

Seismicity of deep low-frequency and shallow induced earthquakes near the Moriyoshi-zan volcano in the Akita prefecture

MASUKAWA, Kazuma^{1*}, KOSUGA, Masahiro¹

¹Graduate School of Sci. & Tech., Hirosaki Univ.

Deep low-frequency earthquakes occur mainly around active volcanoes in northeastern Japan. These events are thought to be generated by geofluid such as magma or supercritical aqueous fluid, however, there is no direct evidence so far to support the idea. The great 2011 Off the Pacific coast of Tohoku (Tohoku-oki) Earthquake caused triggered seismicity in many areas apart from the source area. The investigation of relation between the induced shallow crustal earthquakes and deep low-frequency earthquakes may be helpful to examine the effect of geofluid. To do this, we plot spatiotemporal distribution of both the shallow ordinary events and deep low-frequency earthquakes for the source areas of low-frequency earthquakes. We found that the activity of low-frequency events in some areas changed after the Tohoku-oki earthquake. For example, the activity has decreased in a shallower source area beneath Iwate volcano. Anomalous induced seismicity was found in an area to the north of Moriyoshi-zan volcano in the Akita prefecture. The earthquakes form an unusual vertical column with a height of about 5 km. In addition, a reflected phase is commonly observed for the events in the column-like cluster. This area is also one of the source areas of deep low-frequency earthquakes. Before the Tohoku earthquake, the low-frequency earthquakes have been occurring intermittently at a depth range of 25-40 km. After the Tohoku-oki earthquake, the range became shallower to 25-30 km, which suggests the migration of geofluid and resultant increase in seismicity started two months after the Tohoku-oki earthquake.

Keywords: deep low-frequency earthquake, geofluid, Moriyoshi-zan volcano