

Abstract

The world's largest earthquakes, the most destructive tsunamis and the most explosive volcanism are generated at subduction zones at convergent plate margins. Despite of high societal and economic importance of these areas, there are still some poorly understood processes, such as the process of magma generation and ascent to the Earth surface. This thesis contributes to the solution of the problem of location of source areas of calc-alkaline magma and its migration. It consists of two parts: in the first one, the phenomenon of volcanism at convergent plate margins and seismological background are described, while the second part explores structures in the lithosphere beneath volcanoes in the broader region of the Banda Arc (Indonesia). For the purposes of the research, the ISC hypocentral determinations based on data from the global seismic network, relocated by a procedure of Engdahl et al. and collected in the so called EHB database were used. The analyses of spatial, time and magnitude dependencies in the dataset of earthquakes occurring within the Banda Arc area enabled us to formulate several conclusions: The occurrences of strong teleseismically recorded earthquakes in the lithospheric wedge beneath volcanoes suggests that the respective rock medium is not partially melted. Moreover, the occurrence of earthquake swarms most probably reflects the existence of highly fractured brittle medium. Therefore, the source of magma seems to be situated below the deepest events of these sequences, which is, in many cases, within the subducting slab. In case of the Colo volcano the correlation between the volcanic activity and earthquake sequence was observed. The beginning of seismic sequence shortly preceded the volcanic explosion, which corresponds to the idea of triggering of seismicity by magma ascent and intrusions. Earthquake sequences were found also beneath the submarine Manipa Basin where no historical record of volcanic activity is available. In the context of sea floor morphology and geodynamic position of the Manipa Basin relative to the Wadati-Benioff zone of the Seram subduction, we consider that the basin represents a wide, recently volcanically active submarine caldera structure with a distinct volcanic cone in its center.