How flat subduction and the upper plate rheology control the deformation of the North China craton

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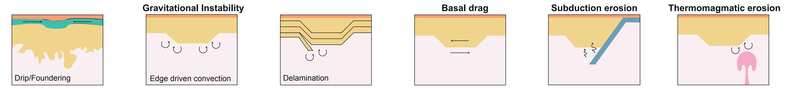
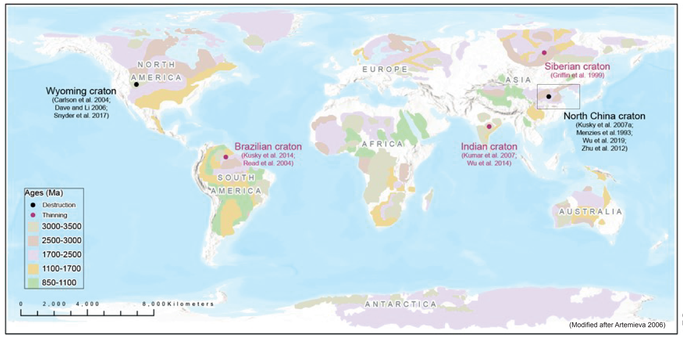
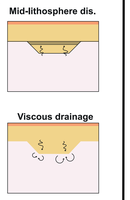
Introduction



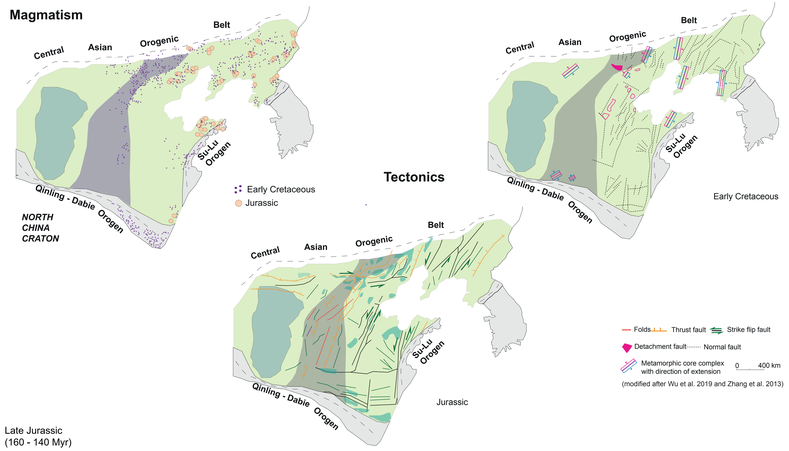


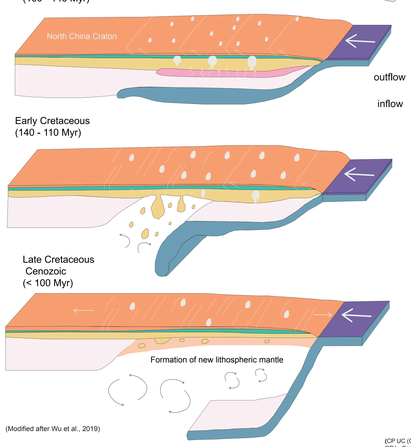


- Upper crust
- Lower crust
- Lithospheric mantle
- Thermal anomaly
- Asthenosphere
- Subducting slab
- MLD
- Lubricant layer

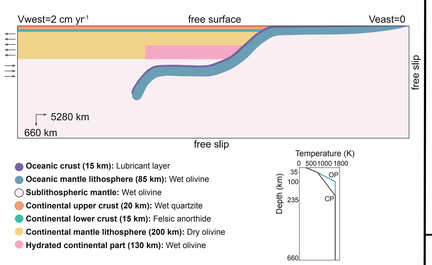
(Modified after Artemieva 2011; Lee et al. 2011; Wang and Kusky 2019)

Tectonics

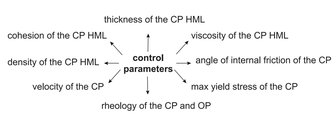




(Modified after Wu et al., 2019)

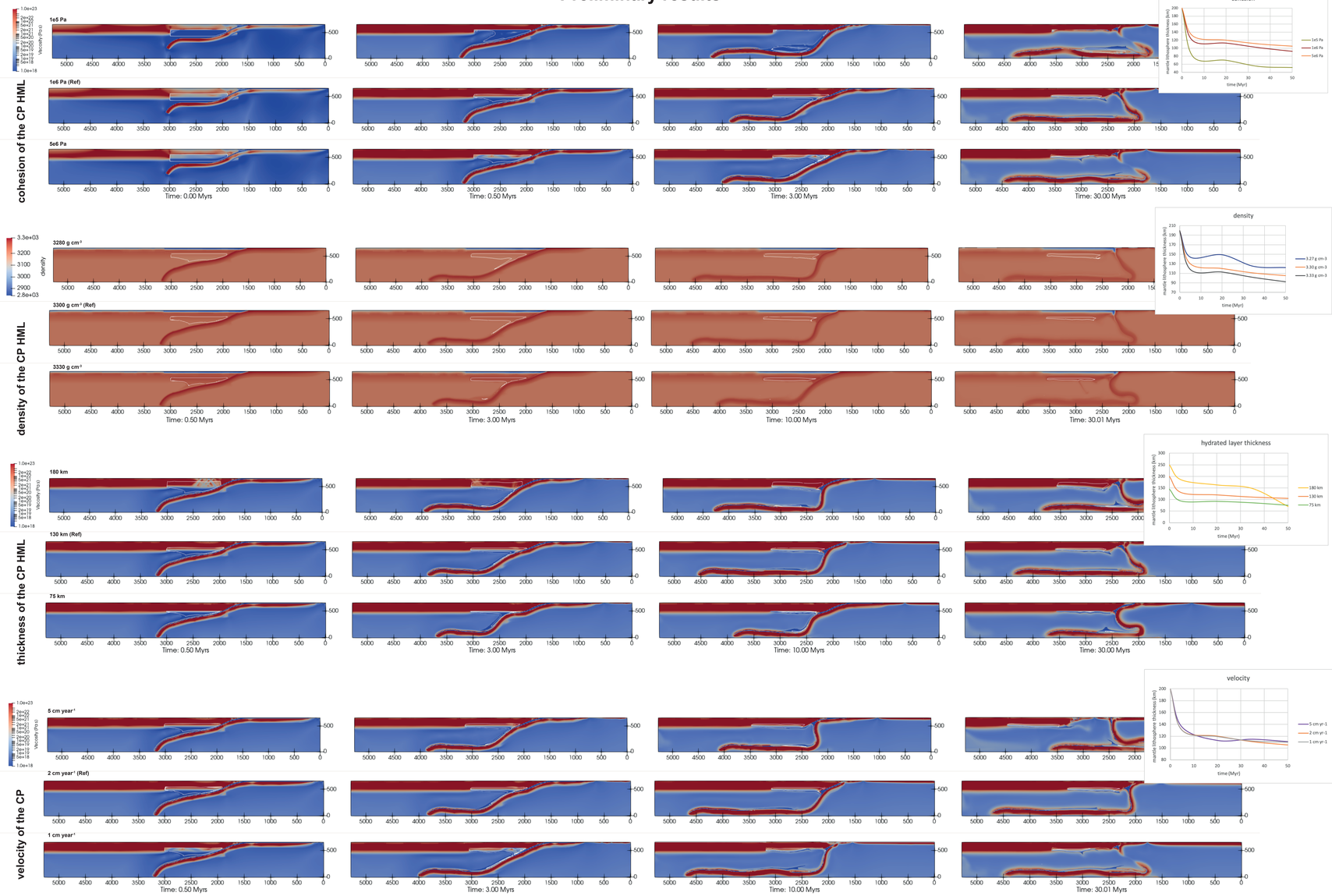


- **Oceanic crust (15 km):** Lubricant layer
- **Oceanic mantle lithosphere (85 km):** Wet olivine
- **Sublithospheric mantle:** Wet olivine
- **Continental upper crust (20 km):** Wet quartzite
- **Continental lower crust (15 km):** Felsic anorthide
- **Continental mantle lithosphere (200 km):** Dry olivine
- **Hydrated continental part (130 km):** Wet olivine



(CP UC (Gleason and Tulis, 1995), CP LC (Rutter and Brodie, 2004), OP L, CP ML, CP HML, M (Hirth and Kohlstedt, 2004), OP C: Oceanic plate crust, OP L: Oceanic plate lithosphere, CP: Continental plate, UC: Upper crust, LC: Lower crust, ML: Mantle lithosphere, CP HML: Hydrated mantle lithosphere, M: Mantle)

Preliminary results



Preliminary conclusions and what to do next?

✓ Flat slab with a hydrated cratonic layer is required for craton deformation.

✓ Cohesion and density of the hydrated cratonic layer has an important effect on cratonic deformation.

+ Parameterization of other control factors,
+ Reconciling geophysical data with model results,
+ Comparison with other deformed craton examples around the world.

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