# Appendix 1: Geological Time (in Million Years, Ma). Simplified from the International Stratigraphic Chart (International Commission of Stratigraphy, 09/2010)

| Eon | Era | Period | Epoch | Age (Ma) | | Eon | Era | Age (Ma) |
|---|---|---|---|---|---|---|---|---|
| Phanerozoic | Cenozoic | Quaternary | Holocene | | | | | 542 |
| | | | Pleistocene | 2.6 | Precambrian | Proterozoic | Neoproterozoic | |
| | | Neogene | Pliocene | | | | | 1,000 |
| | | | Miocene | 23 | | | Mesoproterozoic | |
| | | Paleogene | Oligocene | | | | | 1,600 |
| | | | Eocene | | | | Paleoproterozoic | |
| | | | Paleogene | 65 | | | | 2,500 |
| | Mesozoic | Cretaceous | Upper | | | Archean | Neoarchean | |
| | | | Lower | 146 | | | | 2,800 |
| | | Jurassic | Upper | | | | Mesoarchean | |
| | | | Middle | | | | | 3,200 |
| | | | Lower | 200 | | | Paleoarchean | |
| | | Triassic | Upper | | | | | 3,600 |
| | | | Middle | | | | Eoarchean | |
| | | | Lower | 251 | | | | 4,000 |
| | Paleozoic | Permian | Lopingian | | | | Hadean (informal) | |
| | | | Guadalupian | | | | | 4,600 |
| | | | Cisuralian | 299 | | | | |
| | | Carboniferous | Pennsylvanian | | | | | |
| | | | Mississippian | 359 | | | | |
| | | Devonian | Upper | | | | | |
| | | | Middle | | | | | |
| | | | Lower | 416 | | | | |
| | | Silurian | Pridoli | | | | | |
| | | | Ludlov | | | | | |
| | | | Wenlock | | | | | |
| | | | Llandovery | 444 | | | | |
| | | Ordovician | Upper | | | | | |
| | | | Middle | | | | | |
| | | | Lower | 485 | | | | |
| | | Cambrian | Furongian | | | | | |
| | | | Series 3 | | | | | |
| | | | Series 2 | | | | | |
| | | | Terreneuvian | 542 | | | | |

I. Haapala (ed.), *From the Earth's Core to Outer Space*,
Lecture Notes in Earth System Sciences 137, DOI 10.1007/978-3-642-25550-2,
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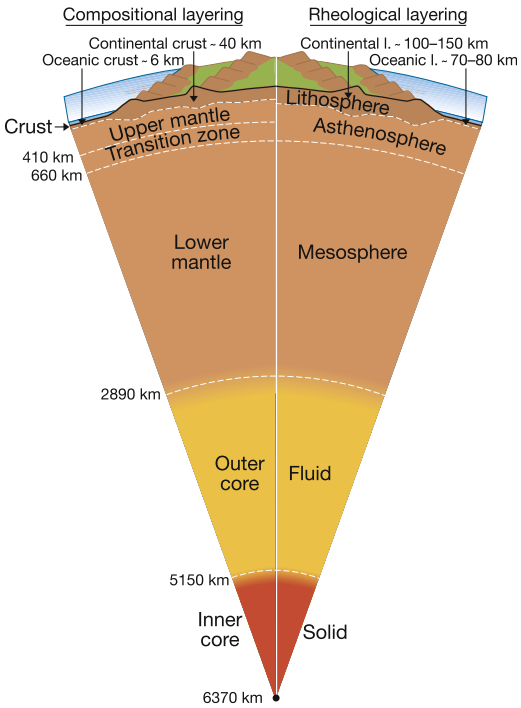
# Appendix 2: Layered Structure of Earth's Interior




The interior of the Earth is layered both in terms of composition and rheological properties, as depicted in attached picture (modified from Fig. 2.39 in Kearey P, Klepeis K and Vine F 2009 Global tectonics 3rd edition, Wiley-Blackwell, Chichester, UK). The boundaries between the **crust** and **mantle** (Mohorovičić discontinuity or Moho), mantle and core (Gutenberg discontinuity) as well as liquid core and solid core are defined by discontinuities in seismic wave velocities.

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The thickness of the outer layers varies markedly depending on the geotectonic environment. The oceanic crust is in average 6 km thick and consists mainly of basaltic rocks and sedimentary interlayers, while the continental crust is in average about 40 km thick but may reach in collisional orogenic belts a depth of 75 km and has variable composition, silicic rocks prevailing in the upper crust and more mafic rocks in the lower crust. The **lithosphere** consists of crust and solid ultramafic uppermost mantle. Its average thickness is in oceanic areas about 70–80 km, in continental areas 100–150 km, and beneath Archean cratons the lithosphere often extends to more than 300 km. The strong, rigid lithosphere is broken into plates that float on less viscous asthenosphere. The **asthenosphere** deforms by creep. It is essentially solid, but may contain in upper parts small amounts of interconnected melt along grain boundaries. A seismic low-velocity zone (LVZ) occurs in the upper parts of the asthenosphere (beneath the lithosphere), but it is poorly developed beneath Proterozoic shields and may be absent beneath Archean shields. The **transitional zone** between the seismic discontinuities at 410 and 660 km is an inhomogeneous zone characterized by transformation of upper mantle minerals like olivine to more densely packed phases. Although the mineral composition of the upper mantle and lower mantle (**mesosphere**) vary markedly, the chemical composition probably remains nearly similar, corresponding common stone meteorites. At 2890 km the solid silicate rock of the lower mantle changes abruptly to a liquid iron-nickel alloy of the **outer core**, and the density jumps from about 6 to 10 g/cm$^3$. Convections in the outer core stir up electric currents in conducting iron to create a geodynamo which is responsible of the Earth's magnetic field. The **inner core** is solid iron-nickel alloy. The temperature at Earth's center is about 5,000°C and the density of the inner core about 13 g/cm$^3$.

# Appendix 3: Layers of Earth's Atmosphere

| Layer | Distance from Earth's surface | Comments |
|---|---|---|
| Exosphere | 690–10,000 km | Free moving hydrogen and helium atoms |
| Thermosphere | 85–690 km | Aurora in lower parts |
| Mesosphere | 50–85 km | Average temperature −85°C, most meteors burn upon entering the atmosphere |
| Stratosphere | 6–20 – 50 km | Contains the ozone layer, pressure 1/10,000 of the atmospheric pressure on the sea level |
| Troposphere | Earth's surface – 6–20 km | Contains about 80% of the mass of the atmosphere |

**Ionosphere** is the part of the atmosphere that is ionized by solar radiation. It extends from about 50 to 1000 km and overlaps both the exosphere and thermosphere and is responsible for the auroras. It forms the inner edge of magnetosphere.

**Magnetosphere** is formed when a stream of charged particles (the solar wind) from the Sun interacts with and is deflected by the Earth's magnetic field.

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Lecture Notes in Earth System Sciences 137, DOI 10.1007/978-3-642-25550-2,
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