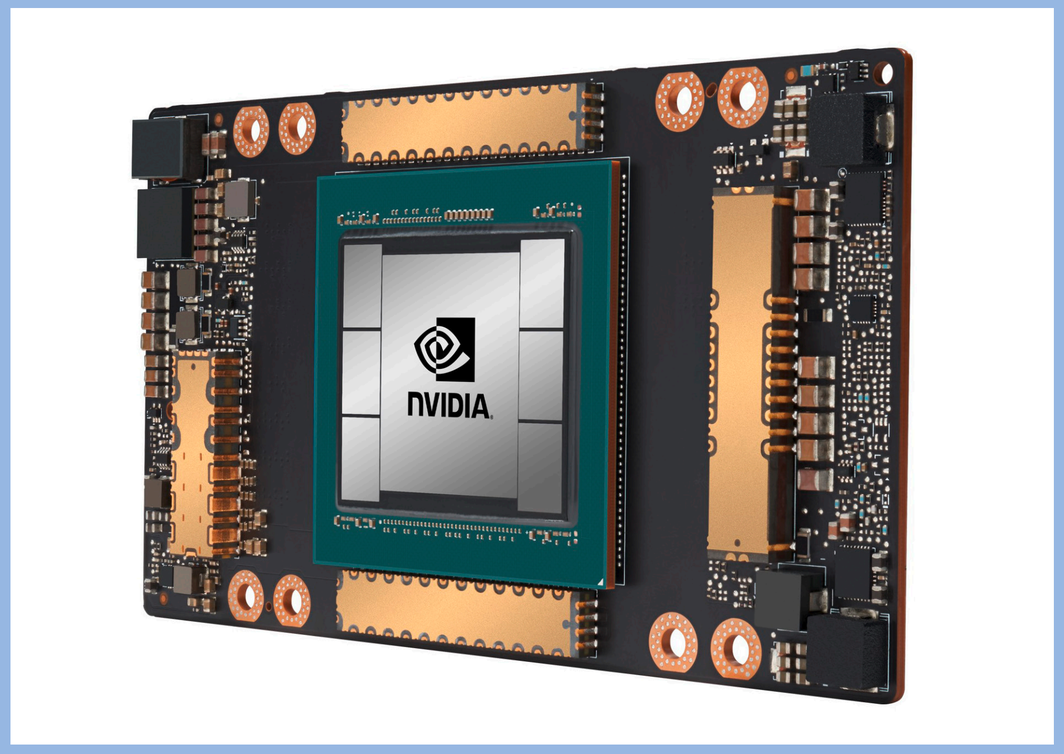
JÜLICH APPLICATION LAB NVIDIA

JÜLICH Forschungszentrum | JÜLICH SUPERCOMPUTING CENTRE

NVIDIA APPLICATION LAB AT JÜLICH



Collaboration between JSC and NVIDIA to

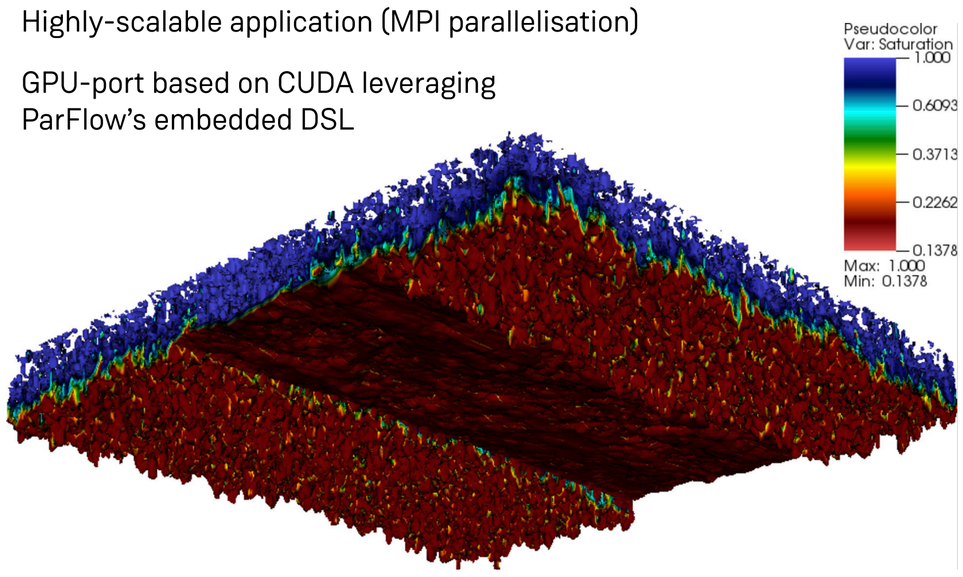
- Enable scientific applications for GPU-based architectures
- Provide support for their optimization
- Investigate performance and scaling

Application requirements analysis

- Support for a broad range of applications
- Investigation of computational needs depending on problem size
- Analysis of mapping to the hardware characteristics of various current and future GPU-based architectures

ParFlow: Ground and surface water modelling

- Numerical method: Finite-difference scheme with implicit time integration
- Highly-scalable application (MPI parallelisation)
- GPU-port based on CUDA leveraging ParFlow's embedded DSL



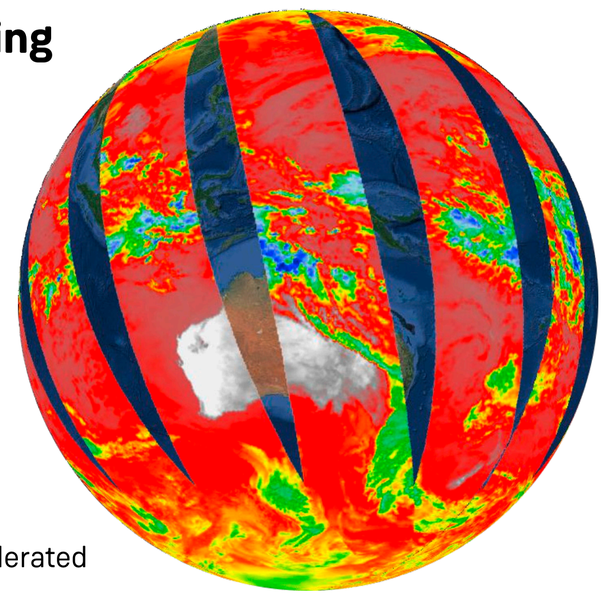
Parallelization on many GPUs

- Exploration of different parallelization strategies
- Computing resources at JSC:
  - JUWELS Booster with 936 nodes, each with 4x A100 and 2x AMD Rome
  - JUWELS Cluster with 48 nodes, each with 4x V100 and 2x Intel SkyLake
  - JURECA DC with 192 nodes, each with 4x A100 and 2x AMD Rome

Hardware architecture and CUDA feature analysis

- Analysis of usability of new features introduced with each new generation of hardware and software
- Analysis of architectural limitations for relevant applications

JURASSIC: Earth monitoring data processing



- Fast radiative transfer model for the analysis of atmospheric remote sensing measurements
- GPU-port based on CUDA

JUWELS Booster Early Access Program

- Enabled early use of new, GPU-accelerated flagship system at JSC
- 14 applications involved from different science areas

Training

- Organisation of workshops and training events
- Aim to improve skills of application developers
- Organisation of GPU Hackathons

HPC System Support

- Deployment, test of GPU-related software
- System diagnostics

Contact: a.herten@fz-juelich.de | Website: www.fz-juelich.de/ias/jsc/nvlab