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3-D display of subducting plates and earthquakes - Subducting two oceanic plates and unique seismicity beneath Kanto

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Recent dense seismic network data have contributed to deepen our understanding of 3-D inhomogeneous structure within the earth and of seismic activity occurring there. For example, investigations based on seismic tomography, hypocenter determinations and focal mechanism analyses have revealed precise configurations of the Pacific (PAC) and Philippine Sea (PHS) plates subducting beneath the Tokyo metropolitan area. Estimated geometry shows a broad contact area between the two plates located directly beneath the Kanto plain. The overlap with the PHS plate subducting above it hinders the PAC plate from being heated by the hot mantle wedge. Moreover, the fore-arc portion of the PHS plate, before its subduction beneath Kanto, had been cooled by the subduction of the PAC plate from the Izu-Bonin trench. These tectonic settings cause lower-temperature conditions within the two oceanic plates and the upper continental plates beneath the Tokyo metropolitan area. As a result, depth limits of seismic activities within the plates and along their boundaries are anomalously deep. Seismic tomography studies show that the eastern-most portion of the PHS slab mantle is serpentinized. The PHS slab may have been torn into two along the western boundary of this serpentinized mantle, with the eastern portion being left behind relative to the subduction of the western portion. This is accompanied by generation of large intraslab earthquakes along the boundary.

3-D display of obtained results, such as detailed configuration of subducting plates, seismic velocity structure and their relations to earthquake activity, is essential to be properly understood by other people or even for ourselves to more deeply understand. It also helps to spread scientific knowledge. Based on this idea, we are trying to develop a method of 3-D display of those images. Here we tried to visualize a three dimensional subducting plates and earthquake hypocenters by using one of the 3-D visualization softwares (Voxler 2; Golden Software), which we will report in this presentation.

Keywords: 3-D display, plate subduction, seismic activity, Tokyo metropolitan area