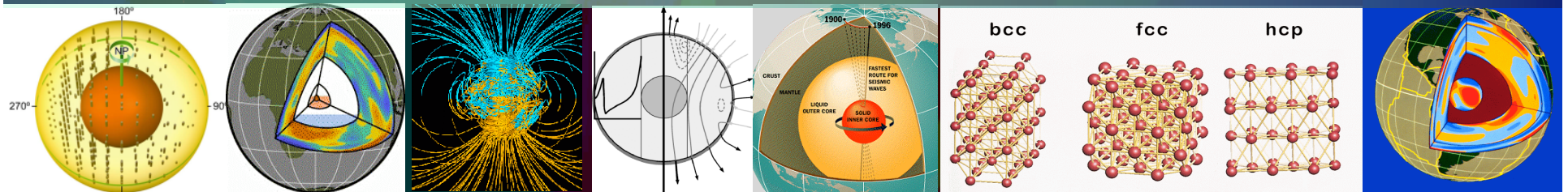
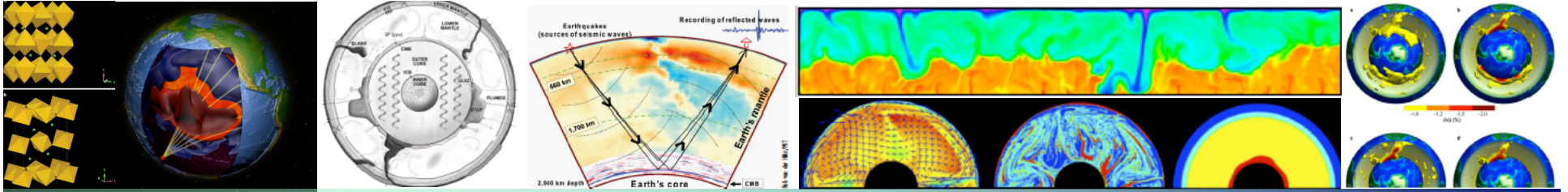


LRSPS Breakout Session: Lower mantle and core



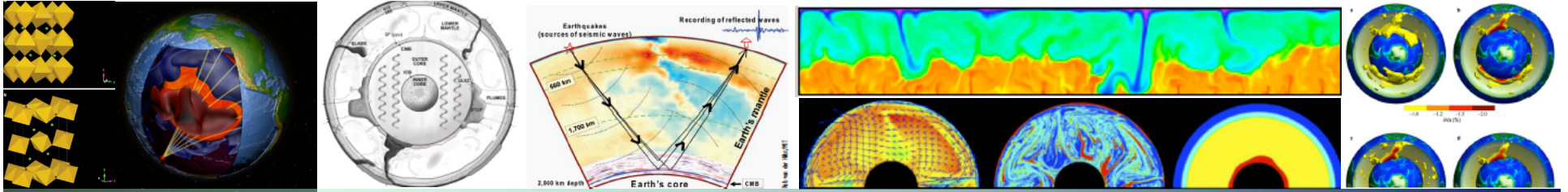


LRSPS Breakout Group Lower Mantle and Core TOPIC 1

Thermo-Chemical Evolution of the (Deep) Earth

Some observations

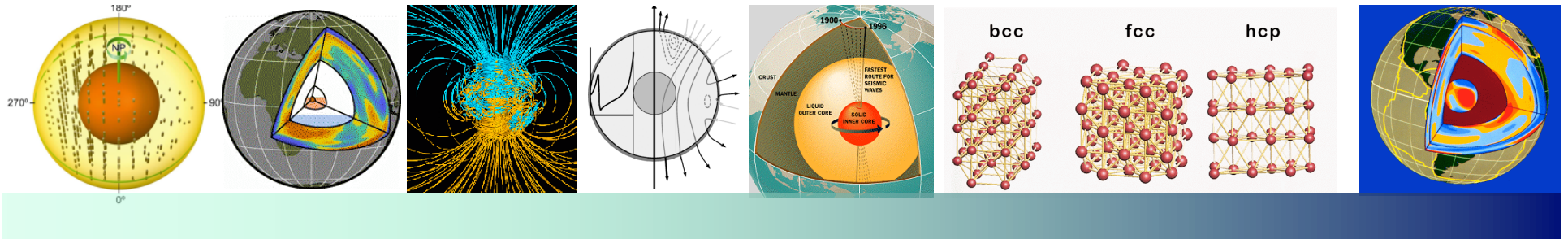
- *Large low shear velocity provinces (LLSVPs), dense*
- *Chemically distinct, "sharp" margins*
- *Shear and bulk sound velocity differ*
- *LLSVPs beneath Pacific, Africa, hotspots, not subduction*
- *Ultra-low velocity zones in places (melt?)*
- *D'' discontinuity: topography, connection to post-perovskite*
- *Discontinuity lateral variations → temperature*



LRSPS Breakout Group Lower Mantle and Core TOPIC 1

Thermo-Chemical Evolution of the (Deep) Earth

- *Emerging views of the deep mantle characterize a richness in thermal, chemical, and dynamical complexities across scale lengths, from planet-wide down to sub-kilometer, which are likely related to the evolution of the planet as a whole (including surface)*
- *Addressing the topics and questions below require close knit collaboration between seismologists studying long and short wavelengths, geochemists, geodynamicists, mineral physicists, and tectonicists, as well as advances in seismometer network and array deployments, and 3D tools.*

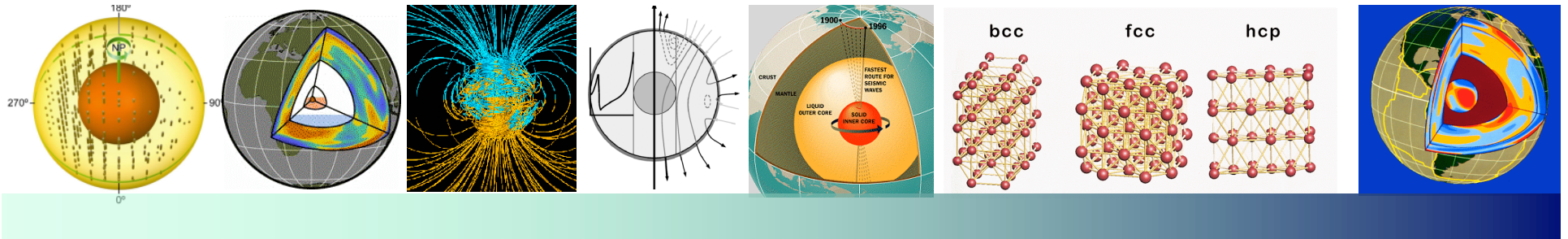


LRSPS Breakout Group Lower Mantle and Core TOPIC 2

A Planet Within a Planet: Earth's Mysterious Inner Core

Some observations

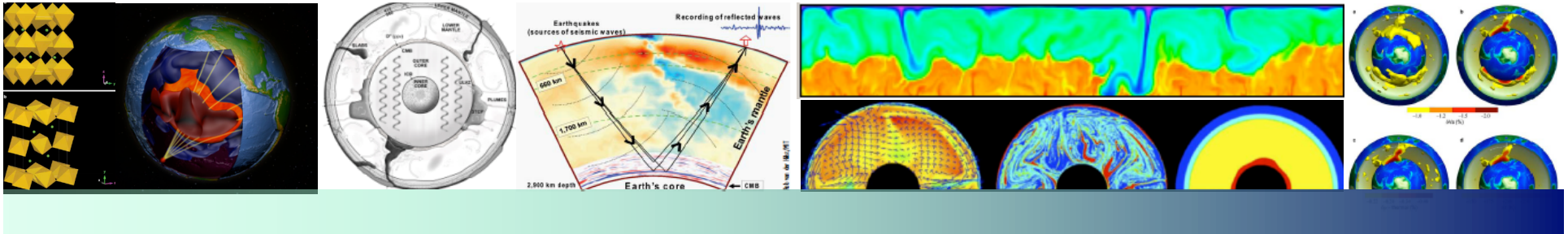
- The inner core may be as complex as the mantle
- Inner core super rotation
- Anisotropy
- Fine layering, including an “innermost inner core”
- Lateral variations in elastic structure
- Temporal evolution of inner core radius (growth)
- Variations in sharpness or fuzziness of ICB



LRSPS Breakout Group Lower Mantle and Core TOPIC 2

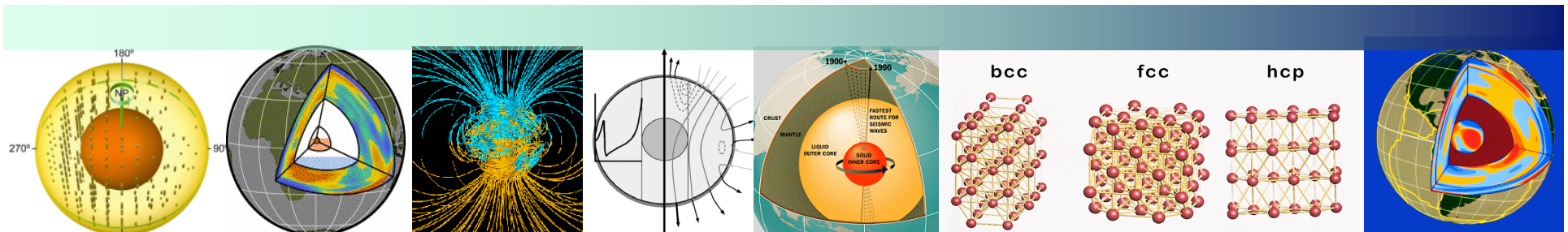
A Planet Within a Planet: Earth's Mysterious Inner Core

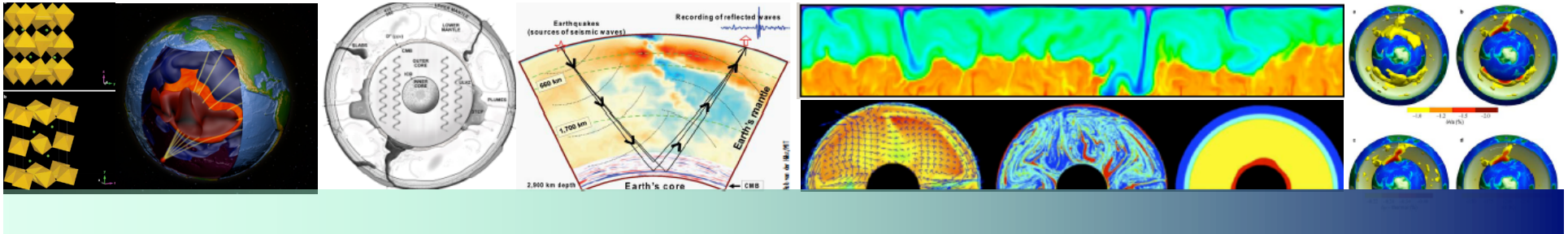
- *Floating in a sea of molten iron alloy, the inner core captivates our imagination and excitement as a planet within a planet.*
- *The inner core resides at the face of a multitude of disciplines which requires close knit collaboration between seismologists studying all scales with mineral physicists, geodynamo researchers, geochemists, geomagneticists, and rock physicists.*



Necessities / Enablers

- New data (seismic arrays in new places, OBS, more BBs)
- Maintain existing arrays, and make avail “protected” data
- 3D tools (modeling, predicting...)
- Multidisciplinary approach
- Whole mantle processes mindset, planetary perspective





Sidebar candidates

Future societal impacts of the deep planet

Large flood basal eruptions (climate, atmosphere, oceans)
 Magnetic field reversals (communication, health)

Beyond Earth

Planetary perspective
 Terrestrial seismological community: inform NASA
 Seismometers deployments on Moon, Mars, ...
 (noise tomog on inactive planets)

