Newsletter 2, September 2010 http://drill.gns.cri.nz/nzcdp/dfdp/index.html

# Deep Fault Drilling Project

## Alpine Fault, New Zealand

*Image courtesy of NASA/JPL/NGA*

## Quick updates:

- Planning proceeding for exploratory drilling at Gaunt Creek in early 2011
- LiDAR data collected along the central Alpine Fault
- Seismic experiment planned for middle reaches of Whataroa Valley
- Proposals under review with agencies worldwide
- M7.1 earthquake strikes near Christchurch, 4 September 2010

## In this issue:

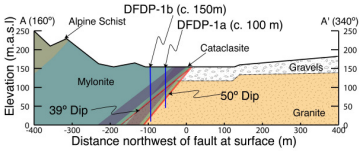


# First stage of Alpine Fault drilling in sight

The first stage of Alpine Fault drilling is scheduled to take place in early 2011 with the construction of two 100–150 m boreholes spaced ~50 m apart next to Gaunt Creek, southeast of Whataroa. The purpose of these boreholes, is threefold: (1) to characterise the shallow fault zone using geophysical logging measurements and core analysis; (2) to construct a permanent seismological, hydrological and meteorological observatory; and (3) to develop the scientific protocols and drilling techniques necessary for drilling in steeply dipping foliated rocks ahead of deeper, more ambitious and challenging drilling.

The boreholes will be drilled using techniques common to groundwater and minerals exploration, fully cored and logged, and instrumented for long-term fault zone monitoring.

Funding has been committed by GNS Science, the National Environmental Research Council (UK), the University of Otago, Victoria University of Wellington, the University of Canterbury, and the University of Auckland, and an application to the Deutsche Forschungsgemeinschaft is under consideration. Proposals for a broad range of




***Cross-section depicting Gaunt Creek boreholes. Image courtesy of Luke Easterbrook-Clark and Virginia Toy (University of Otago). This image is available from the DFDP wiki (overleaf).***

DFDP-related research have been submitted to funding bodies in New Zealand, the US, UK, Germany, Australia, and Canada. Interest and momentum in the project are building!

# Preparations for Gaunt Creek drilling

Planning for the first stage of Alpine Fault drilling at Gaunt Creek in 2011 is underway, with a concession application document submitted to the Department of Conservation in July and preparations now being made for drilling and logging tenders. (Copies of these documents can be found on the DFDP wiki page referred to overleaf.)

In consultation with GNS Science staff responsible for planning and constructing GeoNet sites, the wellhead designs for the two boreholes are being developed to enable long-term seismological, hydrological, and meteorological monitoring using downhole and surface instruments, with real-time telemetry to a local hub at Whataroa. Constructing a resilient observatory requires the boreholes to be built to avoid or withstand inundation by floodwaters and debris flows. The concession application is for a 30-year licence to enable the obser-

# Recent DFDP-related fieldwork

DFDP-related fieldwork has progressed on several fronts, a few highlights of which are noted here.

Rob Langridge (GNS Science) has coordinated the collection of LiDAR data spanning the central Alpine Fault between Franz Josef and Whataroa, as part of a larger LiDAR pilot study of active faulting. The data are being processed, but even the raw images reveal the Alpine Fault's geomorphic expression with unprecedented detail, and the final results are awaited with bated breath.

Students and staff from the University of Canterbury have been busy surveying potential drill sites near the Whataroa River and Gaunt Creek. PhD student Greg De Pascale and MSc student Andrew Klahn, supervised by Mark Quigley and Tim Davies, have used a variety of methods — including resistivity, seismic refraction, and ground-

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**Late-breaking news!**

Visit http://tinyurl.com/DarfieldEQ for updates on the 4 September 2010 M7.1 Darfield earthquake

## Upcoming deadlines/events

26 Sept. 2010 — GeoNZ 2010 abstract deadline (extended due to Darfield earthquake)

22–24 November 2010 — GeoNZ 2010 conference, Auckland

24–26 November 2010 — AusIMM NZ Branch Annual Conference, Auckland

13–17 December 2010 — AGU Fall Meeting

15 January 2011 — ICDP proposal deadline

early February 2011 — Marsden Fund preliminary application deadline

# Report on the ICDP training course

In April, Simon Cox (GNS Science) and Virginia Toy (University of Otago) attended a week-long ICDP training course in Windischeschenbach (site of the 9.1 km KTB borehole) to learn about scientific drilling. The annual course covers a broad range of planning, drilling and logging techniques that will prove invaluable in designing and executing Alpine Fault drilling.

Virginia was particularly impressed by the education and outreach GeoCentre at the KTB site, which provides a fantastic model for the outreach component of the Alpine Fault drilling project. Other highlights for her were discussions about core documentation and archiving, and the presentation by Helga de Wall about constructing geological models from cuttings. Simon found Bernard Prevedel's graph of planned and actual drilling time versus depth very illuminating for anyone contemplating deep drilling. He particularly enjoyed talks by Thomas Wiersberg (on gas monitoring) and Katja Schulze (on pore pressure variations), both closely related to his current research.

Both New Zealand participants found the course very stimulating and encourage other colleagues to attend if the possibility arises.

# Updates to DFDP website and wiki

In tandem with a revision and update of the DFDP website, an editable wiki (https://wiki.gns.cri.nz/DFDP) has been established so that members of the wider DFDP community can share and discuss material. The high-level structure of the wiki is in place, and details have been added regarding upcoming field operations, including the DFDP-1 drilling at Gaunt Creek planned for early 2011, and other activity. The wiki is a public document that can be viewed by anybody, but researchers wishing to make changes can request an account by emailing itsupport@gns.cri.nz.

***Seismic equipment awaiting shipment back to IRIS/PASSCAL from the University of Canterbury's Harihari field station on completion of the DFDP10 deployment (January–May 2010).***

# Recent fieldwork

*(Continued from page 1)*

penetrating radar — to examine the shallow substructure in each location and assess geohazard. The team have also used differential GPS to construct local digital elevation models, which will be amalgamated with the LiDAR data in due course.

Planning for the January 2011 Whataroa seismic experiment led by the University of Otago is progressing well. Andrew Gorman and PhD student Adrienn Kovacs are making preparations to collect 2D and 3D seismic data in the Whataroa Valley. Researchers from ETH Zürich (Alan Green) and Freie Universität Berlin (Stefan Buske) will also take part in this experiment. Modelling work is underway to assist in the selection of optimal shot and receiver locations. Stefan, MSc student Antonia Oelke, and Stephen Bannister (GNS Science) are also using SIGHT98 Whataroa data to image the shallow Alpine fault using seismic migration, and have presented their results at the Deep Seismix symposium in Cairns this month.

***University of Canterbury researchers conducting shallow seismic imaging of Whataroa River terraces in April 2010.***