Discovering Open File 3D Geoscience Models: A Survey of the WAMEX Database

The importance of effectively leveraging Open File Industry Geoscience Data to support research applications.

Resource companies invest significant resources in the development of sophisticated 3D models of the subsurface to inform exploration and production strategies. These models, while critical to advancing understanding and decision-making in the sector, are often submitted in proprietary software systems, limiting their accessibility for external research and academic collaboration.

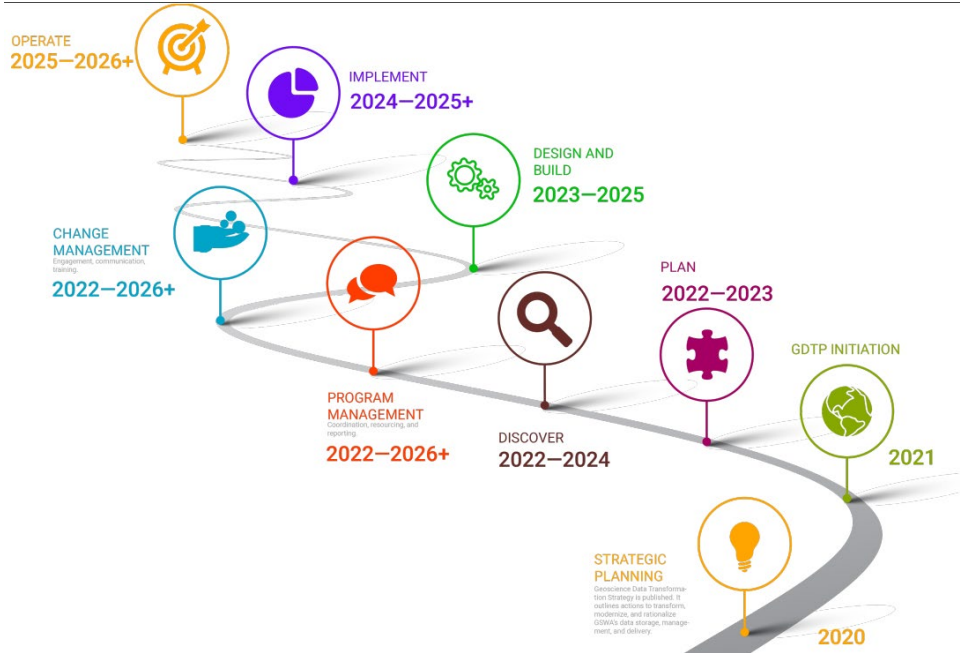
In this talk I'll present the benefits of working with open file 3D data available via the GSWA. How to readily discover it, as well as how we're improving the delivery and access to these resources over the next few years.

GSWA – Data Delivery

From Opaque to Transparent

GDTP - Roadmap

- The Geoscience Data Transformation Program (GDTP) is an initiative that commenced in 2021. This project aimed at modernising, how the GSWA delivers its data.
- This program has entered its implementation phase with much of the underlying infrastructural change already completed.
- What this means for researchers is that the wealth of data available via the survey will be easier to find and access in the next few years. This is great news if you're investigating ML and Data Science projects.



Our data at a glance

- The GSWA currently administers 4 Peta bytes of data.
- All data the GSWA makes available is considered Crown Copywrite and licensed under the Creative Commons 4.0 (CC-4.0-BY). This allows for free use of all data if attribution is given.

- Scanned paper products to PDF/Image files and OCR where possible
  - 24,000 paper seismic sections
  - 3,375 paper well logs files
  - 2,550 GSWA field notebooks
  - 550 GSWA maps and plans
  - 205 thin sections

- Digitalised 675 seismic sections/well log scans to SGY/LAS files ready for consumption into Petro-technical applications

- Transcription of 175 tapes containing seismic data

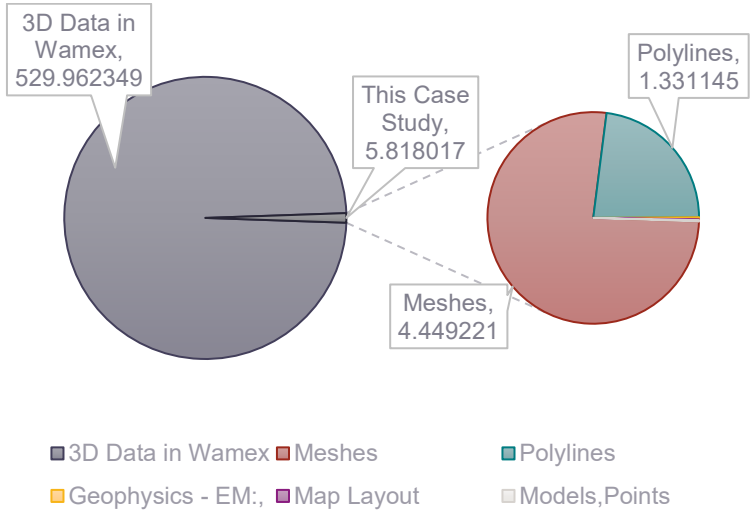
- 1,900 Palaeontology reports digitally enriched by capturing fossil site location

- Pilots for table extraction, OCR and cleansing Ground Gravity data

- And More to Come!

3D Data in WAMEX

- WAMEX when fully decompressed contains 4.1 TB of data. So how do we characterise how much of that data is 3D data?
- GSWA has recently kicked off it's Grad Program and Matt is one of the first wave of participants.
- He's worked with out team and Sue Murray on the development to extend out team's solution to categorise and tag different types of 3D data available in WAMEX.
- He built a configuration file that breaks 3D files into different types of origin software, and from there different types of models and data.
- We then identified 3 key Anumbers that contained 3D data to help demonstrate the types and quality of 3D data available!

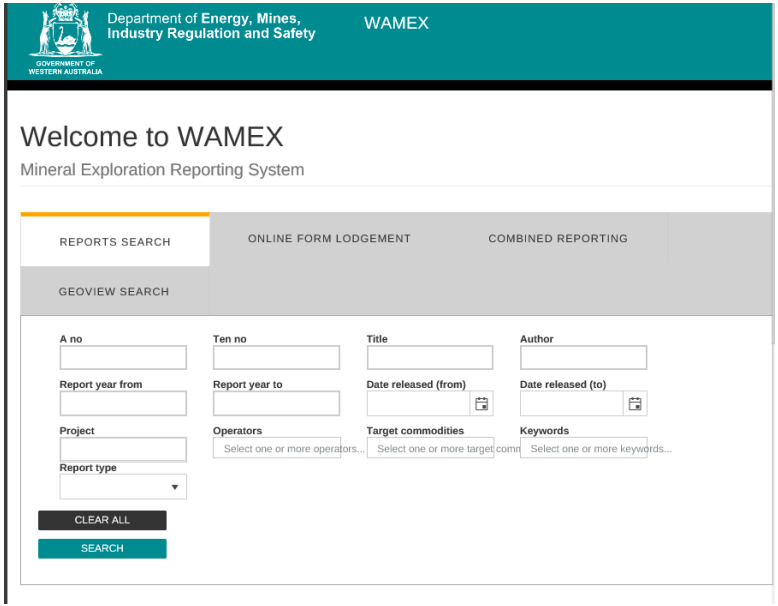


Examples of 3D Data Sets

An Incomplete List

WAMEX Search

- All the data I present today is available by the WAMEX Search, all you'll need to do is go to this link and enter the Anumber.
- There you can access the report as well as the datasets as well.
- https://wamex.dmp.wa.gov.au/Wamex



Central Yilgarn Iron Project

Anumber	96734
Geological Summary	The Central Yilgarn Iron Project (CYIP) includes the Mt Ida and Mt Mason deposits, hosting magnetite and hematite mineralization. Located in the Menzies District, it lies within the Mt Ida Greenstone Belt, influenced by major faults like the Ida and Ballard Faults.
Commodities	Iron
Dataset Summary	Geophysics • Magnetics, high precision Gravity, Remote sensing Geochemistry • 118 RC, 22 DD, 2547 XRF Assays Geology • 1:5000 scale geological mapping.
3D Models	Resource Estimate, Geological Surfaces

Central Yilgarn Iron Project

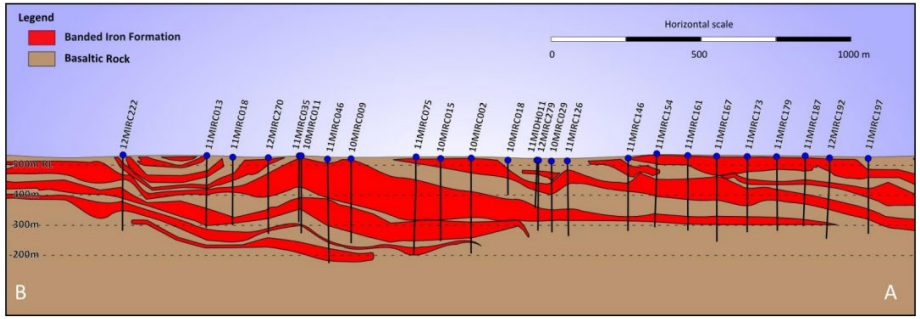
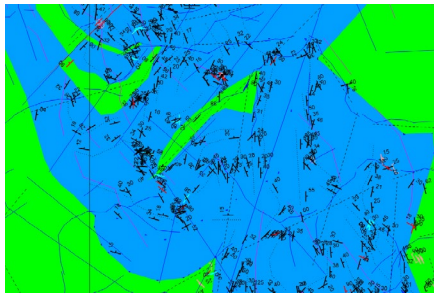


Figure 25 – Mt Ida Geological Model – Long Section 248,800mE



Teutonic Bore

Anumber	93519
Geological Summary	The Achaean Teutonic Bore deposit is a steeply dipping massive sulphide lens in basalts and tuffaceous sediments, with intense alteration. It lies on the Keith-Kilkenny Tectonic Zone's eastern margin, showing pervasive foliation, transposed isoclinal folding, and shear-style deformation.
Commodities	Copper, Gold, Iron, Silver
Dataset Summary	Geophysics • DHEM, FLTEM, other regional products Geochemistry • Surface geochemistry, Diamond Core Lithochem, around 400 total samples. Geology • Petrographic reports, Field Mapping
3D Models	Reserve and Resource Models (Surpac)

Teutonic Bore

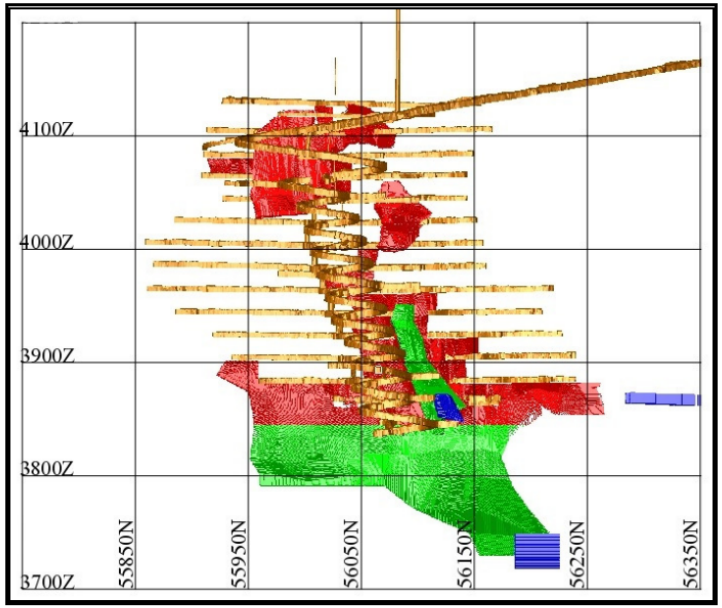
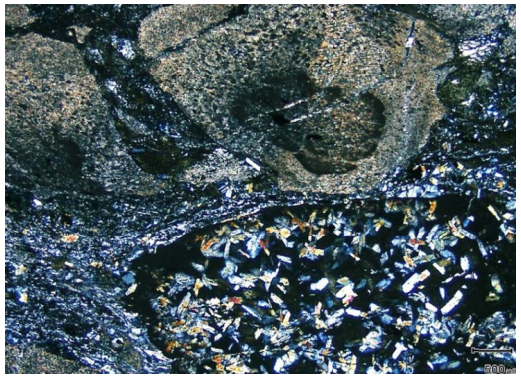
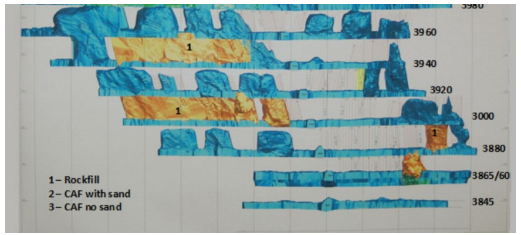


Figure 5-1: Jaguar Resource Classification (Red = Measured, Green = Indicated, Blue = Inferred)

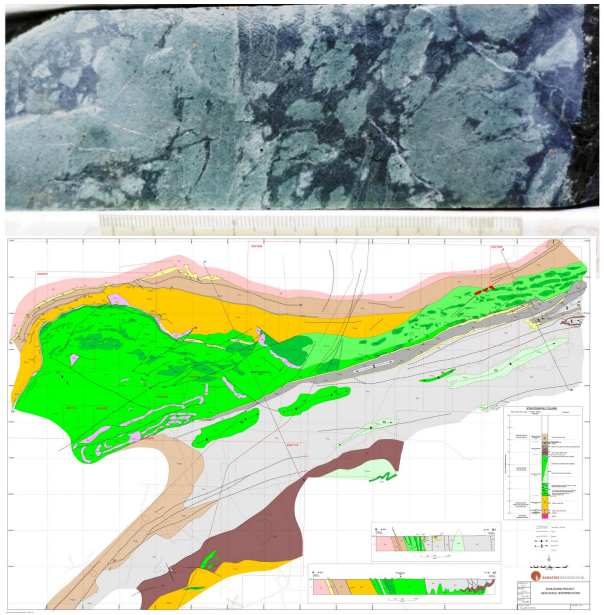


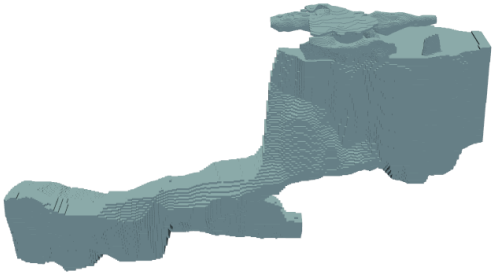


The Doolgunna Project

Anumber	A90315
Geological Summary	Sandfire Resources' Doolgunna Project, located in Western Australia's Bryah Basin, hosts the DeGrussa and Monty deposits—examples of volcanic-hosted massive sulphide (VHMS) copper-gold mineralization.
Commodities	Copper, Gold
Dataset Summary	Geophysics • DHEM, FLTEM, IP, Gravity Geochemistry • 17,225m of AC Drilling, 5,600m RC Drilling • 400 Soil Samples Geology • Petrographic reports, Field Mapping
3D Models	Reserve and Resource Models (Surpac)

The Doolgunna Project

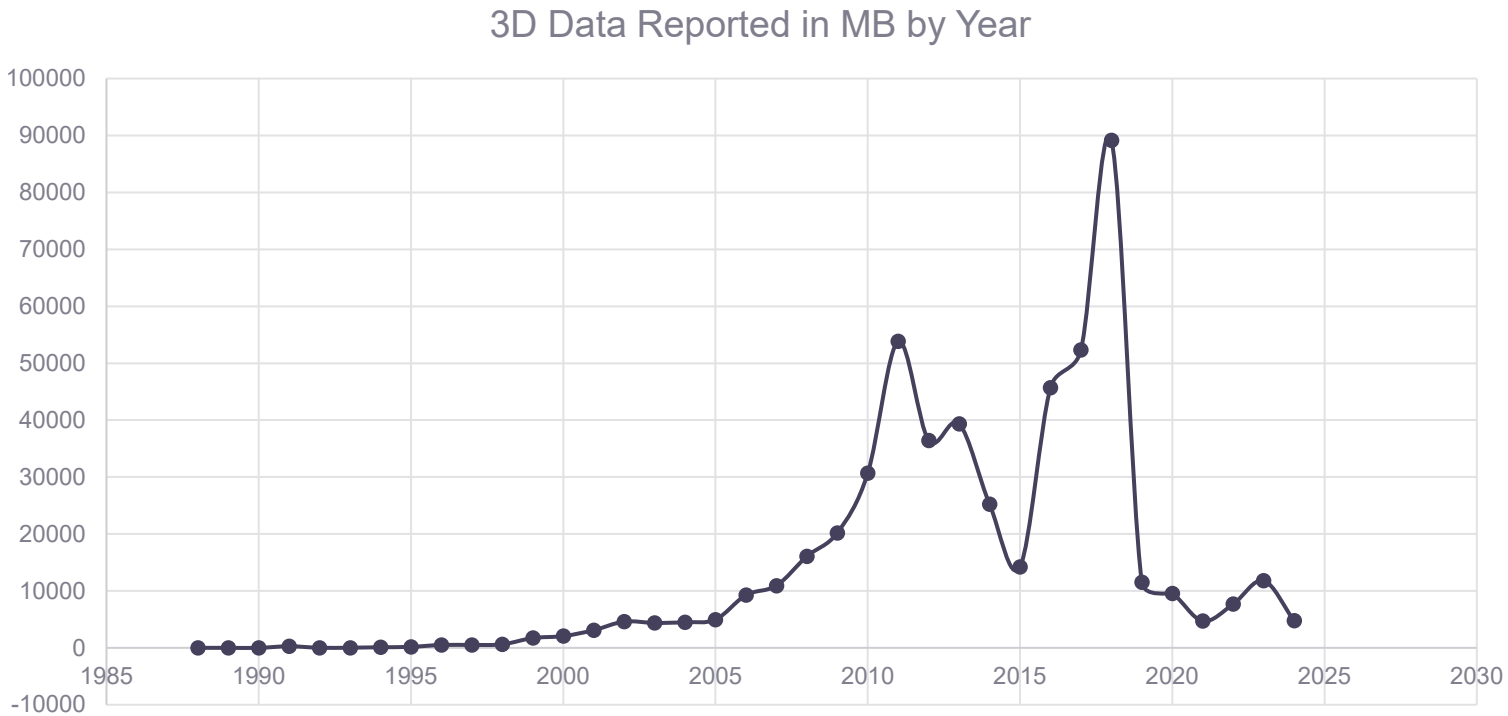


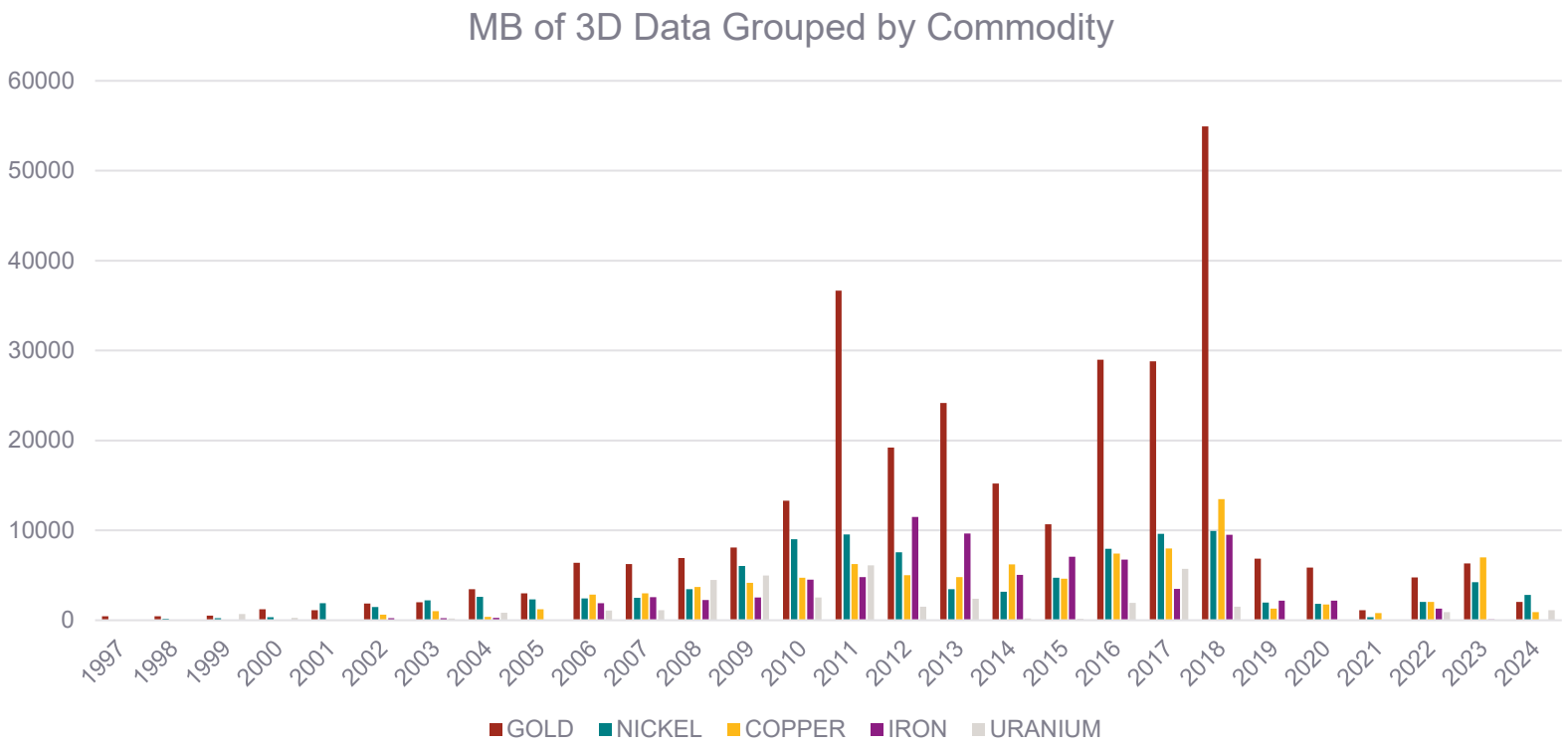


Current Trends and Challenges

The future of 3D Data

- Proprietary software, can mean proprietary formats.
  - Can we overcome the accessibility barriers this presents?
- Many of these models are built using specific versions of proprietary software.
  - What data are the minimum required for reproducing these predictions?
- Many software providers are shifting to a cloud service model.
  - How does this change the data coming into the GSWA?


3D Data Reported in MB by Year
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
-10000
1985
1990
1995
2000
2005
2010
2015
2020
2025
2030


MB of 3D Data Grouped by Commodity
60000
50000
40000
30000
20000
10000
0
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
GOLD
NICKEL
COPPER
IRON
URANIUM

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