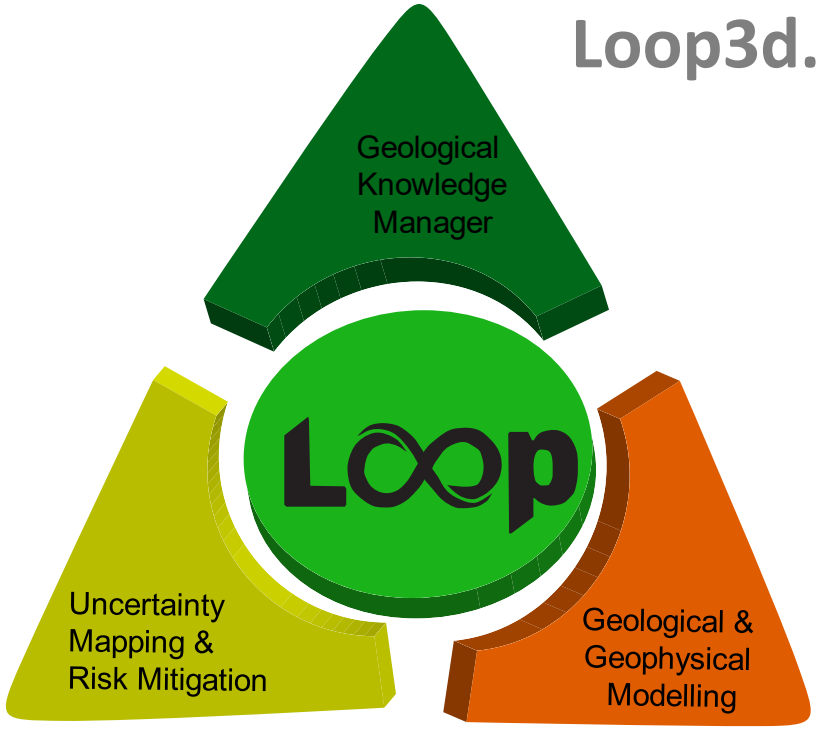
Three-dimensional Bayesian Modelling of Geological and Geophysical data

Loop3d.org

Loop
Quarterly Report #3
Sep 2024

continues from QR 1 to 2 available on loop3d.org



Providing geoscience data globally

Welcome to Loop Jun 2024 Quarterly Reports - Highlights

3D modelling conference

- Fremantle, Apr 7-10 2025 – click here to access the conference website
- 2 days of workshops, 2 days of technical presentations including applications, developments and workflows
- Please visit this link for more information
- Deadline for abstract submission and early bird registration: December 15 ,2024
- 1st circular soon in circulation

Staff news:

- Dr Angela Rodrigues will be on maternity leave from early January 2025! The entire Loop R&D team including partners and sponsors would like to congratulate both Angela and Chris and wish them all the best for this amazing and life-changing event!!!
- The Monash node is looking at recruiting a Hew6 / Hew7 python/C++ programmer to support and maintain the Loop developments. If you know anyone, please let us know
- Laurent Ailleres, Lachlan Grose, Guillaume Pirot and Michel Nzikou attended and presented at the 37th IGC in Busan, Sth Korea. We were part of successful sessions regarding 3D geological modelling applications and uncertainty characterization. Laurent also attended the RING meeting in Nancy, France and the GSA (+3D modelling workshop) in Anaheim, CA, US. The network is growing and it was great catching up with some of our partners overseas and discuss the potential for future collaborative projects

The LoopFoundation is up and running – consider becoming a member (this link)

Welcome to Loop Jun 2024 Quarterly Reports - Highlights

LoopConverter

- a library to link industry/government organization databases to map2loop and LoopStructural is being developed by Rabii Chaarani (embedded Loop researcher with the NTGS). Rabii is also busy making installing map2loop easier by wrapping the gdal library – this is mainly for the windows based users

Map2loop

- numerous bugs addressed and fixed, the demonstration notebooks (github) are now functional with m2l v.3, including estimation of stratigraphic order, thicknesses (multiple methods)
- We are making map2loop more verbose so that we can identify faster the issues arising from bad topology or geometry fed to map2loop from served maps. This should help all of us fix our maps and input data into the Loop workflow

LoopStructural

- LoopStructural 1.6 has been released, now using pyvista for visualisation and new export options for open mining format (OMF), vtk, gocad, geoh5 formats. A webapp is developed to link the deformation history and its parameters to the LoopStructural API to facilitate modelling from either the output of map2loop or user generated csv files
- Development of multigrid solver for LoopStructural using linear operators removes memory overhead for large model grids and improves solving speed ~10x
- Loop visualisation module can toggle object visibility and change opacity allowing for better interrogation and analysis of model
- Loop fold module re-written allowing for different fold profiles to be tested and allowing for manual fitting using ipython widgets

Welcome to Loop Jun 2024 Quarterly Reports - Highlights

Tomofast-x

- Extension of the Tomofast-x inversion platform to support machine learning based inversion
- A machine learning-based gravity inversion code has been developed, using Noddy-generated models as the training set. The resulting inverted model is then compared to the classical inversion performed with Tomofast-x

Map2loop QGIS plug-in

- Data loading from an existing Json file
- Data clipping after processing of the raw data, and the updated data is then transferred to the server for either for modelling or map deconstruction.
- Continuous testing of qgis loop plugin with the newer version of map2loop is ongoing

LoopUI

- A one day workshop on uncertainty quantification and value of information across the mineral value chain was held on September 17th 2024, on UWA campus

Loopers? Who are we?

R & D providers

MONASH University

THE UNIVERSITY OF WESTERN AUSTRALIA — Centre for EXPLORATION TARGETING

CANADA 1842 GEOLOGICAL SURVEY - COMMISSION GÉOLOGIQUE

Australian Government Geoscience Australia

NORTHERN TERRITORY GOVERNMENT

British Geological Survey — NATURAL ENVIRONMENT RESEARCH COUNCIL

Partners

UNIVERSITE D'ORLEANS — Earth Sciences Institute of Orléans ISTO

RING — UNIVERSITÉ DE LORRAINE

Funding

Australian Government — Australian Research Council

Australian Government Geoscience Australia

NSW Regional NSW

Tasmanian Government

NORTHERN TERRITORY GOVERNMENT

Department of Energy, Mines, Industry Regulation and Safety — GOVERNMENT OF WESTERN AUSTRALIA

Queensland Government Business Queensland

VICTORIA State Government

AuScope

USGS science for a changing world

Government of South Australia Department of State Development

SOUTH AUSTRALIA

MinEx CRC

AngloAmerican

BHP

Department of Energy, Mines, Industry Regulation and Safety — GOVERNMENT OF WESTERN AUSTRALIA

Supplementary Funding

AuScope

NORTHERN TERRITORY GOVERNMENT

CSIRO

Australian Government Geoscience Australia

Department of Energy, Mines, Industry Regulation and Safety — GOVERNMENT OF WESTERN AUSTRALIA

Data / case studies

Department of Energy, Mines, Industry Regulation and Safety — GOVERNMENT OF WESTERN AUSTRALIA

CSIRO

NORTHERN TERRITORY GOVERNMENT

Australian Government Geoscience Australia

AngloAmerican

BHP

Loop

Funding since 2018…

currently active

AuScope

$150K

ARC Linkage

$1,700K + $1,550K

EGF 3D fault model

$67K

Loop Portal

$200K

GSC Knowledge Manager

$400K

P6 & OP6

$2,100K

Loop & Thin Geology modelling

$200K

VOI DECRA

$1,000K

GeoMos

$300K

DARE Data Analytics

$600K

Loop embedded researcher

$420K

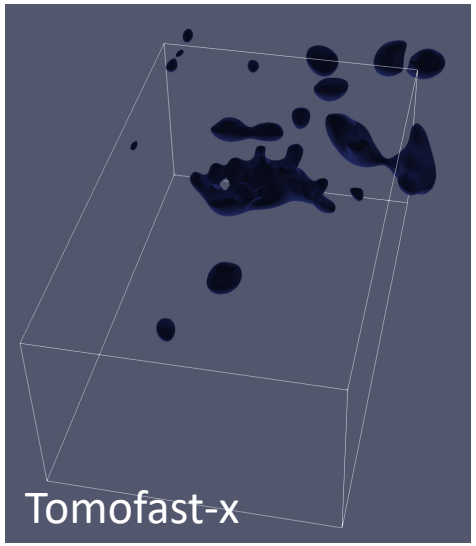
Student Internship

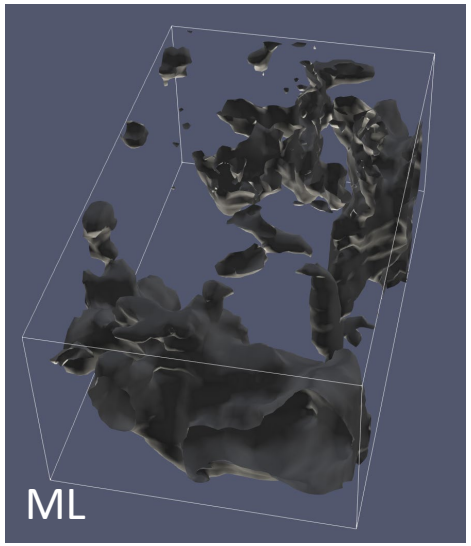
$40K

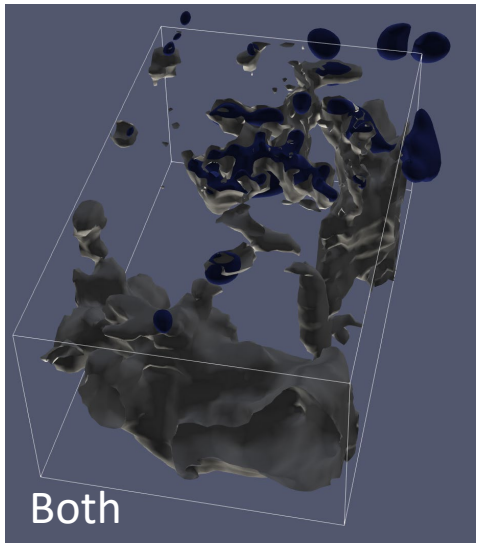
Providing geoscience data globally

Loop – progress illustrated

ρ=+100







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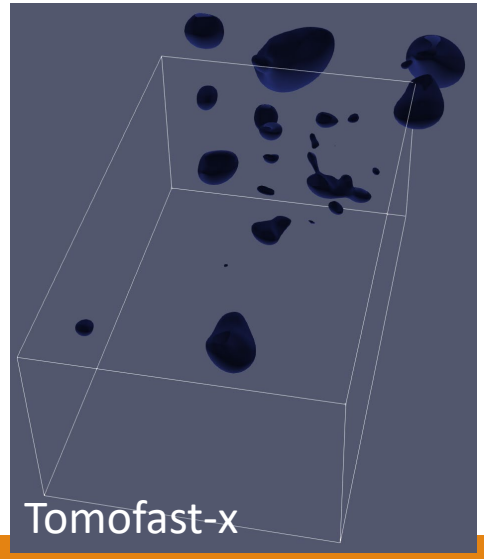
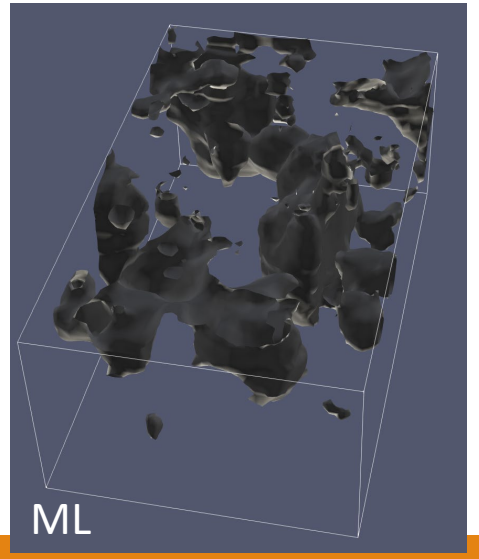
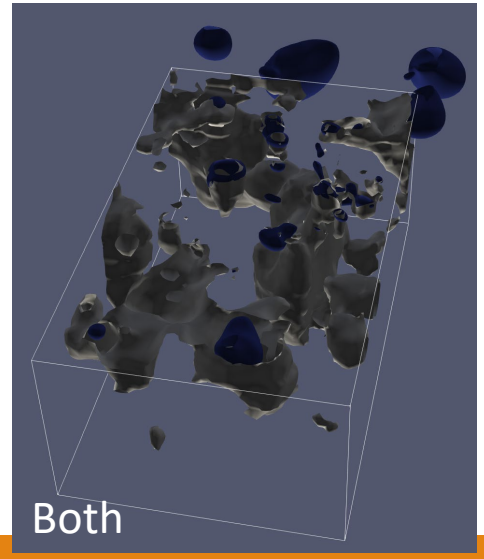


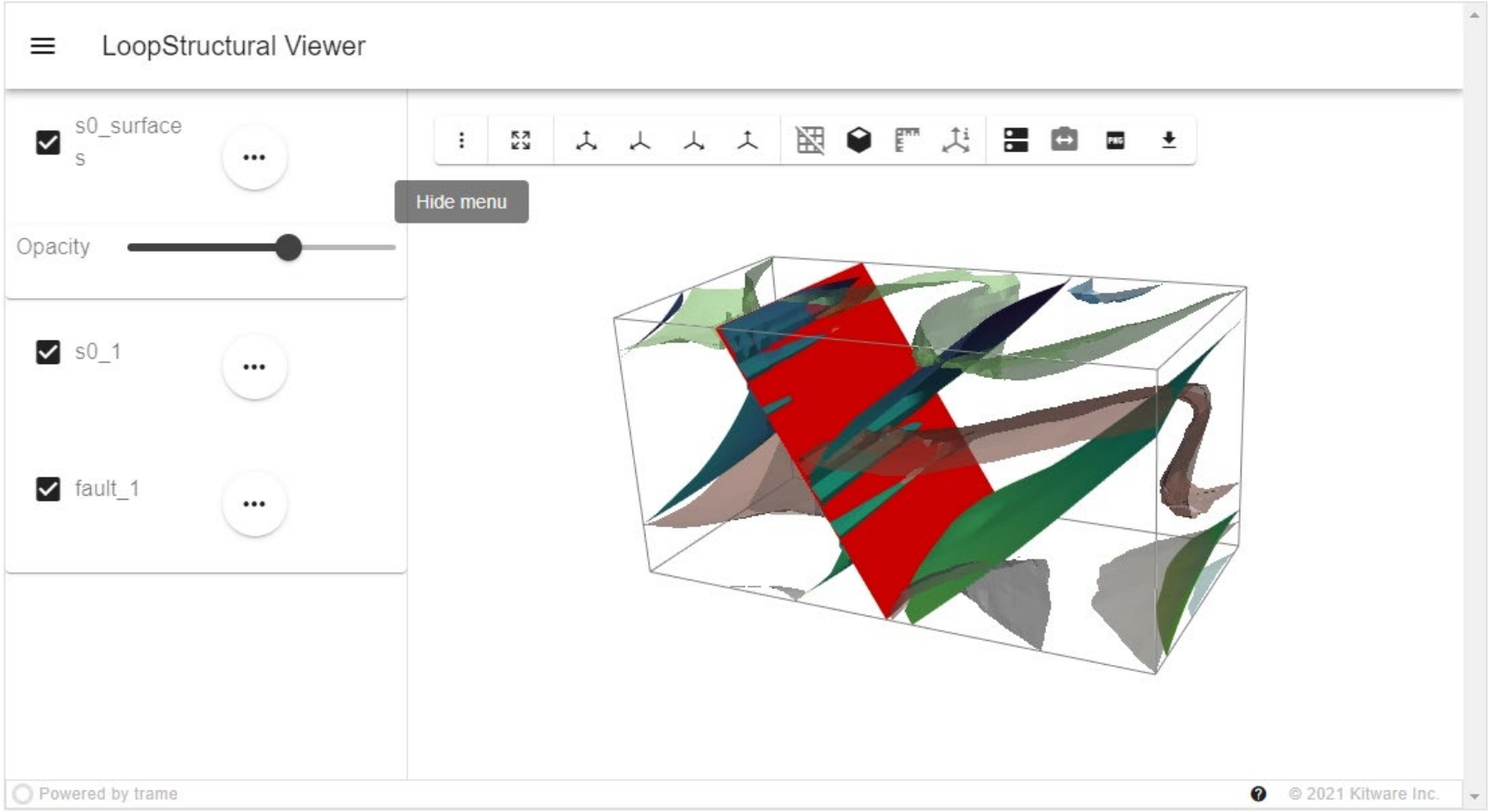




Comparison of inverted model with Tomofast-x

A machine learning-based gravity inversion code has been developed, using Noddy-generated models as the training set. The resulting inverted model is then compared to the classical inversion performed with Tomofast-x (contact Vitaliy for more information)

Loop – progress illustrated



LoopStructural Viewer built with pyVista and now allowing toggling on/off of objects