The importance of unified understanding of crustal deformation in plate convergence zones

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It is said that breakthroughs often comes from interdisciplinary studies. If so, the collaboration among seismology, geodesy, topography and geology must be meaningful. In this paper, adding a historical viewpoint of earth science, we would like to consider the meaning of the collaboration a little more. This nearly equals to consider the meaning of holding the special session of 'unified understanding of the crustal deformation of plate convergence zones' in this meeting.

In 1912 Alfred Wegener proposed the continental drift theory, which is a origin of plate tectonics. In order to enhance the plausibility of the continental drift theory, he extensively gathered various information from every related scientific field, such as geodesy, geophysics, geology, paleontology, paleo-climatology, and so on. Since he could not show the reasonable driving force of continental drift, the theory was abandoned after his death. However, it dramatically revived in late 1960s as plate tectonics. Here, the development of paleomagnetism, which provided large amount of quantitative data, contributed to the establishment of the plate tectonics. Plate tectonics gives a common framework for geology, geography and geophysics, although the origins of them, particularly for geology and geophysics, were completely different.

In recent years, the development of space geodesy, such as GPS and InSAR, is very important. We could never imagine having geodetic data with such high accuracy, high density and high sampling rate. In this situation, one of the most important purpose of our collaboration must be to establish post plate tectonics. Plate tectonics is basically a tectonics for the oceanic lithosphere. In continental collision zones, such as in India and Eurasia collision zones, we see deformation with large variety in the size and rate, which cannot be well explained by plate tectonics. In order to clarify the rules of deformation that the continental lithosphere obeys, interdisciplinary collaboration must be very effective and indispensable.