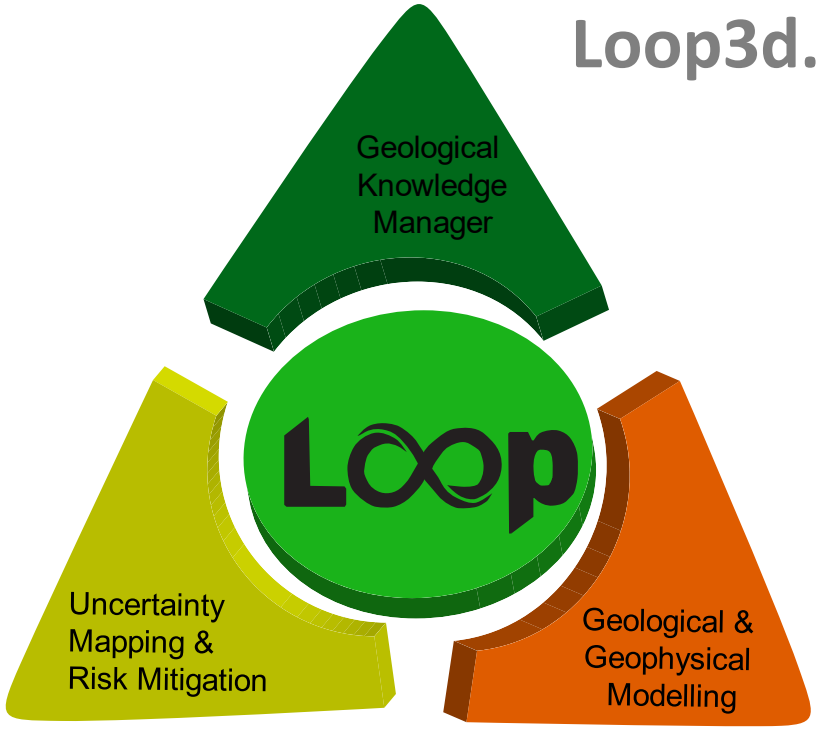
Loop

Three-dimensional Bayesian Modelling of Geological and Geophysical data

Loop3d.org

Loop
Quarterly Report #2
Jun 2024



Providing geoscience data globally

Welcome to Loop Jun 2024 Quarterly Reports - Highlights

3D modelling conference

- Fremantle, Apr 7-10 2025
- 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

Staff news:

- Roy Thomson has officially terminated his engagement with Loop and joined the Bureau of Meteorology – he promises to try and make the weather better…
- Noelle Cheng's contract has been extended to the end of March 2026
- CSIRO has renewed internship funding for Ayla Edwards for SEM2 2024. The Loop project is also funding a casual employment for Ayla. Ayla will be testing Loop Technologies (mainly m2l and LoopStructural) and build case studies in collaboration with CSIRO. We hope that Ayla will continue with Loop next year as an Honours students

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)

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)

LoopStructural

- LoopStructural 1.6 has been released, now using pyvista for visualisation and new export options for vtk, gocad, geoh5 formats.
- Added interpolation API providing easy access to loopstructural interpolators
- Basic implementation of mesh processing tools for preparing Loop models for numerical modelling (e.g., using underworld). In collaboration with AuScope, we can now generate conformable (to faults, stratigraphy and intrusions) **meshes from Loop models**. These will be tested and benchmarked while modelling hydrogeological flow

Tomofast-x

- Extension of the Tomofast-x inversion platform to support inversion of full tensor gravity gradiometry data (FTG). Added support for inversion of one-component Tzz and six-component full tensor data.

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

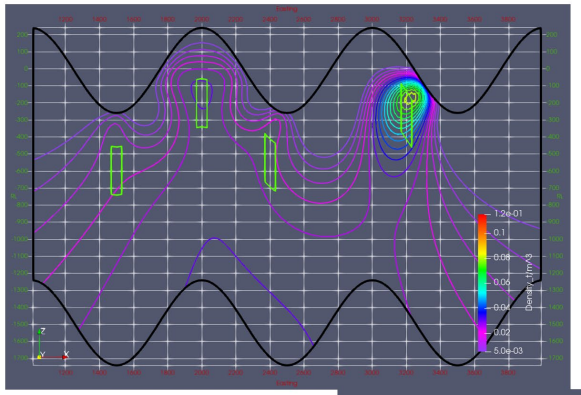
$420K

Student Internship

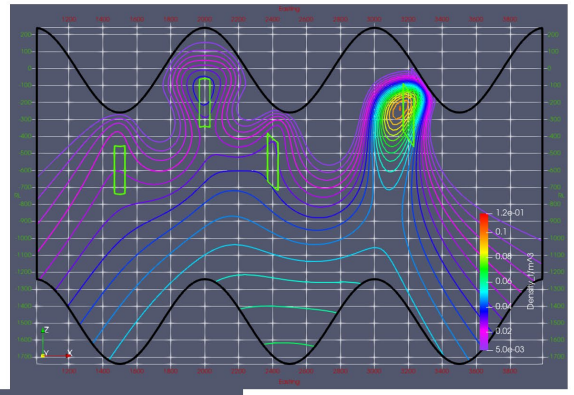
$40K

Providing geoscience data globally

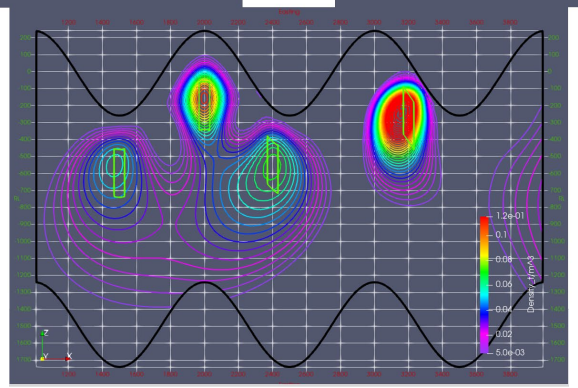
Loop – progress illustrated



Gravity



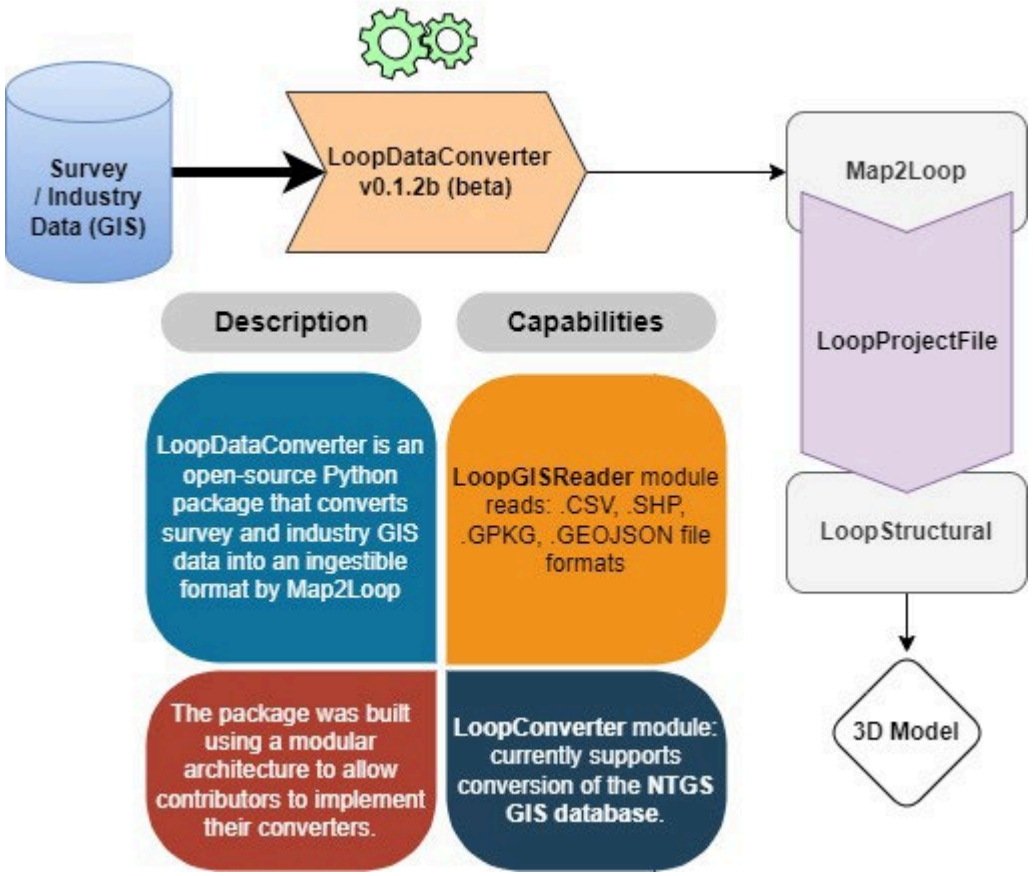
Gradiometry Gzz



Gradiometry full tensor (6 comp)

Inversion of synthetic. The black sinusoidal line corresponds to complex topography, and the data are located on the topographic surface. The inverted model gets better when inverting the full tensor gradiometry data as compared to 1-component Tzz inversion, and gravity Tz inversion (V. Ogarko)

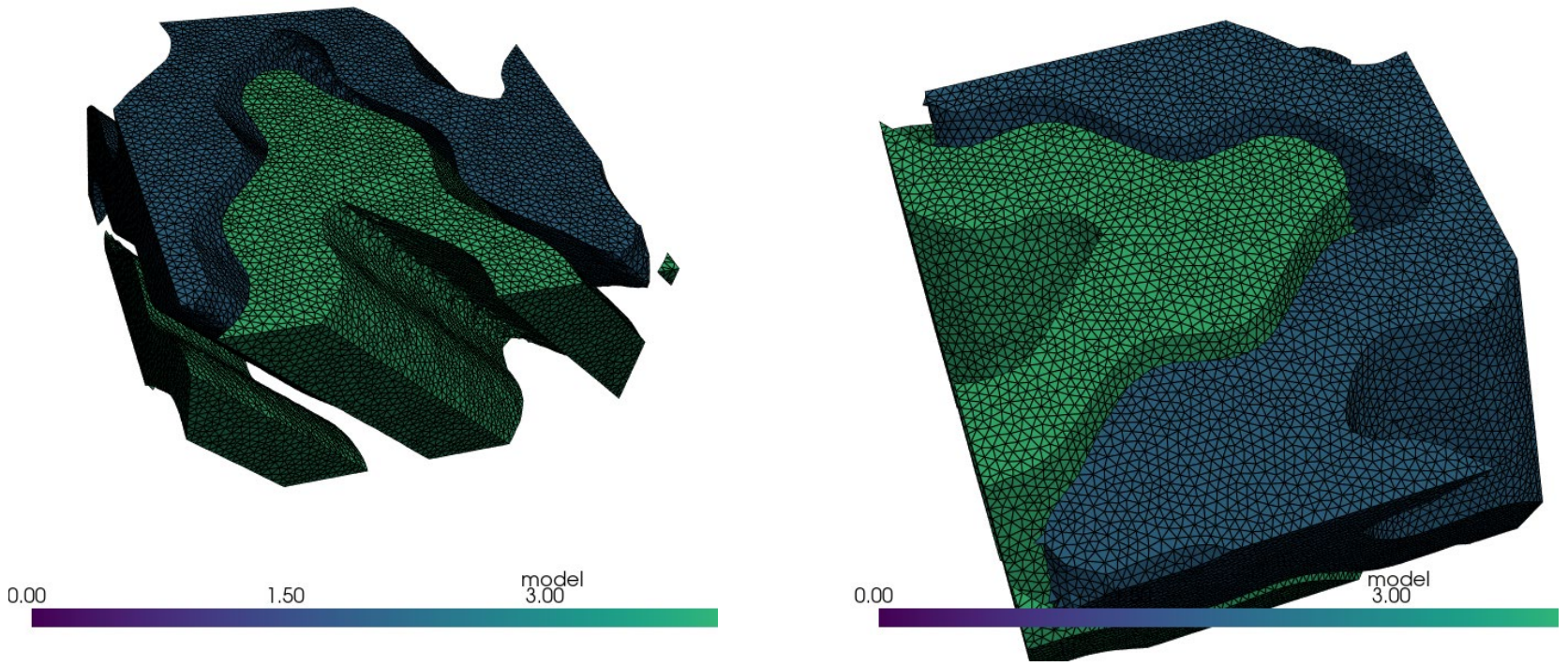
Loop – progress illustrated



Proposed and tested workflow for data extraction and input into the map2loop process
(R. Chaarani)

The process is currently developed for and tested on NTGS data server

Loop – progress illustrated



Two different views of the Gautier at al., (2016) synthetic model with a tetrahedric mesh throughout, conformable to stratigraphy. The meshing methods also generates meshes conformable to faults
(L. Grose & T. Gollapalli [AuScope, Monash node])