

Case Study: Money from Space

An Economic overview of Space and Radio Science in Southland

This Case Study has been prepared for the EDANZ Journal following a presentation by Venture Southland at conference. The information has been provided by Steve Canny, Group Manager, Enterprise and Strategic Projects, Venture Southland and Robin McNeill, Enterprise Projects Manager, Venture Southland

Southland is positioned simultaneously at the south-west corner of New Zealand and the south-east corner of Australasia. It is the closest landmass to the South Magnetic pole outside of Antarctica. Its location - provides the most favorable position in New Zealand for radio astronomy, ionospheric research, down loading data from polar orbiting spacecraft and tracking certain rocket launches. The region's natural advantages also include low levels of electromagnetic interference, which is necessary for these activities.

Venture Southland became involved when organisations that had come to New Zealand to expressly find out who to talk to around the opportunity to locate facilities in this unique area approached them as the Enterprise Agency in the region. Steve Canny, Group Manager Enterprise and Strategic Projects saw the huge potential, but Robin McNeill (Enterprise Projects Manager) was key to building on to those opportunities. He had joined the staff of Venture Southland as a chartered professional engineer and had worked on telecommunications and solar energy systems since 1981.

This meant that Venture Southland were able to do most of the design work in-house, contract in all civil engineering works and construction and engage local telecoms engineering firms to do rigging, install aerials and suchlike.

While Southland has a digital strategy, "Connecting to our Future" - a key issue, is that new information and new opportunities come faster than the final draft of the strategy.

A full strategy, "Looking up: A Strategy to Develop Space Science and Technology Opportunities in Southland", in part funded by NZTE is in the process of being completed. It provides scope for even more imaginative ways to capitalise on Southland's natural and infrastructural advantages such as identifying industrial tourism opportunities such as aurora watching and rocket launching.

The projects

The Unwin Station Radar project continuously receives reflected short-wave radio signals transmitted by the radar in a southern arc that includes the South Magnetic Pole. The data is transmitted back to La Trobe University in Australia where it is made available to users. The station is very important from a global perspective as it completes a worldwide network of radars focused on auroral zones. Southland's southerly aspect, low radio noise and unobstructed horizon make it an ideal location for such a facility.

Building and maintaining the Unwin station utilized local skills in the construction, technical work and ongoing maintenance phases and specialist technology has already been developed for international markets.

It continues to bring the following major benefits to New Zealand as a whole:

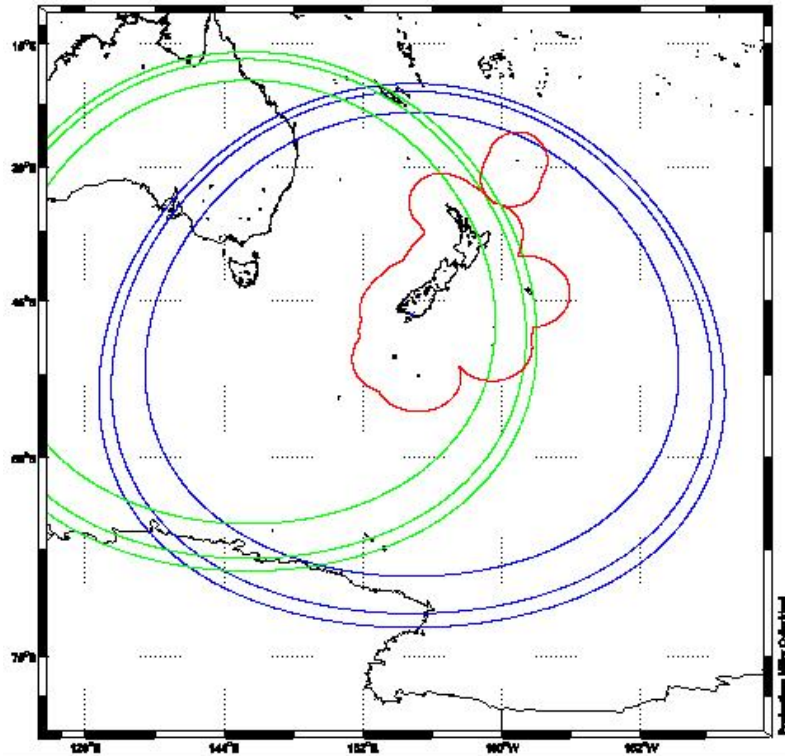
- Greater understanding of the ionosphere to assist with space weather predictions
- Prediction of telecommunication interference, and the ability to provide a better understanding of the effects of electro magnetic fields to power grid management
- Attracts the world's leading international researchers to Southland as well as associated conference opportunities.
- Provides an opportunity for local and national students to participate in world class research.

Satellite tracking target projects



Venture Southland is working with a number of parties to upgrade their satellite earth station at Awarua (10 kms to the south of Invercargill) - a proposed site in the PrioraNet global Ground Station Network programme (see above). This network was designed specifically to provide comprehensive telecommunications and ground support for earth orbiting satellites.

Remote sensing satellites orbit the earth about twelve and half times each day, scanning the earth for at radio and optical frequencies. (see below) These satellites are also used to monitor land use, oil pollution and ship movements and provide search and rescue assistance. Awarua offers excellent look-angles to space craft over the Southern ocean. The station has already played a critical role in the first launch of ATV the European Space Agency's automated transfer vehicle in March 2008



Remote Sensing Satellites field of view from Invercargill

Square Kilometre Array (SKA)

The SKA is a global radio astronomy project. It is a 1.5 billion Euro deep - space radio telescope with one square kilometre of collecting area and is planned to be built by a consortium of 17 countries. Two bids have been short listed. - one in Southern Africa and the other in Australasia (centred in Western Australia and with two SKA stations in New Zealand.)

The New Zealand connection is important as it would extend the baseline to almost 6000 kms - doubling the resolution of the telescope. The two proposed sites need to be as distant from each other as possible and would be linked by high-speed data connectivity. One particularly promising site in New Zealand is Awarua in Southland. Up to 50 satellite dishes could be based in Awarua or on the south coast of Southland.

A successful Australasian bid to build what will be the world's largest radio telescope could be worth tens of millions of dollars to the Southland economy. The cost to install and build those dishes would be worth \$50 million alone. This would include extremely fast broadband and the use of supercomputers, and Venture Southland says that if the project got the green light it would be a major boost for industrial tourism and employment in Southland.

On 21 August 2009 in Sydney Minister Kim Carr and Minister Gerry Brownlee signed an agreement for Australia and New Zealand to cooperate on the SKA, including a joint bid



to host the project “The SKA project promises to be a top global science project of the 21st century, using one of the world’s most powerful computers, to explore fundamental questions in science,” Mr Brownlee said.

“If our bid is successful, the SKA will not only significantly increase Australia’s and New Zealand’s scientific capabilities; it will result in economic benefits and spinoffs in a number of areas, including supercomputing, data transmission, renewable energy, construction and manufacturing,” Senator Carr said. It could revolutionise astronomy, physics and many other areas of science.” It is expected that having a remote station in Invercargill would be worth nearly \$40million to the economy and bring huge tourism and research opportunities with the creation of high technology jobs and the promotion of educational opportunities for students from the Southland region.

The hosting site for the SKA will be decided in November 2012 by global scientists.

Analysis

Venture Southland - the region’s economic development agency has taken an integrated approach to developing a number of related projects which position Southland in a unique economic value chain. These encompass:

- Location
- Facilities for research (universities both national and international)

- Positioning to attract opportunities and partners (space agencies in France and Sweden and Europe)
- Positioning to attract investment and leveraging for new business
- More opportunities for peripheral small businesses in the region.
- Growing trust by space agencies and research organisations in Southland's ability to successfully build and host facilities

Venture Southland's involvement in the development of radio science projects has already revolutionised the economy of Southland, with projects already approved. Investment to date stands at \$4.55 million with projects targeted at \$54.3 million.

So far all projects have been fully funded by end users. Venture Southland has an MOU with the Swedish Space Corporation regarding how it may develop the Remote Sensing Satellite earth station and an appropriate business model is still being developed.

Venture Southland staff talk to local businesses who work in the space sector, or who are interested in working in the sector locally. In December 2008 a regional Sustainability Liaison group was established to ensure a coordinated approach to the delivery of business support. This group will address regional gaps between business needs and available assistance.

So far, only the value to schools has been analysed in any robust way. The major spin-off has been through education and, against national trends, the number of Year 12/13 Physics students has doubled because of space science activities.

Key learnings

1. Location, location, location - Identifying and capitalizing on Southland's natural advantages.
2. Being flexible enough to seize opportunities as they arise and to leverage at every opportunity.
3. Having the right staff on board. Southland has been able to maximize its natural advantage by having a qualified staff member (a professional engineer) on its team that can talk the same language as researchers and space agency engineers.

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