

## Mantle

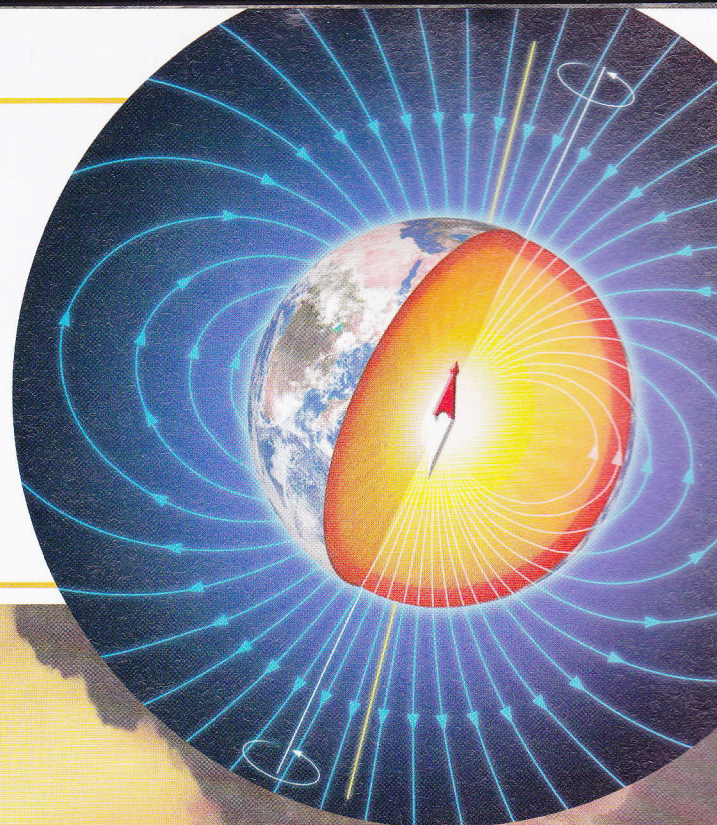
The largest internal layer, the mantle accounts for 84 per cent of Earth's volume. It consists of a rocky shell 2,900km (1,800mi) thick composed mainly of silicates. While predominantly solid, the mantle is highly viscous and hot material upwells occur throughout under the influence of convective circulation. The mantle was formed by the rising of lighter silicate elements during planetary differentiation.

## Inner core

The heaviest minerals and elements are located at the centre of the planet in a solid, iron-rich heart. The inner core has a radius of 1,220km (760mi) and has the same surface temperature as the Sun (around 5,430°C/9,800°F). The solid core was created due to the effects of gravity and high pressure during planetary accretion.

## Magnetic field in the making

Earth's geomagnetic field began to form as soon as the young planet developed an outer core. The outer core of Earth generates helical fluid motions within its electrically conducting molten iron due to current loops driven by convection. As a result, the moment that convection became possible in Earth's core it began to develop a geomagnetic field - which in turn was amplified by the planet's rapid spin rate. Combined, these enabled Earth's magnetic field to permeate its entire body as well as a small region of space surrounding it - the magnetosphere.



## Shock heating explained

During the accretion to its present size, Earth was subjected to a high level of stellar impacts by space rocks and other planetesimals too. Each of these collisions generated the effect of shock heating, a process in which the impactor and resultant shock wave transferred a great deal of energy into the forming planet. For meteorite-sized bodies, the vast majority of this energy was transferred across the planet's

surface or radiated back off into space, however in the case of much larger planetesimals, their size and mass allowed for deeper penetration into the Earth. In these events the energy was distributed directly into the planet's inner body, heating it well beneath the surface. This heat influx contributed to heavy metallic fragments deep underground melting and sinking towards the core.

### 4.1 BYA

#### Brace for impact

The Late Heavy Bombardment (LHB) of Earth begins, with a period of intense impacts pummeling many parts of the young crust.

### 4 BYA

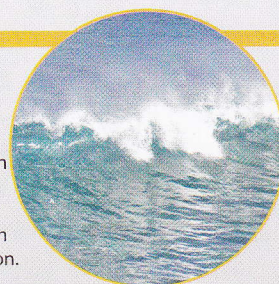
#### Archean

The Hadean eon comes to an end and the Archean period begins.

### 3.9 BYA

#### Ocean origins

Earth is now covered with liquid oceans due to the release of trapped water from the mantle and from asteroid/comet deposition.



### 3.6 BYA

#### Supercontinent

Our world's very first supercontinent, Vaalbara, begins to emerge from a series of combining cratons.