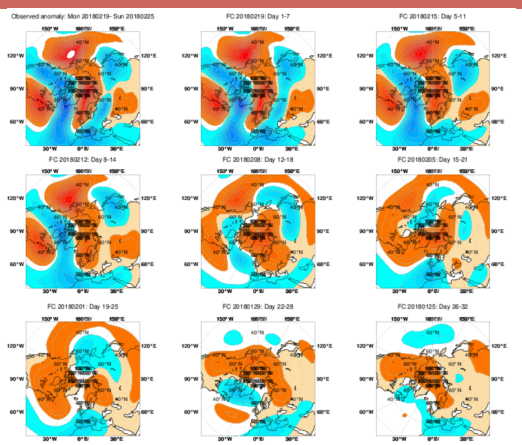
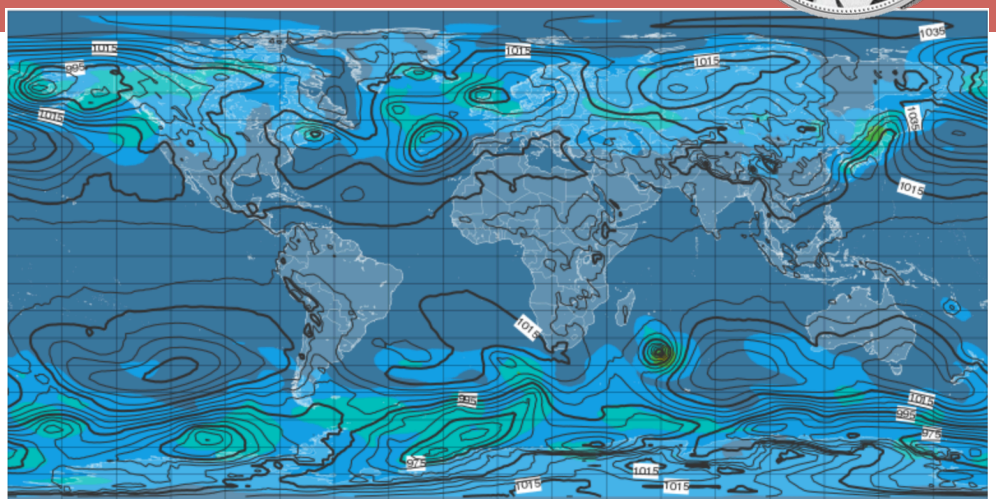
Weather Forecasting Performance Analysis on Isambard

Mihail-Calin Ionescu, supervised by Simon McIntosh Smith
University of Bristol, Department of Computer Science





Isambard

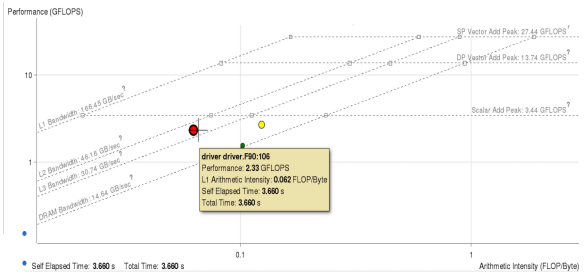
- Tier 2 Supercomputer - The first ARM HPC cluster, it will have over 10.000 ARMv8 cores.
- Two Thunderx2 x 32 cores per node
- Incorporates multiple architectures: x86 (Broadwell), XeonPhi, Nvidia Pascal GPUs

Background - ECMWF

- IFS – Integrated Forecasting System – provides medium (10 days) to long range (6 months) forecasts.
- OpenIFS - Open source version of IFS, lacks a few of the IFS features
- ESCAPE dwarfs – smaller, stand-alone programs, the building blocks for IFS
- Most codes are memory bound

Aims

- Exploring how well the code works out of the box, the higher bandwidth provided by Thunderx2 should lead to better performance compared to Broadwell
- Comparing different compilers (Cray, Intel, GNU, ARM HPC)
- Comparing vectorisation levels (AVX vs NEON vs SVE)
- Potential benefits of HBM-style memories on future CPUs



Progress

- Obtained runtime analysis, roofline models for a subset of the ESCAPE dwarfs
- Starting building OpenIFS on Isambard

Issues

- ARM nodes availability – offline for 3 week at the moment
- Compilation issues on ARM when using the Cray and ARM HPC compilers