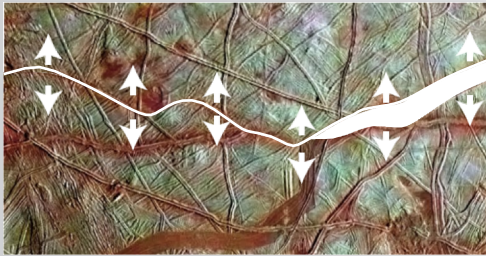


# Europa's extensional bands may expose ocean material

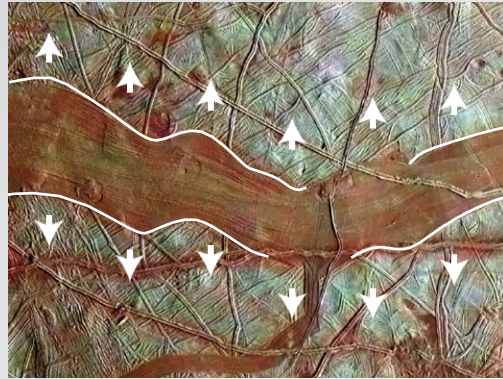
S. M. Howell & R. T. Pappalardo (2018)  
doi:10.1029/2018GL077594

*Geophysical Research Letters*,  
→

## Smooth band opening on Europa



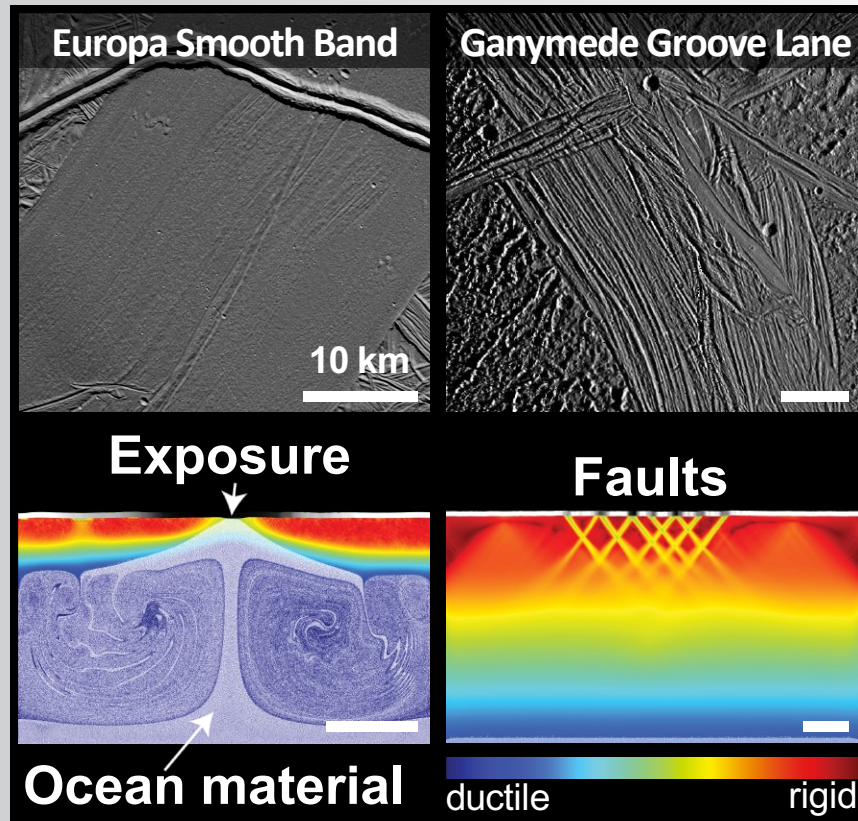
Initial (Reconstructed)



Final (Observed)

- On Europa and Ganymede, extensional bands form where the cold, brittle part of the ice shell pulls away, exposing the warm, ductile part.
- Many bands on Europa are smooth and knobby (hummocky), and many on both Europa and Ganymede are dominated by tectonic faults.

## End-member model predictions



- We use advanced computer simulations of ice stretching, flow, and faulting to understand what controls the character of bands and at which band types ocean material frozen into the shell might be exposed at the surface.
- We infer from model results that different band types form a spectrum of terrains governed by ice shell strength. Europa's smooth bands are formed in weak ice shells, and more tectonic bands form from the widespread rifting of strong ice at lower strains.
- Europa's smooth bands may expose ocean material at the surface that was frozen into the shell during the lifetime of that band. Tectonically dominated band types are unlikely to expose ocean material.