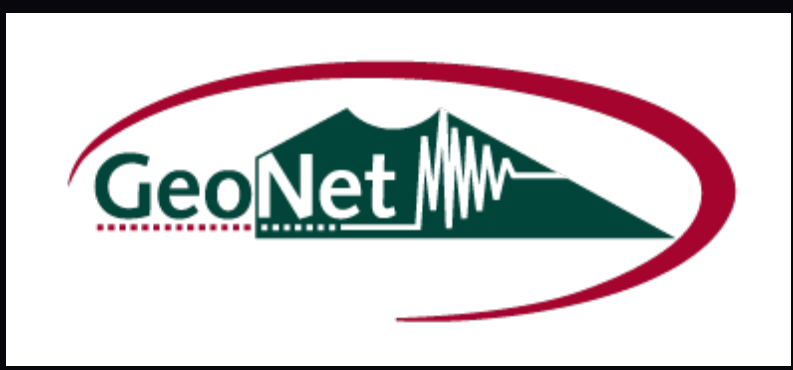


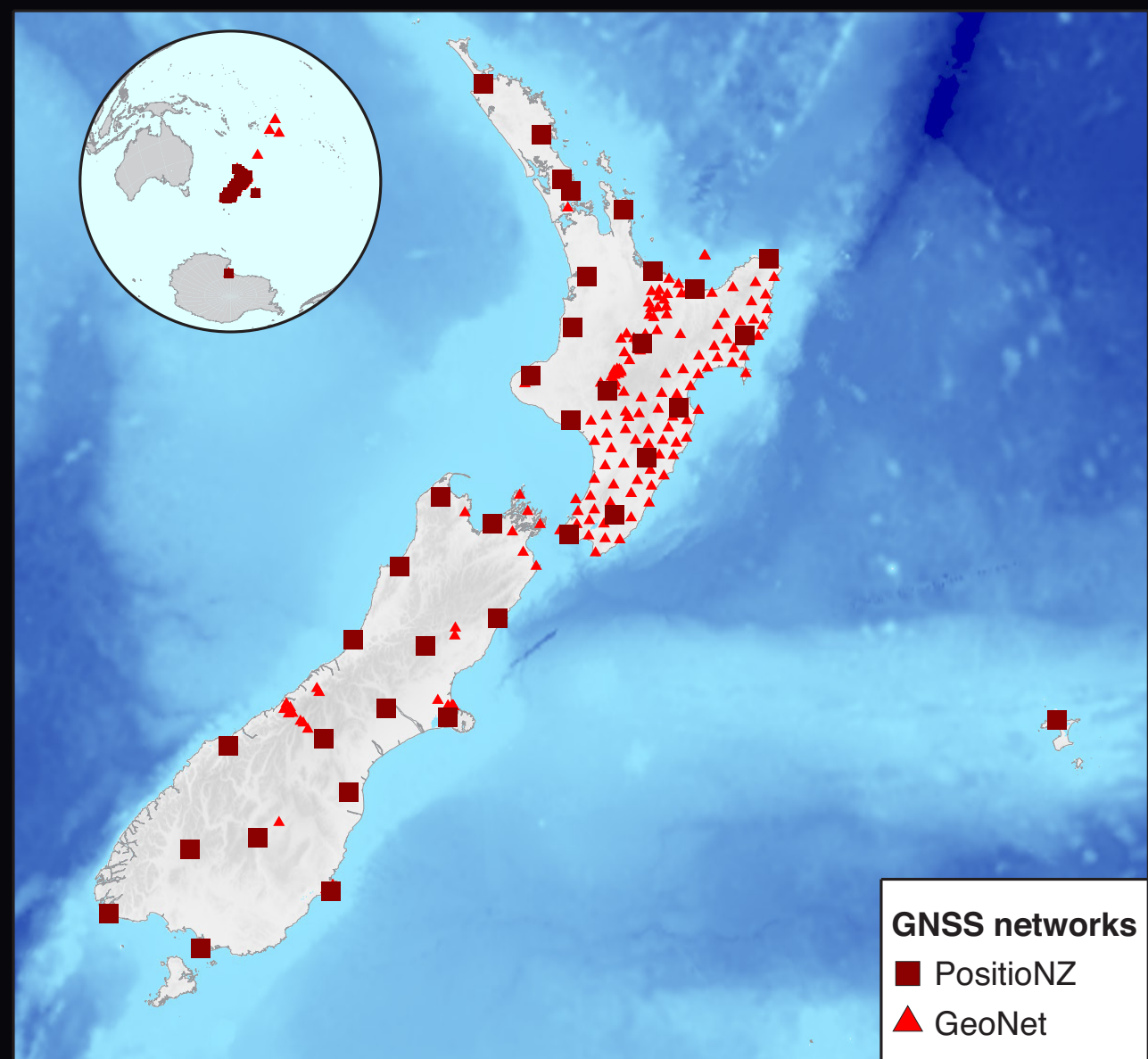
# The GeoNet and PositionNZ multi-GNSS networks (New Zealand): future challenges from an IGS network operator point of view

E.D'Anastasio<sup>1</sup>, P.Gentle<sup>2</sup>, M.Amos<sup>2</sup>, D. Campbell<sup>1</sup>, L. Bland<sup>1</sup>, K. Fenaughty<sup>1</sup>

<sup>1</sup> GNS Science - Te Pū Ao, <sup>2</sup> Land Information New Zealand  
mailto:info@geonet.org.nz, positionz@linz.govt.nz



## THE NETWORK



The GeoNet and PositionNZ networks, operated by GNS Science in partnership with Land Information New Zealand (LINZ), comprise the New Zealand national continuous GNSS network. The networks contain approximately 200 CORS sites, including 3 stations located outside of New Zealand (Antarctica, Tonga and Samoa). The LINZ PositionNZ network is a subset of 37 stations contained within the GeoNet network.

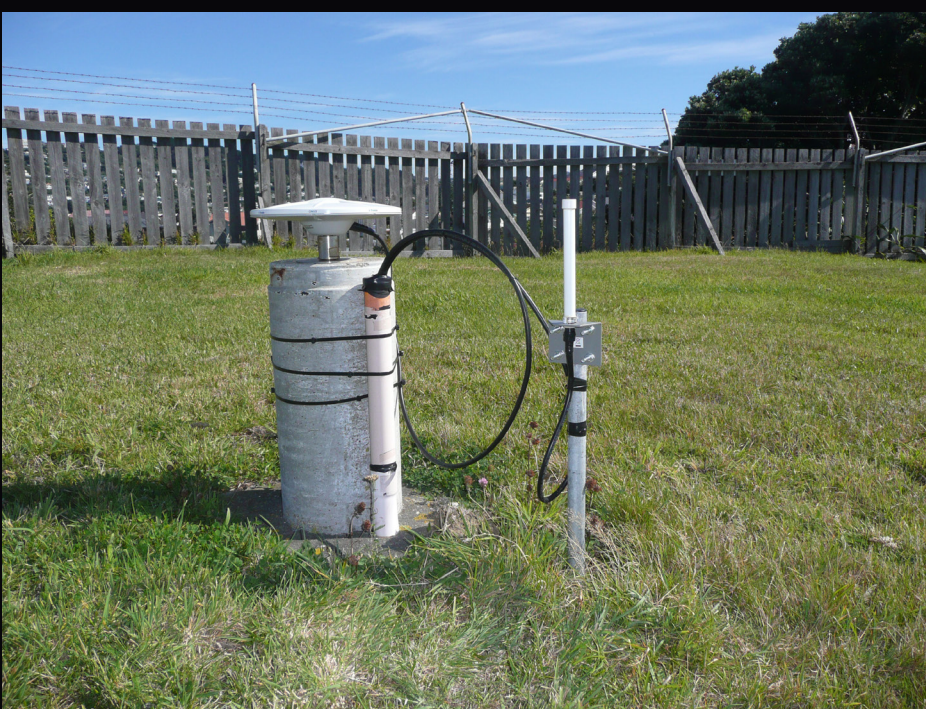
GNS Science and LINZ contribute 7 sites to the IGS network, 6 of which are part of the IGS-Real Time network.



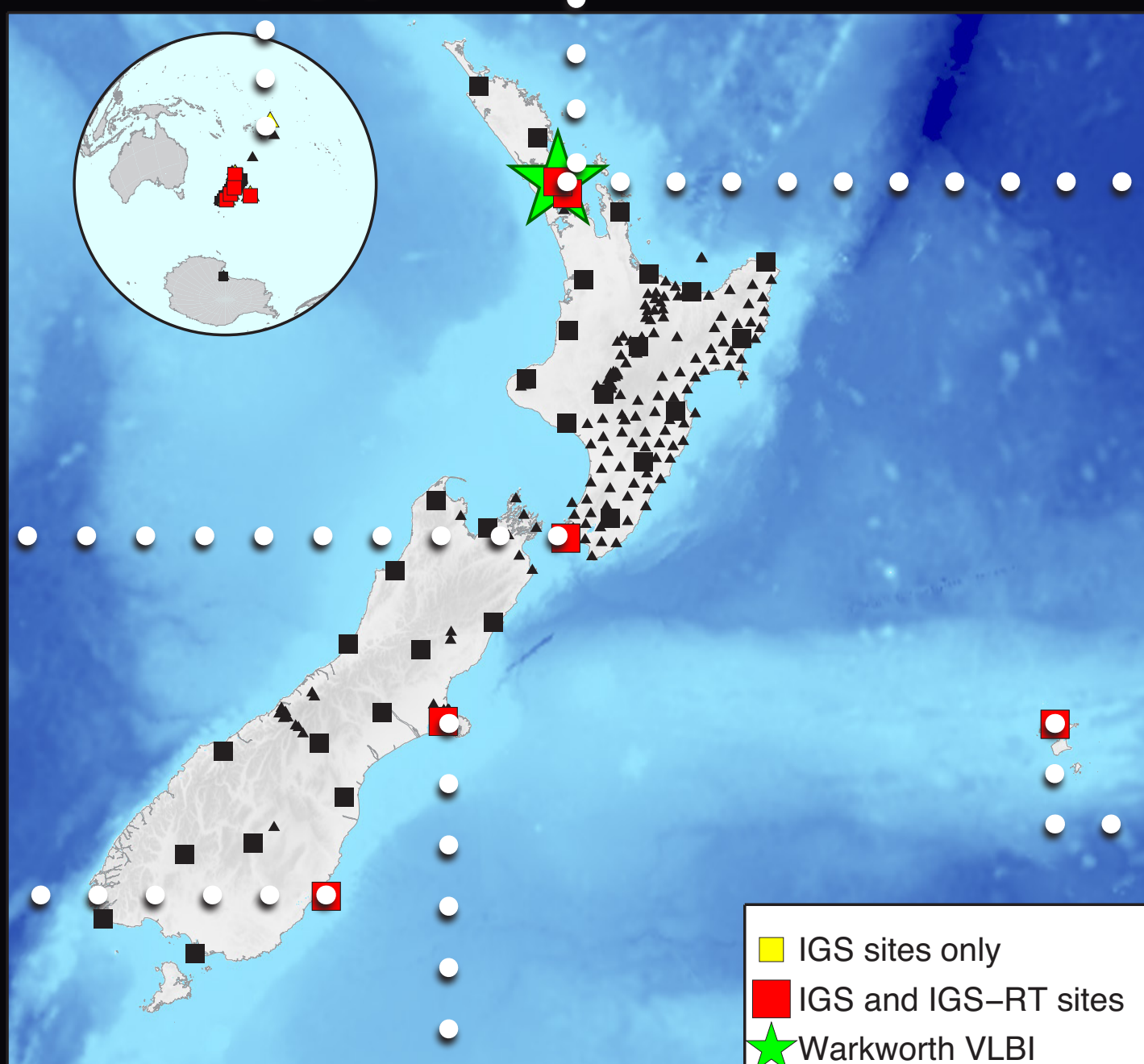
FALE



WARK



WGTN



AUCK



CHTI



MQZG



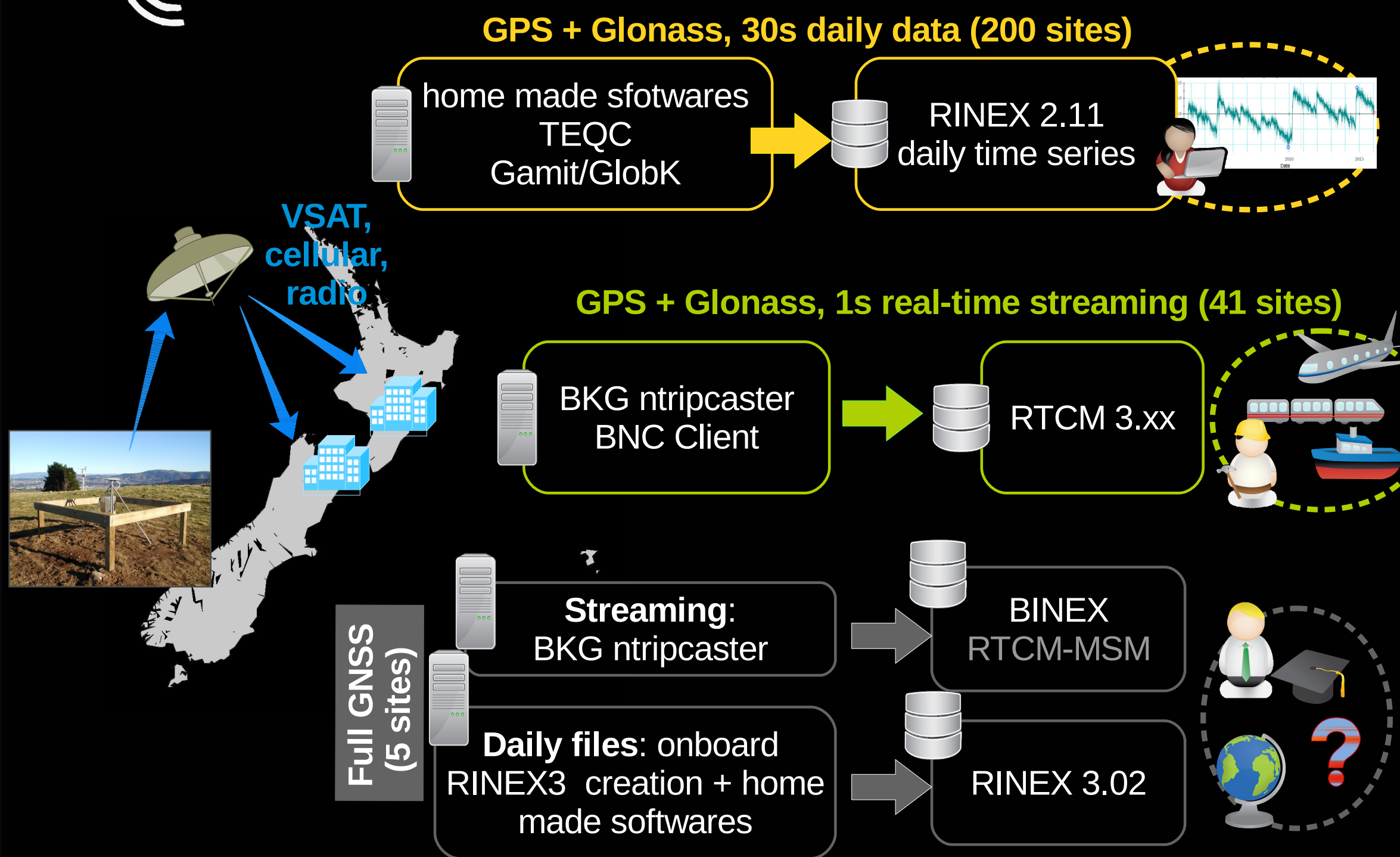
DUND

The networks cover 3 different tectonic plates and all sites (except one in Antarctica) are located on the Pacific-Australian Plate boundary. Their main purposes are geohazards monitoring and reference frame definition.

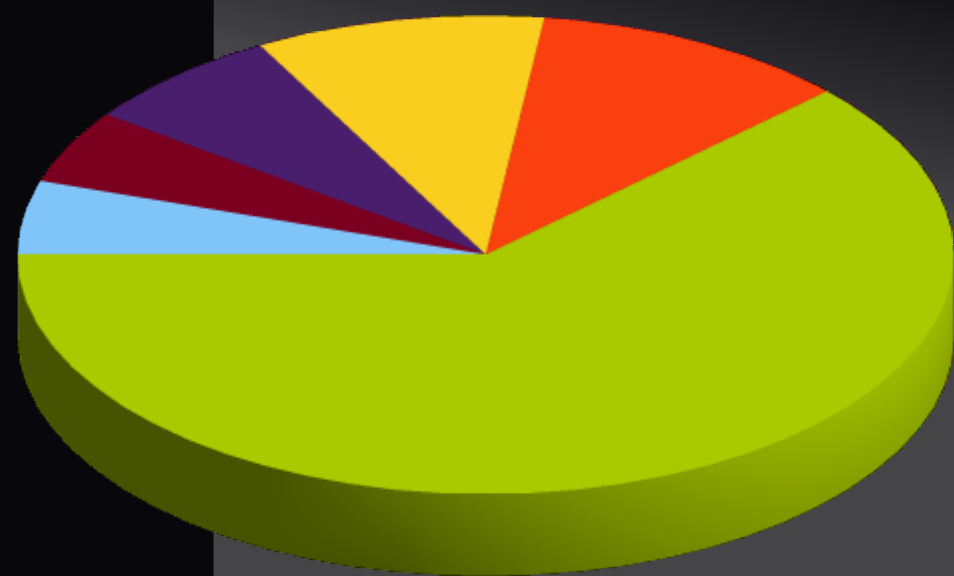
## THE INFRASTRUCTURE

Redundancy is a key component of our network infrastructure. Streaming sites has a primary and backup data link, and servers are located and duplicated in 2 different sites in New Zealand.

Daily time series, rinex files and real time streams are made freely available through our websites.



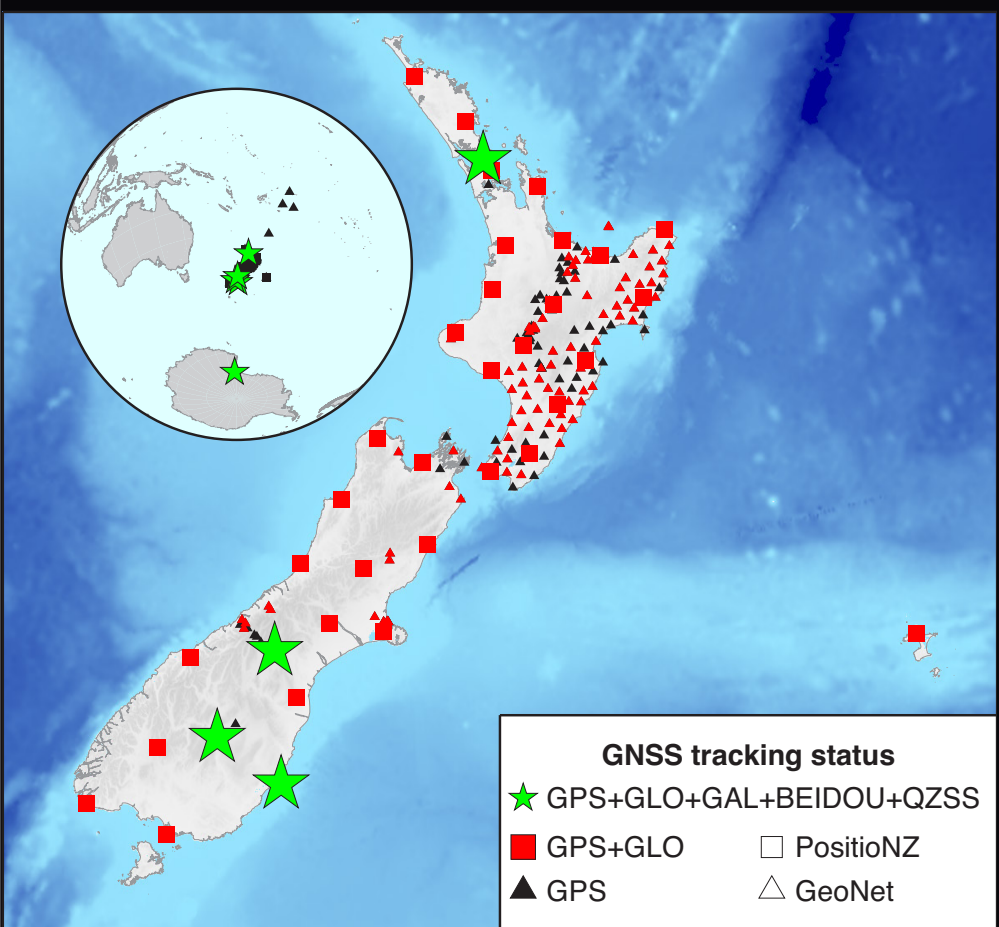
GeoNet/PositionNZ data is used by a wide community, the majority of which is made up of surveyors and researchers.



■ surveying  
■ engineering, infrastructure & transportation  
■ education & research  
■ government  
■ farming & agriculture  
■ others (retail, fisheries, etc)

## THE CHALLENGE

The increasing number of available constellations encourages the move to multi-GNSS signal tracking. Currently, 62% of the GeoNet/PositionNZ sites are tracking GPS and Glonass and 5 PositionNZ sites are tracking also Galileo, QZSS and BeiDou, contributing to various multi-GNSS projects such as MGEX. We aim to enable the full-GNSS constellation tracking on all PositionNZ sites in the near future.



The step towards multi-GNSS has many implications and challenges

These include:  
**User Expectations and preparedness:** user community might not be ready to use RTCM-MSM and RINEX3 in the short term. There could be an expectation to provide the legacy and new products at the same time.

**Transition period:** there will be a transition period to move the whole structure from GPS+Glonass (Rinex2 and RTCM3.x) to full-GNSS (Rinex3 and RTCM-MSM), and for end users to accomplish that. How long will it last?

**Data processing and quality:** daily solutions calculated with scientific processing software (Bernese, Gipsy, Gamit) are still mainly focused on GPS processing only.

**Data format and handling:** our data translation and quality check are heavily reliant on teqc. Teqc does not support the new RINEX3 file format. A tool which is powerful, recommended by IGS and supervised by a wide scientific community is desirable.

**Web resources**  
<http://www.linz.govt.nz/positionz-network>  
<http://www.geonet.org.nz>

**Increased data volume:** with full constellation enabled, streamed data volume is twice as large, and could be an issue for some data links (VSAT, cellular) requiring further upgrades.

