



Role of the creeping segment in the synchronization of earthquake cycles on oceanic transform faults revealed by numerical simulations in the framework of rate-and-state friction

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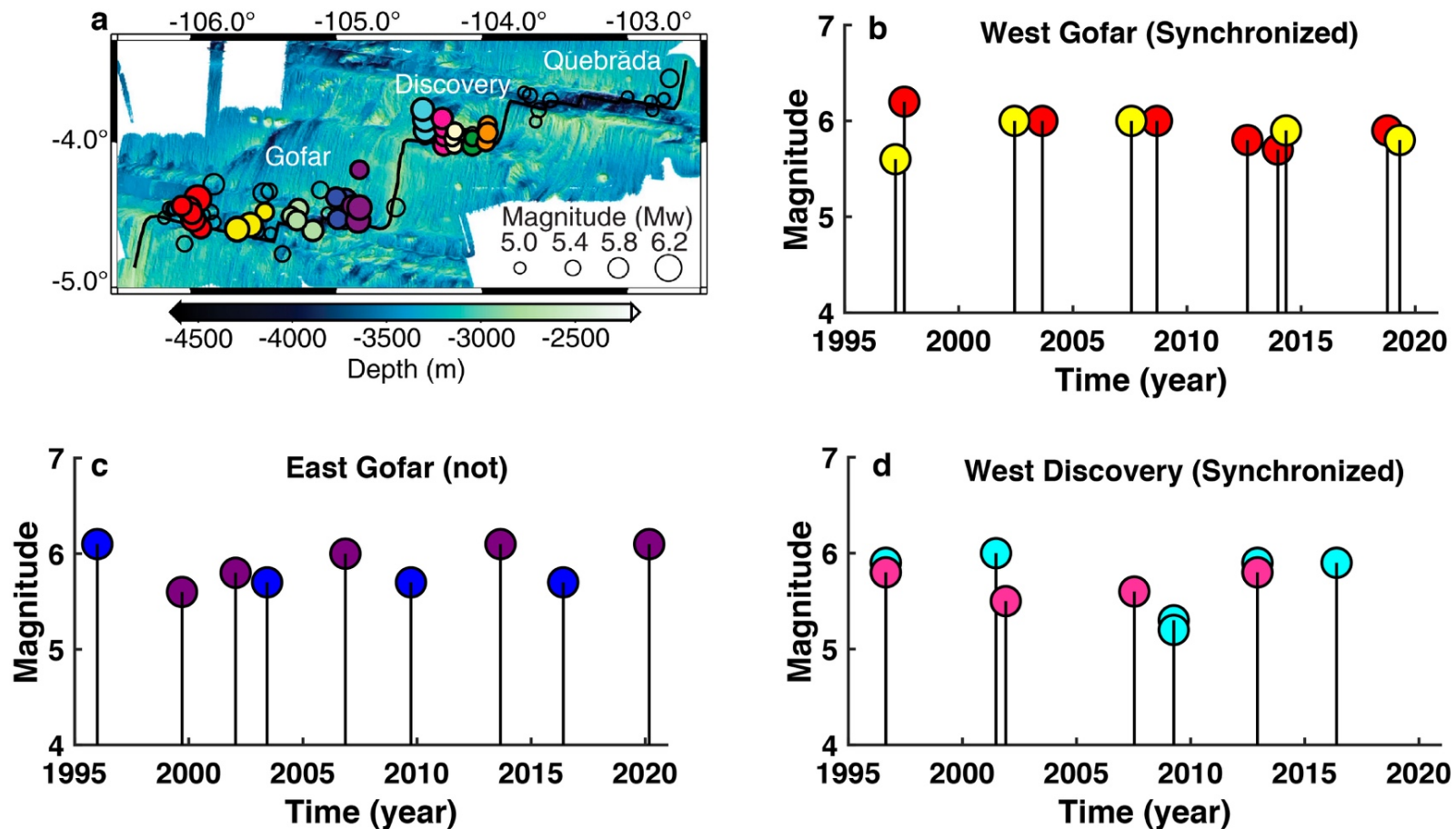
Key points



- We simulated earthquake cycles of the Gofar oceanic transform fault with a model consisting of two seismic patches separated by a barrier patch in the framework of rate/state friction.
- Static stress transfer can lead to earthquake synchronization, opposite to what has been suggested before.
- The width of the barrier patch is more important than friction and stress condition of the barrier.
- Surprisingly, complex state exists for cases with certain parameters, resulting from partial rupture due to stress interaction.
- The effect of D_c is strange, creating surprisingly unrelated cases.

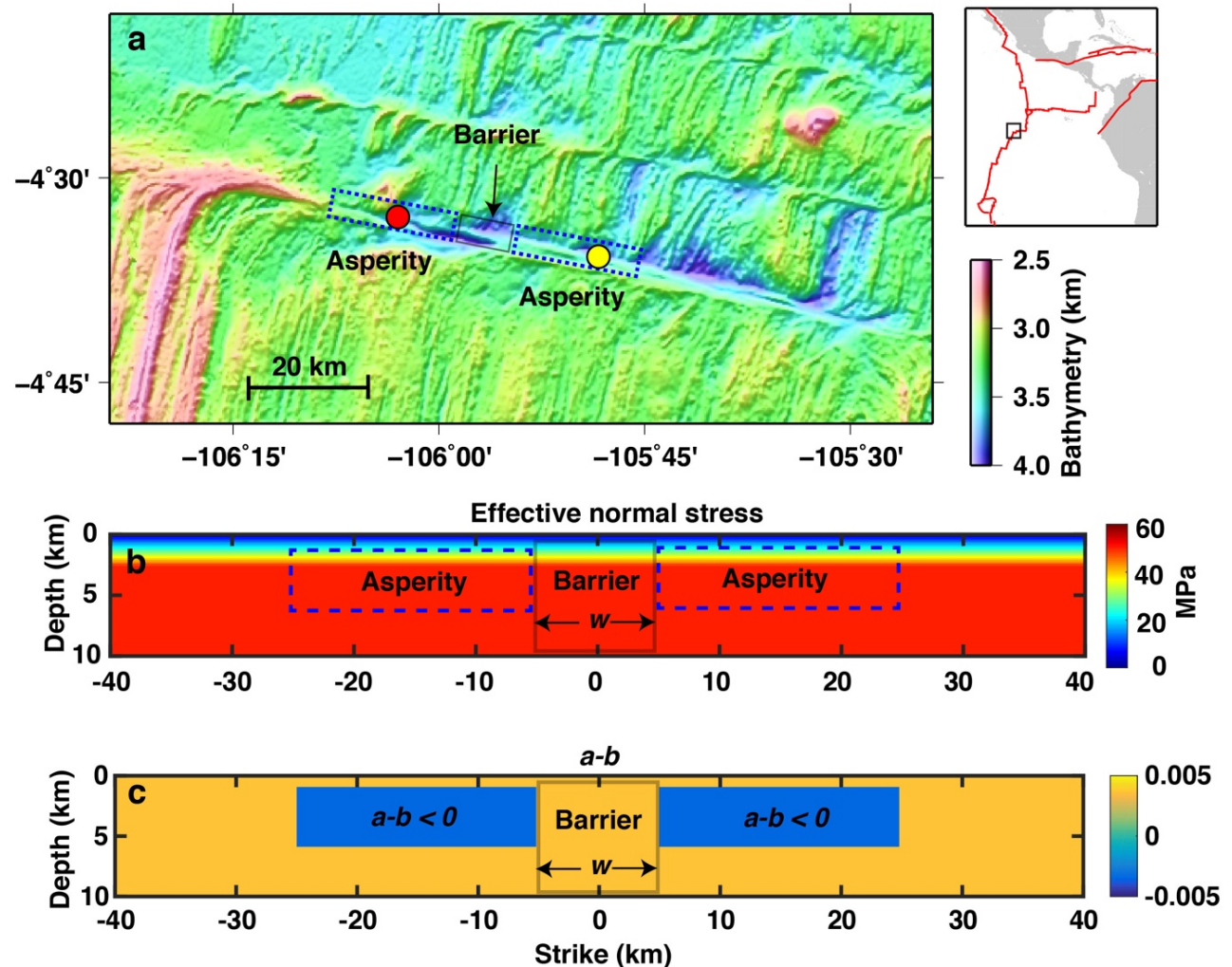
Motivation

To explain the well-observed synchronization (or not) of earthquakes on adjacent seismic segments on oceanic transform faults.



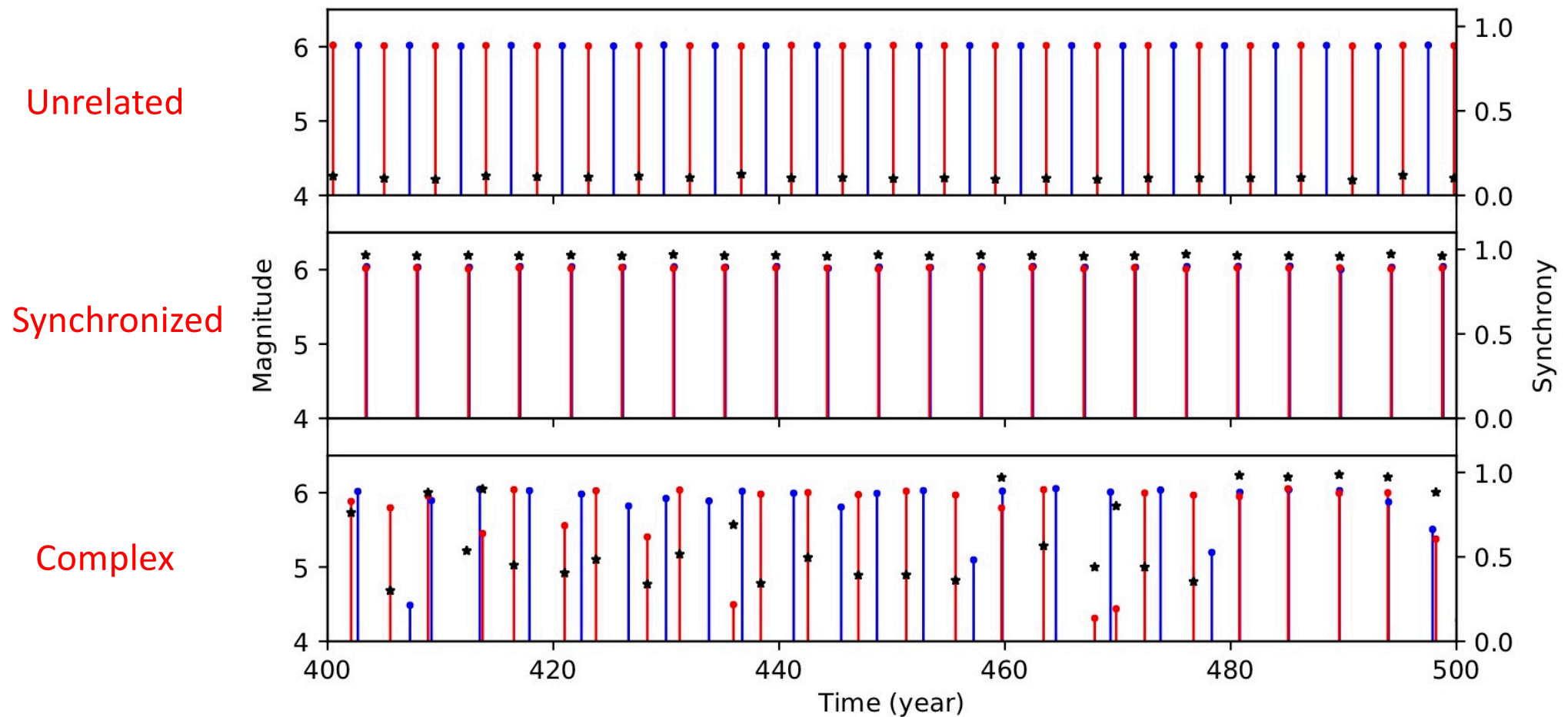
Model setup

- Two seismic patches separated by a barrier patch.
- We varied the key parameters of the barrier patch to investigate its role.
- Boundary Integral Method
- Linear Elasticity
- Isotropic & homogeneous
- Rate-and-State frictional law (lab-derived)
- Quasi-dynamic

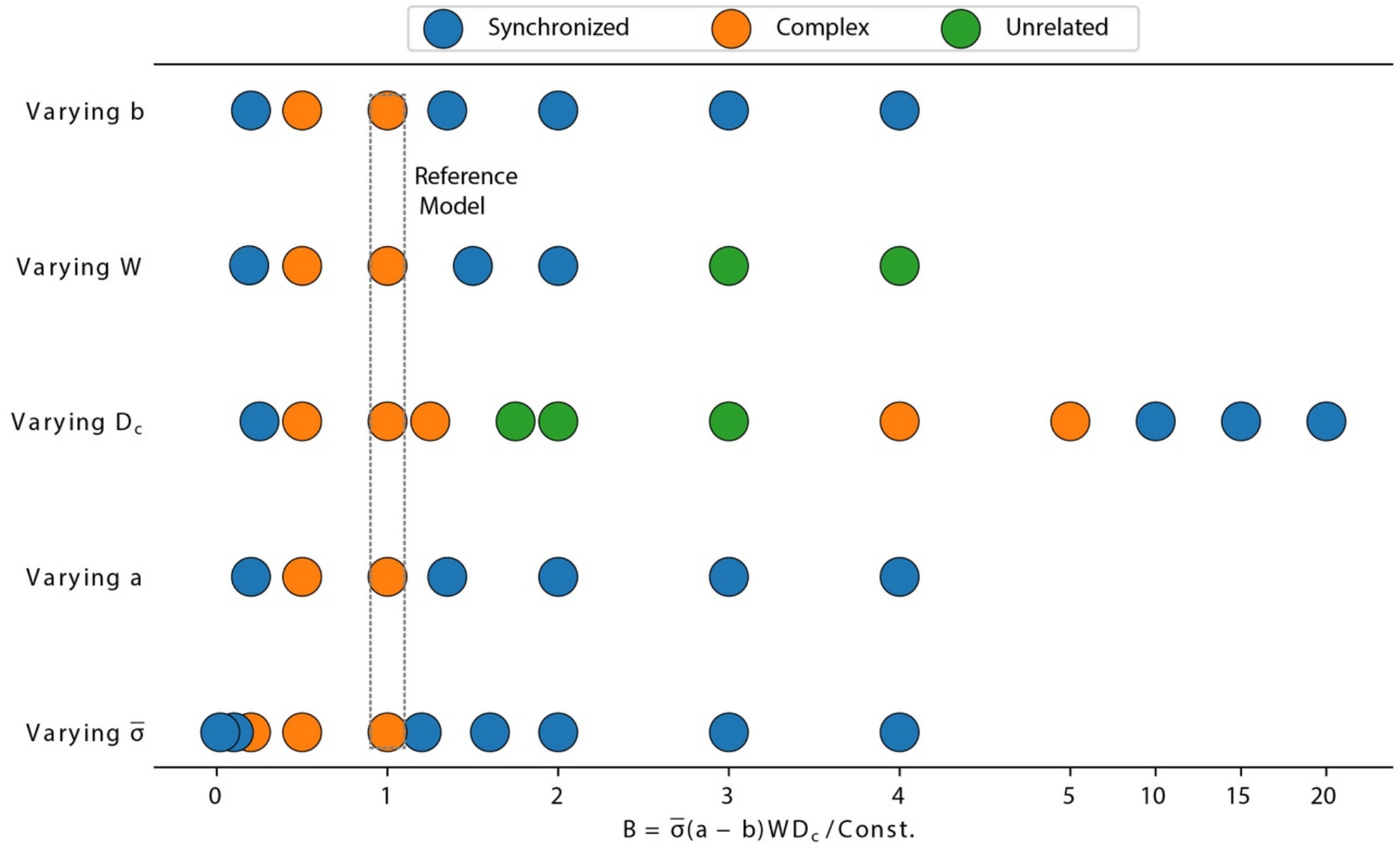


Results

- Red and blue stems indicate earthquakes on the left and right patch, respectively.
- Black stars indicate the synchrony state: 1 means perfect synchronization, 0 means no.
- Simulated earthquake sequence can be grouped into **three groups**. Below are example results from three separate simulations with different parameters of the barrier.

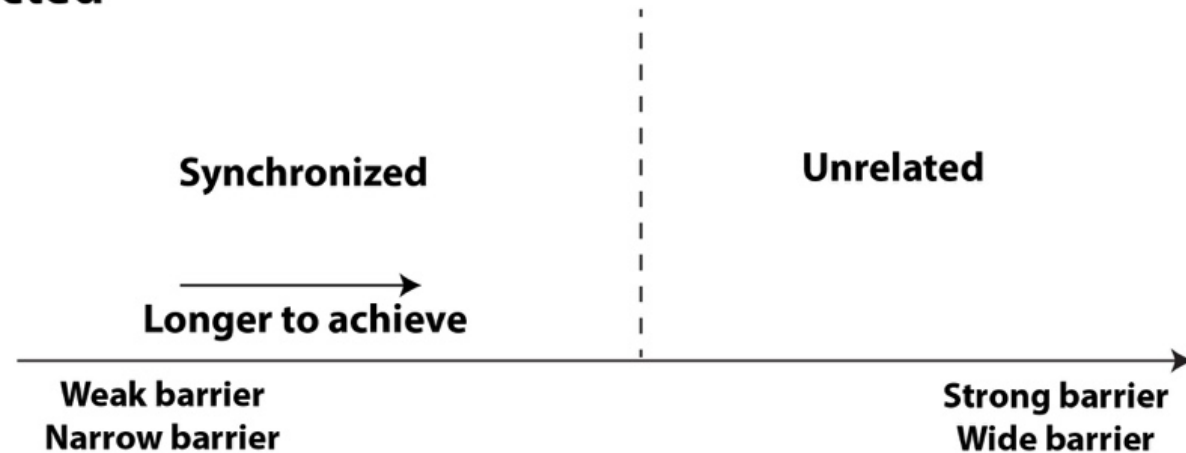


Results



Results

Expected



Observed

