

Excitation of low-frequency wave from tensile-shear dislocation seismic source

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Excitation mechanism of low-frequency waves from a tensile-shear crack is investigated by using a simple spring-slider model. We suppose a source region where dikes and faults exist, which is so called Hill model: the long-axis of dike is parallel to the maximum stress direction and a fault is elongated from the tip of the dike with an angle of 45 degree. To examine the fault motion driven by a pressure in the dike, I present a simple spring-slider system. The system consists of plural blocks connecting each other with other through a spring. One side of the upper most block is connected with a piston filled with a compressible fluid. Each block is set on the surface being controlled by a slip weakening friction law. The fault motion is triggered by an increase of pressure inside the piston. As the pressure increases, the upper most block is forced to move, which also stress the downward blocks. When the stress from the piston reach a critical level, the upper most block start to rapidly move. As a result, the downward blocks are forced to slip. Such processes are repeated in the downward blocks, and the slip of blocks propagates.

The simulation results show that a rapid slip is observed when increase rate of pressure in piston is large and/or compressibility of the fluid is large. However, slow slip is observed when the increase rate of pressure is small and/or the compressibility is small. Since slow slip generates a low frequency wave, such process is considered to be a candidate of the generation of low-frequency waves recognized in volcanic earthquakes and tremor.