Enhancing Scientific Reproducibility and Software Correctness in CrocoDash for Regional Ocean Modeling

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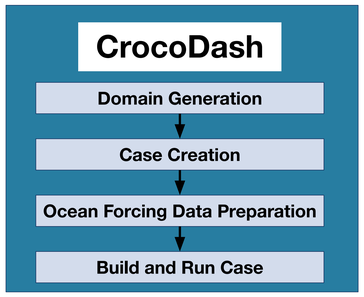
BACKGROUND

- **Regional ocean models** provide powerful tools for studying the impacts of climate change at finer spatial scales. They can offer insights into processes that are often unresolved in global climate models.
- These models can require large technical overhead.
- **CrocoDash** is a Python package that streamlines this process for rapid model prototyping of regional Modular Ocean Model version 6 cases in the Community Earth System Model.

User-facing Jupyter dashboard

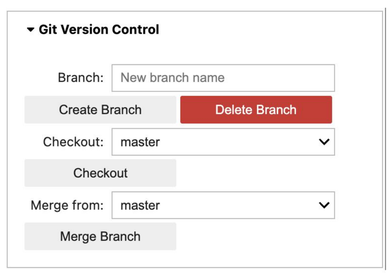


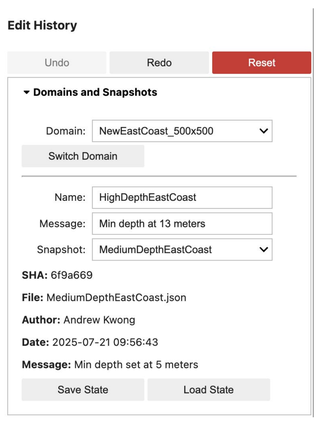
OBJECTIVE

This project enhances the CrocoDash workflow to support scientifically **reproducible** configurations of regional ocean models, increasing accessibility for users and promoting open, collaborative science.

METHODS

- **History and Provenance**
- **Git Version Control**
- **Structure and Shareability**

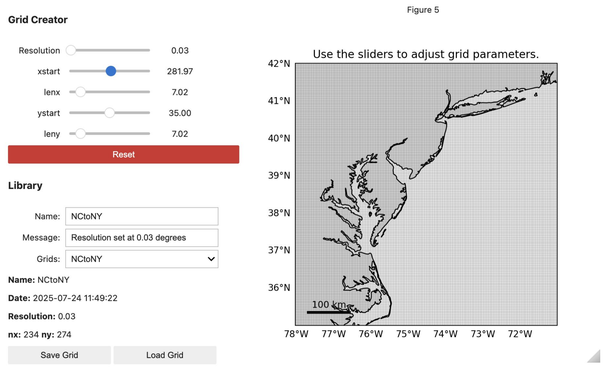




RESULTS

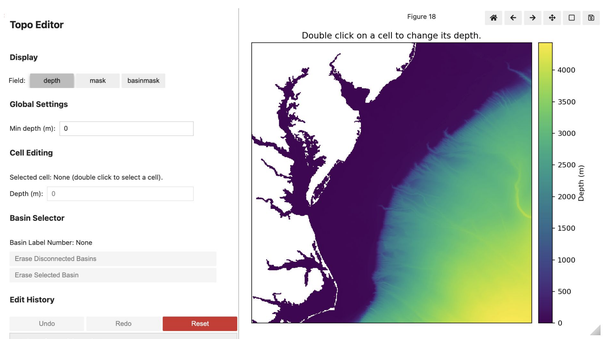
GRID CREATOR

Interactive tool to **create** horizontal grids



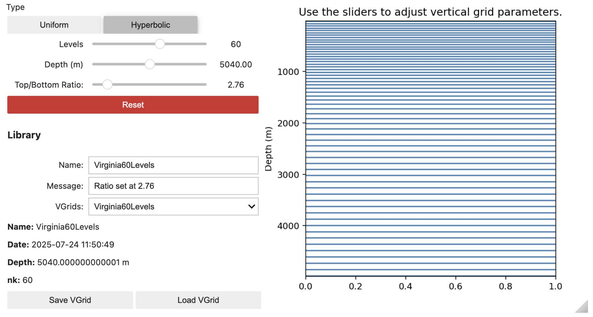
TOPO EDITOR

Interactive tool to **customize** topography

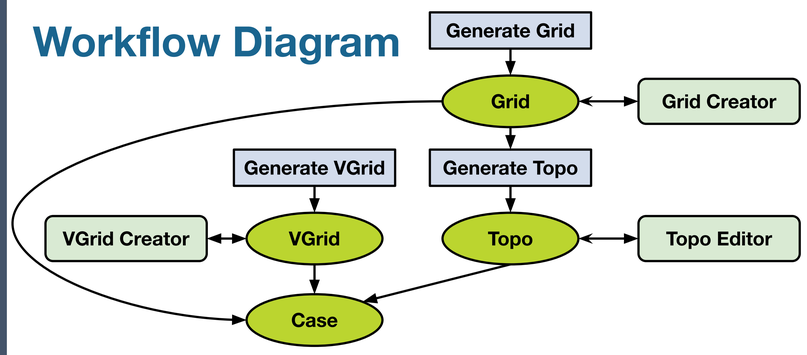


VGRID CREATOR

Interactive tool to **create** vertical grids



Workflow Diagram

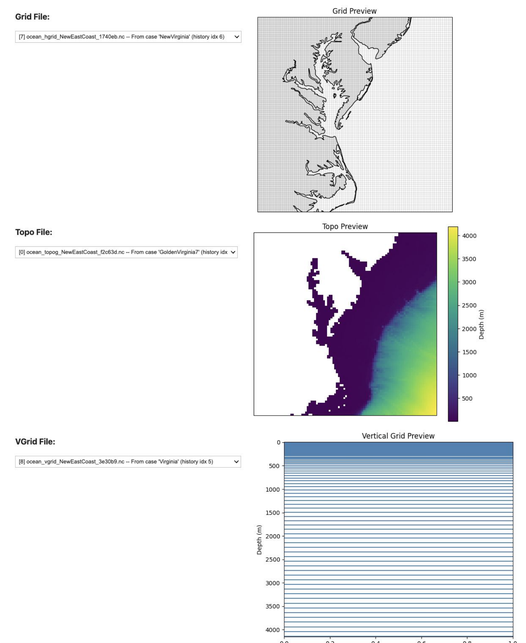


CASE ASSEMBLER

Assemble cases from **history**, not scratch

Select Domain Objects

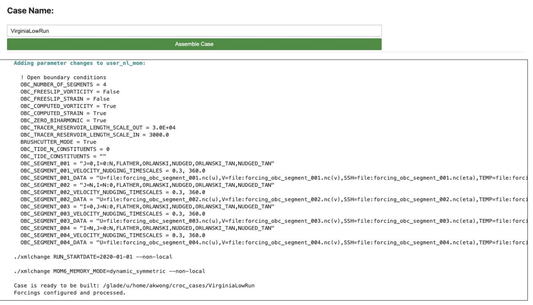
1. Horizontal Grid
2. Topography
3. Vertical Grid



Select Forcing Configuration

Initial conditions, open boundary conditions, and tides

Create and Assemble Case



CONCLUSIONS

- Our new features provide the foundation for rapid, reproducible Earth system modeling.
- **Future work** will involve documentation and testing, as well as adding features to handle for other edits and workflows performed in CrocoDash.

This material is based upon work supported by the U.S. National Science Foundation National Center for Atmospheric Research, which is a major facility sponsored by the U.S. National Science Foundation under Cooperative Agreement No. 1755088. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the U.S. National Science Foundation.