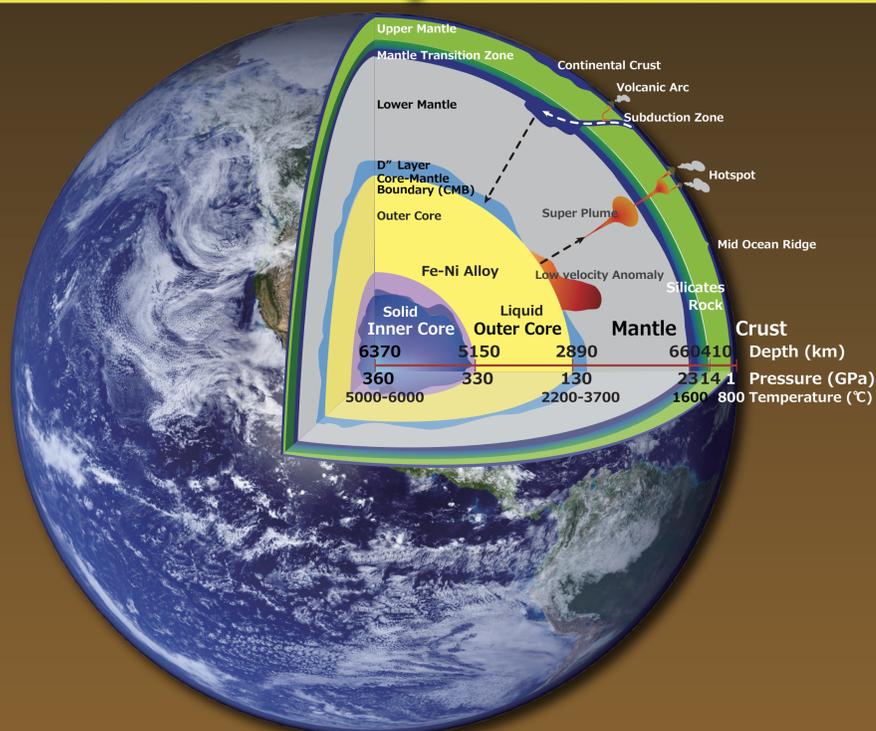


Earth's deep interior explored by high-pressure experiments

Extreme conditions of high pressure and temperature in the deep Earth



The radius of the Earth is about 6,400 km, but only 10 km depth is achieved by drillings so far. Truth is that the Earth's deep interior is an unreachable place where pressure and temperature reached at the center are estimated to be respectively 360 GPa and 5000 K or higher.

Two types of high-pressure apparatus: generating the conditions within the Earth



Multi-anvil apparatus

ORANGE-2000 and 3000. Precise experiments up to 40 GPa are possible.



Diamond-anvil apparatus

Pressures over 300 GPa at the Earth's center can be generated by pressing samples by a pair of diamonds.

Phase transitions of minerals

A "phase transition" is characterized by the change of configuration of atoms in mineral by the effect of pressure. Diamond is a high pressure form of graphite, whose phase transition occurs at 5 GPa (150 km depth). Measurements of the conditions where the phase transitions occur and changes of the physical properties of minerals (density, sound velocity, chemical properties etc) accompanying the phase transition bring fruitful information for understandings of the Earth's deep structure and materials.

Phase transition of a hydrous mineral FeOOH and water transportation into the deep Earth's mantle with subducting slabs.

