NELSAM update: work in Tautona mine

January 22, 2006

By Ze'ev Reches

Current activities

We have had several positive developments since the last update of December, 2, 2005; all reports are posted on our page earthquakes.ou.edu.
The recent visitations of NELSAM people to Tautona mine have been as follows:
Ze'ev Reches and Vincent Heesakkers visited Dec. 28, 2005- Jan. 13, 2006. We logged two boreholes, installed two accelerometers, oversaw the local management of the project, and coordinated the drilling activities.
TC Onstott visited Jan. 10- Jan. 21, 2006, He logged and sampled the DAFBIO hole.
Margaret Boettcher has started to work on NELSAM as a Mendenhall post-doc in Menlo Park. She will come for a month, starting Jan. 28, 2006 to study the seismic software of ISSI and work on the early data of our network.
Art McGarr will use his trip to South Africa (Jan. 20-31, 2006) as a member of a seismic hazard committee for a short visit to Tautona mine to meet with Margaret and Gerrie van Aswegen.
Malcolm Johnston will come on Feb. 8, 2006 for ten days for inspection of the current network, the installation of accelerometer in the long borehole LIC118, and preparation for the displacement meter installation (in DAFAULT1 and DAFAULT2).
Sergei Stanchits and Masao Nakatani will come to Tautona mine in early February to explore the options for high frequency to acoustic emission monitoring in NELSAM cubby.
Hiroshi Ogasawara will come in March for the installation of the Ishii strain meter in DAF5 (see below).

The operations of our South African collaborators have been indispensable for our success.
Ryno Muller is the NELSAM person for all daily operations; he is employed by Open House and stationed in ISSI, Western Deep. Ryno's professional work and supervision are essential for NELSAM success.
Hannes Möller of the Rock Engineering in Tautona mine has organized a management group in Tautona mine that undertook on itself to help NELSAM operations where necessary (see below). The positive results of the support of this group has become evident immediately after the first meeting on Jan. 3.
Derek Litthauer and Esta van Heerden of U of Free State, Bloemfontein continue that intense involvement in NELSAM, in the DAFBIO operations and camera logging.
Gerrie van Aswegen and Shuan Murphy continue their involvement in all NELSAM operations from ISSI. The ISSI people, primarily Patrick and Francois continue to work on the installations of the accelerometers.
Reynier Steenkamp is the foreman and trainer in Boart-Longyear who is in charge of NELSAM long drilling. He had provided many useful advices on drilling and installations, and was resourceful in fixing the troubled drilling equipment in the early stages.

Renewed collaboration with Tautona mine.

On Jan. 3 we had a meeting of NELSAM with Tautona mine representatives. People that attended from Tautona mine: Rock Engineering (Rob McGill, Shaun Murphy, Hannes Möller), Capital development (André van Jaarsveld, Piet Lambreght), Geology (Rob Burnett), and Production (Danny Davies, Danie Burger, Dirk Erasmus, Swanie Swanepoel). From NELSAM: Ze'ev Reches, Vincent Heesakkers, and Ryno Muller. After the presentation of NELSAM operations and their contribution to reducing seismic hazards, we discussed the points of needed help: Getting better drilling production by Calulo, faster mobilizations of NELSAM equipment, and support in infrastructure (electricity, building wall to the cubby etc).

We received very positive response; continuous follow-up will be coordinated between Hannes Möller and Ze'ev Reches.

Long boreholes drilling.

DAFAULT1 and DAFAULT2. The two main boreholes across the Pretorius fault were completed (see map). DAFAULT1 is 60 m long and was drilled at angle of 19° downward across the Pretorius fault, and DAFAULT2 is 50 m long and was drilled co-linearly at angle 19° upward. Both holes are now cased and waiting for the installation of the displacement meter by Malcolm.

DAFBIO. Drilling DAFBIO started on Wed. Jan. 18, 2006 at the presence of NELSAM microbiology team (TC Onstott, Derek Litthauer and two students). The core sampling systems worked properly, and we expect successful sampling and logging in the next ten days.

DAFGAS will be drilled after the completion of DAFBIO.

DAF5. Hiroshi Ogasawara will install an Ishii strain meter in a new borehole to be drilled after DAFGAS. The new hole, called DAF5, will be drilled 18° downward and deviating by 20° to DAFAULT1 (see map). DAF5 will be drilled to 20 m, reamed and camera logged before the installation of the strain meter. If the camera logging and/or the core will indicate poor conditions (high stresses and/or intense fracturing), other options will be considered.

Borehole camera logging.

The camera system was successfully fixed and tested in the U of Free State, Bloemfontein, thanks to Derek Litthauer and Esta van Heerden. We succeed to log two boreholes during the last two weeks: The vertical hole #9 to its full depth (11.4 m) with excellent quality images, and the 19° inclined DAFAULT2 in the cubby. The images of DAFAULT2 are of poor to mediocre quality due to problems with the electrical power in the cubby. The problem with the electric supply was fixed, and we hope for good logging results of the coming holes in the cubby.

Short borehole drillings.

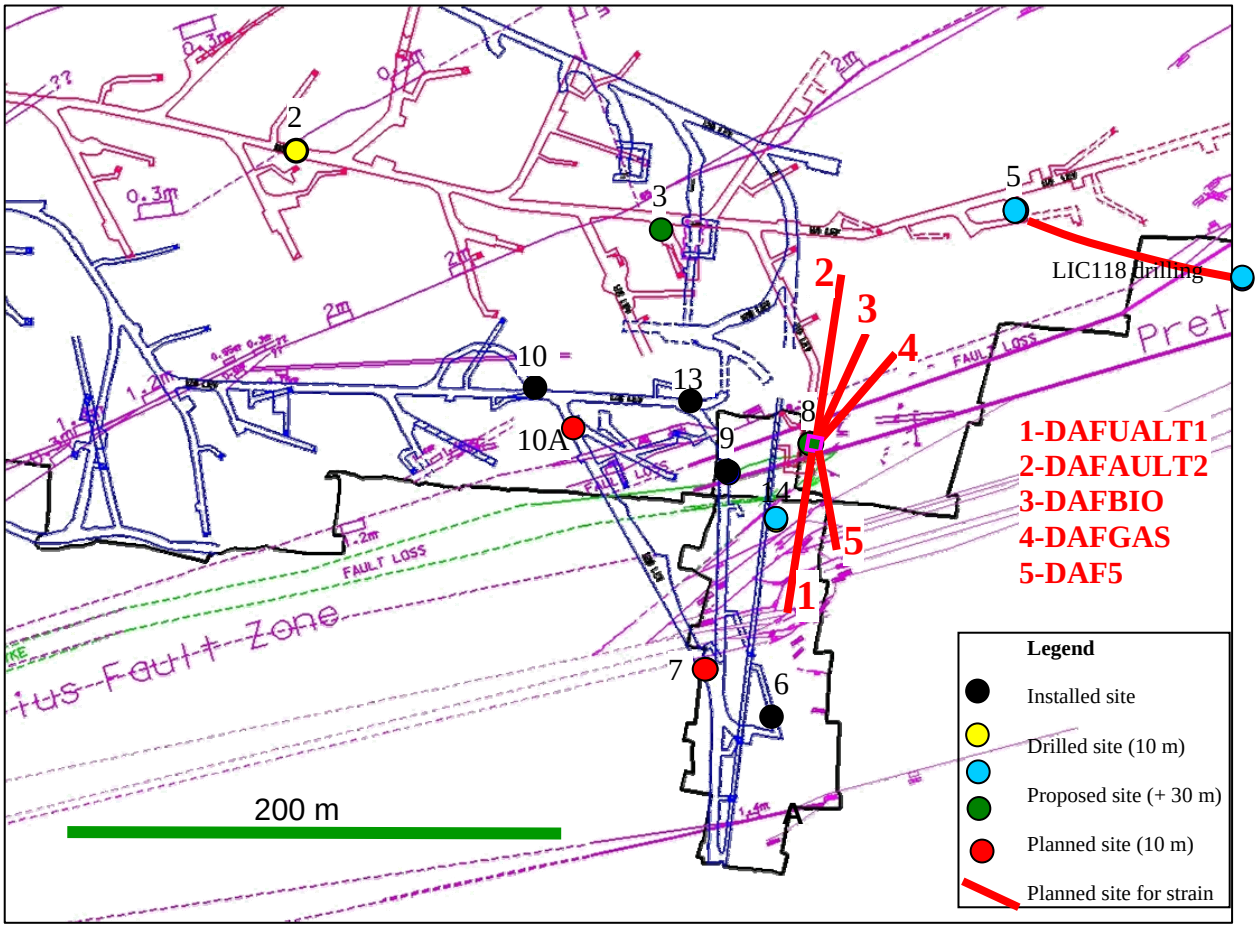
The main reason for the delay in the installation of the accelerometers is the poor performance of Calulo drilling company. Some improvement was noted after pressure from Tautona mine management: Drilling started at site #2 (level 118), and the drilling rig was moved to site #14 (no drilling there yet). Due to the severe power limit on the rig of Calulo (pneumatic operation), Calulo cannot drill at 75 mm diameter to depth larger than 15 m (we want 30 m in some boreholes). This limit can be removed if they will have the proper

reaming bit (that is not used routinely in South Africa). Malcolm explores the options to provide the needed bit from the US.

Installation of accelerometers/EM/thermisters.

During the last three weeks we completed the installation of accelerometers at sites #9 and #6 in 120 level (in additions to the already operating systems at #10 and #13). Each of these four sites includes two 3-component accelerometer systems and a thermister; sites # 9 and # 6 also include a pair of EM electrodes. Site #9 will be connected these days to the seismic network, and #6 will be connected after its area will be connected to the mine electricity system.

A special challenge is the planned installation in LIC118 borehole. This is a subhorizontal borehole, 60 mm in diameter, that was drilled by the Geology department of Tautona mine to distance of more than 900 m. We logged this hole with our camera to distance of 418 m. We plan to install an accelerometer/velocity system at distance of 150 m, which is on the south side of the Pretorius fault (see attached map). This accelerometer will be in the region of planned mining in the next 2-5 years.



Site design as og Jan. 22, 2006