

Crustal movement rates of Korean Peninsula before and after the 2011 Tohoku-Oki earthquake

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We investigated the crustal movement rates of Korean Peninsula before and after the 2011 Tohoku-Oki earthquake. According to the GPS analysis, the coseismic deformation by this earthquake on the Korean Peninsula was about 5 cm in eastern region and about 1 cm in western region with the average of about 3 cm. This amount of deformation is similar to the annual movement. Because the amount of crustal deformation in the eastern region is larger than that in the western region, the east-west extension may be occurred.

In order to investigate crustal deformation on the Korean Peninsula following the 2011 Tohoku-Oki earthquake, we compared the speed and direction of the crustal velocity vector depending on epicentral distance before and after the earthquake. Before the 2011 Tohoku-Oki earthquake, the directions of velocity vector in the eastern and western regions were similar, although the speed of velocity vector in the western region was larger than that in the eastern region. After the earthquake, the eastern region has been moving more eastward direction than the western region, so the difference in the direction of the eastern and western regions became further widened. On the other hand, as the speed of the western region slowed down and the speed of the eastern region increased, the difference in speed between the eastern and western region was reduced. These results continued to be shown from 2012 to 2016, and this motion has been maintained.

In conclusion, due to the 2011 Tohoku-Oki earthquake, the difference in the speed and direction of crustal velocities between the eastern and western region of Korean Peninsula was reduced and further widened, respectively. Our results suggest that recent crustal movement pattern of the Korean Peninsula is different from that before the megathrust earthquake and that crustal movement is stabilizing.

Keywords: 2011 Tohoku-Oki earthquake, crustal movement rates, GPS, speed, direction