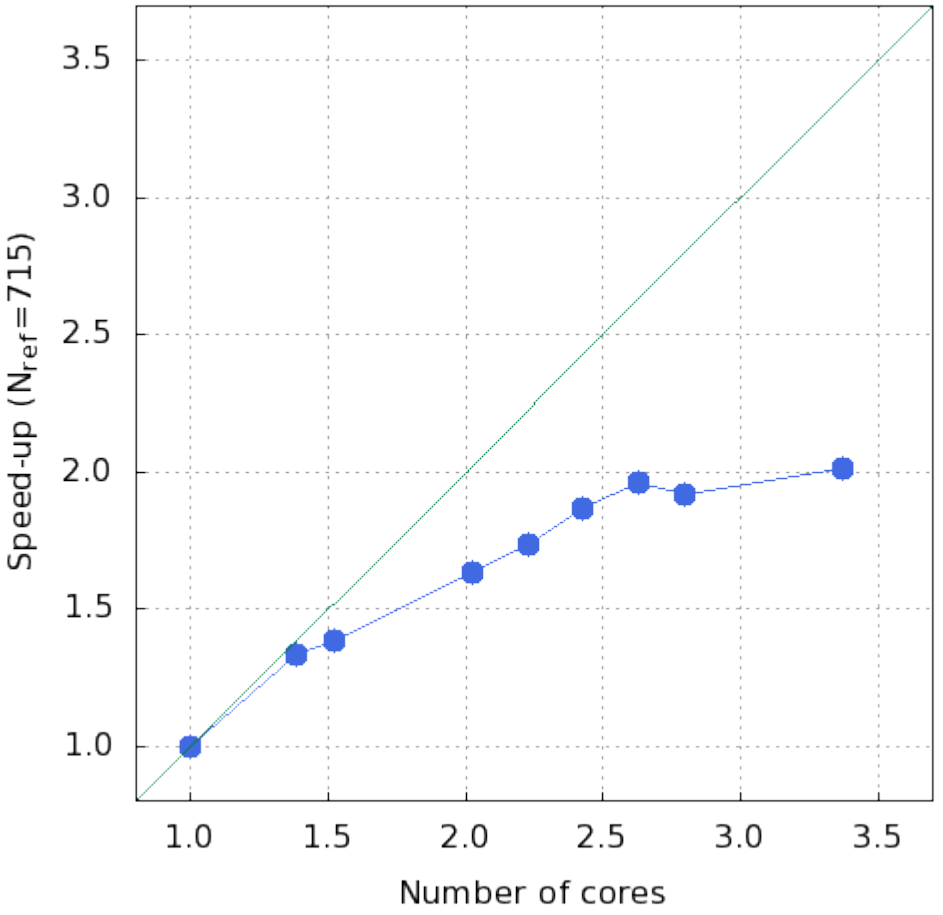
Performance Results



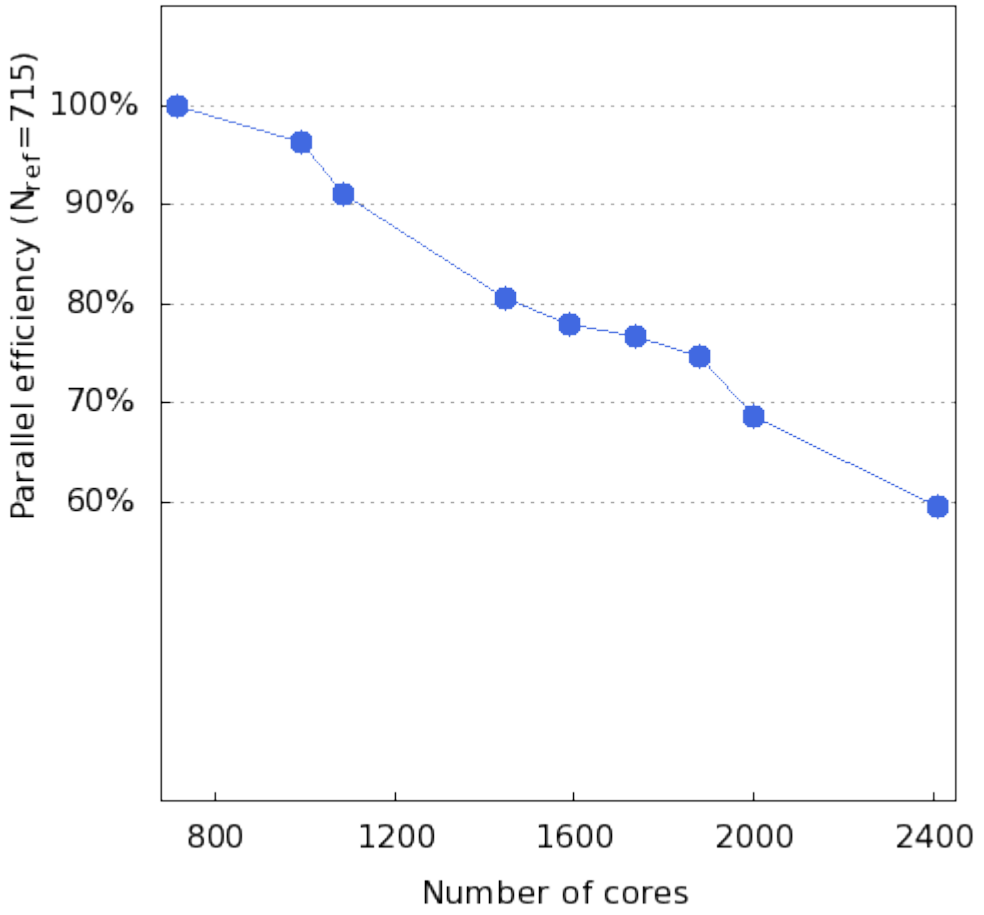
Performance Results



Performance Results



Performance Results



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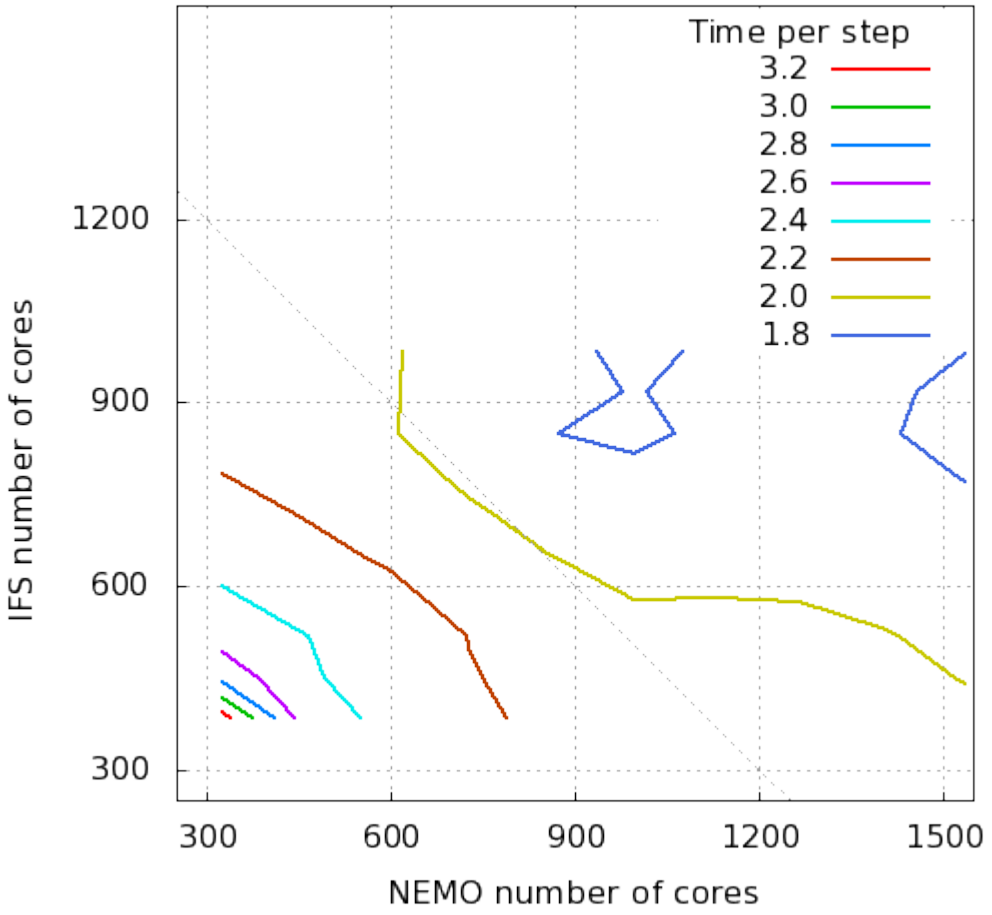

Current/future Development

- Component updates
  (NEMO 3.4.x and OASIS3-MCT)
- Performance (analysis, optimisation)
- Ensemble runs
- New components (Vegetation, Chemistry)
- Vertical resolution (atmosphere)