

Slow events and giant earthquakes in friction experiments of polymer gels

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When a soft polymer gel is slid against a counterpart, unlike the cases for rock specimen, slip events of various sizes from microscopic to the sample size are often observed, and their statistics follow the Gutenberg-Richter scaling. Furthermore, complex slip dynamics accompanying fast and slow slip can be generated by controlling the rheology of the gel samples [1].

In this presentation, we report on our experimental studies on sliding friction between a plexiglass block and a silicone gel with different degrees of viscoelasticity. The system shows slow slip events in viscous gels and fast events for less viscous gels, and the size-duration relation follows M_0 to $T^{1/2}$ for viscous gels. We will also report more detailed analysis by applying the PIV (Particle Image Velocimetry) method to visualize the elementary rupture processes as well as development of the stress field towards a giant slip event.

Reference:

[1] T. Yamaguchi, M. Morishita, M. Doi, T. Hori, H. Sakaguchi, J.-P. Ampuero, JGR Solid Earth, 116, B12306 (2011).

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