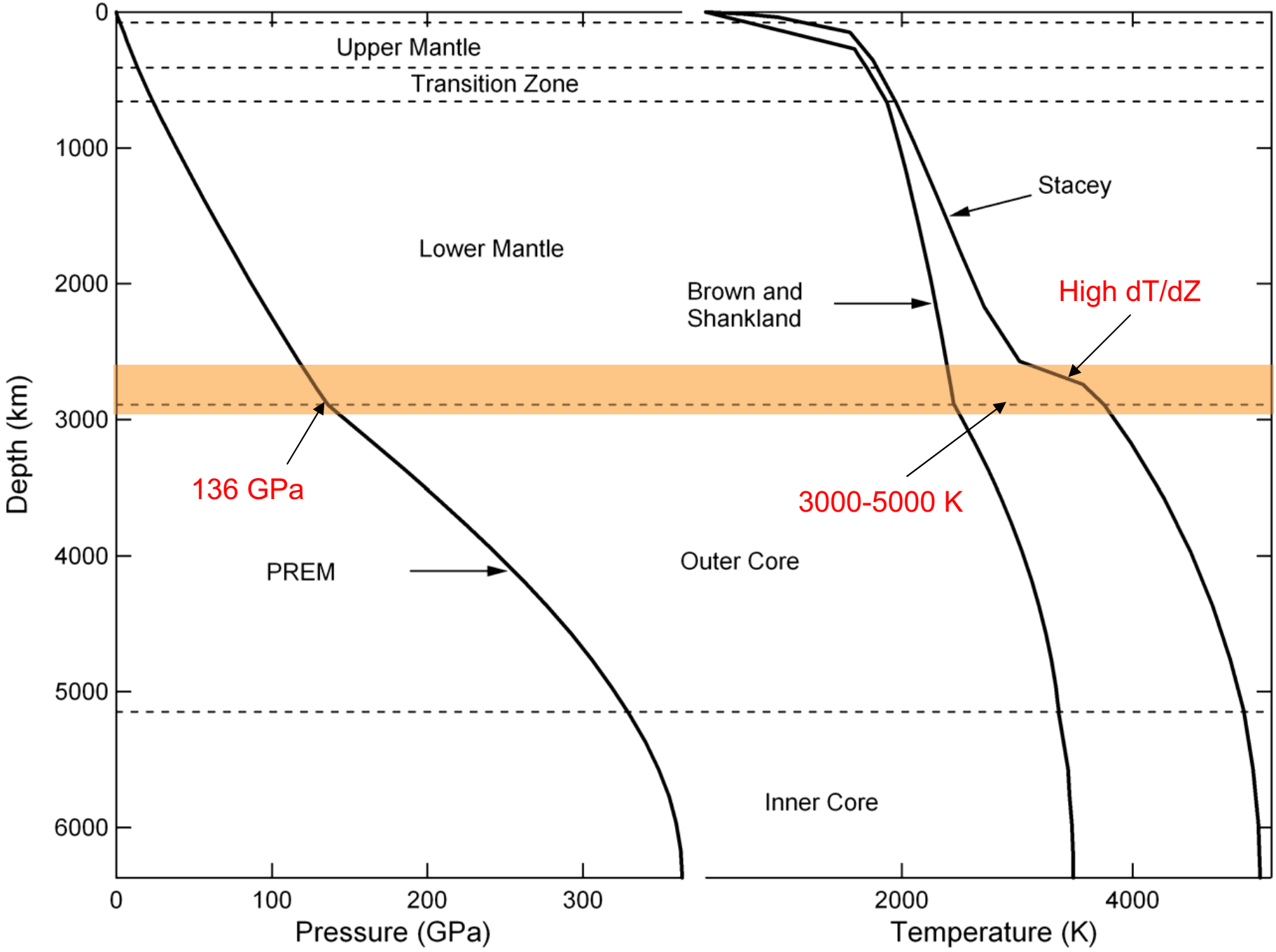
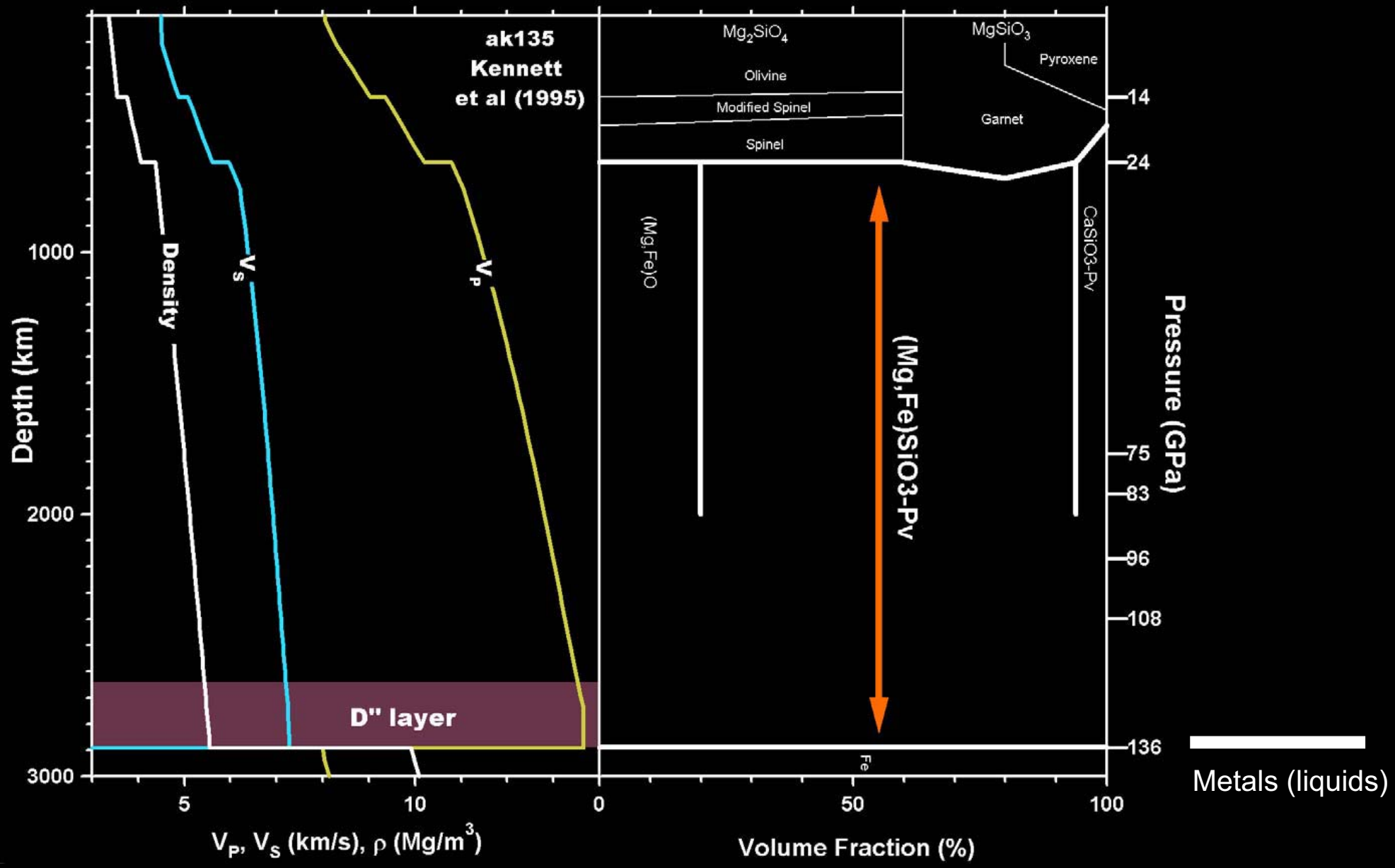
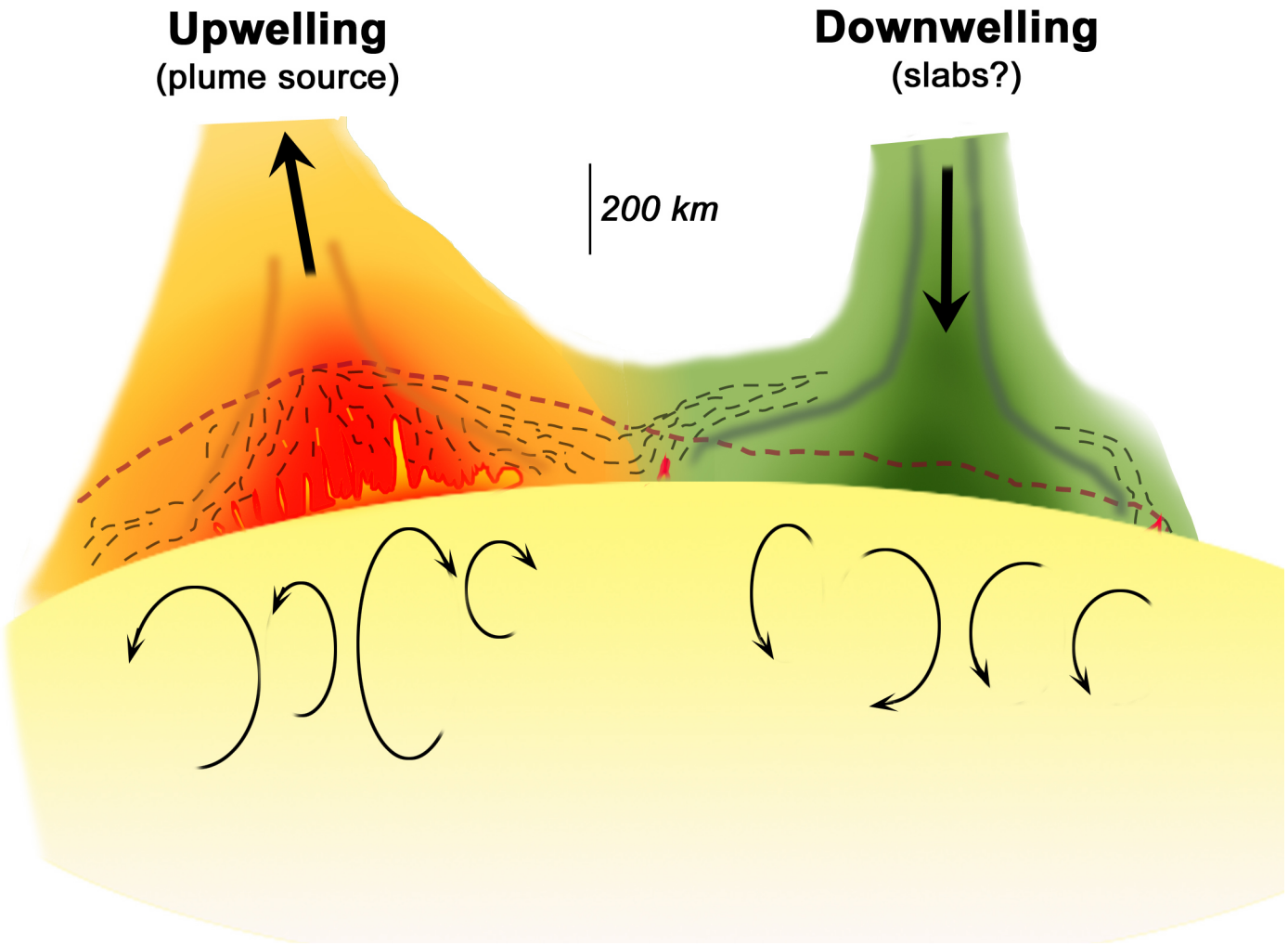
Pressure and Temperature at CMB



Materials at CMB



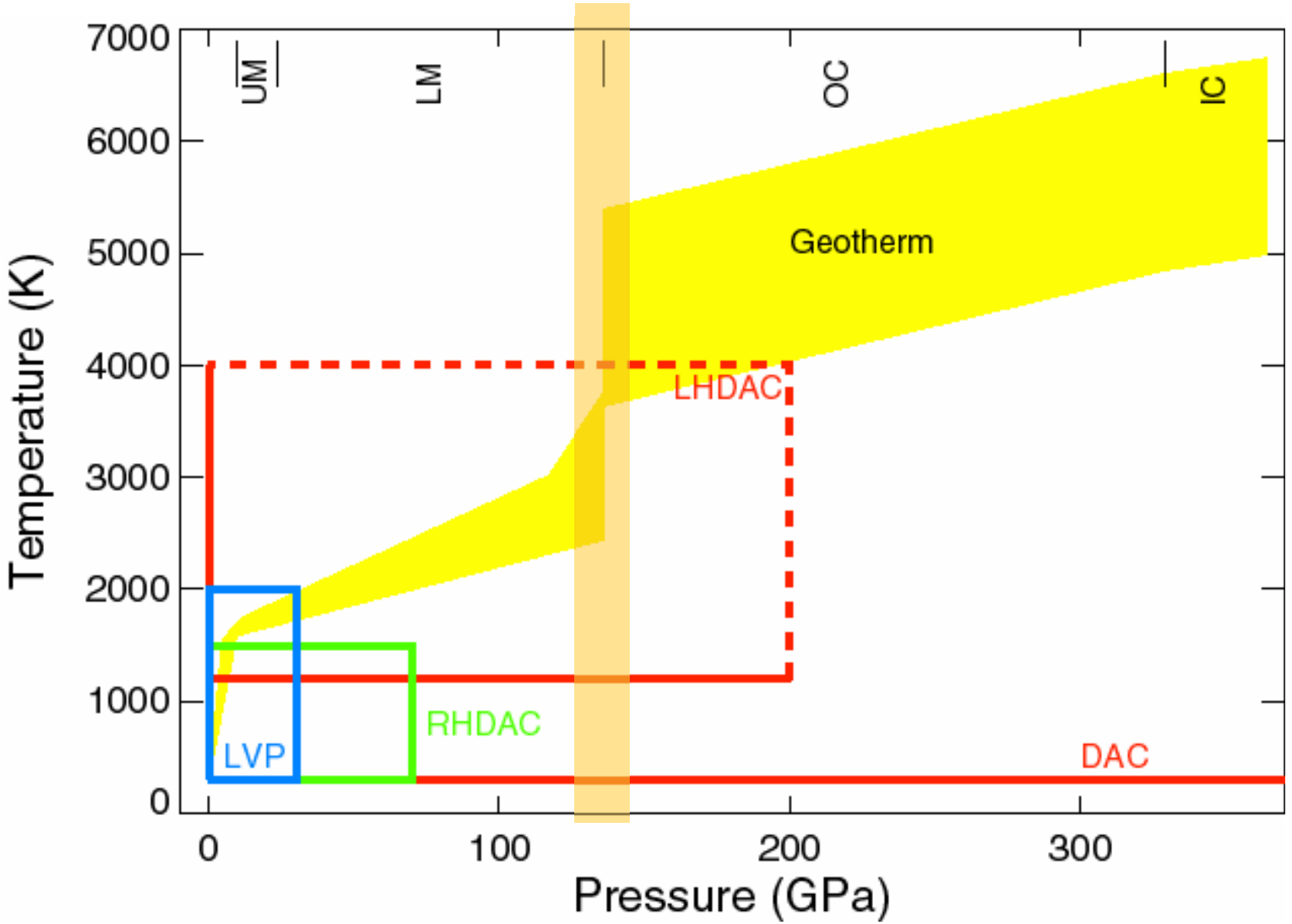
Strong Mantle Flow near CMB



Lay et al. (1998) Nature 392, 461

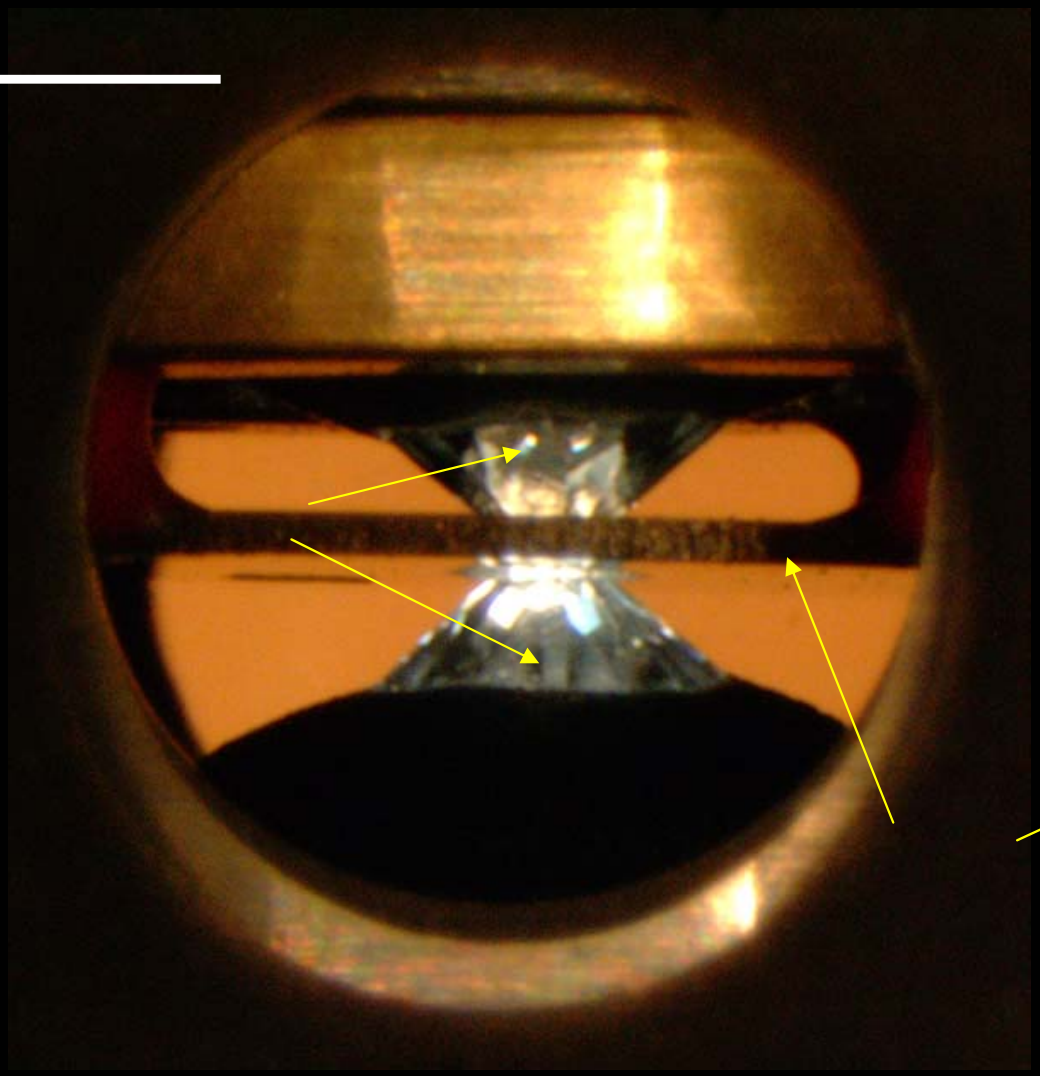
Differential Stress → Mineral Texture

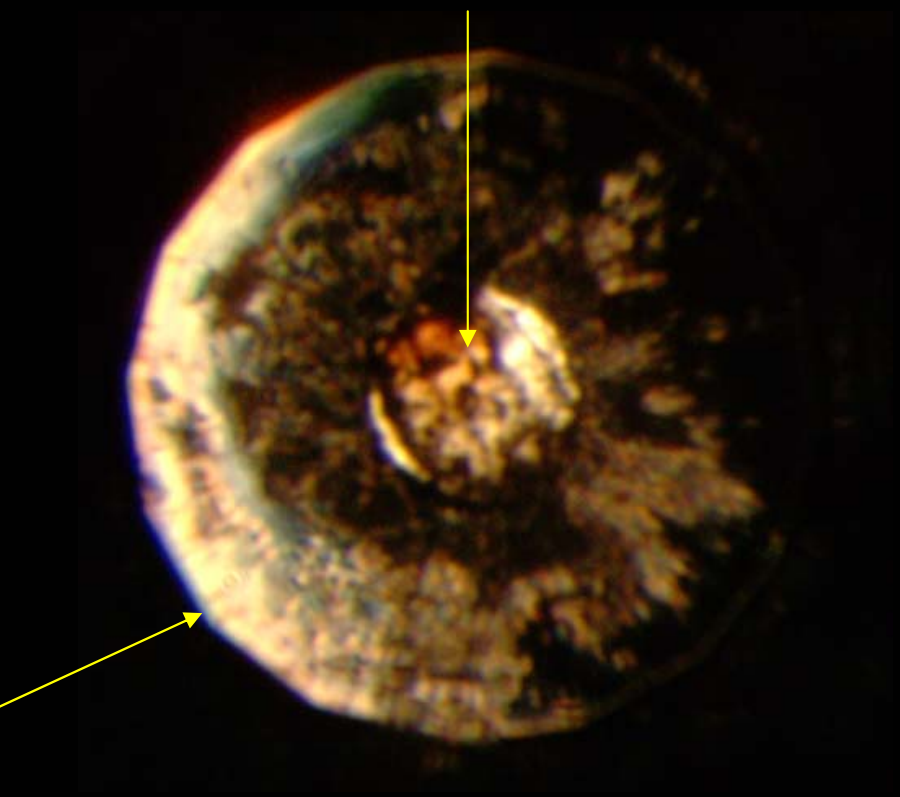
High P-T Techniques



LHDAC: Laser Heated Diamond Anvil Cell
LVP: Large Volume Press
RHDAC: Resistance Heated Diamond Anvil Cell

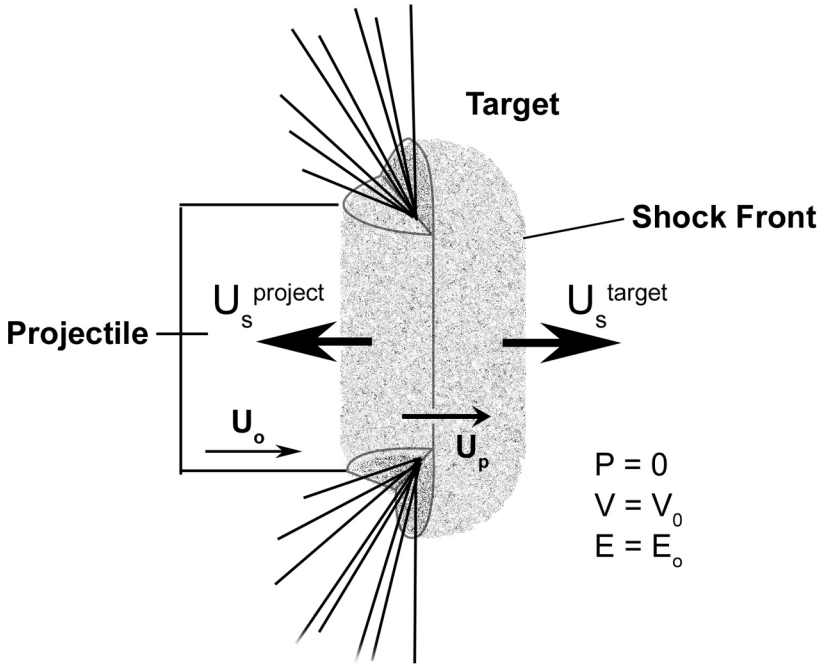
Pressure - Diamond Anvil Cells





Sample size	Pressure generated by 10^3 N
1 mm^2	1 GPa
10^{-2} mm^2	100 GPa

Shock Wave



P = 1 - 800 GPa

T > 6000 K

Direct measurements for density, pressure, and sound wave velocity.

Ambiguous temperature measurements

(cf) Laser shock

First Principles Calculations

- Schrodinger equation
- Many body problem – *N* interacting electrons
- Truncation problem – Space, Time
- Thermal effect – Static lattice (bonding) *E* vs Vibrational *E*

MIT Mineral Physics Lab