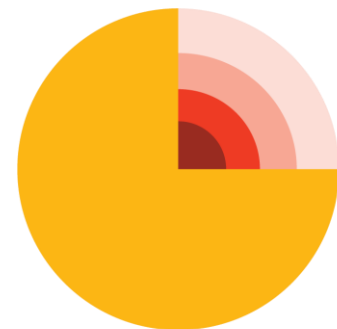


# ChEESE-2P@TUM

Michael Bader  
Technical University of Munich



**ChEESE**





## Team at Technical University of Munich:

- Michael Bader
- Mario Wille (ExaHyPE software)
- Sebastian Wolf (SeisSol software)
- N.N. (SeisSol software, to be hired in 2023)
- Lukas Krenz (SeisSol@ChEESE)
- Ravil Dorozhinskii (SeisSol@ChEESE)

## Software packages:

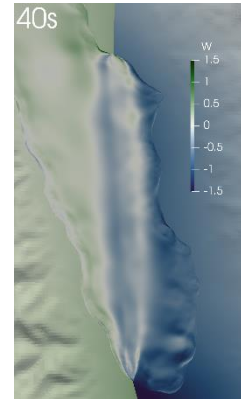
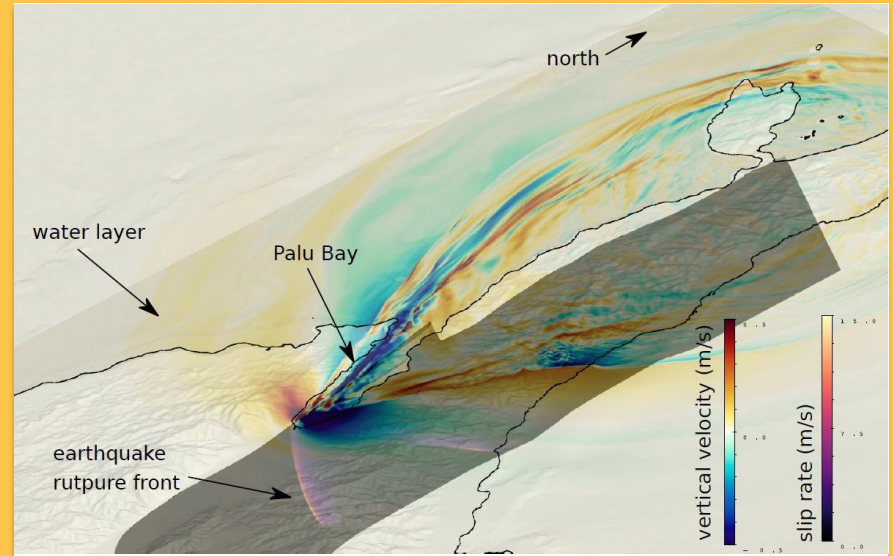
- ExaHyPE: [www.exahype.org](http://www.exahype.org)
  - SeisSol: [www.seissol.org](http://www.seissol.org)
- 

## SeisSol

Earthquake simulation software using high-order ADER-DG discretisation on fully-adaptive tetrahedral grids.

### In ChEESE-2P:

Towards advanced multiphysics earthquake simulations.

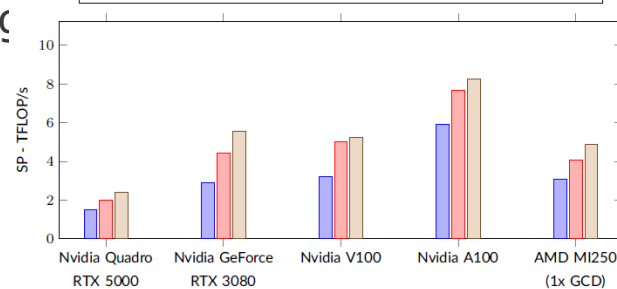
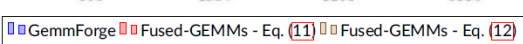
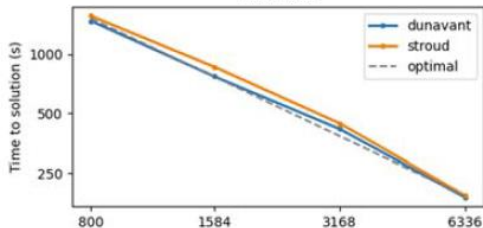
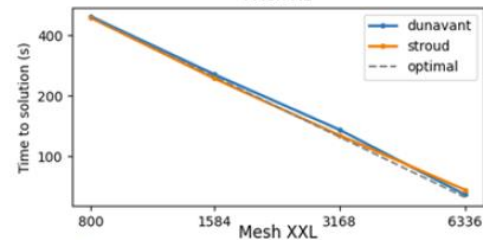
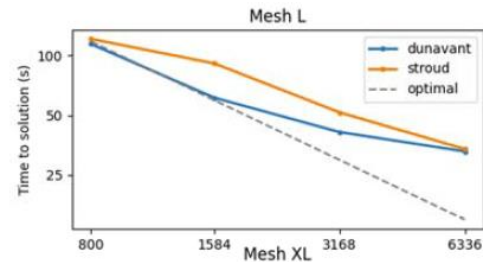


## Performance Portable SeisSol:

- Increased CPU flexibility and GPU port in CHEESE-1P

### Recent Work:

- From CUDA only to SYCL/HIP/CUDA/OpenMP
- Improved code generation (higher arithmetic intensity)
- CUDA Graphs for local time stepping (latency of CUDA calls)
- Full-machine runs on SuperMUC-NG and Frontera

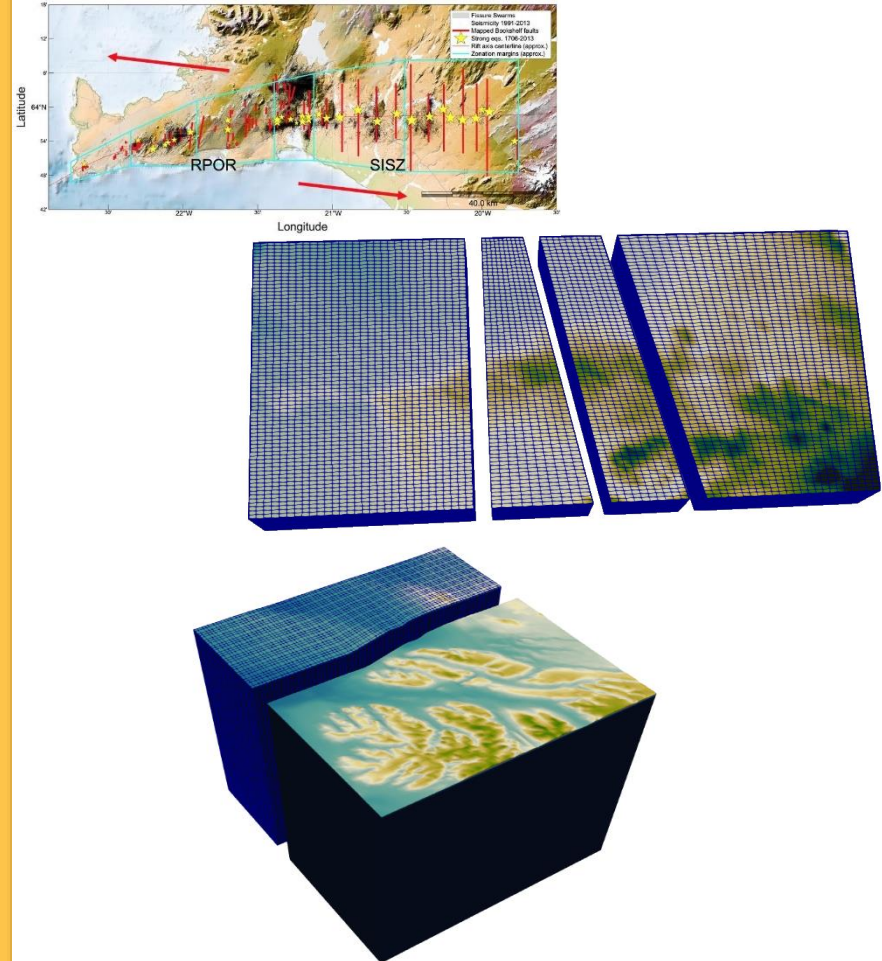


# ExaHyPE

Engine to solve  
hyperbolic PDE systems  
using high-order  
ADER-DG discretisation  
On tree-structured  
adaptive Cartesian grids.

## In ChEESE-2P:

Towards UQ-driven  
approaches for  
probabilistic seismic  
hazard analysis



## ExaHyPE on GPU Supercomputers:

- ChEERE-1P: Scalability bottlenecks identified in underlying AMR framework Peano
- Moved to Peano4/ExaHyPE2 during the “interregnum”

### Recent Work:

- GPU parallelism via offloading “batched” tasks using OpenMP target offload
- Finite-Volume models running, DG “upcoming”
- Identified bottlenecks in handling of GPU memory
- Developed new approach that keeps handling of GPU memory on host (Mario -> submitted to ISC'23)



# Thank you



@cheese-coe



<http://cheese2.eu>



@cheese-coe



@cheese\_coe@techhub.social

