



Seismicity And Accretion Processes Along The Mid-Atlantic Ridge south of the Azores using data from the MARCHE Autonomous Hydrophone Array

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The seismicity of the South Atlantic Ocean has been recorded by the MARCHE network of 4 autonomous underwater hydrophones (AUH) moored within the SOFAR channel on the flanks of the Mid-Atlantic Ridge (MAR). The instruments were deployed south of the Azores Plateau between 32° and 39°N from July 2005 to August 2008. The low attenuation properties of the SOFAR channel for earthquake T-wave propagation result in a detection threshold reduction from a magnitude completeness level (Mc) of ~ 4.3 for MAR events recorded by the land-based seismic networks to $Mc=2.1$ using this hydrophone array. A spatio-temporal analysis has been performed among the 5600 events recorded inside the MARCHE array. Most events are distributed along the ridge between lat. 39°N on the Azores Platform and the Rainbow (36°N) segment.

In the hydrophone catalogue, acoustic magnitude (Source Level, SL) is used as a measure of earthquake size. The source level above which the data set is complete is $SL_c=205$ dB. We look for seismic swarms using the cluster software of the SEISAN package. The criterion used are a minimum SL of 210 to detect a possible mainshock, and a radius of 30 km and a time window of 40 days after this mainshock (Cevatoglu, 2010, Goslin et al., 2012). 7 swarms with more than 15 events are identified using this approach between 32° et 39°N of latitude. The maximum number of earthquake in a swarm is 57 events. This result differs from the study of Simao et al. (2010) as we processed a further year of data and selected sequences with fewer events. Looking at the distribution of the SL as a function of time after the mainshock, we discuss the possible mechanism of these earthquakes : tectonic events with a "mainshock-aftershock" distribution fitting a modified Omori law or volcanic events showing more constant SL values. We also present the geophysical setting of these 7 swarms, using gravity, bathymetry, and available local geological data. This study illustrates the potential of hydrophone data to monitor segment-scale ridges processes in the vicinity of the Lucky Strike seafloor observatory (lat. 37°20'N), the Azores node of the EMSO (European Multidisciplinary Subsea Observatory) system.

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