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The M∼5 triggered Events in the South Iceland Seismic Zone on June-17, 2000: Determination of Fault Plane, Magnitude and Mechanism

K. S. Vogfjörd, (1) S. Hjaltadóttir (1) and R. Slunga (2)

(1) Icelandic Meteorological Office, Physics Department, Reykjavík, Iceland, (2) Uppsala University, Department of Geophysics, Uppsala, Sweden /vogfjord@vedur.is / Fax: +354 522-6001)

The June-17, Mw=6.5 event triggered several events in the South Iceland Seismic Zone and on Reykjanes Peninsula within minutes of its origin time. Four events, two of which were of magnitude M∼5, were dynamically triggered, during the arrival of the S wave-train, in the first half-minute. Two additional M∼5 events occurred after 2 minutes and 5 minutes, respectively. The triggering distances were between 2 and 85 km. Due to their origin being so close in time to the June-17 event, which saturated several instruments in and around the Seismic Zone, detection, location, magnitude- and mechanism determination of the dynamically triggered events, based on local seismograms has proved somewhat problematic. In spite of their sizes, the dynamically triggered M∼5 events were not detected teleseismically either. Their relative origin times were 26 s and 30 s.

Mechanism of the 2 minute event, just 2 km west of the June-17 event, is well constrained by the event's wave forms and the relatively located aftershock distribution. Due to a less favorable station coverage, the mechanism of the 5-minute event, at 85 km distance west of the June-17 event, is not as well defined and the few aftershocks recorded in its epicentral area do not help constrain the fault plane. The 26 s event, at 65 km distance near Hvalhnjúkur is well located, but its wave forms are disturbed by the June-17 event, so mechanism and size are not well determined. The 30 s event, at 77 km distance near Kleifarvatn, is rather poorly located, and seismic data cannot constrain its size and mechanism. However, relatively located aftershocks fairly well determine fault-strike and size. By using the spectral amplitudes of P- and S-waves

from a well recorded and constrained N-S, vertical strike-slip, M∼5 event, which occurred on Reykjanes Peninsula on August 23, 2003, the seismic moments of the two dynamically triggered M∼5 events can be extracted. Using the relatively located aftershock distributions to constrain the fault orientations and sizes, their mechanisms and stress drops can then be estimated. Surface displacements of the Kleifarvatn event were well resolved by InSAR and the derived fault orientation agrees well with the results from the seismic data.