

**Research report of ERI visit**  
(from 1 January 2019 to 30 August 2019)

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(hosted by Dr. Jun'ichi Fukuda)

This visit was initially planned in the fall of 2017 for a one-year long-term postdoc research, and the original proposal was to probe the continental-scale 3D viscosity structure with co- and post-seismic surface deformation data of the 2011 Tohoku-oki earthquake in northeast Japan. With some delay, I arrived at ERI in early 2019. After exchanging ideas and thoughtful discussions with Dr. Fukuda, we decided to shift our focus to southwest Japan and to study the effects of viscous mantle flow on interseismic deformation and continental faulting along the Nankai subduction zone. This new focus formed a research proposal and was supported latter by *JSPS Postdoctoral Fellowship* for overseas researchers (second recruitment of 2019 program). Therefore, the research of ERI visit is effectively “ongoing” in the form of our JSPS project and has definitely a prolonged impact on my academic career. Hereafter, I summarize what we have found so far in plain language.

We use numerical computer models to simulate the time evolution of surface motion from one large earthquake to the next large earthquake (so-called earthquake cycle) in Nankai. These models allow us to jointly use current and historic measurements, which are fragmented in space and/or time. By carefully comparing our model predictions with these real measurements, we find that the viscous flow in mantle driven by subduction fault locking is very important and can cause the variation of surface motion during the entire earthquake cycle over hundreds of years. So, measurements conducted in a few years may represent only a quick snapshot and cannot be simply averaged and considered as a steady state motion for a longer time of the subduction system. Our models also predict that the rate of surface motion in Nankai will continue to change in future till the occurrence of next earthquake and therefore have important implications for earthquake hazard assessment in southwest Japan and many other subduction zones. If the readers are interested in more about our work, please refer to our published paper in *Geophysical Research Letters* (DOI: 10.1029/2019GL085551).

By the chance of this report, I here would like to thank my host Dr. Fukuda for enjoyable and time-track-losing discussions on various earthquake-related topics, which had inspired us many new research ideas. It was a good time and onset to visit you. I also greatly thank Prof. Masataka Kinoshita and other committee members for understanding my personal situation and helping me to revise the time of my visit. This must cause many administrative and other inconveniences. Finally, I would like to give many thanks to the staff members in the International Office for providing me a warm hospitality and helping me and my family on all kinds of problems. I am deeply indebted to you.