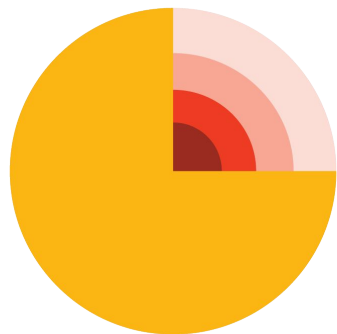




ChEESE

Seis  Sol

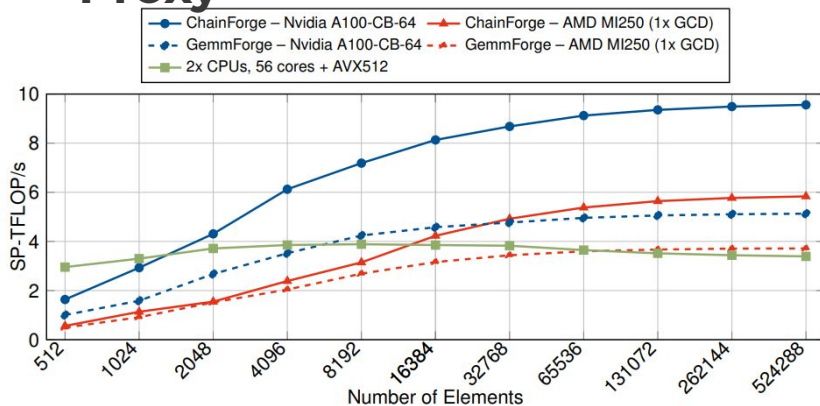
Vikas Kurapati(TUM), Michael Bader(TUM), Alice Gabriel(LMU)



Project funded by EuroHPC under the grant agreement No 101093038.



Performance Portability - SeisSol Proxy

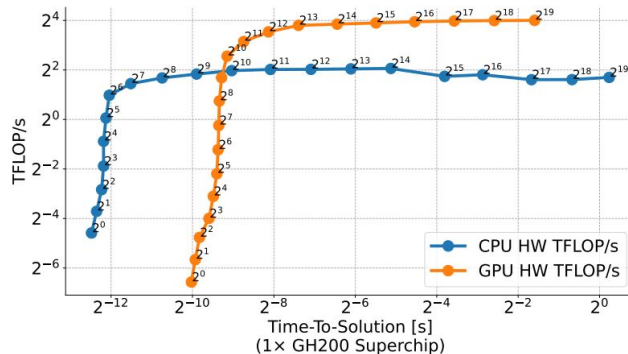


Status after RP1:

- Wave propagation kernels evaluated on Leonardo and LUMI GPUs
- Key observation: massive overhead for small clusters (top)

Current Work:

- Testing with Grace-Hopper (bottom)
- multiple small incremental improvements of code generation based on performance analysis
- no personnel for ChEESE in M19-M24 (2nd half of 2024).



Grace-Hopper

Performance Portability: LUMI

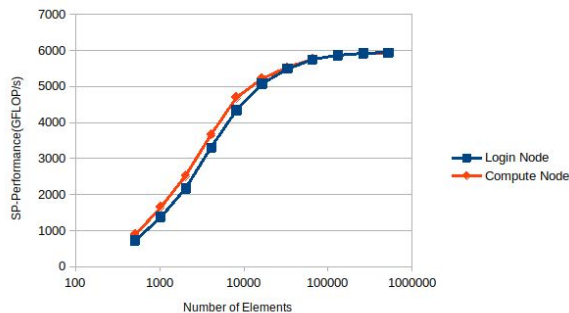
Nodes	Time(min)	HW-FLOP/s	NZ-FLOP/s
8	48.98	13.032	3.964
16	53.84	11.893	3.620
32	42.17	15.219	4.628
64	58.23	11.075	3.368

Performance on LUMI for Dynamic Rupture with elastic Material for Ridgecrest scenario

Problems with LUMI:

- Outdated drivers on the GPU
- Newer ROCm versions don't work properly
- Graph capturing not working when capturing multiple streams
- MPI problematic when sending too large messages
-> does not allow large enough partitions
-> 4 nodes would be appropriate!
- Hoping for current update of LUMI software stack ...

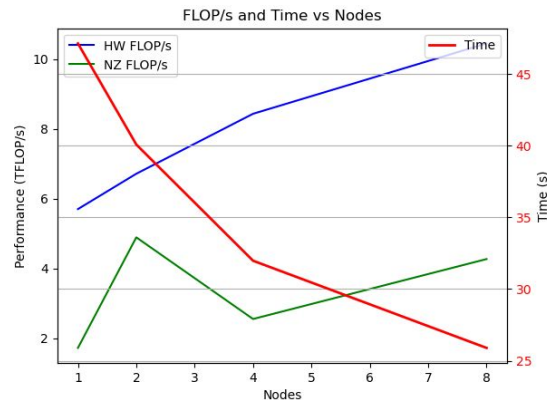
Performance Portability - Frontier



Comments:

- Newer ROCm versions didn't work properly
- Graph capturing not working when capturing multiple streams

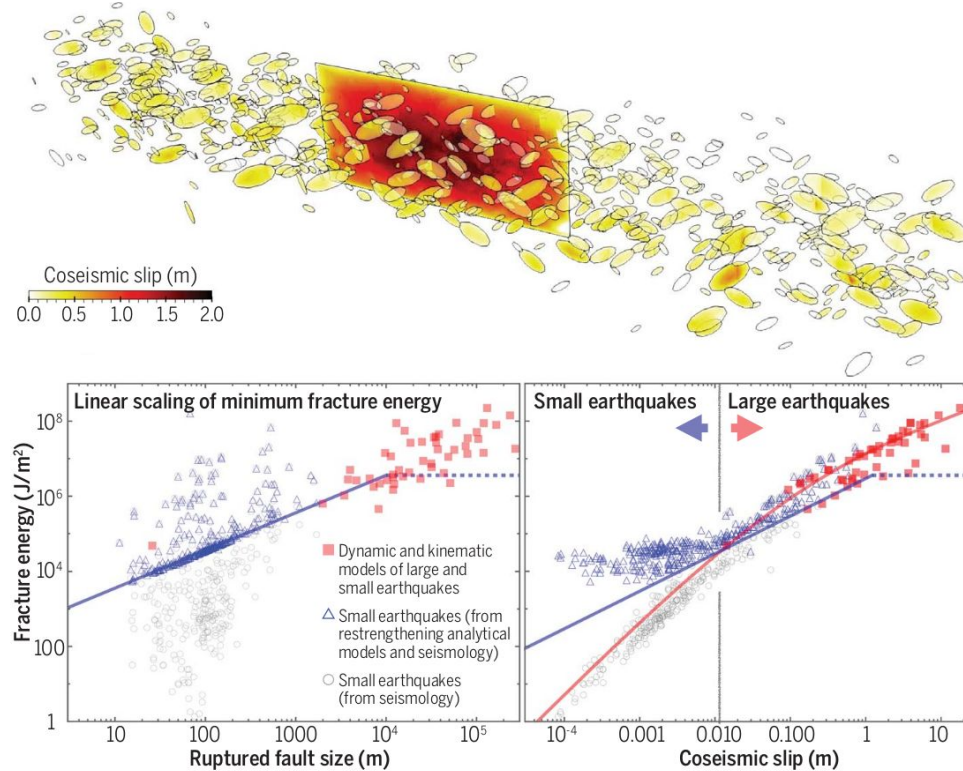
Proxy Performance on Frontier - Order 6



Ridgecrest- scaling on Frontier- order 4

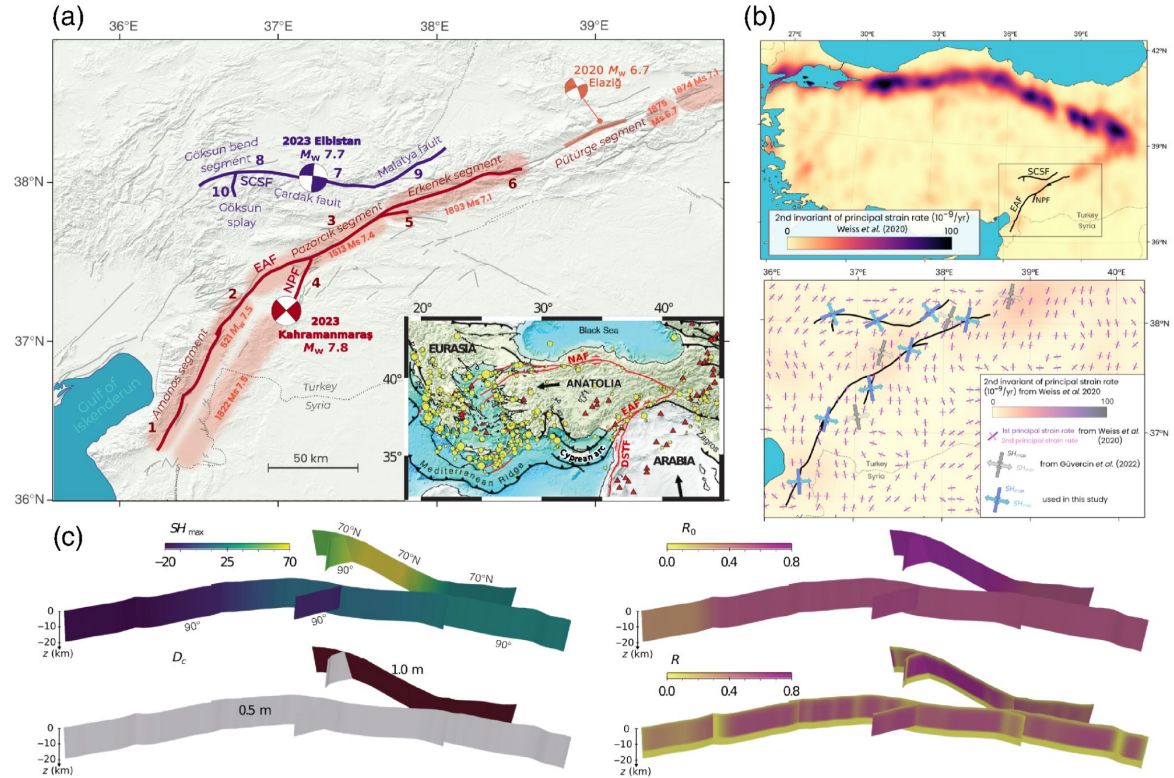
Fault-size dependent fracture energy and rupture dynamics of cascading earthquakes in multiscale fracture networks

Gabriel et. al, Science, 2024,



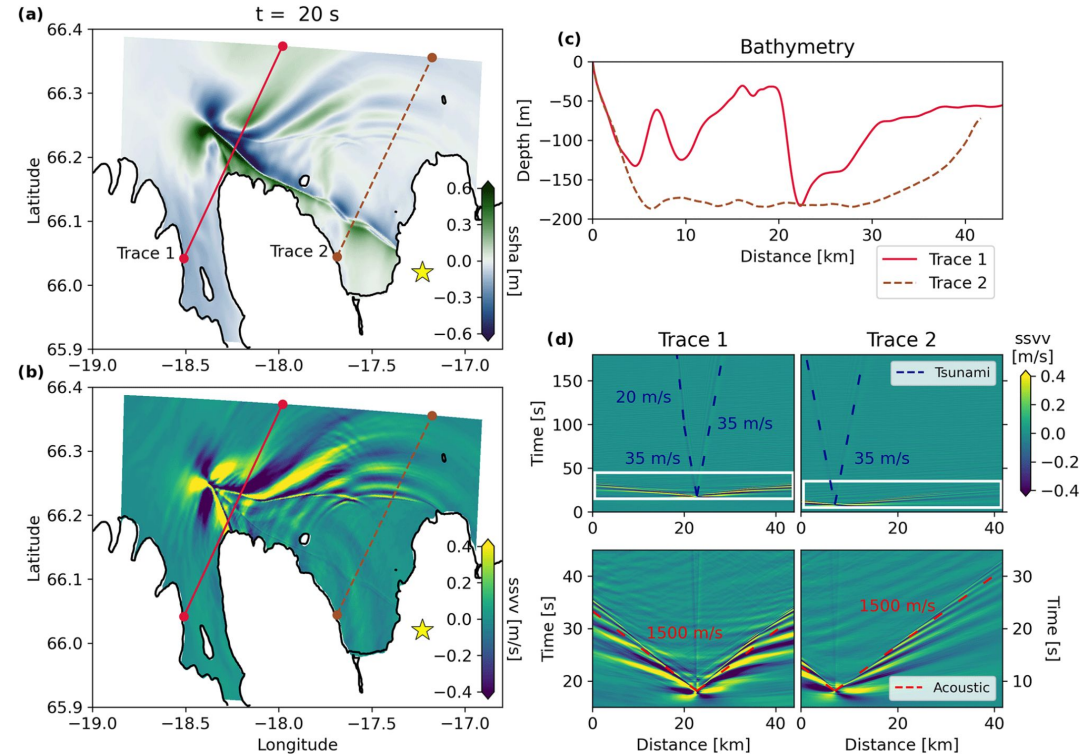
3D Dynamic Rupture Modeling of the 6 February 2023, Kahramanmaraş, Turkey Mw 7.8 and 7.7 Earthquake Doublet using Early Observations

Gabriel et. al, EGU, 2024



Linked and fully-coupled 3D earthquake dynamic rupture and tsunami modeling for the Húsavík-Flatey Fault Zone in North Iceland

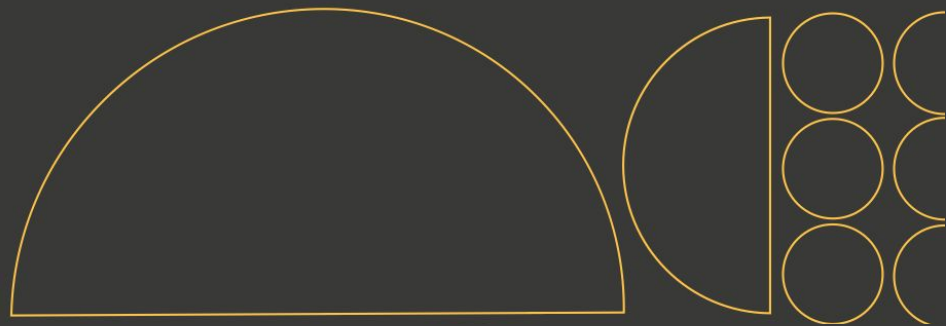
Kutschera et. al, EGU, 2024



Outreach, Impact, ...

- SeisSol is now an App in the new Quakeworx science gateway in SCEC.
- SeisSol will be one of the applications at ISC25's Student Cluster Competition

Thank you!



@cheese-coe



<http://cheese2.eu>



@cheese-coe



WP3: SeisSol-proxy

Legend

Not tested
Fetch the code
Compile code
Run test cases
Validate results

			x86 profiling status	HBM study	ARM porting	ARM profiling	SVE study	Optimisation status + comments
SeisSol	SeisSol CPU testing feedback	SeisSol GPU testing feedback	Not started	Not started	Not started	Not started	Not started	Not started

- Validation of the obtained numerical results needs attention
 - Need to run the full application to check correctness
 - Proxy was developed for performance testing purpose, not correctness
 - Simple tests exist (SeisSol precomputed) that can be used for that purpose on the full app
- SeisSol-proxy GPU version needs LLVM with NVIDIA support(WIP).