

Relationship between the seismic moment release rate in the Nankai subduction zone and the 2011 Tohoku earthquake

*Yoko Kono¹

1. Yokohama Science Frontier High School

To investigate the impact of the 2011 Tohoku earthquake to the slip at the transition zone on the plate interface in the Nankai subduction zone, we have examined the temporal variation in the seismic moment release rate in the periods with no long-term slow slip events before and after the 2011 Tohoku earthquake for six areas, the northern, the central and the southern Kii, and the eastern, the central and the western Shikoku. We used the data of the seismic moment of slow slips estimated by the empirical relationship between the apparent moment of deep low-frequency tremors and short-term slow slips during April 2002–July 2013 [Daiku et al., 2018] and newly analyzed data during August 2013–February 2017. We estimated the seismic moment release rates before and after the 2011 Tohoku earthquake using the nonparametric bootstrap method for each area.

We recognize no significant variations in the seismic moment release rate before and after the 2011 Tohoku earthquake for the northern and the southern Kii and the eastern, the central and the western Shikoku areas. These variations are coincident with no significant coulomb stress change induced by the 2011 Tohoku earthquake in the Nankai subduction zone [Toda et al., 2013]. On the other hand, for the central Kii area, the seismic moment release rate decreases significantly after the earthquake. However, the decrease is also observed even before the earthquake. We, therefore, consider that the decrease is not likely to be affected by the 2011 Tohoku earthquake.

From the results mentioned above, we conclude that the 2011 Tohoku earthquake does not affect the seismic moment release rate at the transition zone in the Nankai subduction zone. However, there is a possibility that, in the central Kii areas, together with the southern Kii area before the 2011 Tohoku earthquake, a frictional condition at the transition zone might have varied gradually with time.

Keywords: Earthquake, Deep low-frequency tremors