An integrated and interoperable platform enabling 3D stochastic geological modelling

Preparing a Loop-Ready dataset
Example of the NTGS dataset

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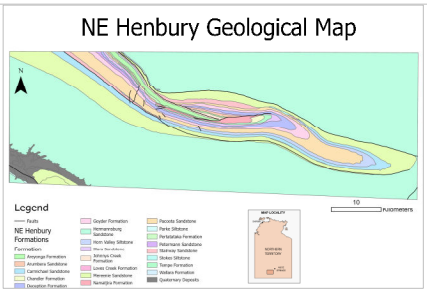
Summary

The Loop platform, like any modelling system, requires input datasets to be correctly formatted to process the data and perform the necessary computations for the output. In this section, we will discuss how to prepare a dataset for ingestion by Map2Loop, using the Henbury Geological Map from the Northern Territory as an example. The process involves using the LoopDataConverter package, which automatically converts input from the NTGS GIS database into a format compatible with Map2Loop. Once processed by Map2Loop, the output will be ready for use in building a 3D model with LoopStructural.

The Geology of The Henbury Map – Amadeus Basin

Geology of The Henbury Region

The geology of the Henbury region is characterised by Neoproterozoic to Devonian sedimentary rocks from the Amadeus Basin, which have been significantly shaped by the Petermann and Alice Springs Orogenies into a fold-and-thrust belt. From an economic perspective, the region is home to petroleum fields, particularly the Mereenie and Palm Valley fields, and it also holds potential for uranium and base metals exploration.



Automatic Conversion of NTGS Dataset: LoopDataConverter

Map2Loop File Requirements

Shapefile example name	Shape file description	Geometry Type
Geological_units.shp	stratigraphic or lithological units	Polygon
Linear_Features.shp	faults and axial traces	LineString
Orientation_data.shp	bedding measurements, foliations etc.	Point

Examples of Map2Loop data requirements

Orientation Data Requirements

Example Attribute name	Variable name	Data Type	Required/ optional	Description
Strike	"dipdir_column"	Integer	Required	Strike (using the right hand rule)
Dip	"dip_column"	Integer	Required	Dip

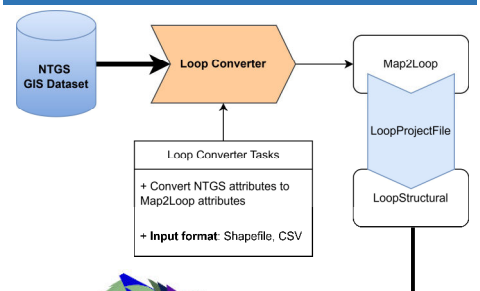
Linear Features Data Requirements

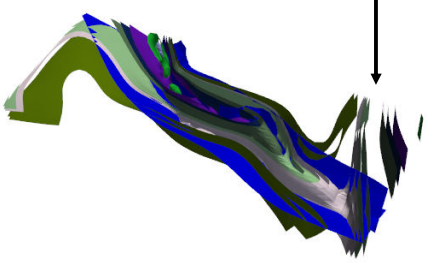
Example Attribute name	Variable name	Data Type	Required/ optional	Description
Feature	"structtype_column"	String	Required	Structure type: Fault, Fold
DipDir	"dipdir_column"	Integer	Required	Dip Direction

Geological Units Data Requirements

Example Attribute name in QGIS	Variable name in Map2Loop	Data Type	Required /Optional	Description
group	"group_column"	String	Optional	Group name
Formation/Lithology	"unitname_column"	String	Required	Formation name
Alt_unit	"alt_unitname_column"	String	Required	Field containing alternate stratigraphic unit names

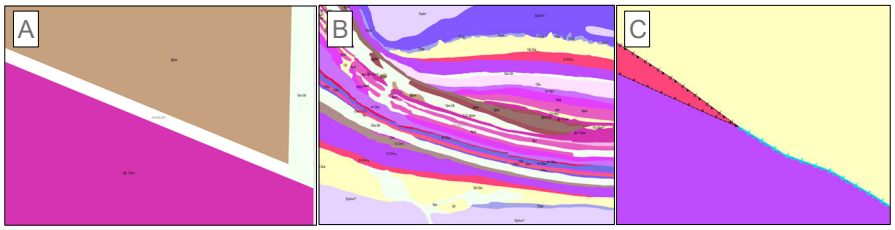
LoopDataConverter in the Loop Workflow





3D geological model of the NE Henbury Map

Problems to correct before modelling



[A] Incorrect polygon topology, resulting in incorrect basal contacts. [B] Quaternary deposits conformable to folded formations. Requires solid geology interpretation to avoid erroneous unit thickness values. [C] Segmented fault lines that lead to modelling multiple faults instead of only one fault.

Acknowledgments

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