

Status HPC projects

B. Arntsen

NTNU

Department of Geoscience and petroleum
borge.arntsen@ntnu.no

October 2023

HPC Projects

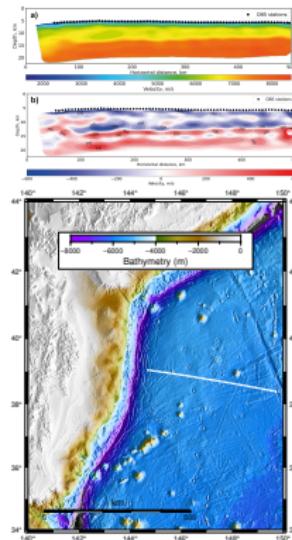
1. Simulation of ship noise (EU) start 2024
2. Inversion of the earths crust in the pacific
3. Inversion of the Mantel (North Atlantic)

EU SEASOUNDS

- ▶ Large scale simulation of noise propagation in isfjorden, Svalbard.
- ▶ Software: SPECFEM 3D public domain
- ▶ OpenCL, do not expect problems using the LUMI GPU cluster
- ▶ Recruiting PhD, expect start in Q3.

Inversion of pacific crust

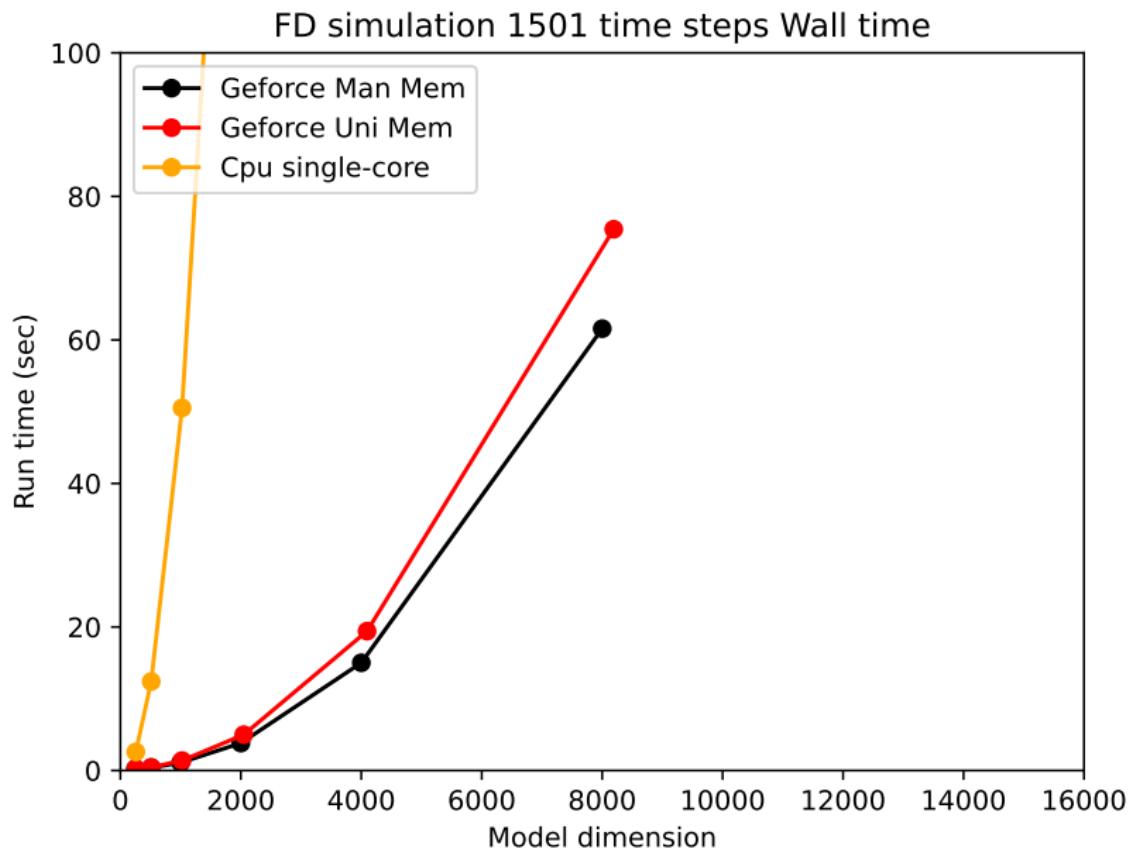
- ▶ Rockseis software
- ▶ C++ 120k+ codelines
- ▶ Port to multiple GPU architectures
- ▶ Single source + Out of bounds check etc..
- ▶ Language/Compilers with GPU acceleration and standard language
- ▶ Domain Specific Language
- ▶ Unified memory
- ▶ Initial port of mini application



Mini application

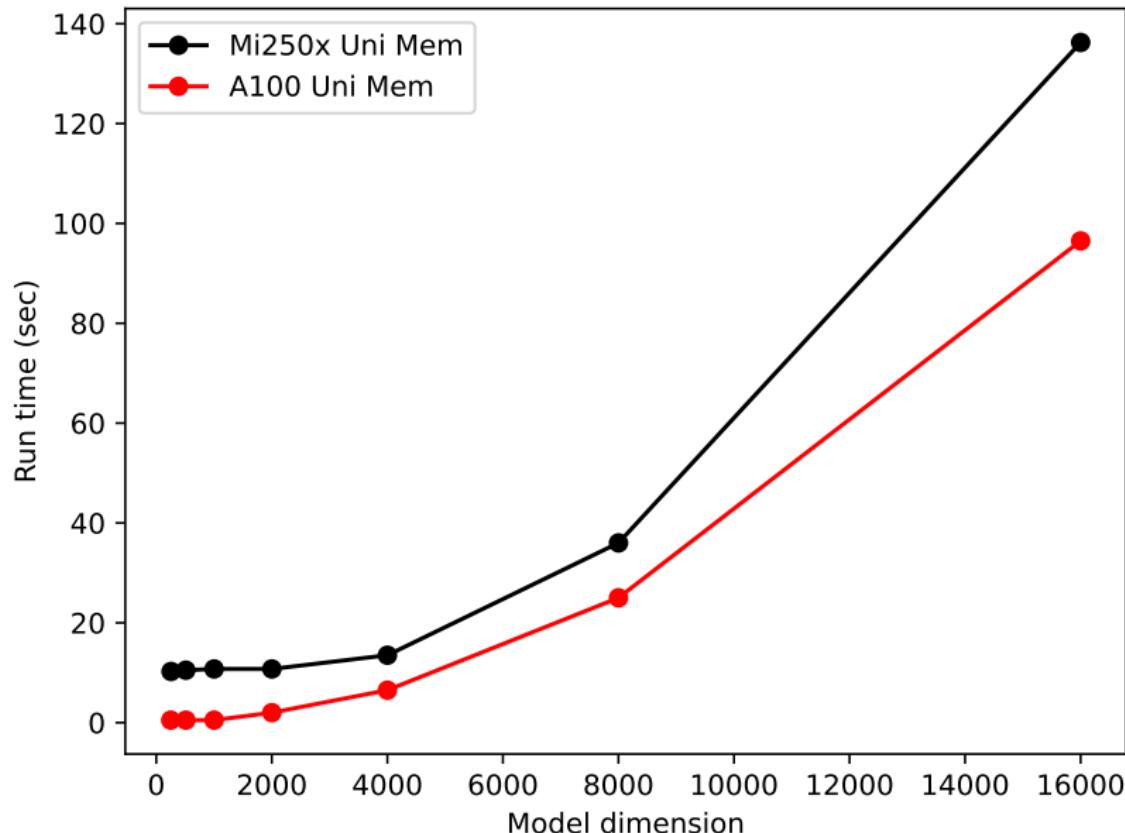
Video

Mini application



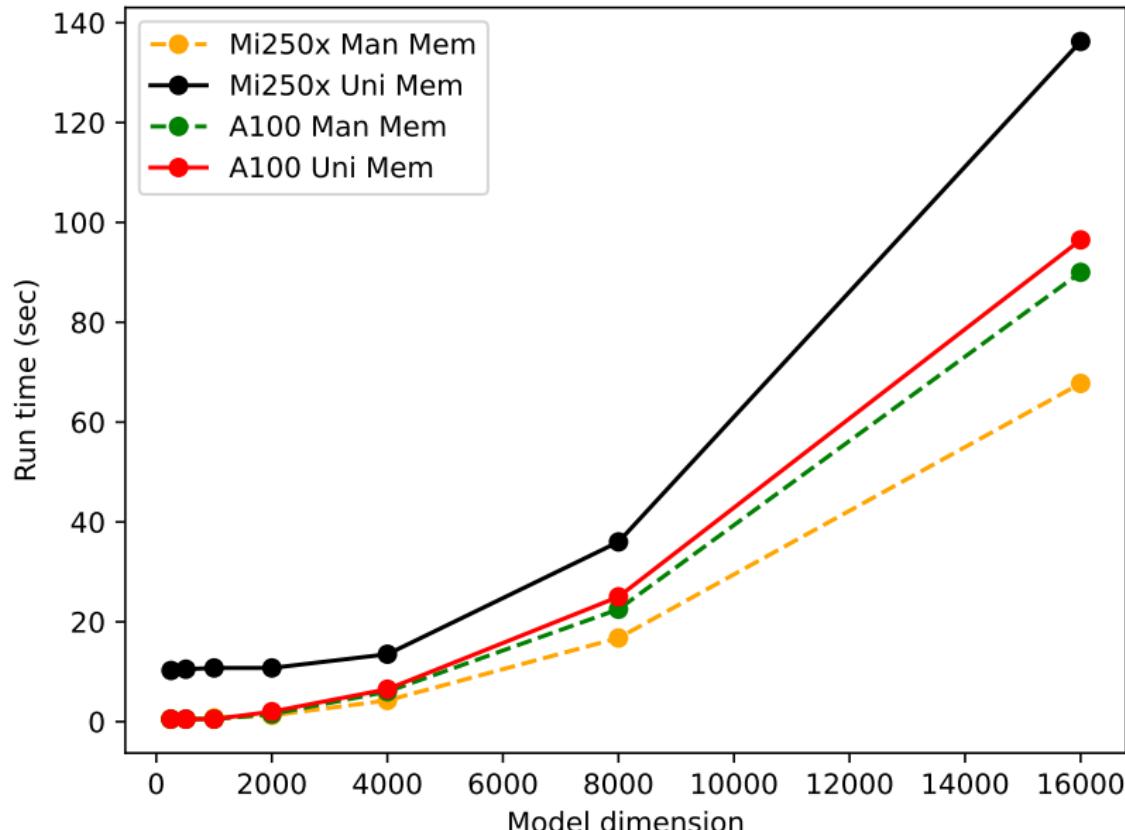
Mini application

FD simulation 1501 time steps Wall time



Mini application

FD simulation 1501 time steps Wall time



Rock Seis GPU port

- ▶ Time critical parts ported to GPU
- ▶ Single source DSL generates C, CUDA or HIP using Unified Memory
- ▶ Reasonable speedup vs cpu on A100
- ▶ Too slow on Mi250x ?

Future code development

- ▶ Python + Standard Language or DSL with support for GPU acceleration and
- ▶ Julia ?