Implications of the remarkable decrease of the intermediate-depth seismicity beneath the Volcanic Front

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We found that density of earthquakes in the upper seismic plane in the Pacific slab subducted under Japan decreases remarkably beneath the Volcanic Front and on its deeper side. The decrease in the seismicity is so sharp that we can easily mark the point where the seismicity begins to decrease for each slit zone taken in the east-west direction or perpendicular to the Volcanic Front. A line connecting the points delineates eastern boundary of the distribution of active volcanoes.

It should be mentioned here that the feature, however, is somewhat different in the Kanto region. Although the seismicity in the upper seismic plane in the Kanto region begins to decrease sharply at a certain depth as well, that point is not just beneath the Volcanic Front, but is clearly deviated to the east or to the shallower side. A notable feature is that the depth where upper seismicity decreases is not much different from region to region. This is true even in the Kanto region, and the depth is about 100km. This fact means that the cause of the discrepancy between the site where upper seismicity begins to decrease and the Volcanic Front in the Kanto region can be attributed to the displacement of the Volcanic Front to the deeper side of the seismic plane. We think this displacement is produced by the subduction of the Philippine Sea plate above the Pacific plate in the Kanto region.

Another interesting fact is that the seismic activity in the upper plane shows high b-value beneath the Volcanic Front or near the site where the seismicty begins to decrease. We consider that the above features of the seismicity in the upper plane, i.e., conspicuous decrease of the density of earthquakes and high b-value at about the depth of 100km, indicate that physicochemical processes that may be causally related to magma genesis are progressing there.