



A year of seismic swarm activity on the Mohns – Knipovich Ridge Bend

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The seismic swarm activity on the Mohns – Knipovich Ridge Bend, North Atlantic, between September 2007 and September 2008, was studied within an International Polar Year project that aimed to investigate the Barents Sea passive margin. The project involved the installation of an ocean-bottom seismometer and hydrophone (OBS/H) deployment in the vicinity of the ridge bend, as well as the deployment of temporary stations in regional distances, including a 13 element small-aperture seismic array on Bear Island, close to the Western Barents Sea continental margin. During the study, the Mohns – Knipovich Bend region was quite active, seismicity being mainly expressed in the form of larger or smaller swarms consisting of low to moderate magnitude events. The main volume of this seismicity occurred directly on the ridge bend, in an area known for increased hydrothermal activity (in close vicinity to the Loki's Castle hydrothermal vent field), and can be separated into two larger populations; one occurring in September 2007 and one in the beginning of December of the same year. Waveform cross-correlation analysis on the records of the nearest OBS/H station demonstrated a very large variability of waveforms within this activity, with only very few events forming well defined clusters. The same analysis revealed the existence of two small clusters of highly similar events in the northern terminus of the Mohns Ridge, occurring in January and June 2008. A waveform cross-correlation detector applied on the records of the same station, recovered a multitude of very weak earthquakes associated with these two clusters, thus facilitating a statistical analysis for each one of them. The results (e.g., spatio-temporal and cumulative distributions, b-values) indicate that the June 2008 swarm has a clear tectonic character, while the January 2008 swarm and the 2007 activity on the ridge bend are presumably related to volcanism on the ridge. Taking into account the achieved resolution in locating these swarm events and combining our results with a high resolution bathymetric relief, we can assign each of these swarms to particular ridge segments, as defined by previous studies. The results from the statistical analysis will be discussed in view of the swarms' location within a magmatism- or tectonism-dominated ridge segment, in an attempt to interpret the mechanism(s) that control the seismic activity on the Mohns – Knipovich Bend and its vicinity.