

Seismic activity in the Hida region and linear trend of earthquake distribution, central Honshu, Japan

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The observation network of earthquakes in the Hida region has been well improved in recent years, in particular in the mountainous region. Hypocenters of microearthquakes determined by the network data at the Kamitakara Observatory, Kyoto University shows some swarm activities in the northern part of the Hida mountain range from November, 2001 to January, 2002. The maximum magnitudes of the swarms are in the range of 1.8-2.8. Such small activities were not detected three years ago. The activities are low after February, 2002, so they are changing from time to time. The activities seem to occur around the volcano Mt. Tateyama, but not just beneath the crater. The activities are so small that the usual trigger system fails to get most of the events. The hypocenters were obtained by manual triggering of the events. Monitoring and analyses of such kind of activity are useful to study the seismic activity near volcanoes in the Hida Mountains and active tectonics.

The improved network of the Hida area shows some clear linear trends of earthquake distribution. In particular, clear trends are seen in the epicenter distribution in recent years. In the northern Hida region, there is an apparent trend of earthquake distribution in northeast-southwest direction, which corresponds to the Atotsugawa fault system. In this area clear linear trends are separated along the three faults of the Atotsugawa fault system. The depth distribution shows that seismicity continues vertically to the base of the seismogenic layer. Another linear earthquake distribution, about 40km long, and parallel to the Atotsuwawa fault lies about 50km southeast of the Atotsugawa fault. Seismic activity is high in the southwest of the linear trend of earthquakes, but relatively low in the northeast part of the distribution. Depth distribution of earthquakes is quite similar to that of the Atotsugawa fault. In the southwestern part of the distribution, focal depths are 10-15km, while they decrease to be about 5km at the intersection of the Hida mountain range. This is closely related to the thermal structure in the upper crust. Temperature in the Hida mountains is high, as indicated by the existence of some volcanoes.

Focal mechanism solutions along the trend of earthquakes show strike-slip fault type with a maximum pressure axis of west-northwest direction. The type of the mechanism is consistent with the global stress field in the area.

At the intersection of the Atotsugawa fault with the Hida mountain range, near southern flank of the volcano, Mt. Tateyama, the north-south trend of the mountain range seems to be shifted consistent with the right-lateral fault motion. Similarly, at the intersection of the linear trend of seismicity with the Hida mountain range, in the south of volcano Mt. Yakedake, the trend of the mountain range is shifted as the linear trend of the seismicity moves like a right-lateral fault. In southwestern part of the linear trend, there are some active faults with the same trend of the earthquake distribution, but no active faults are found in the northeastern part. Therefore, it is not clear that the fault can generate one large earthquake. Some other surveys including exploration study are needed to make clear the characteristics of the linear trend of seismicity.