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Research interest: non-intrusive, data-driven Reduced Order Modeling (ROM) for Earth science applications.

Goal: Use data from forward models to build ROMs that are fast and accurate, making it possible to explore parameter space.

Applications: Large-scale, time-dependent 3D simulations.

- Wave propagation
- Dynamic rupture of the lithosphere
- Mantle dynamics
- Hazard assessment for megathrust earthquakes.
- Supraglacial lakes on ice sheets.

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Process:

1. Execute a suite of large scale forward simulations, checkpointing the model output → large data matrix.
2. Perform the SVD on data matrix, use the results to build the ROM.

Computational focus/challenges:

- Currently developing Python toolbox for ROM
- Code is currently serial, aim to parallelize
- Need to exploit HPC infrastructure to manage large volumes of data and compute the SVD at scale
- Aiming for distributable code, useful for range of problems