Earthquakes and pre-earthquake processes, special issue

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The year 2009 marked the centennial of earthquake monitoring in Iceland. This year was also the 30th anniversary of volumetric strain measurements in boreholes, the 20th anniversary of the initiation of the SIL seismic network and the 10th anniversary of the ISGPS continuous GPS station network. To mark these milestones, the Meteorological Office, in collaboration with the University of Iceland, University of Akureyri, Reykjavík University, Iceland Geosurvey and the University of Uppsala hosted an international conference on earthquakes, pre-earthquake processes and earthquake prediction research on October 30th. The conference was dedicated to the memory of Sigurður Thorlacius Rögnvaldsson, geophysicist, who died in a tragic car accident in October 1999. A total of 15 talks and 17 posters were presented at the conference.

Following the conference, participants were invited to submit papers to a special issue of Jökull. The first seven papers of this issue were presented at the meeting. The articles span a wide range of topics on fault mapping, seismicity studies, studies of seismic noise and GPS measurements. It is in many ways suitable that such a wide range of topics be represented in this special issue commemorating Sigurður Rögnvaldsson as his work during his short career was quite broad in scope. Also, in earthquake prediction research a multi-disciplinary approach is needed.

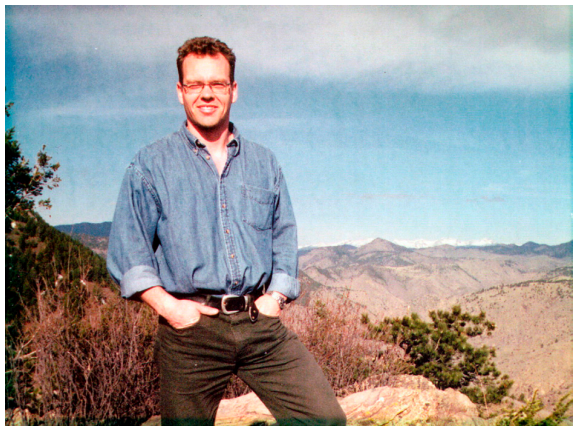
In the first paper of the special issue, Geirsson *et al.* give an overview of results from continuous GPS observations in Iceland, 1995 to 2010. In addition to the background, plate spreading signal and rebound due to melting glaciers, the CGPS network in Iceland (ISNET) has captured deformation transients caused by earthquakes, magma movements, and pressure changes in geothermal systems, thereby providing valuable data, and complementing the SIL seismic network for monitoring natural hazards in Iceland. Then Brandsdóttir *et al.* report on the May 29th, 2008, earthquake aftershock sequence which reveals some details about the fault geometry and shows how these two events have triggered seismicity along adjacent faults. Martens *et al.* write about precise seismic locations applying an automated detection tool to an earthquake swarm in the rift zone in northern Iceland. They compare results obtained with data from two different networks, with 6 joint stations, using different location software. Horálek and Fischer describe intra-plate earthquake swarms in West Bohemia/Vogtland (Central Europe) which resemble in many ways swarms in the rift zones in Iceland. Guðmundsson and Brandsdóttir write about geothermal noise clearly associated with active geothermal areas around Ölkelduháls, SW Iceland, by study of amplitude decay and phase correlation. Hjartardóttir *et al.* describe a 30 km long fault on the eastern flank of the northern volcanic zone in Iceland, possibly related to the deglaciation in the early Holocene and Einarsson describes comprehensive mapping of Holocene surface ruptures in the South Iceland Seismic zone, where the most destructive earthquakes in Iceland occur.

Sigurður Thorlacius Rögnvaldsson

Sigurður was born in Reykjavík in January 1964. He graduated from the Menntaskólinn við Hamrahlíð junior college in 1982 and received his B.Sc. degree in geophysics from the University of Iceland in 1987. During his undergraduate years, Sigurður worked summers at the Icelandic Energy Authority, carrying out electromagnetic resistivity surveys and other field work for geothermal prospecting.

Sigurður continued his geophysics studies in Sweden at the Uppsala University where he obtained a Ph.D. degree in 1994. His supervisors while at Uppsala were Ragnar Slunga and Reynir Böðvarsson. His thesis research focused on developing and testing geophysical algorithms implemented as part of the SIL (South Iceland Lowland) digital seismic network for analysis of earthquake data. In collaboration with Ragnar Slunga, his most important contributions were in automatic estimation of fault-plane solutions for microearthquakes by inverting observed polarities and spectral amplitudes of P- and S-waves, and in relative locations of microearthquakes. Sigurður's research thus demonstrated that microearthquakes contain information about large-scale tectonic processes.

Upon graduation from Uppsala University, Sigurður first held a postdoctoral position at the Nordic Volcanological Institute in Reykjavík, and then moved to the Geophysical Department of the Icelandic Meteorological Office (IMO) in the fall of 1995. At IMO, Sigurður participated in the deployment and day-to-day maintenance of the SIL system as well as its development. The map on the IMO web site showing daily seismic activity was implemented by Sigurður during a seismic crisis in Hengill in 1998, and it is an example of his creativity and efforts to rapidly display SIL data.



Sigurður Th. Rögnvaldsson. Photo: Ari Tryggvason.

Sigurður participated in a number of different Icelandic and international research projects after his return to Iceland but the focal point of his research continued to be analyzing microseismicity in Iceland, building on his doctoral work in Uppsala. These studies included mapping of faults in the Tjörnes fracture zone, the South Iceland seismic zone and the Hengill regions, using relative relocations and earthquake focal mechanisms. Mapping of seismically active faults at depth using relative relocations of microearthquakes provide important information on the seismotectonics of a region, and the method is now also used in geothermal exploration.

Sigurður's contributions to the field of seismology during his short career demonstrate the enthusiasm that he held for the subject. He was a great colleague and a true friend - always ready to help, whether the problem involved deciphering convoluted computer codes, delving into the mysteries of the SIL system, making presentable documents using LaTeX and figures using GMT, or discussing life, the universe and everything.