

Progress Report to *Sindri* on GlyVeSTMaP:

The Glyvursnes-Vestmanna Seismic Tie, Marine Portion

1 November 2006 to 31 December 2007

During the first half of 2007 we formulated plans for the acquisition of the marine seismic data for the project: GlyVeSTMaP (Glyvursnes-Vestmanna Seismic Tie, Marine Portion). [We still often refer to the project by the shorter acronym GlyVeST.] This planning involved discussions and coordination with co-investigators: Robert Stephen (Bob) White (University of Cambridge), Morten Sparre Andersen (GEUS) and Uni Kárason Petersen (Jarðfeingi), and with several people at other institutions involved: the Fisheries Laboratory (Fiskirannsóknarstofnun), the Earth and Energy Directorate (Jarðfeingi) and particularly Per Trinhammer at the University of Aarhus, Department of Earth Sciences.

In addition, we applied for necessary permission through Jarðfeingi and made advance notifications for the seismic work to the Fisheries Inspection Service (Fiskiveiðueftirlitið) and the Maritime Rescue and Coordination Center (MRCC) of our survey plans. Regarding local fishing activities, we also had contact with P/F Týggjará, P/F Vestlax and Felagið Hummarabátar, with assistance from Martin Heinesen of Jarðfeingi. During the seismic survey, daily notification was made to Kringvarp Føroya and to MRCC with details of our sailing plan.

My PhD students, Khanh Duc Nguyen and Hilmar Simonsen, were also making preparations by helping to improve our data-processing capability and setting up initial data-processing flows. We carried out a major upgrade of our Linux cluster (*Teyggjan*) in 2007. Khanh Nguyen played a very helpful role in this as he had considerable previous experience with this kind of system, and he made a major contribution (on seismic applications) to a comprehensive 30-page Faculty report on *Teyggjan* (Joensen et al., 2007). Both Khanh and Hilmar began setting up processing flows in ProMAX, which is state-of-the-art seismic data-processing software, requiring a high-performance computer like *Teyggjan* for best results. They also devoted time to reviewing the relevant literature on subbasalt seismic imaging and related topics.

According to plan, we carried out the seismic survey to acquire the GlyVeSTMaP seismic data in July 2007. For this marine program we contracted to hire the seismic acquisition equipment from the University of Aarhus, together with their extremely able engineer, Per Trinhammer, who supervised the installation and operation of this equipment aboard ship. In addition, we coordinated with Fiskirannsóknarstofnun and hired their research vessel, the Magnus Heinason, complete with its excellent crew and backup staff. We also collaborated closely with Jarðfeingi scientists, who were doing their own survey in adjacent waters using the same equipment and vessel, just before our survey. We benefited significantly from this cooperation in terms of shared effort, logistics and some costs, such as mobilization/demobilization costs.

In this acquisitional phase of the work, Hilmar Simonsen made an indispensable contribution to our effort. We also had assistance onboard from Uni Petersen, Julia Kingsbury and two of Jarðfeingi's staff (Finn Mørk and Thomas Varming) who stayed on to assist us even after their own program was completed. At this time, Khanh Nguyen was on parental leave (two weeks in July and 10 weeks in September-November, 2007).

The project proposal specified an absolute minimum experiment comprising two marine seismic-reflection profiles, one ~50 km long through Vestmannasund, past Kirkjubønes and tying to an industry line south of Nolsoy (OF94-029); and a second profile ~30 km long shot from Tangafjørður, past Glyvursnes and Kirkjubønes. Then, if conditions were favourable, the marine profile would be extended from south of Kirkjubønes to the south end of Suðuroy. In actual fact we were able to acquire all of these lines as well as an additional one running northeast from near Kaldbaksnes past Klaksvík, tying to the industry line OF94_010 (Figure 1). And we were able to cover all these at least twice.

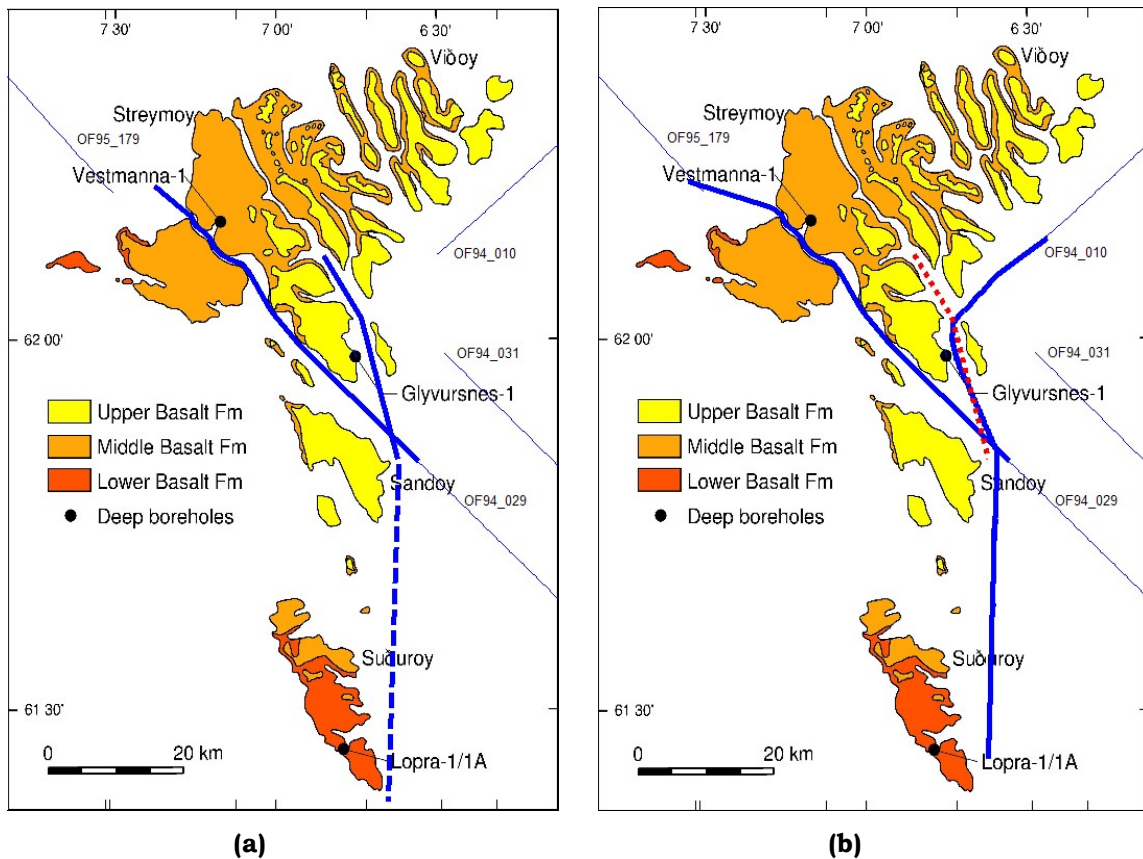


Figure 1. (a) Seismic data-acquisition profiles as originally proposed. **(b)** Profiles as actually acquired in the GlyVeSTMaP survey. The stippled red line was acquired by Jarðfeingi but is available to us.

These profiles give us the opportunity to produce a seismic tie between the seismic and borehole data acquired during the 2003 Glyvursnes experiment and the borehole data acquired in 2004 at Vestmanna. Additionally, by virtue of our success in acquiring seismic data all the way south to a point east of Lopra, offshore of southern Suðuroy, we have the opportunity of tying to the Lopra borehole data.

In the second half of 2007, work continued on the preparation of processing flows and we began initial processing of the GlyVeST data as well as industry data from a couple of adjoining profiles. We reported on the acquisition work and the earliest processing work at the 1st Jóannes Rasmussen Conference at the end of August, 2007. See Simonsen et al. (2007) and Kingsbury et al. (2007).

When not on parental leave, Khanh got a good start on the work of processing the marine seismic data. His preliminary treatment of the GlyVeST data included the creation of a database containing seismic, borehole and other data related to the project. Hilmar's data-processing got off to a slower start because of his coursework, which had suffered some delays. Nevertheless both PhD students have progressed sufficiently that they will be submitting expanded abstracts to the Society of Exploration Geophysicists (SEG) for oral presentations in November 2008 [submitted in early April, 2008]. See Nguyen et al. (2008) and Simonsen & Brown (2008).

Khanh has been assisting further with preparations for use of *Teyggjan* and with the installation and testing of geophysical software on this cluster. He also assisted Julia Kingsbury (Cambridge) on a particular aspect of the GlyVeSTMaP geophysical data in connection with her MSc research (Kingsbury, 2008). Although unrelated to GlyVeST, he presented a paper (Nguyen, 2007) at an AAPG Conference (American Association of Petroleum Geologists) in Athens, 18-21 November 2007. [He is also spending five weeks in early 2008 doing specialized processing for the elimination of multiples at the processing centre in Vietnam of Fairfield (his former employer and a world leader in this technology). This will be described in the report for 2008.]

References

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