Geological Mapping and Innovative GIS Applications for Identifying Natural Resources Potential: The New Zealand QMAP Experience

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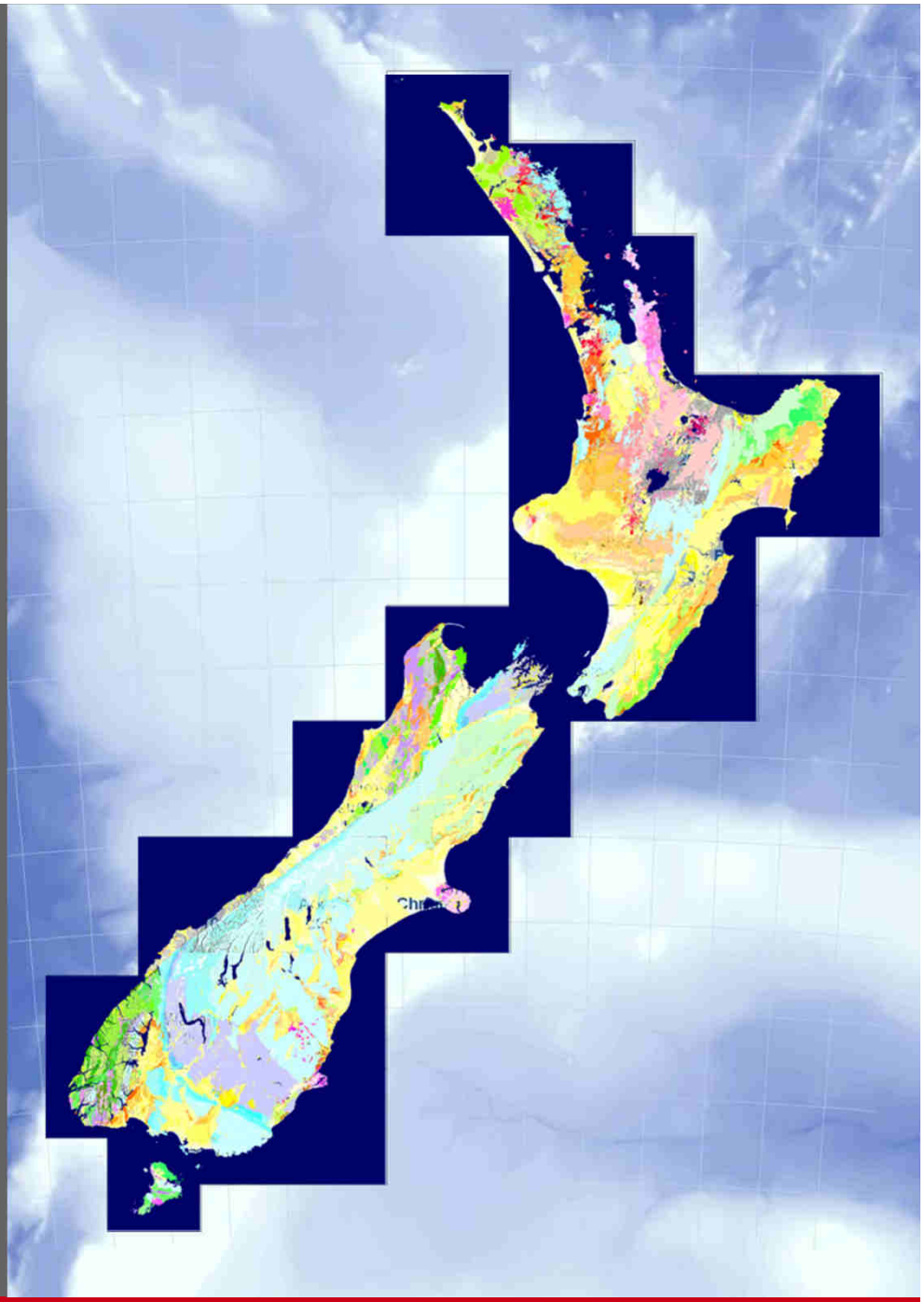
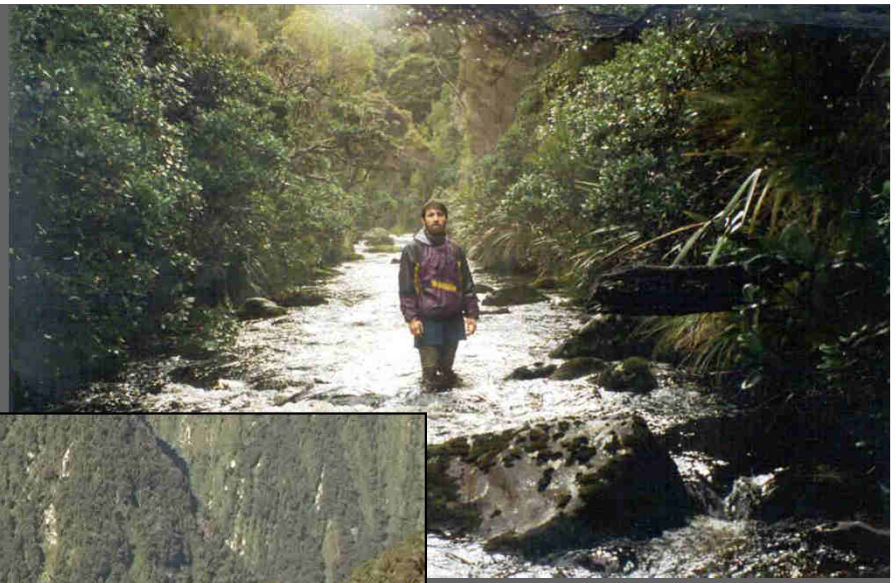
Presentation Outline

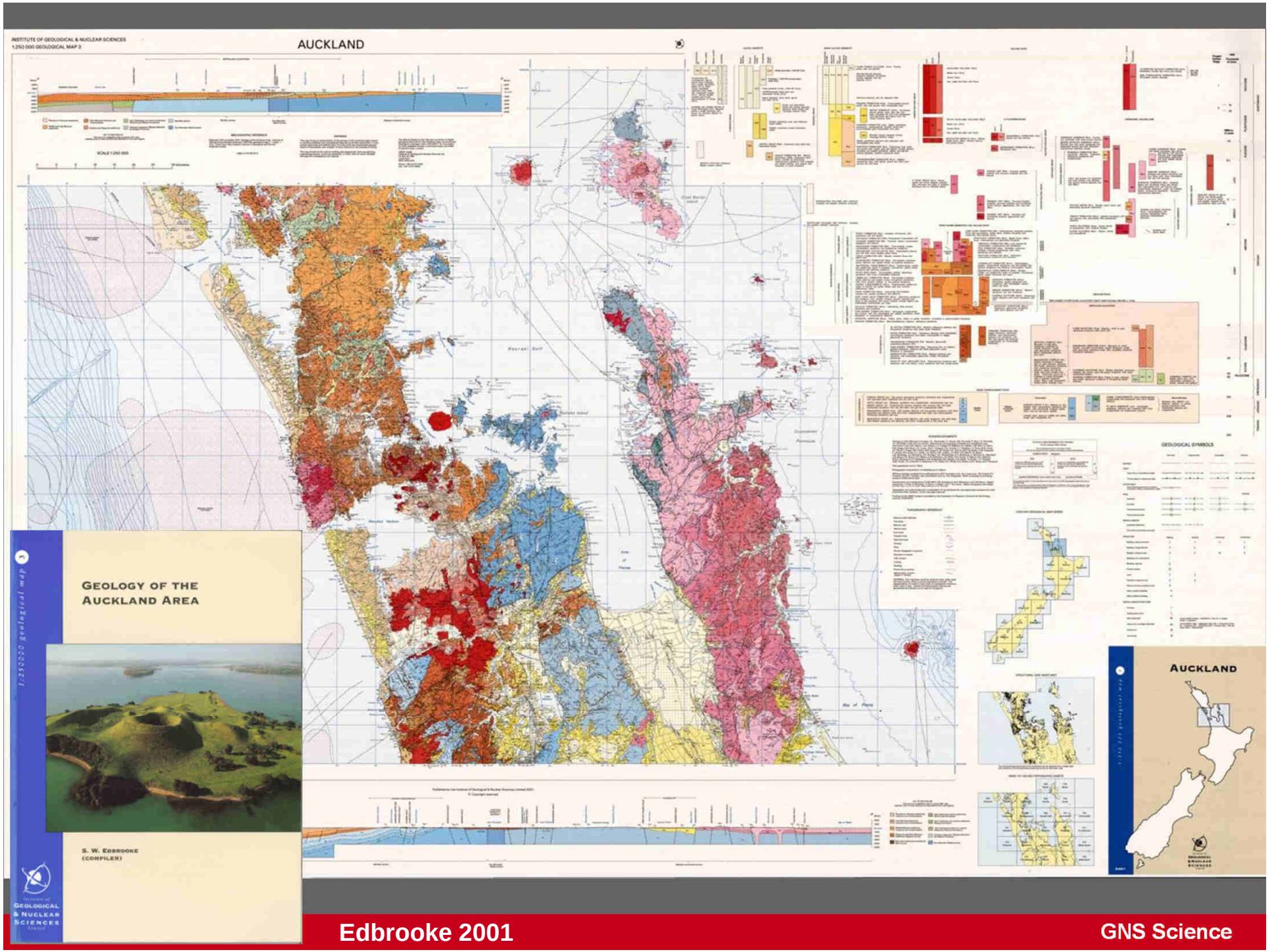
- New Zealand's Geological Map QMAP
- Importance of geological maps for minerals exploration and investment
- Value-added GIS modelling to mapping
- Importance of re-mapping – case study from PNG

QMAP: Geological Map of New Zealand

- National coverage at 1:250,000
- 20-year period
- 21 separate maps
- Designed and built around ESRI ArcGIS – key project decision

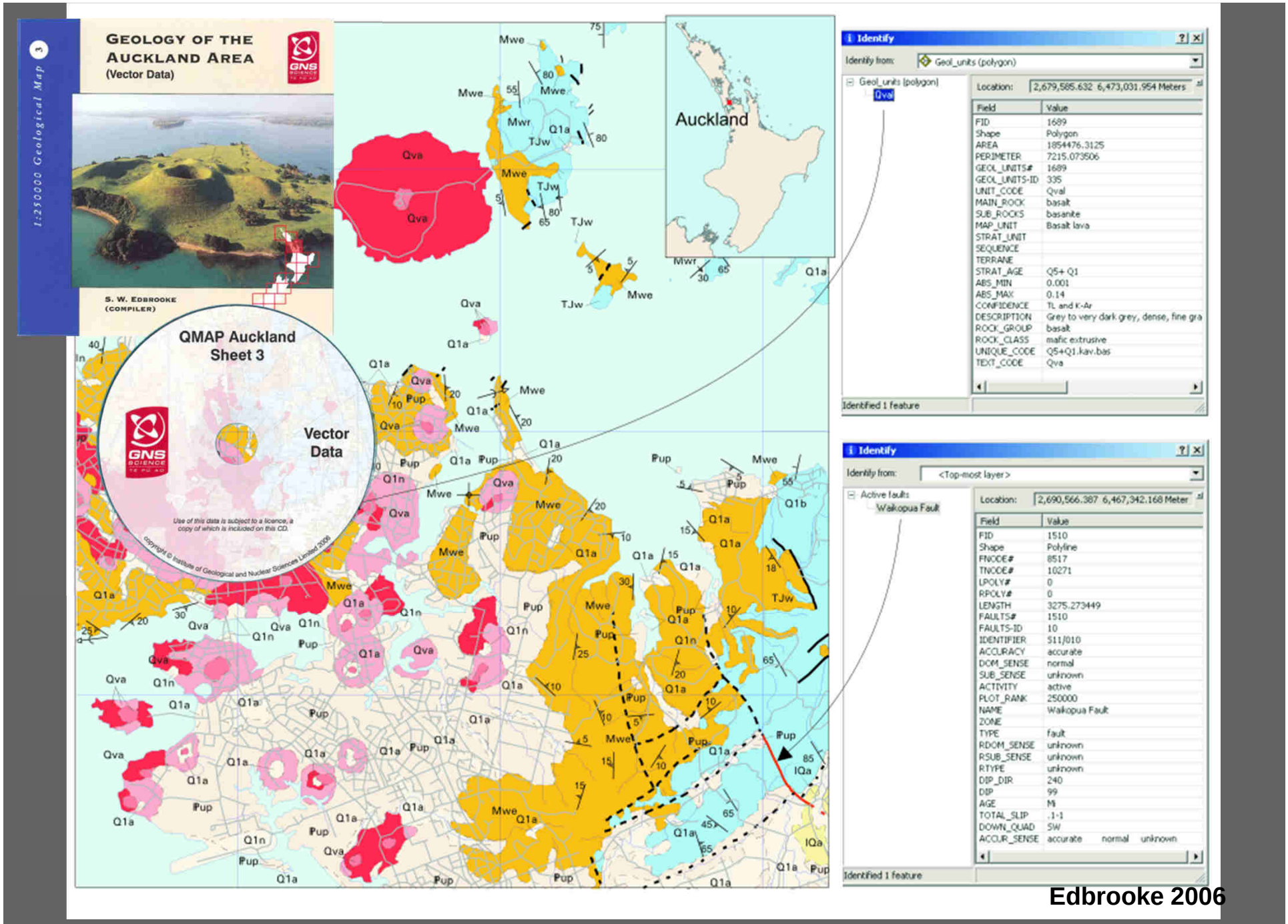






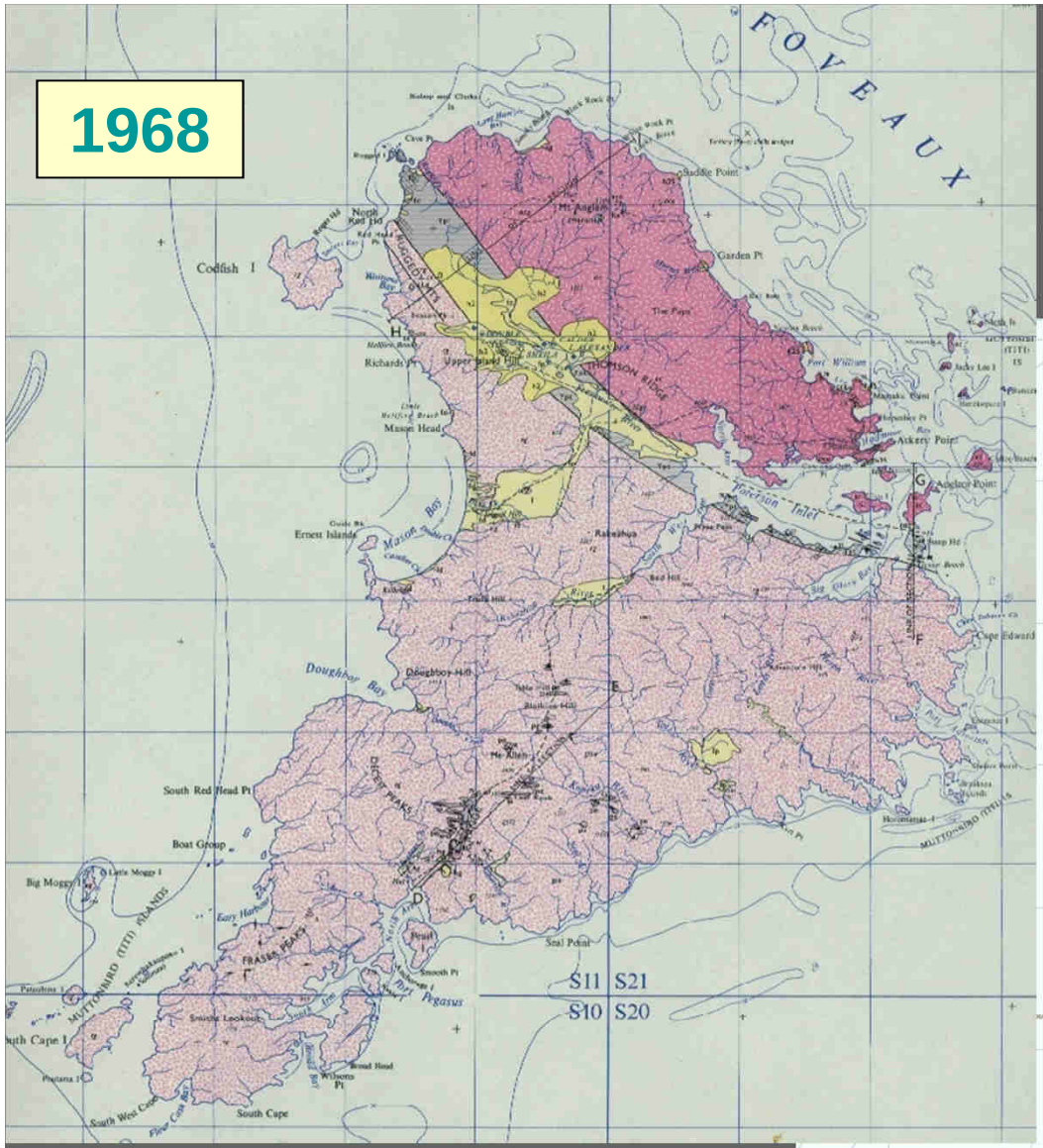
Edbrooke 2001

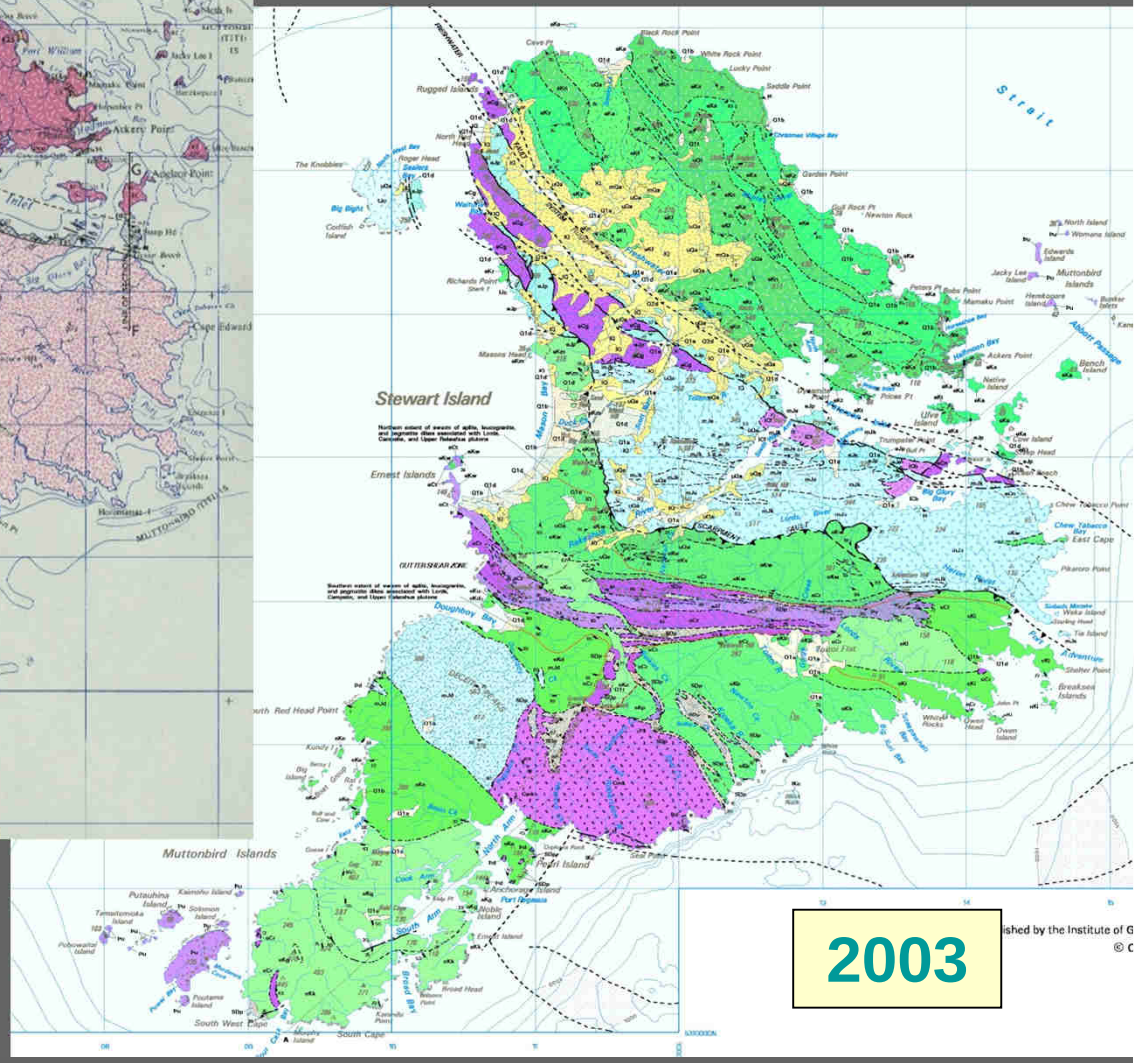
GNS Science



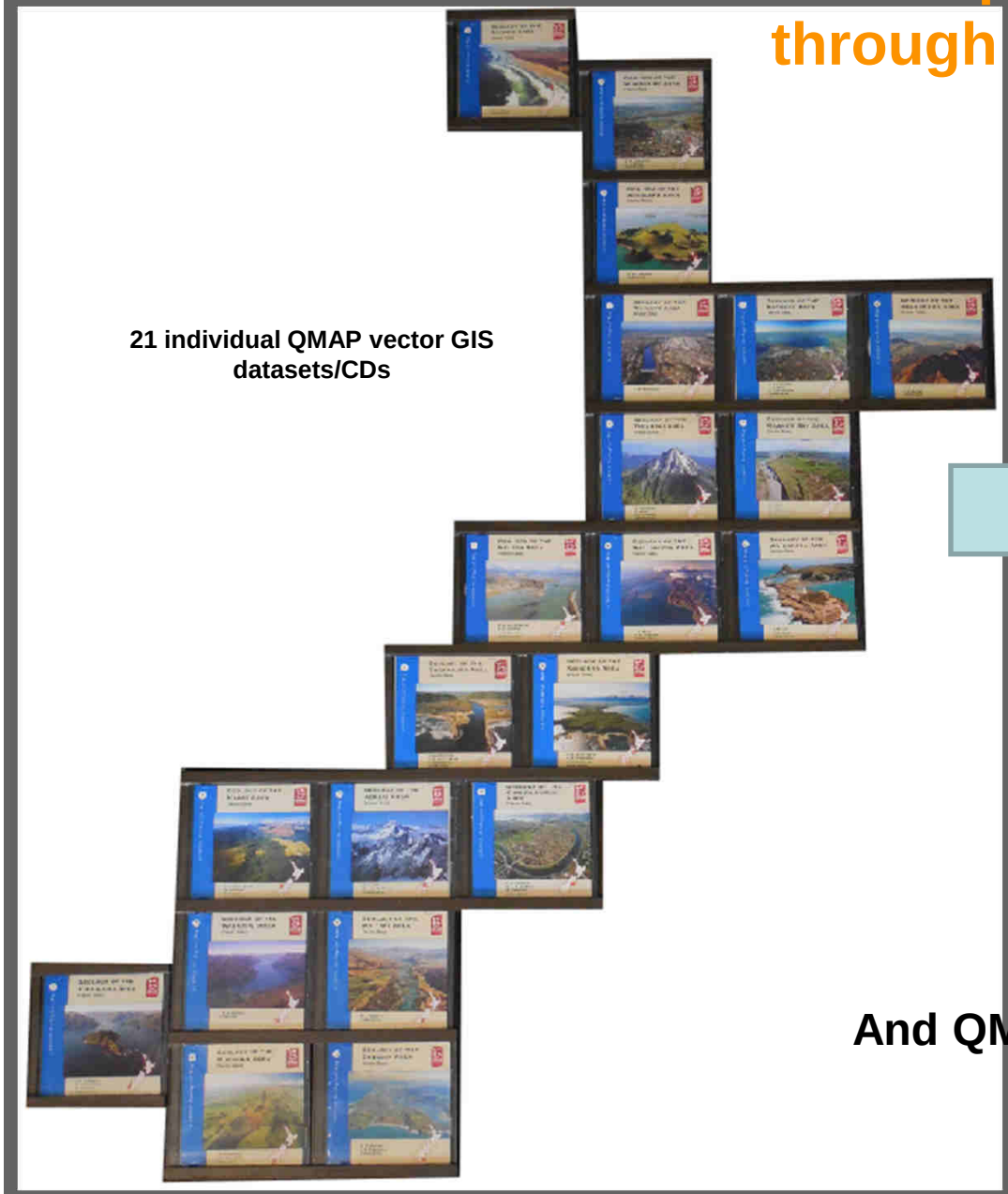
Edbrooke 2006

QMAP: Re-mapping



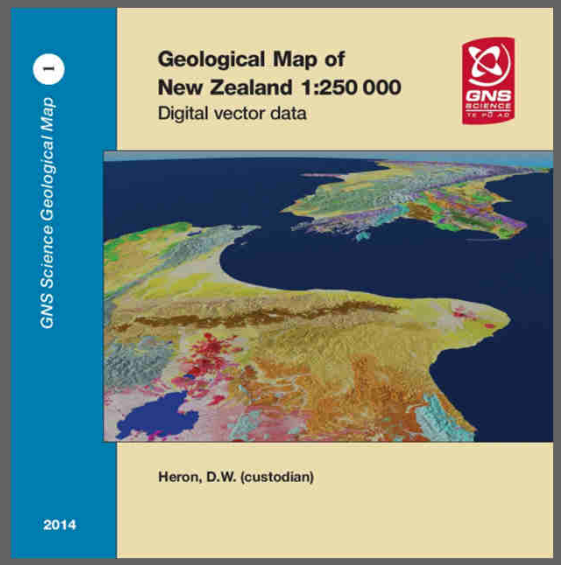


Future-proofing QMAP GIS data through episodic updates…



21 individual QMAP vector GIS datasets/CDs

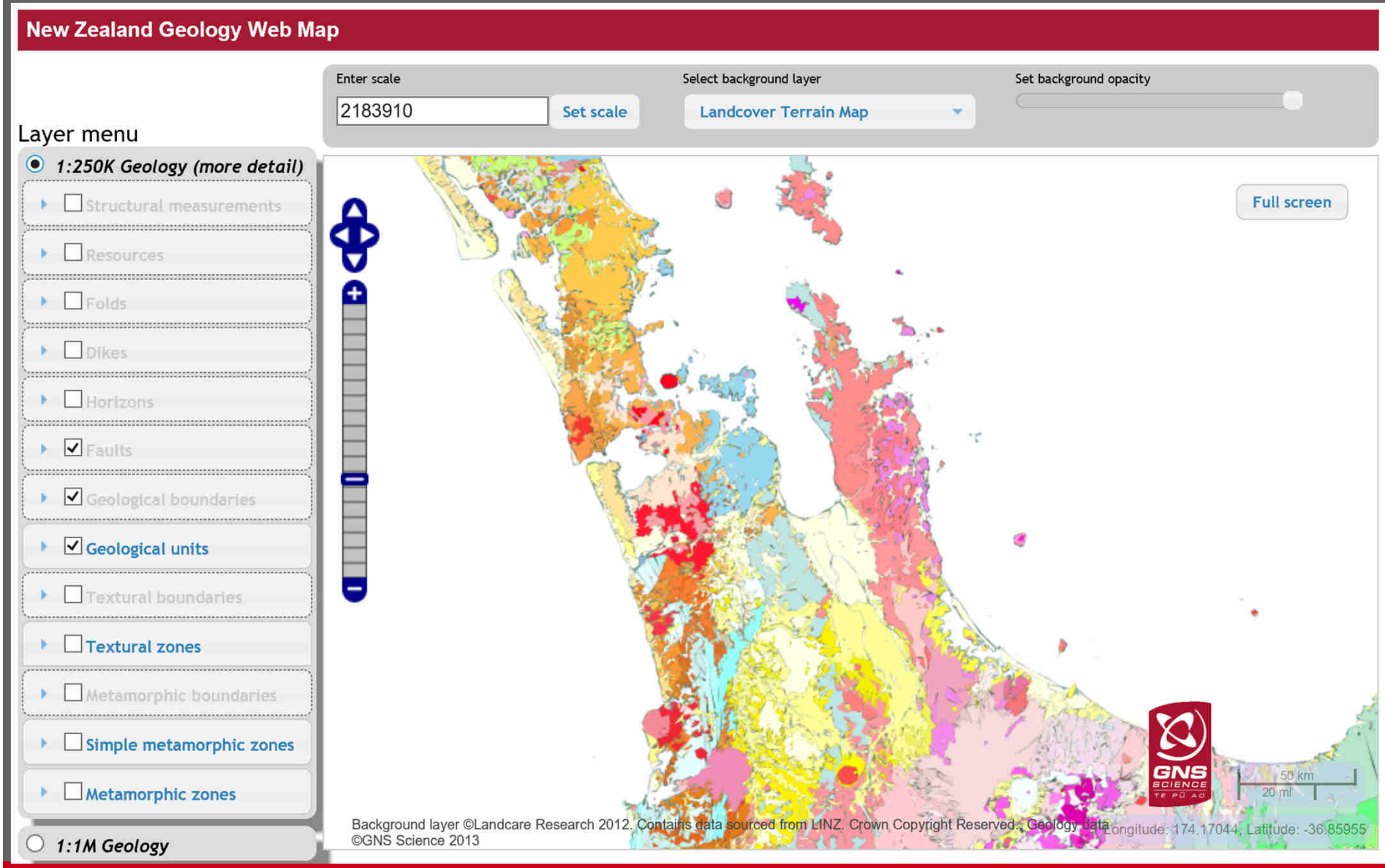
QMAP Seamless GIS 2014



And QMAP Seamless GIS 2016 is coming…

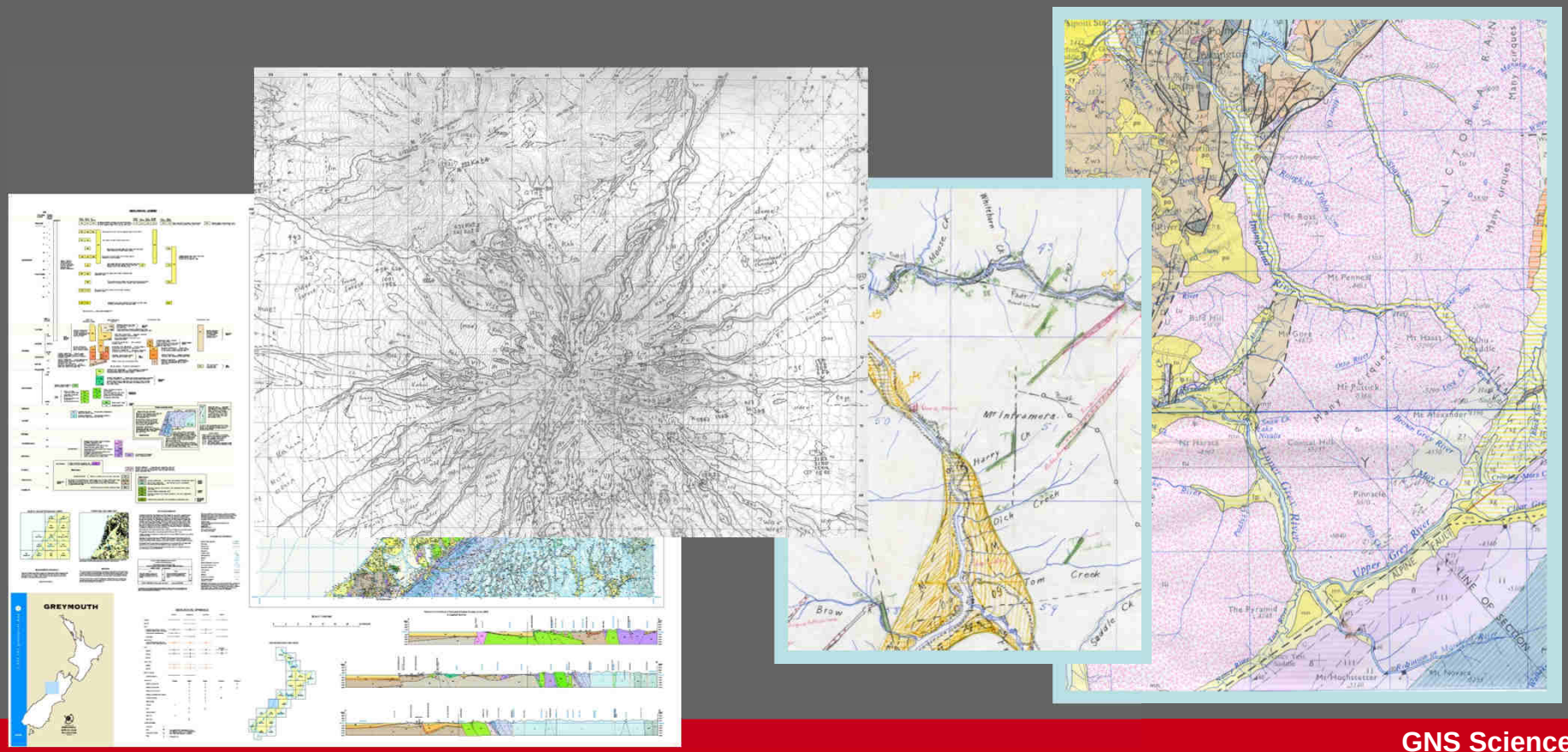
QMAP on-line:

http://data.gns.cri.nz/geology



Regional Geological Map Archive and Datafile (RGMAD) – A Nationally Significant Database

- http://data.gns.cri.nz/metadata



Geological maps are a primary data resource

Resources

Minerals
Aggregate
Petroleum
Coal
Groundwater
Geothermal

Hazards

Active faults
Seismic shaking
Landslides
Erosion
Deposition

Environmental

Soil quality
Contaminants
Natural toxicity
Climate change
CO_2 storage

Research and education

Geological maps

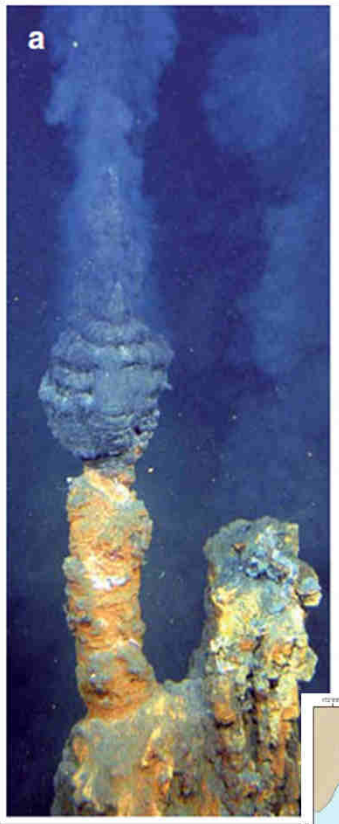
New Zealand: World-Class Gold Deposits

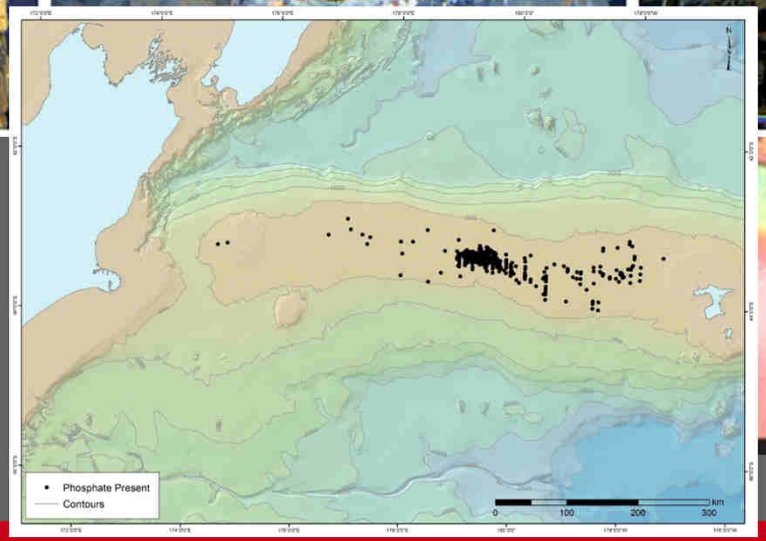
Waihi Gold Mine
10 Million Ounces

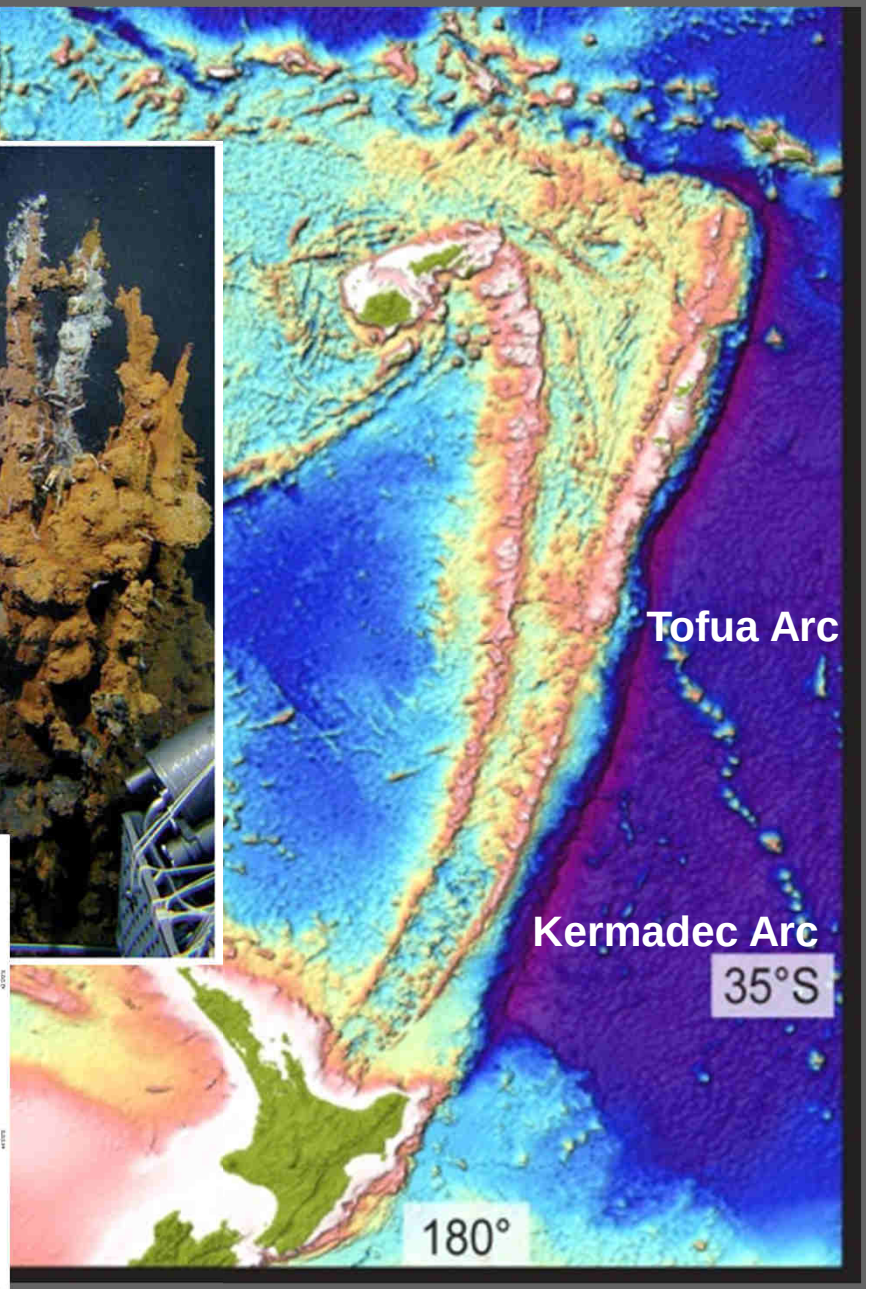
Macraes Gold Mine
5 Million Ounces

Combined Annual Production
of over 300,000 Ounces
NZ$ 500M

NZ EEZ Marine Minerals







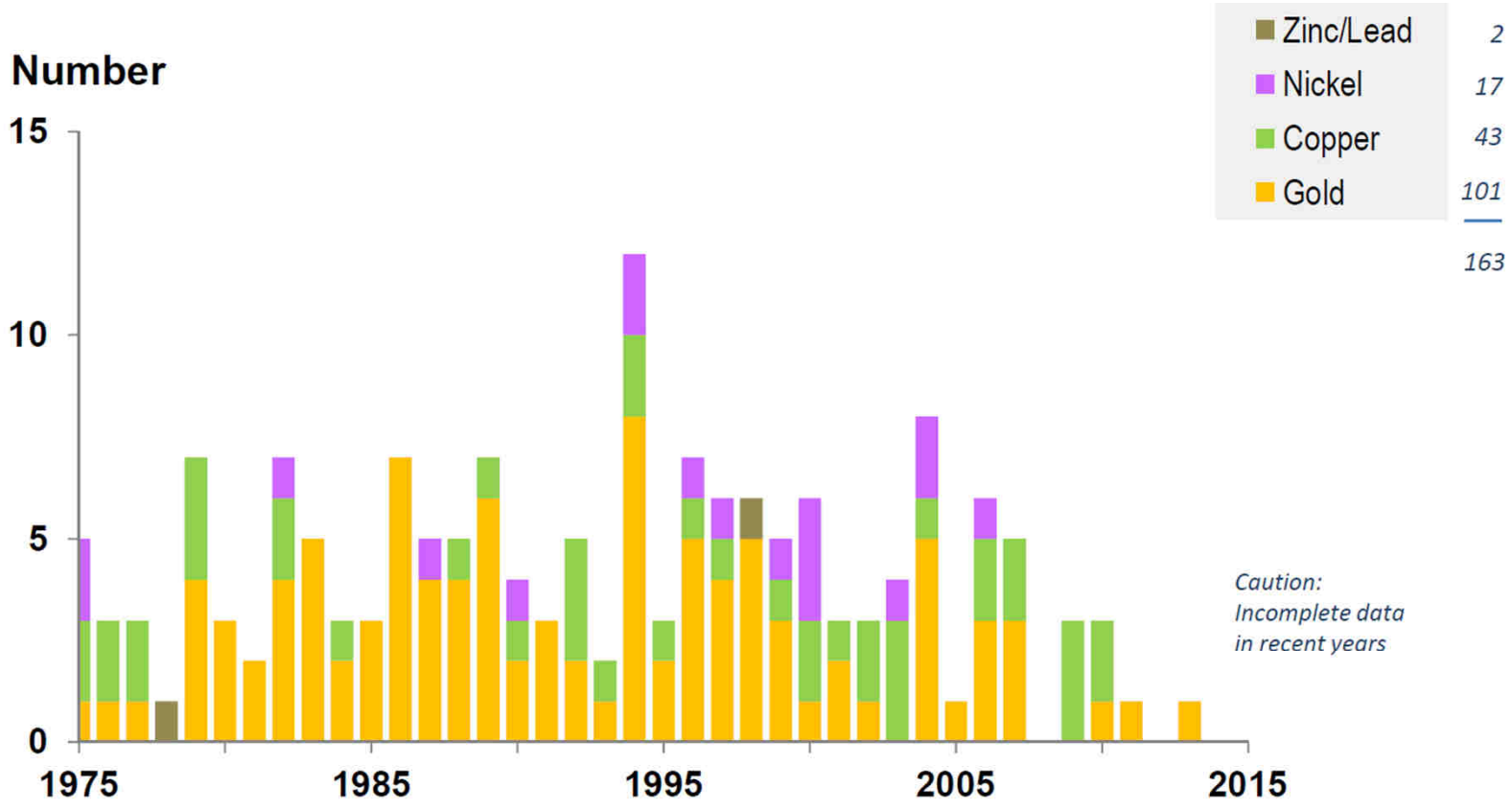
SW Pacific:
World-Class
Mineral Deposits
Ok Tedi Cu Au
Lihir Au
Panguna Cu Au
Gold Ridge Au
Vatukoula Au
Goro Ni Co
Waihi Au
Macraes Au

Exploration: The Life Blood of Mining

Area Selection for Investment = Uncertainty

Geologic Maps + Data = Derisking

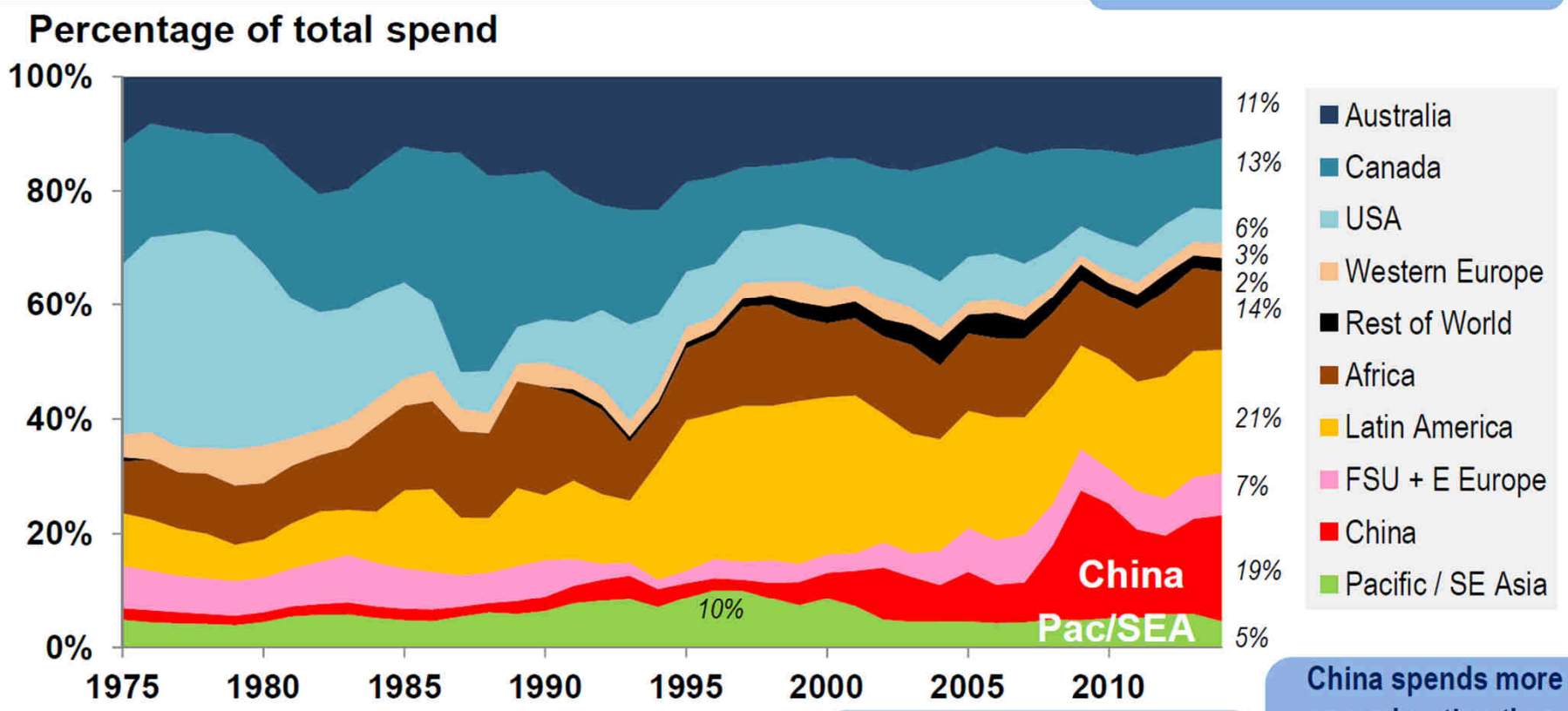
Mineral Discoveries in the Pacific Declining



Note: Based on Moderate-, Major- and Giant-sized deposits
Excludes satellite deposits in existing camps

Source: MinEx Consulting © March 2015

Exploration Investment in Pacific Halved in last 20 Years



Pac/SE Asia share has also **halved** in the last 2 decades

China spends more on exploration than any other country in the World

Note: Includes bulk minerals (such as iron ore, coal and bauxite)

Sources: MinEx Consulting estimates © March 2015, based on data from ABS, NRCan, MLR (China), OECD and SNL

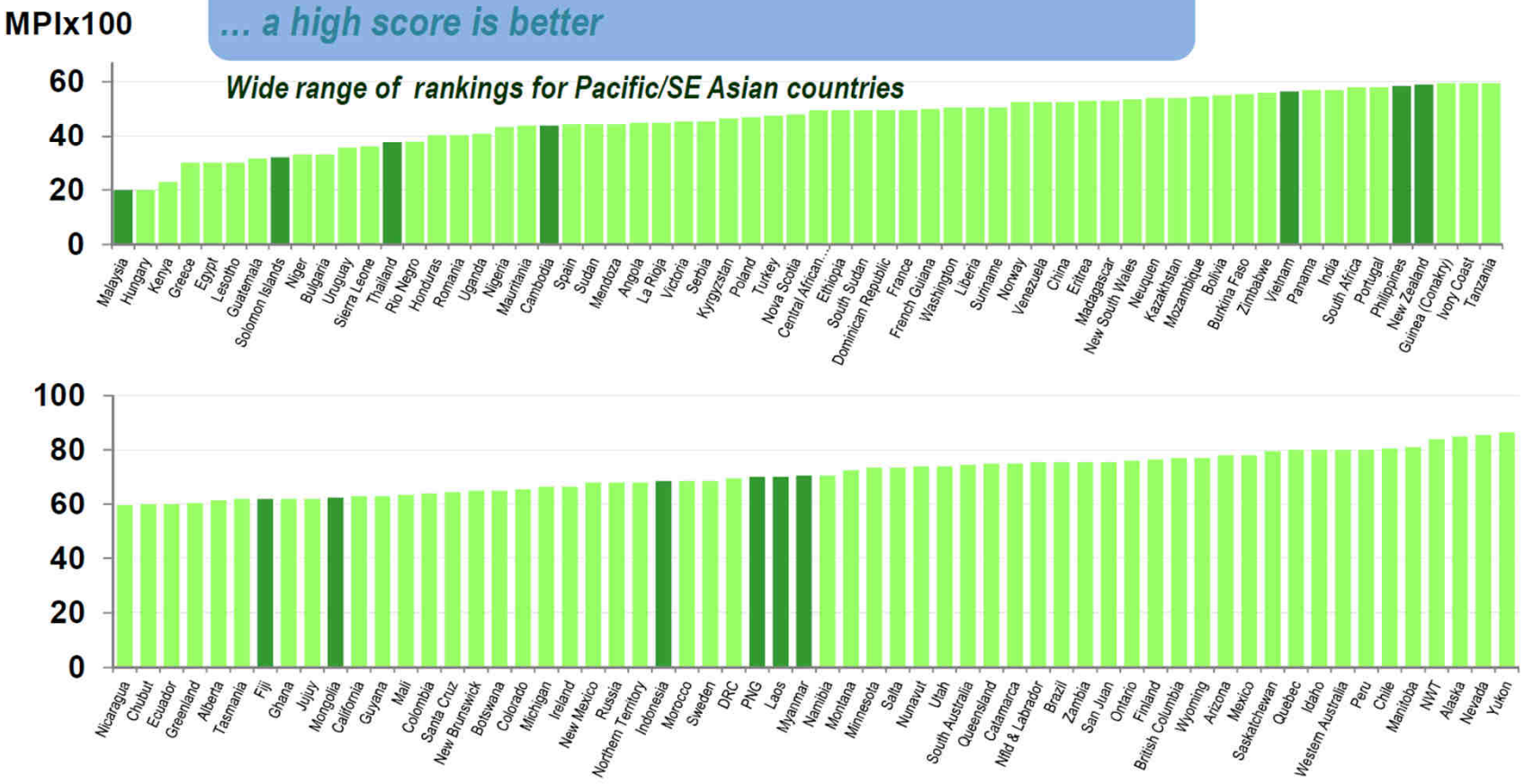
Mineral Potential = Key Investment Factor

Mineral Potential Index: March 2015

122 jurisdictions around the world

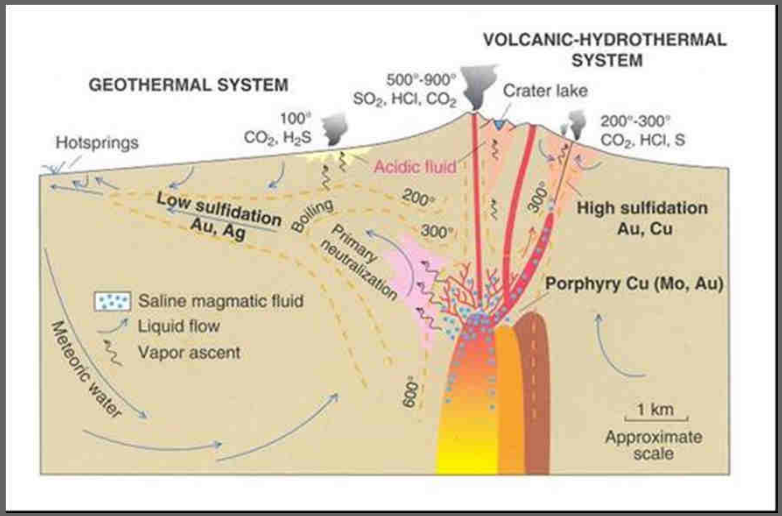
MPI is a measure of "geological potential" of the Country

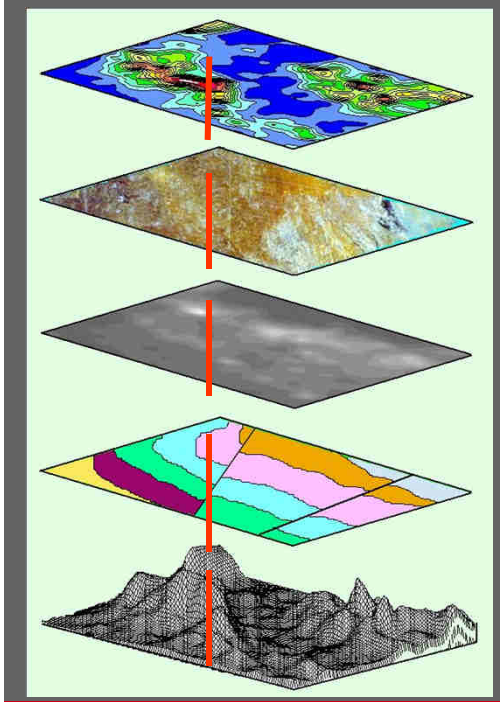
... a high score is better



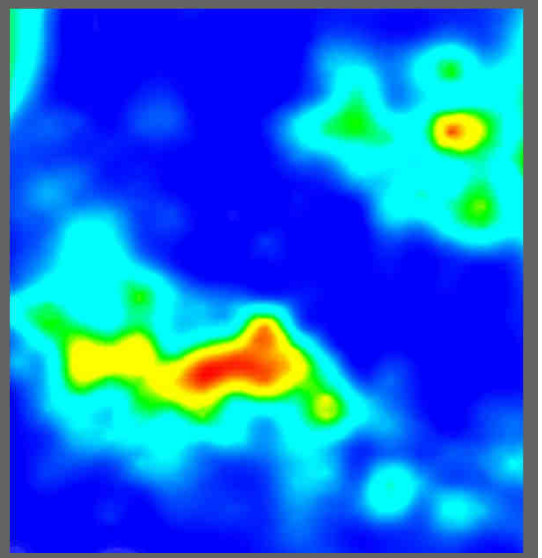
Source: Fraser Institute March 2015

NZ Gold Mineral Potential Modeling



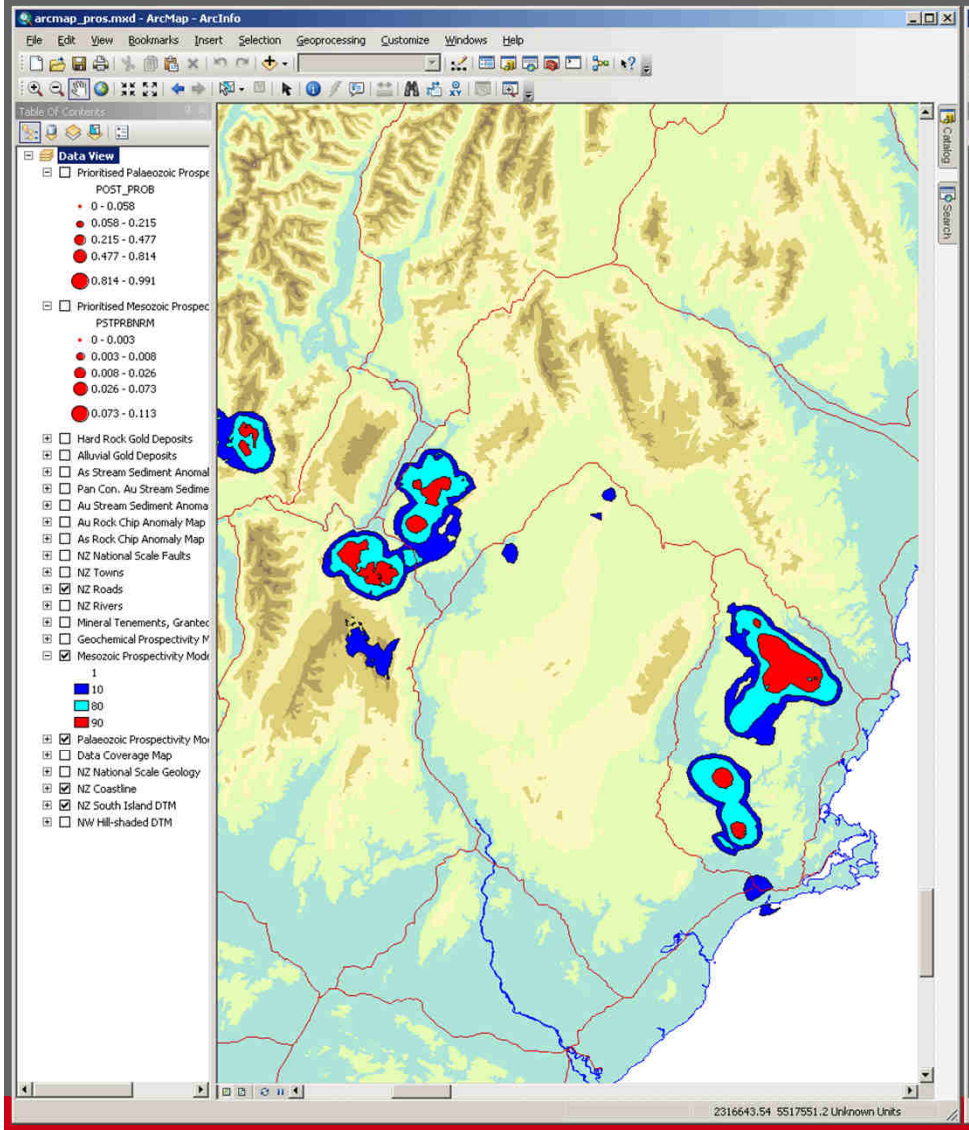


A weighted aggregation process

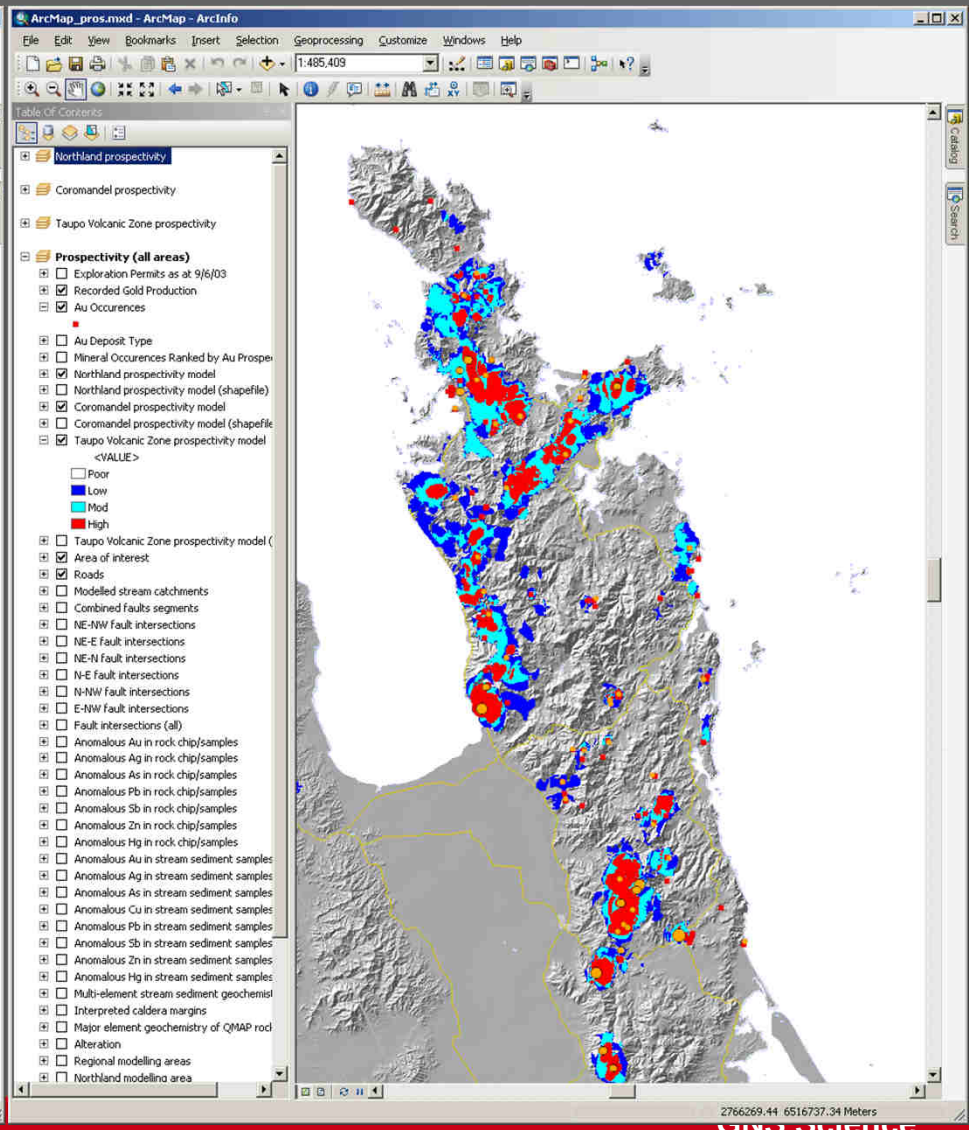


Prospectivity Modelling: Assisting in Area Selection

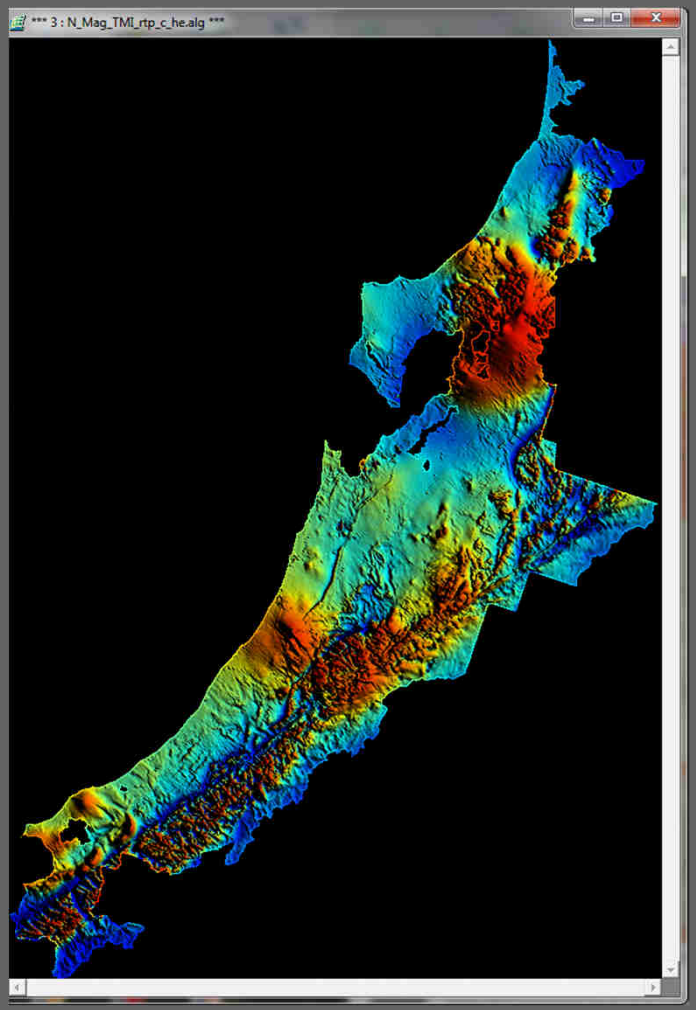
Mesothermal Gold

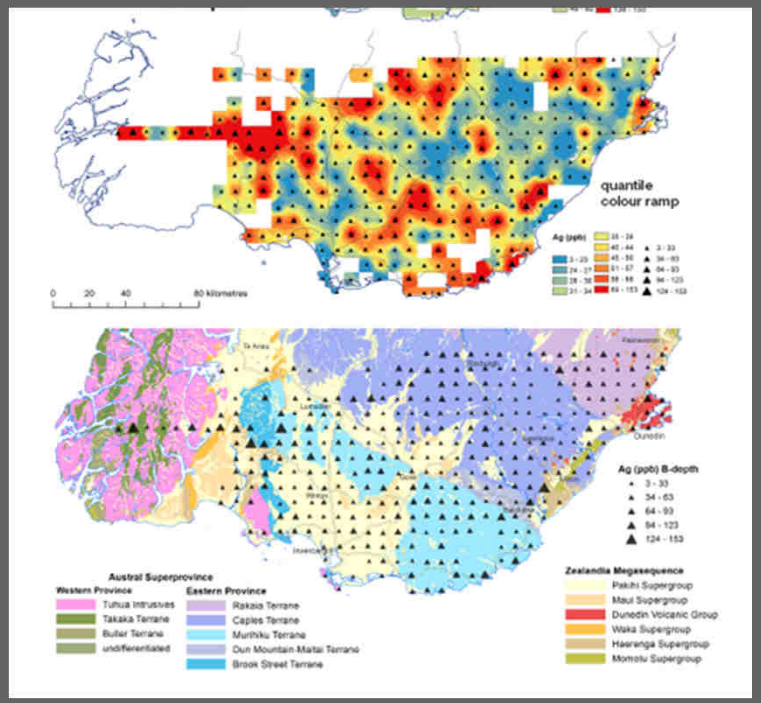


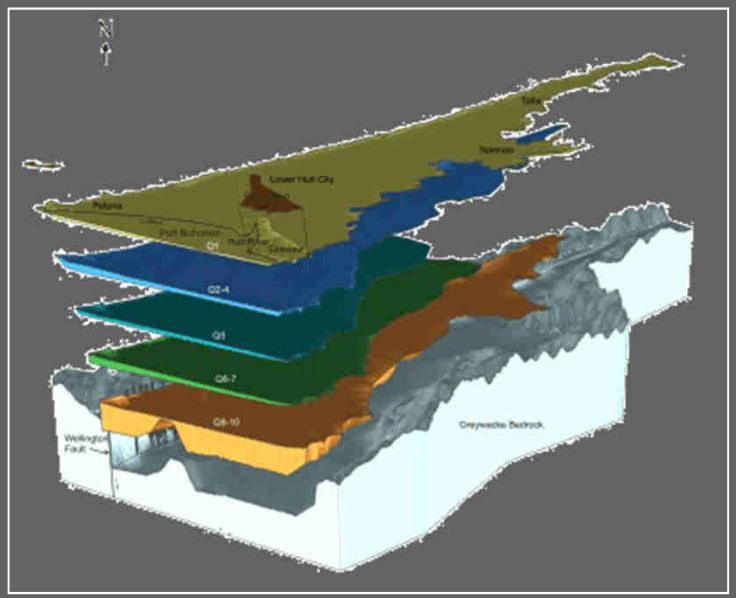
Epithermal Gold



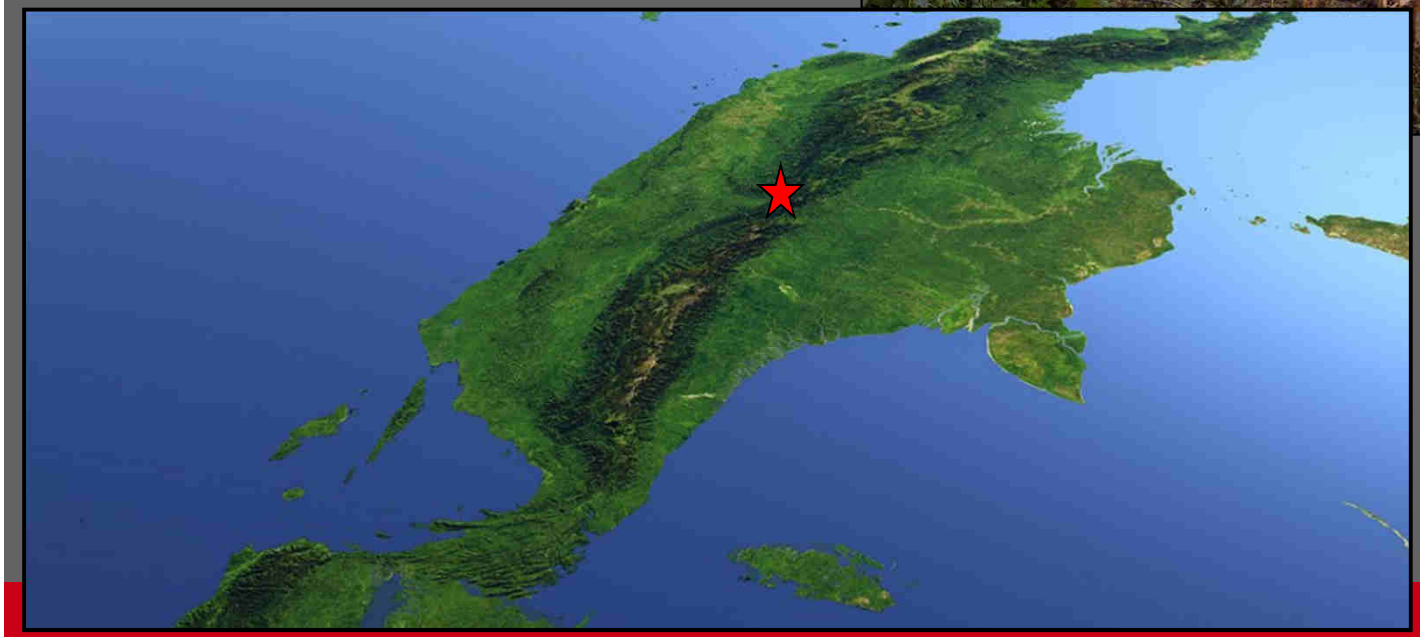
Value-Adding to QMAP



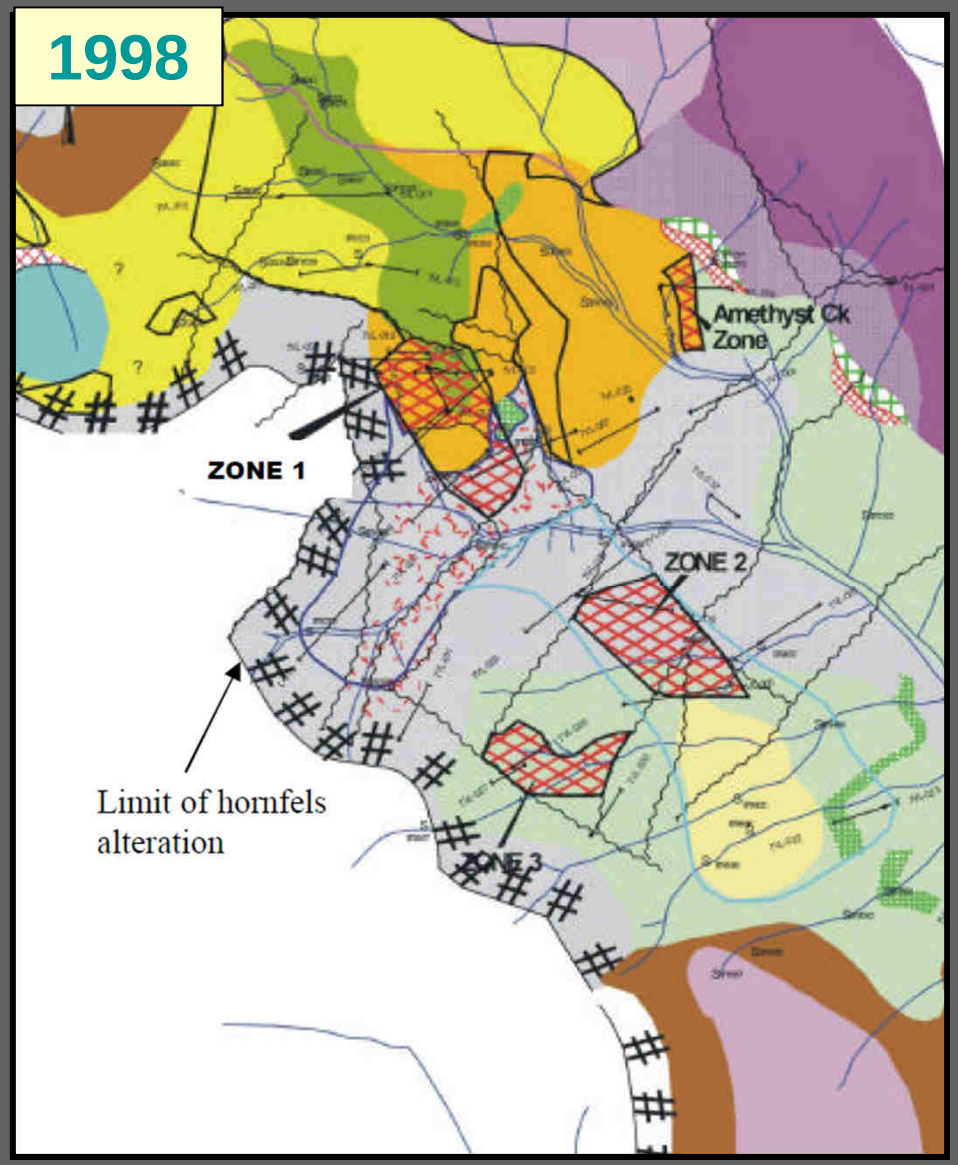




Geologic Re-mapping: Ok Tedi, Papua New Guinea



OK TEDI MINING



Townsville Cu-Au Project, Ok Tedi Papua New Guinea: Re-mapping

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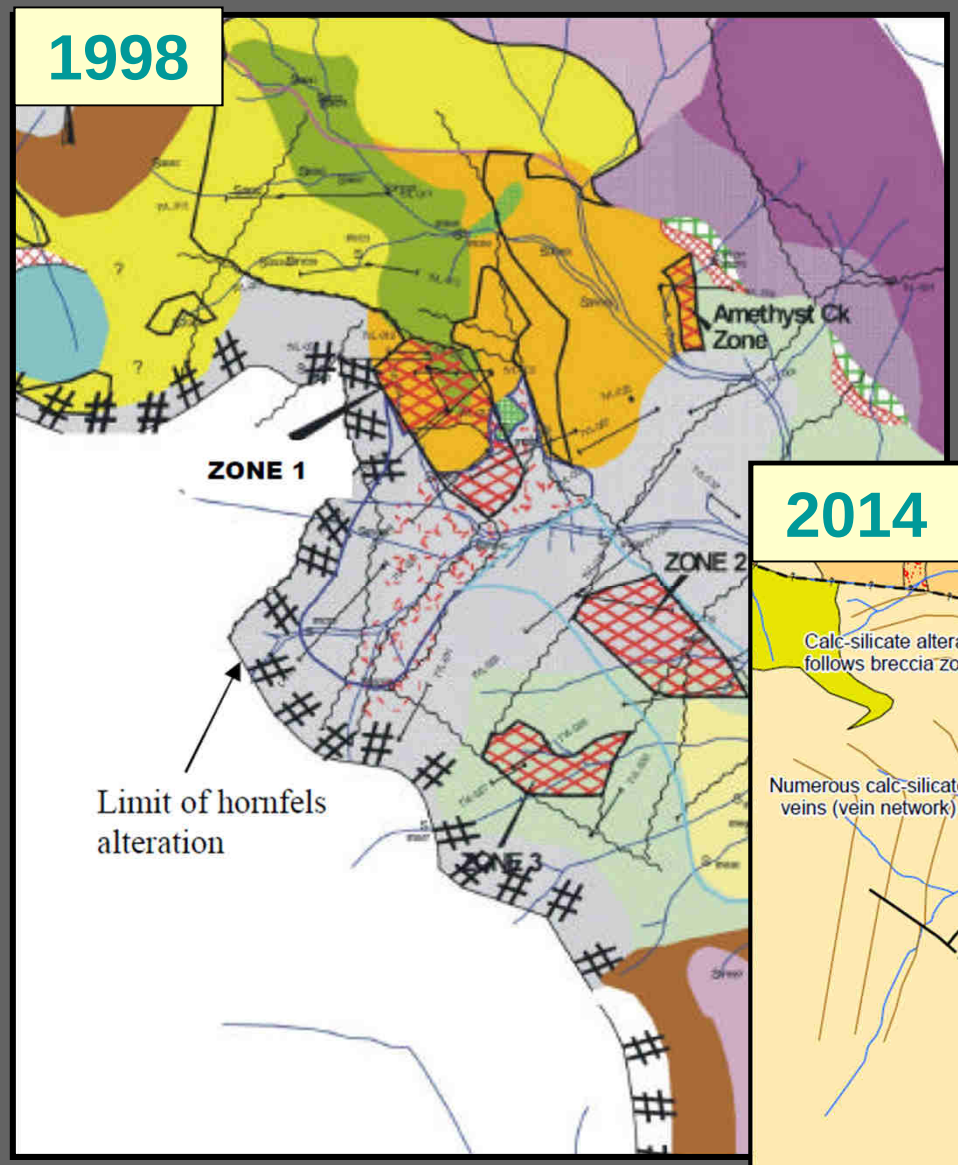
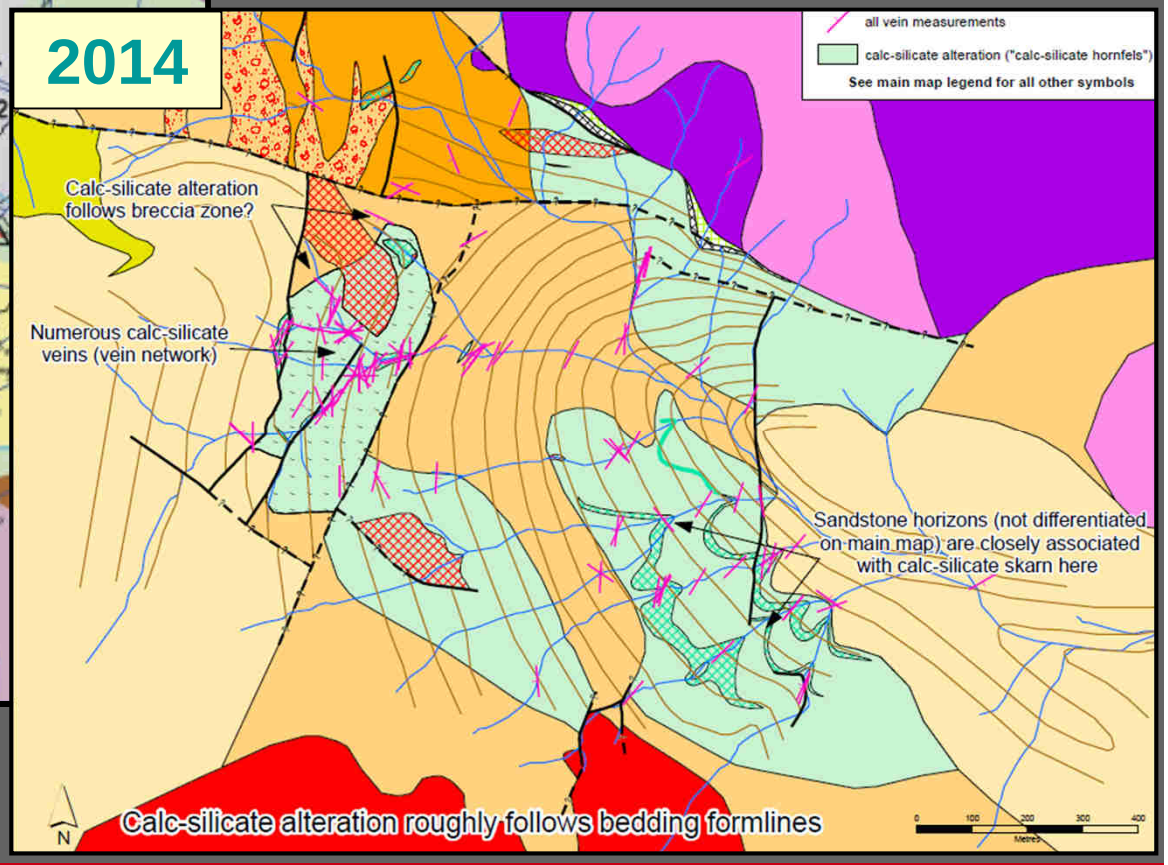
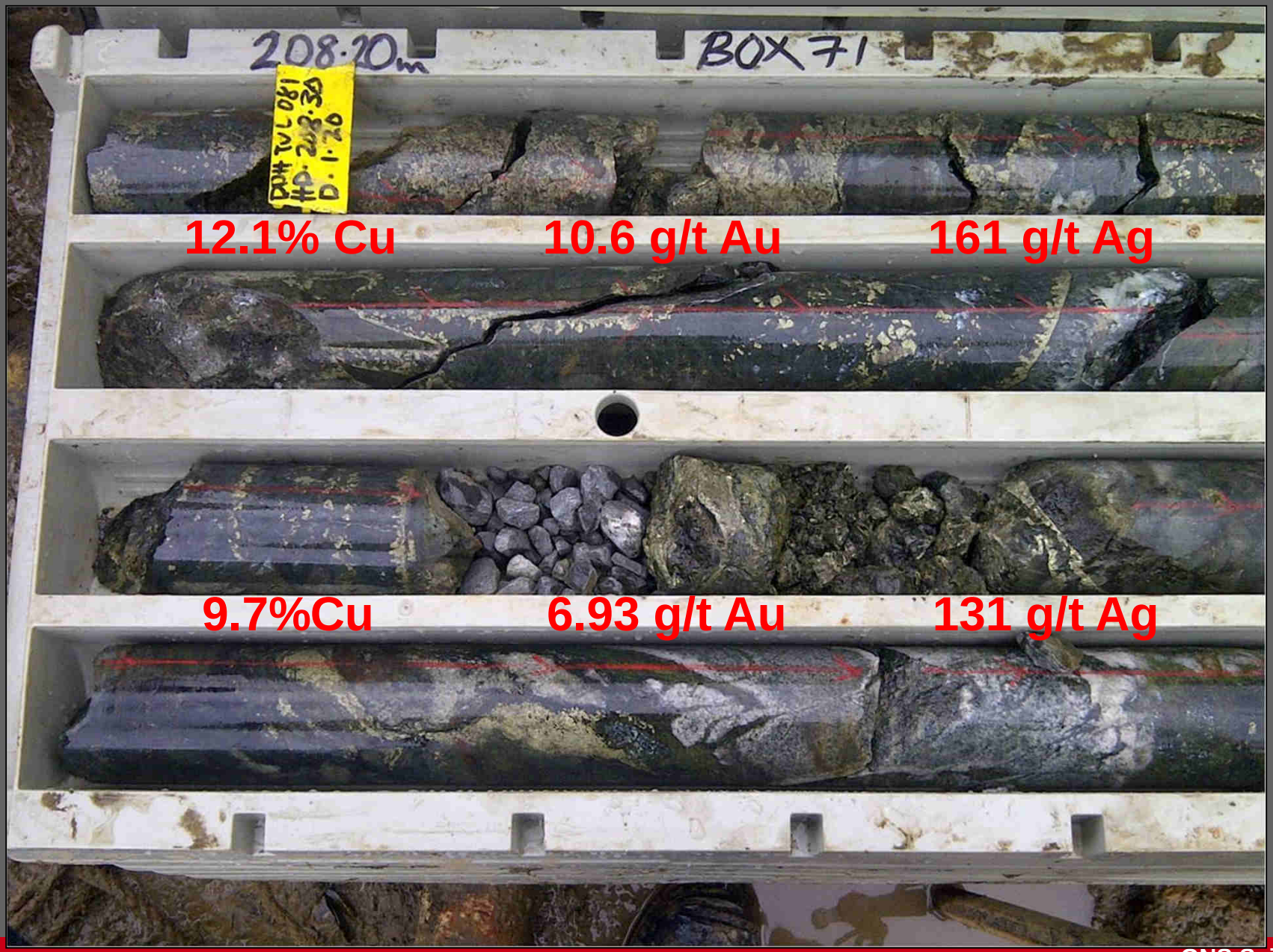




New Copper-Gold Discovery

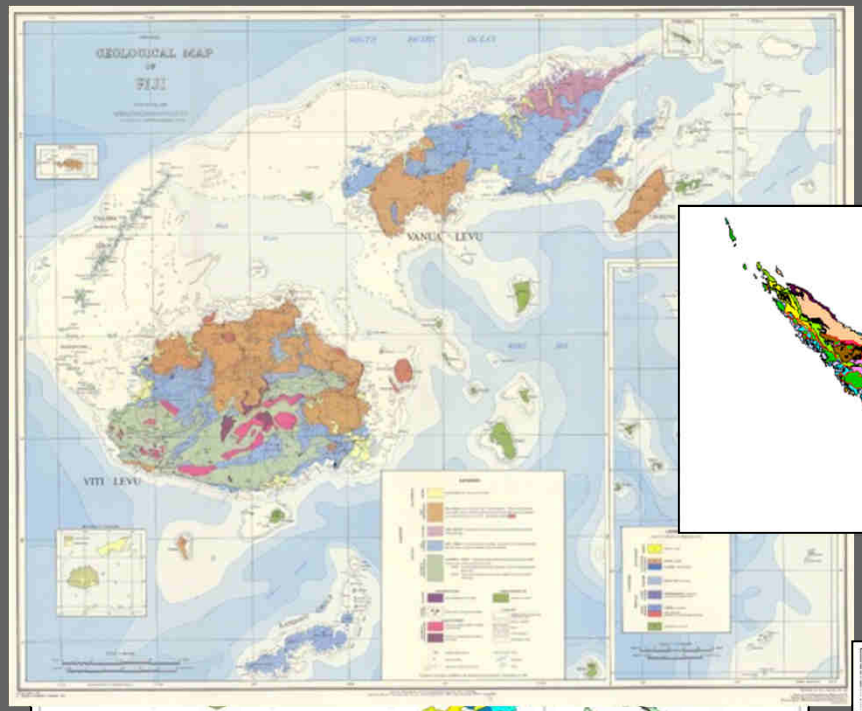


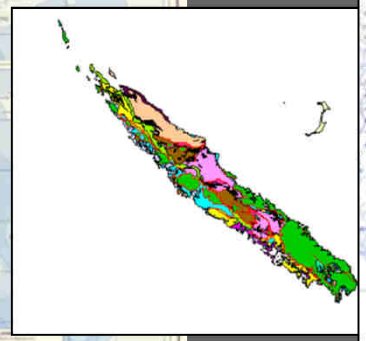
Summary

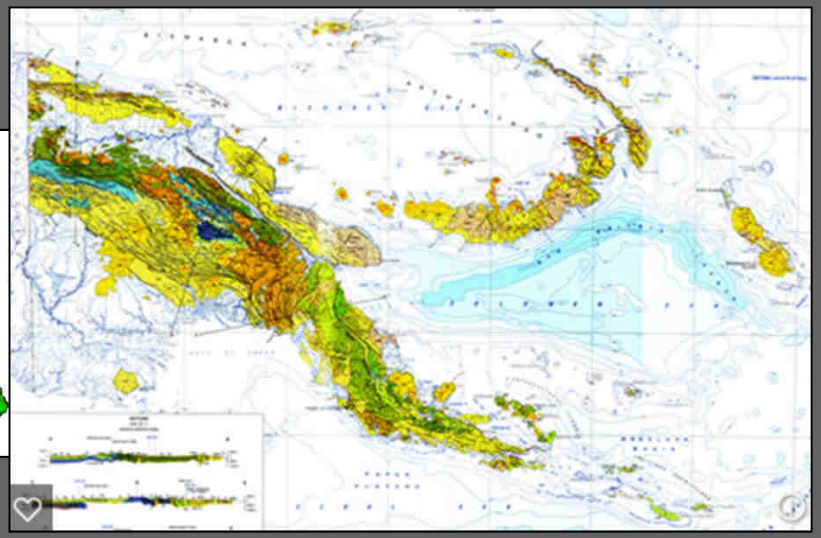
- Geological maps are a primary data resource – hazards, environmental, minerals research
- Geological maps are highly valued by the exploration industry and help de-risk investment decisions
- We can increase levels of exploration investment by making quality geologic maps freely available
- Mapping is relatively cheap with a good return on $$ – NZ QMAP
- Maps underpin “value-added” GIS studies
- Mapping is never done – remapping leads to new discoveries in mature areas

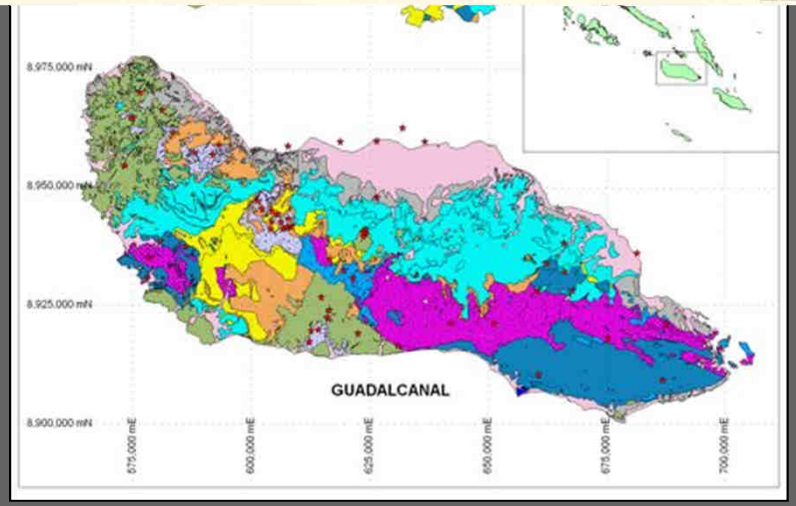
Vinaka
Kia Ora

Oceana Geological Maps









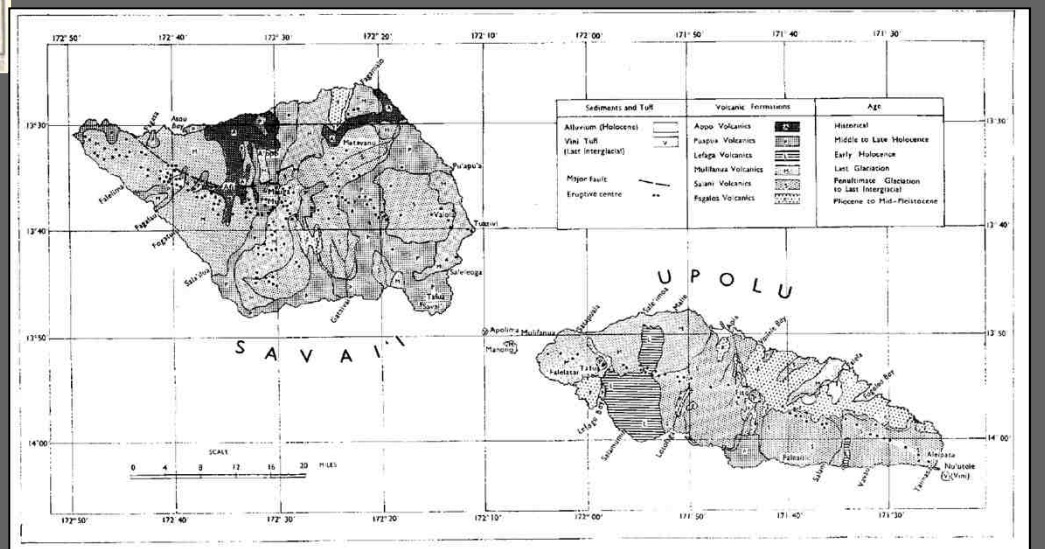


FIG. 1—Simplified geological map of Western Samoa.