Episodic slip in two degree-of-freedom block-spring model

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   We consider a simple two-block model, in which Block 1 and Block 2 are connected by a liner spring and driven by a slowly moving driver. The friction on each block is assumed to obey rate and state dependent frictional law. We assume the friction parameters so that Block 1 becomes unstable while Block 2 is stable.
   It is found that episodic slow slip occurs when the friction parameters of Block 2 are near the stability transition. After the stress is reduced due to dynamic event, both blocks stick during a period. When the stress is accumulated to a curtain level, Block 2 starts slow slip. When the slip of Block 2 is approaching a steady state slip, decaying oscillation in the stress and the slip velocity occurs around the steady state values. The decaying oscillation approaching a steady state could be a plausible generation mechanism of the episodic slip observed in Tokai area in 2002.
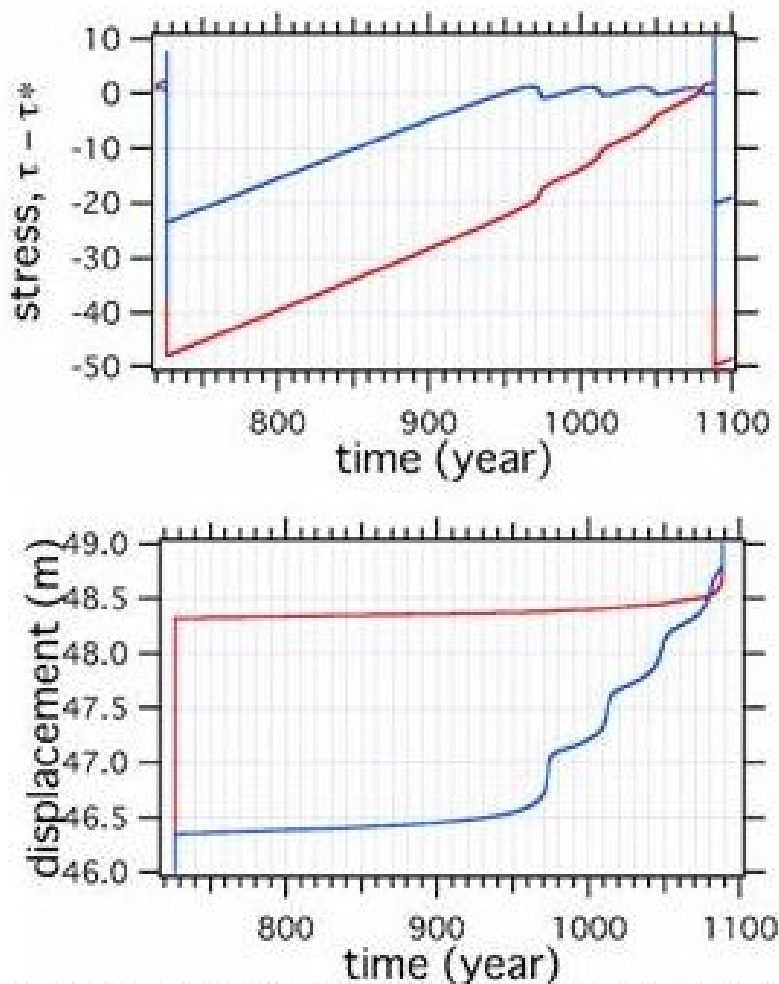

Fig.1. ふたつのブロックモデルにおける応力と変位の時間
変化. 赤線は不安定なブロック1, 青線は安定なブロック2.
ブロック2が間欠的すべりを起こす.