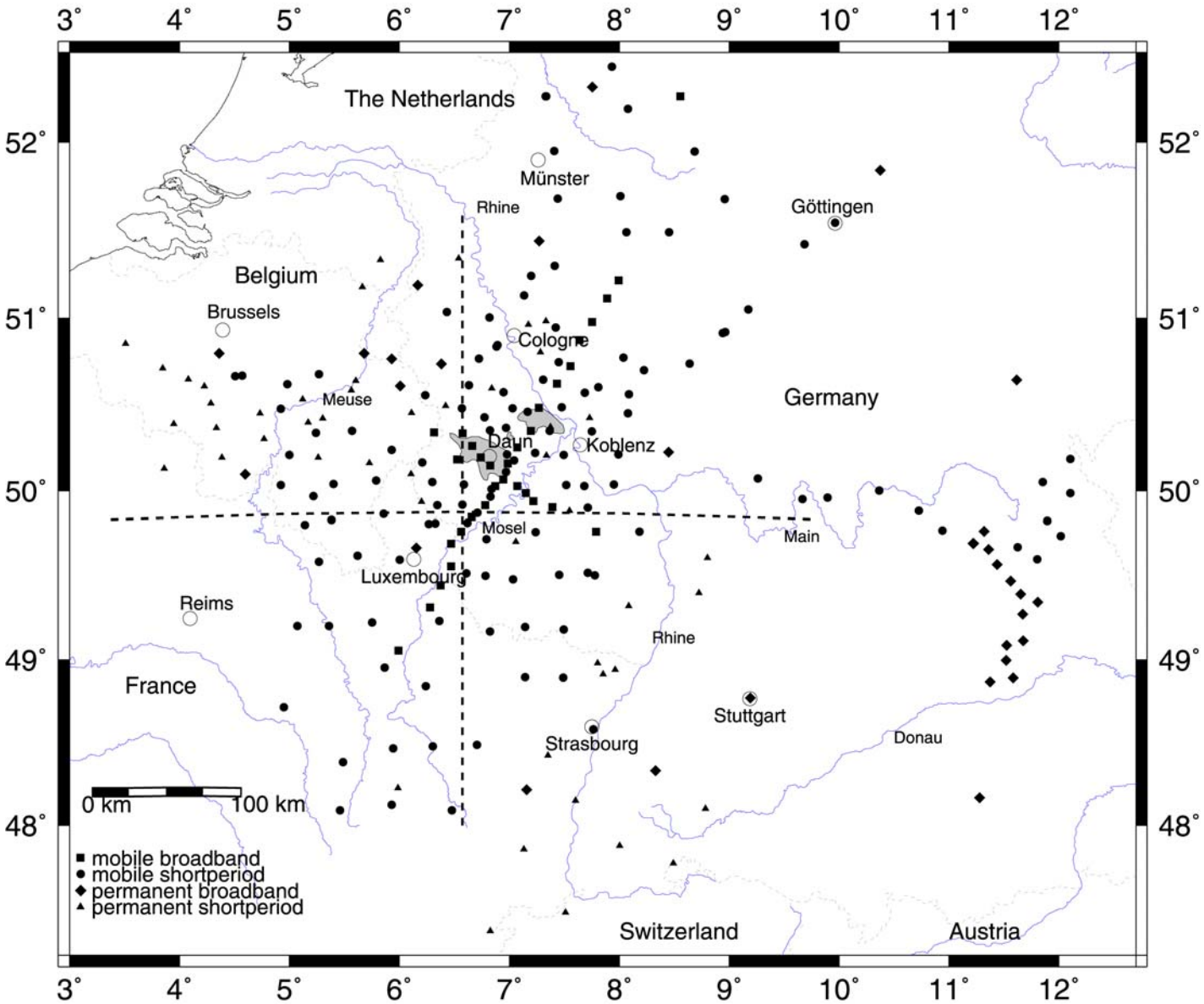
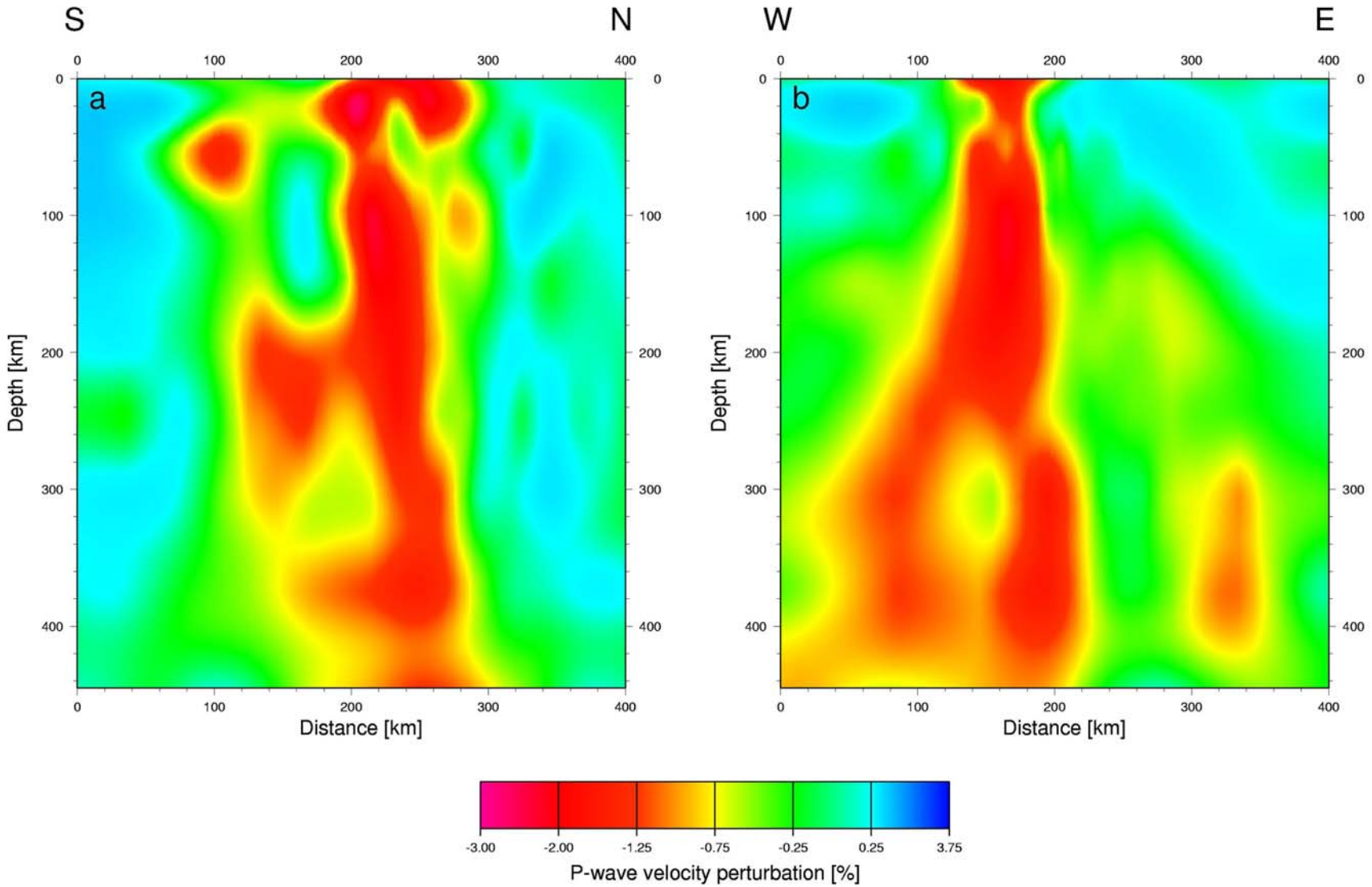
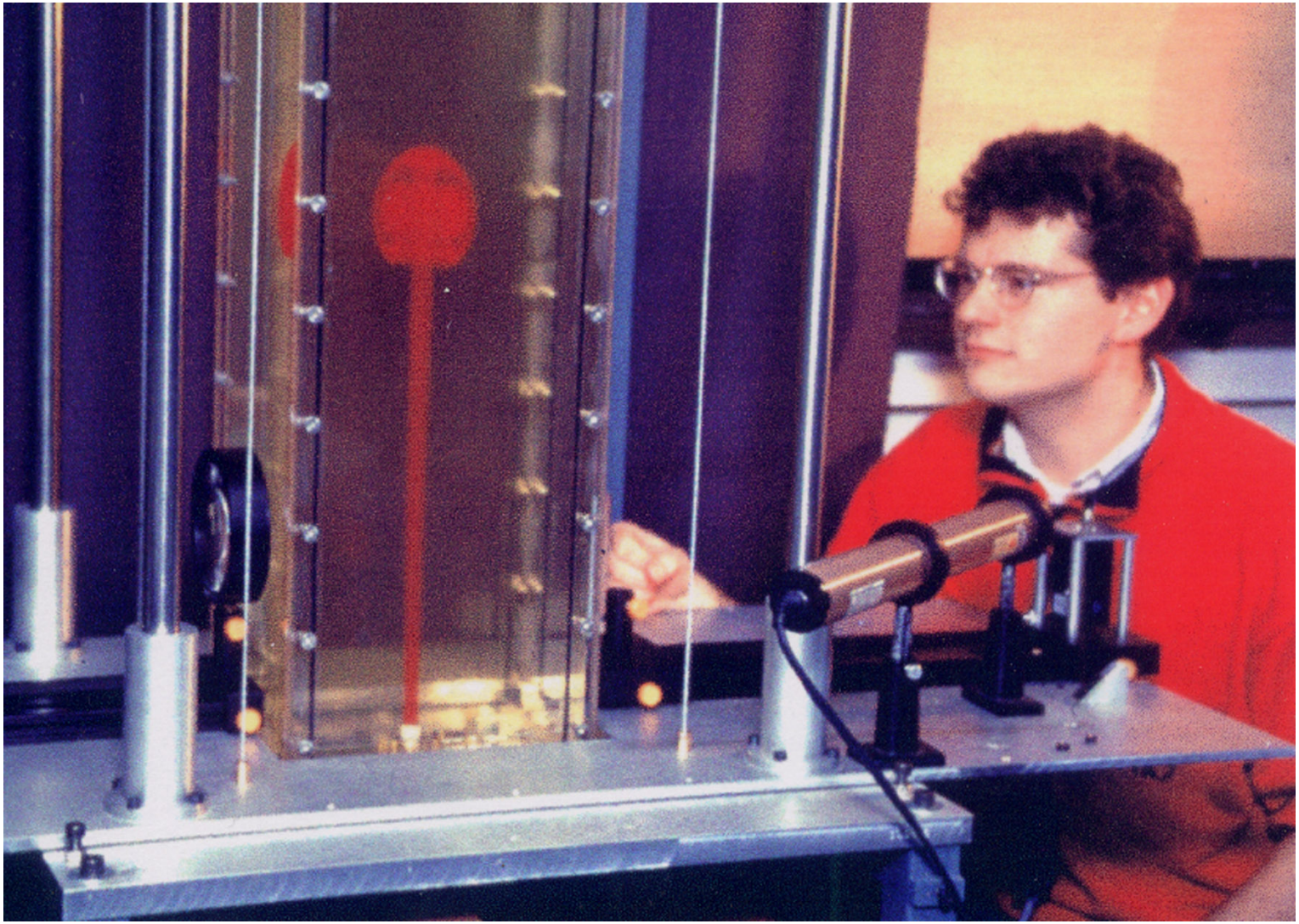


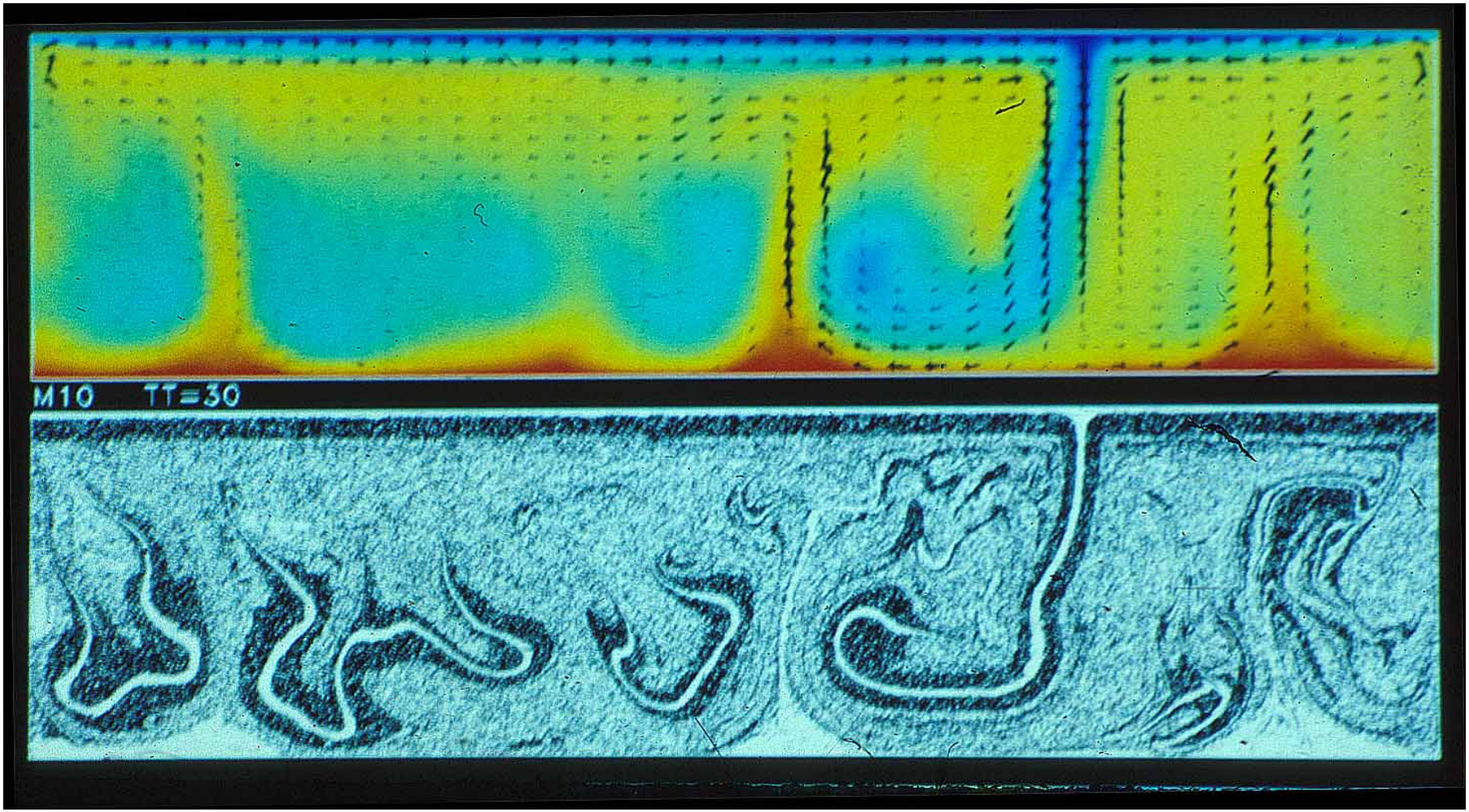

Temporary seismic network centered in the volcanic Eifel region, Germany




Seismic image of a plume in the upper mantle below the Eifel region

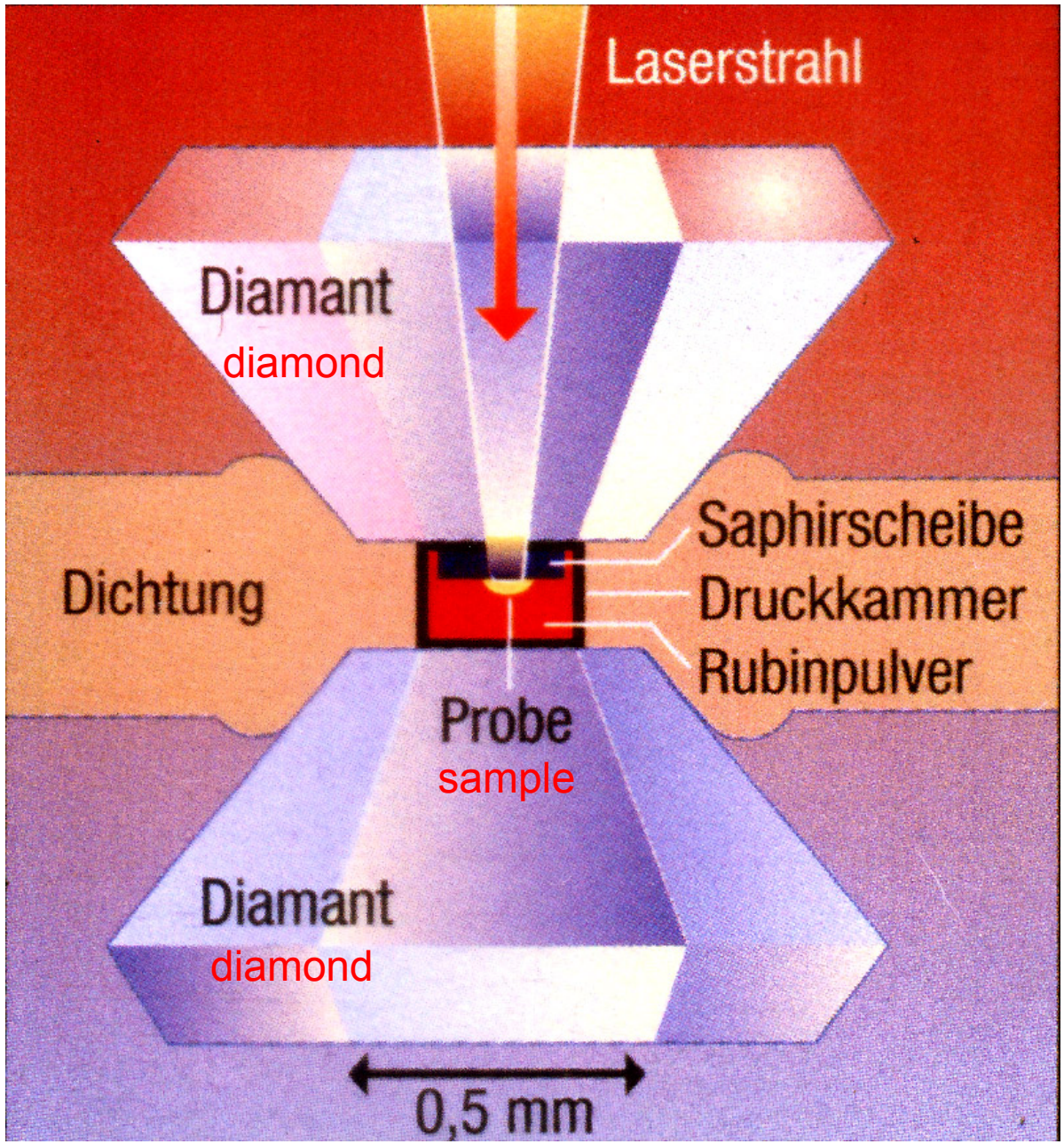


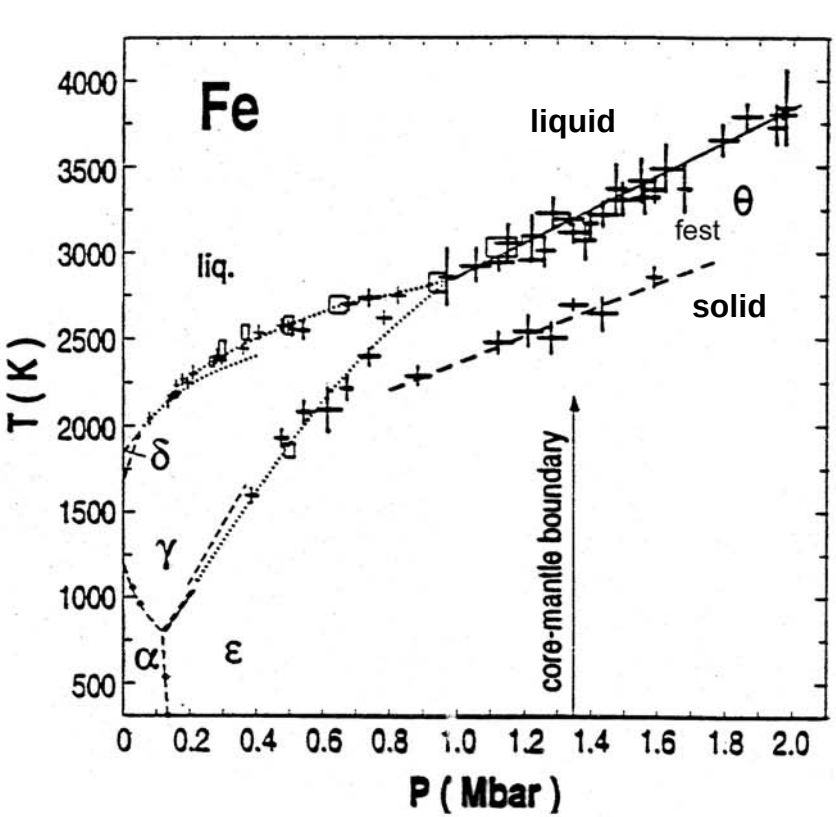
Laboratory plume generated by injecting hot corn syrup through a nozzle into a tank with cold syrup. Red dye has been added to the hot syrup.

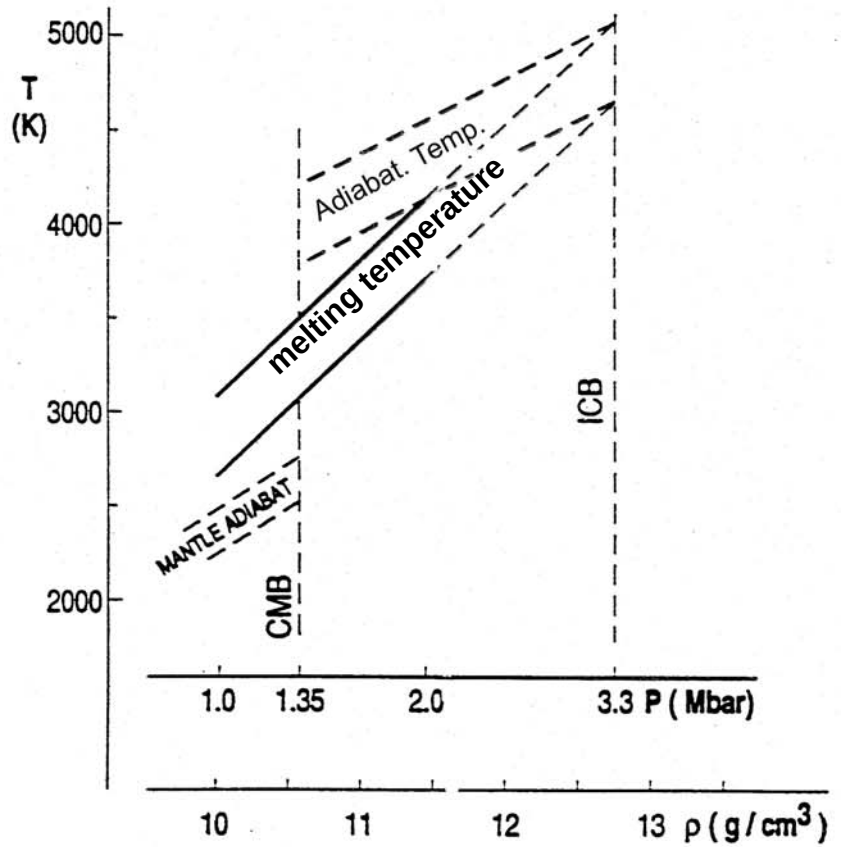



Computer simulation of mantle convection in a 2D box. Viscosity is strongly temperature-dependent and plate motion is imposed as boundary condition. Top panel: Temperature and flow. Bottom: Chemical composition with density of basaltic component proportional to brightness.

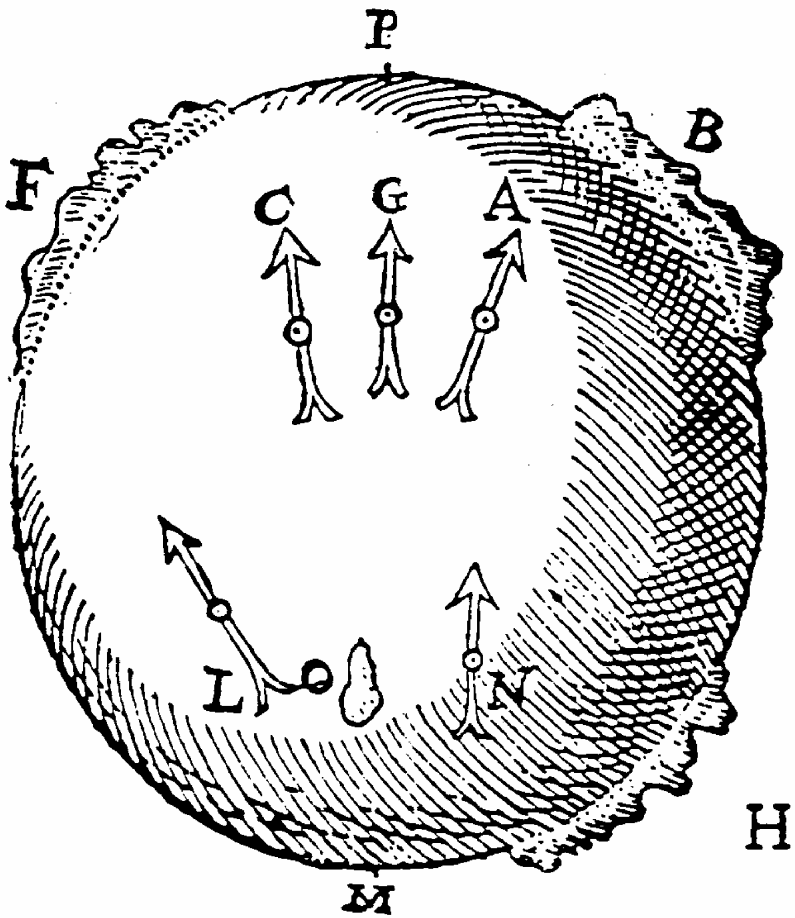
Diamond anvil press allows to generate pressures as in the Earth‘s core

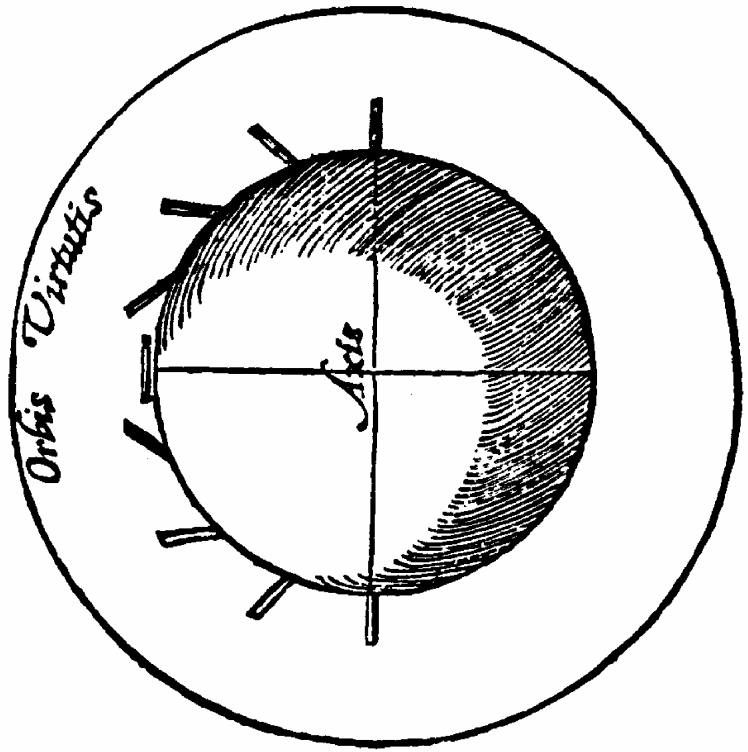




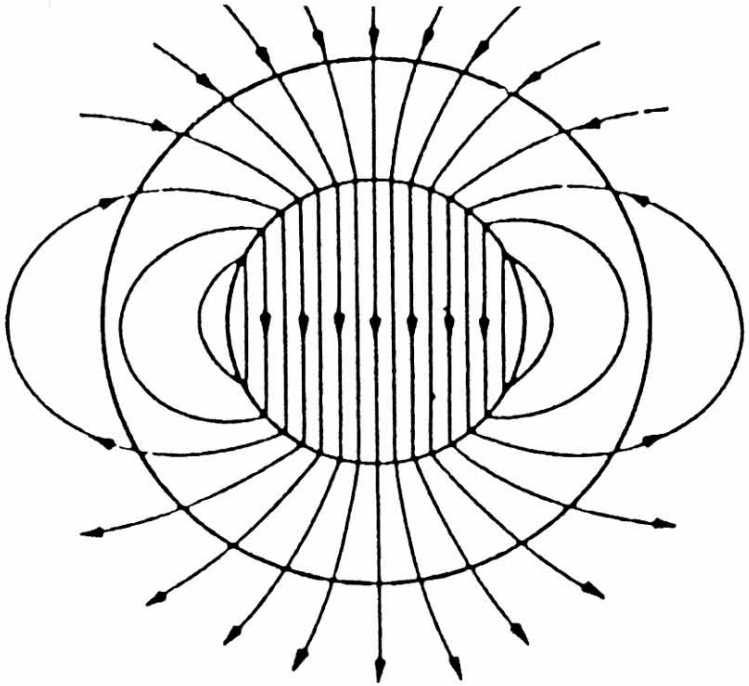

Iron melting at high pressure and temperatures in the Earth‘s core



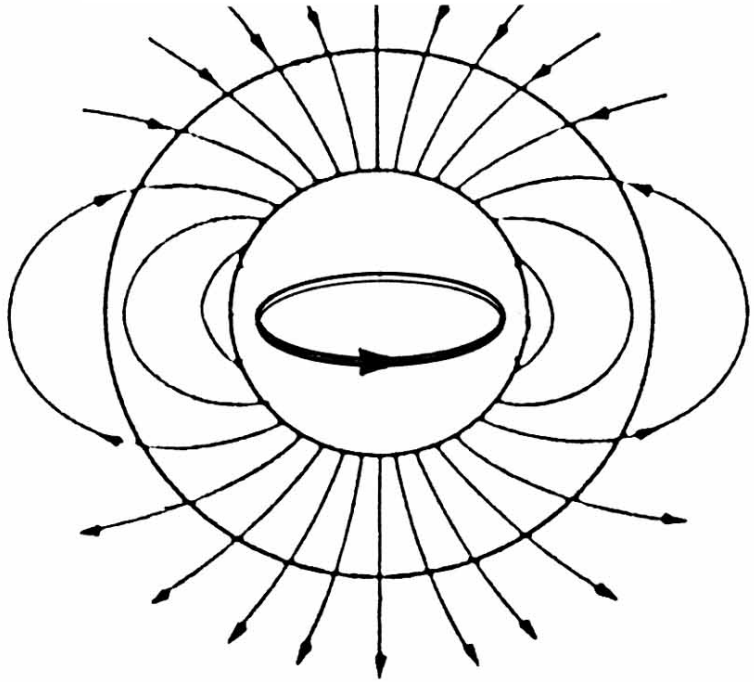




William Gilbert (1600) concluded that the Earth itself is a big magnet

**Homogeneous magnetisation**

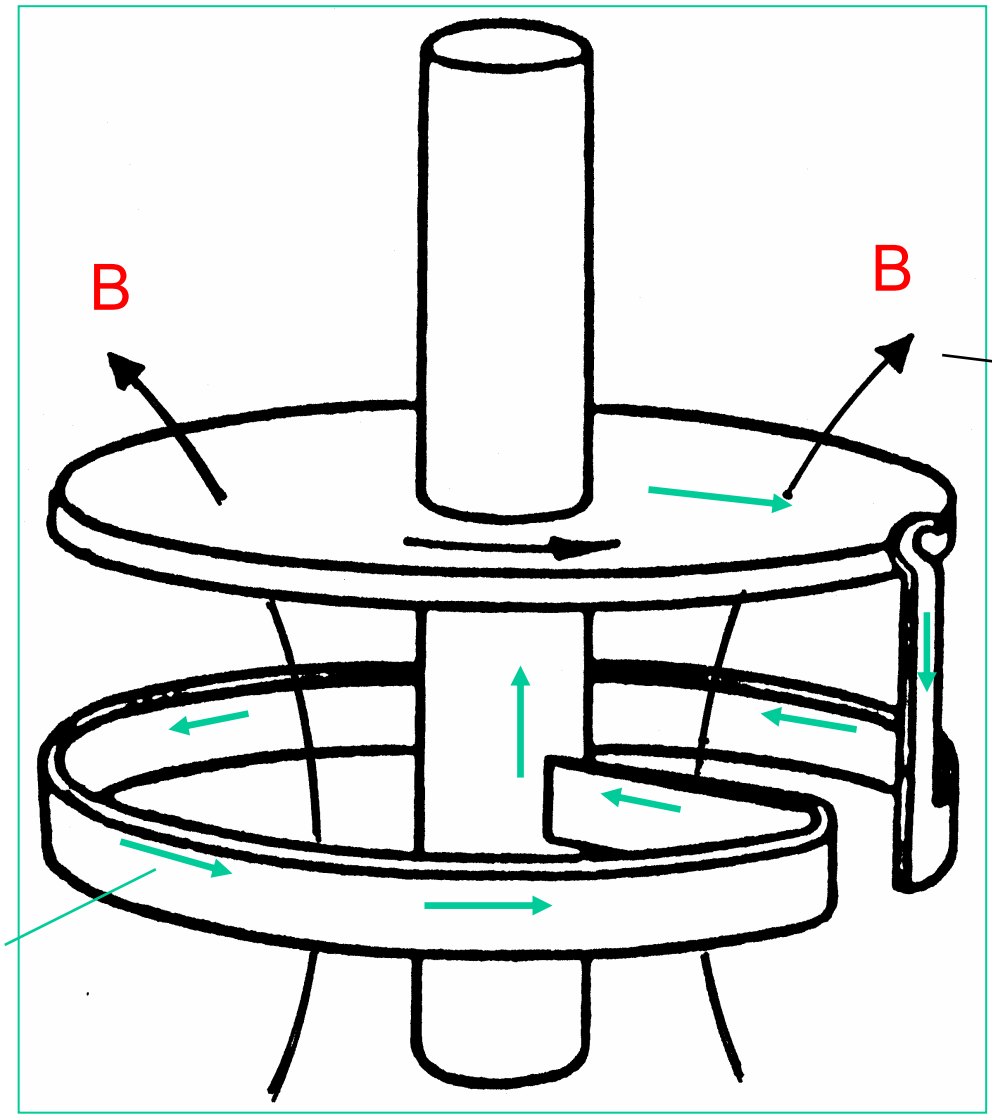


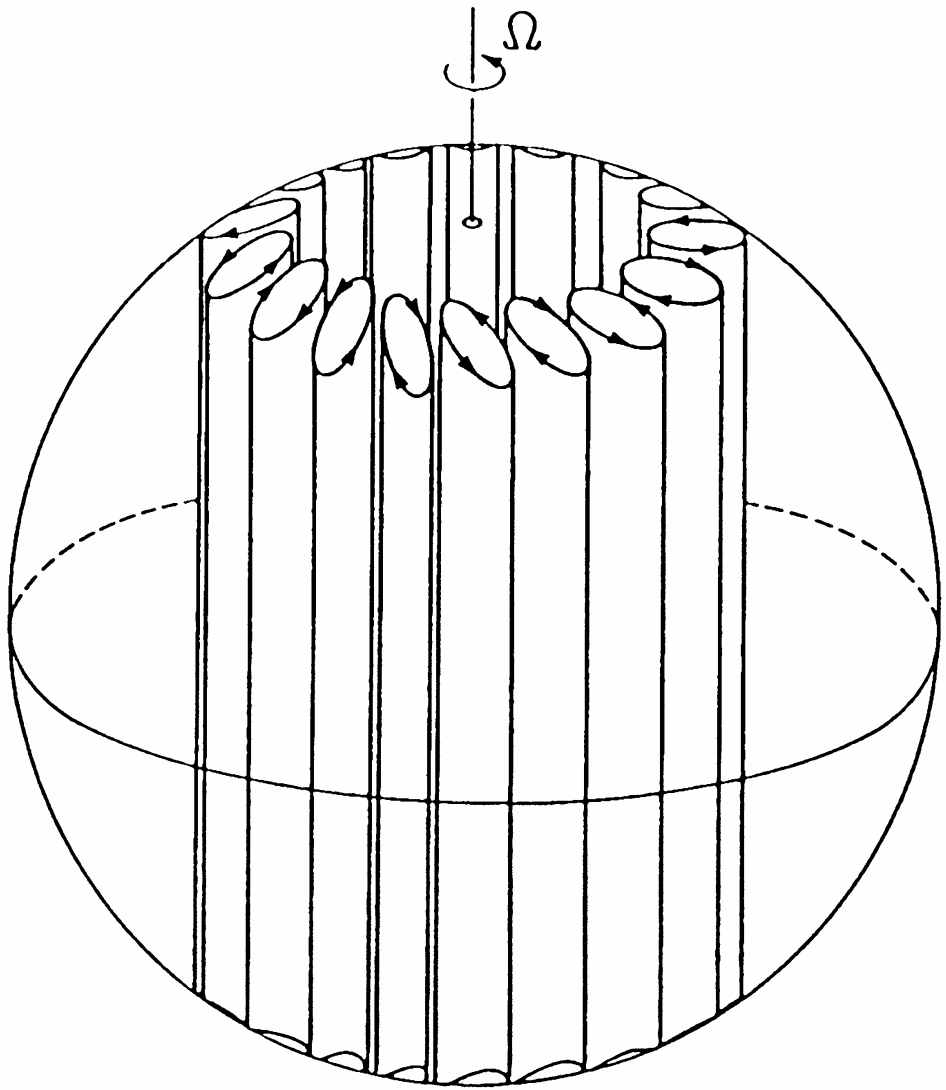
**Electrical ring current**



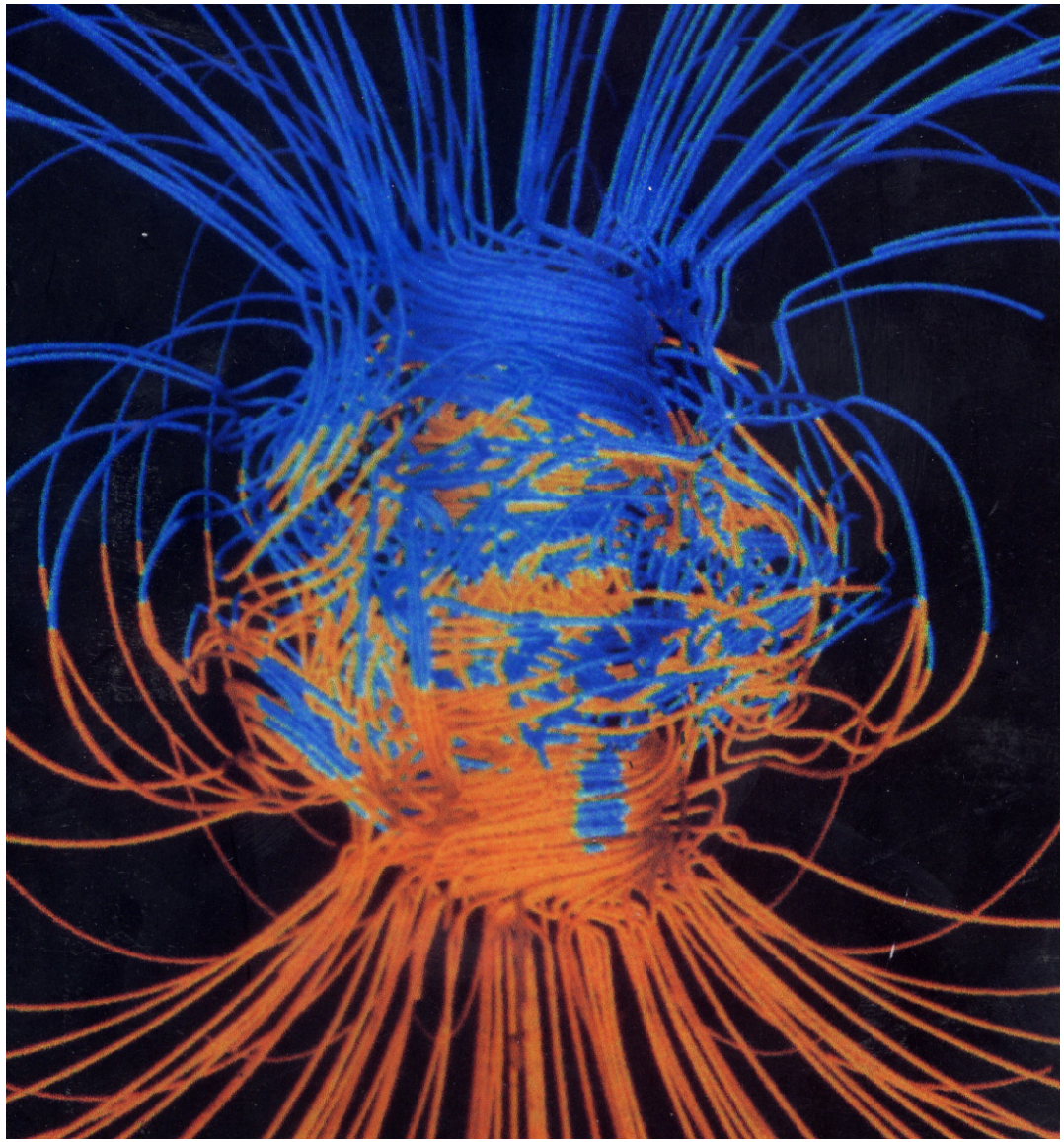
Origin of geomagnetic dipole field ?

# Self-sustained disk dynamo: a toy model



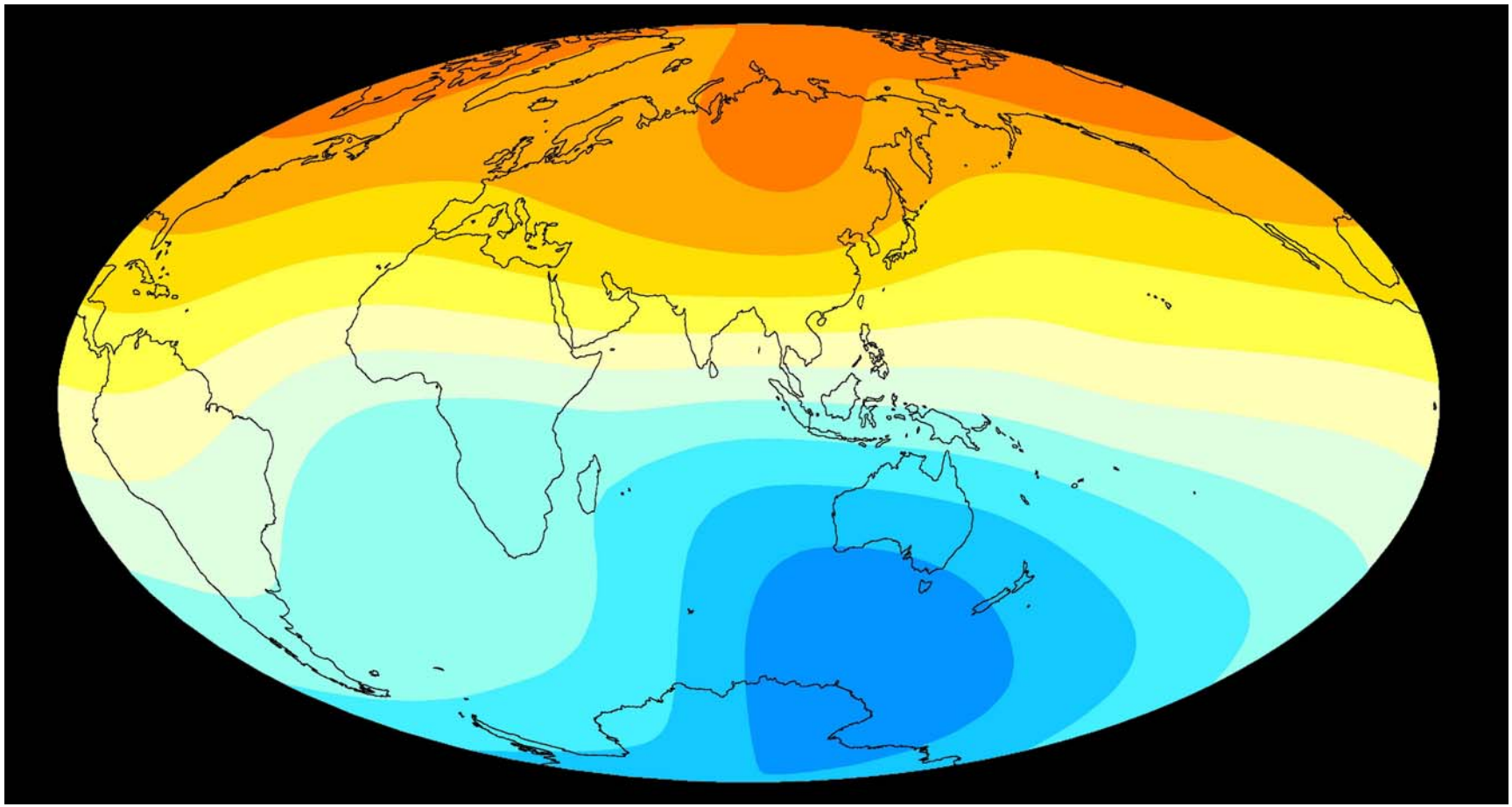



Pattern of convection in a rapidly rotating spherical shell (Busse, 1972): Convection rolls aligned with the rotation axis by the action of Coriolis forces

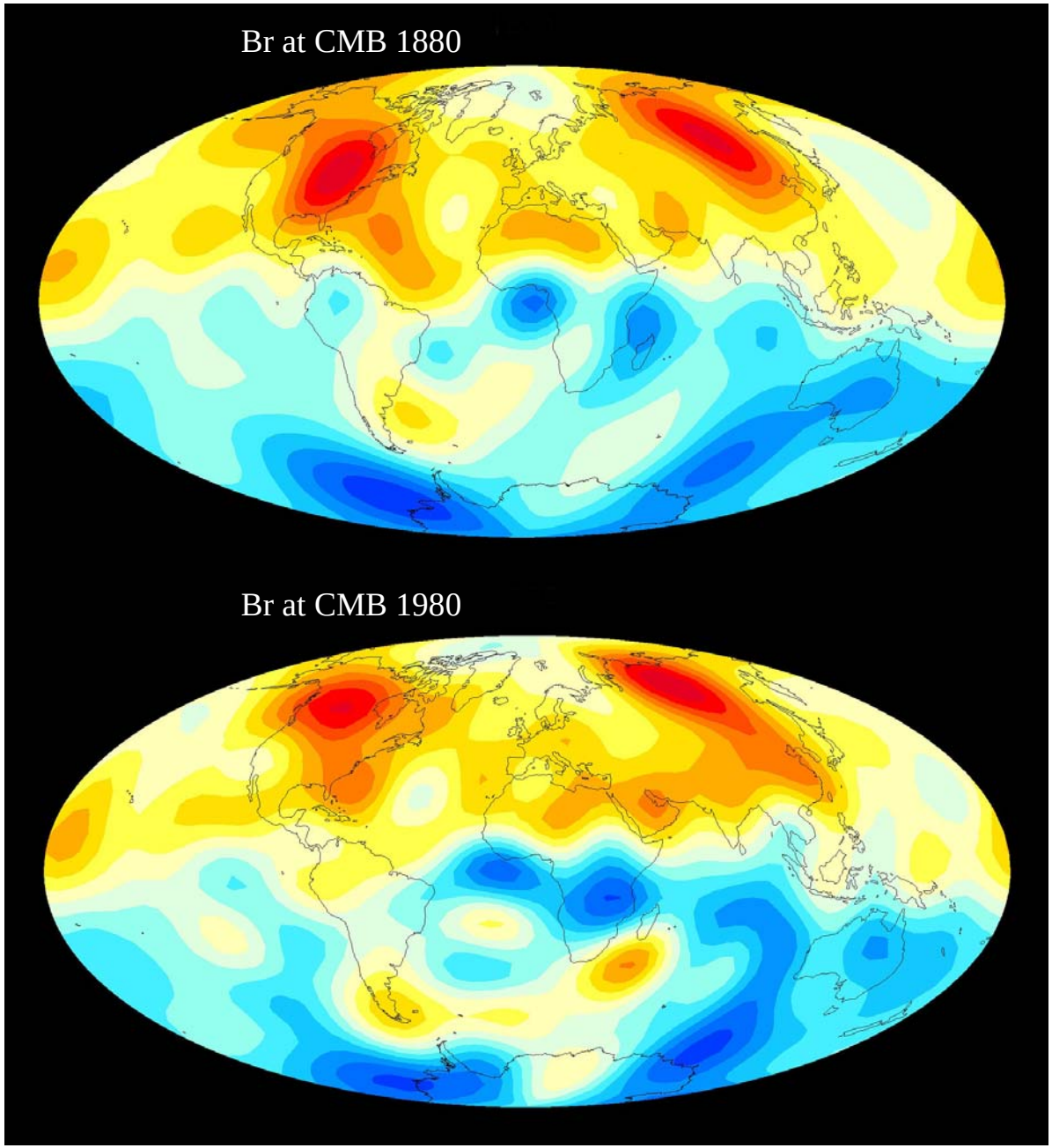


Magnetic field lines in one of the first successful geodynamo simulations
(Glatzmaier & Roberts, 1995)

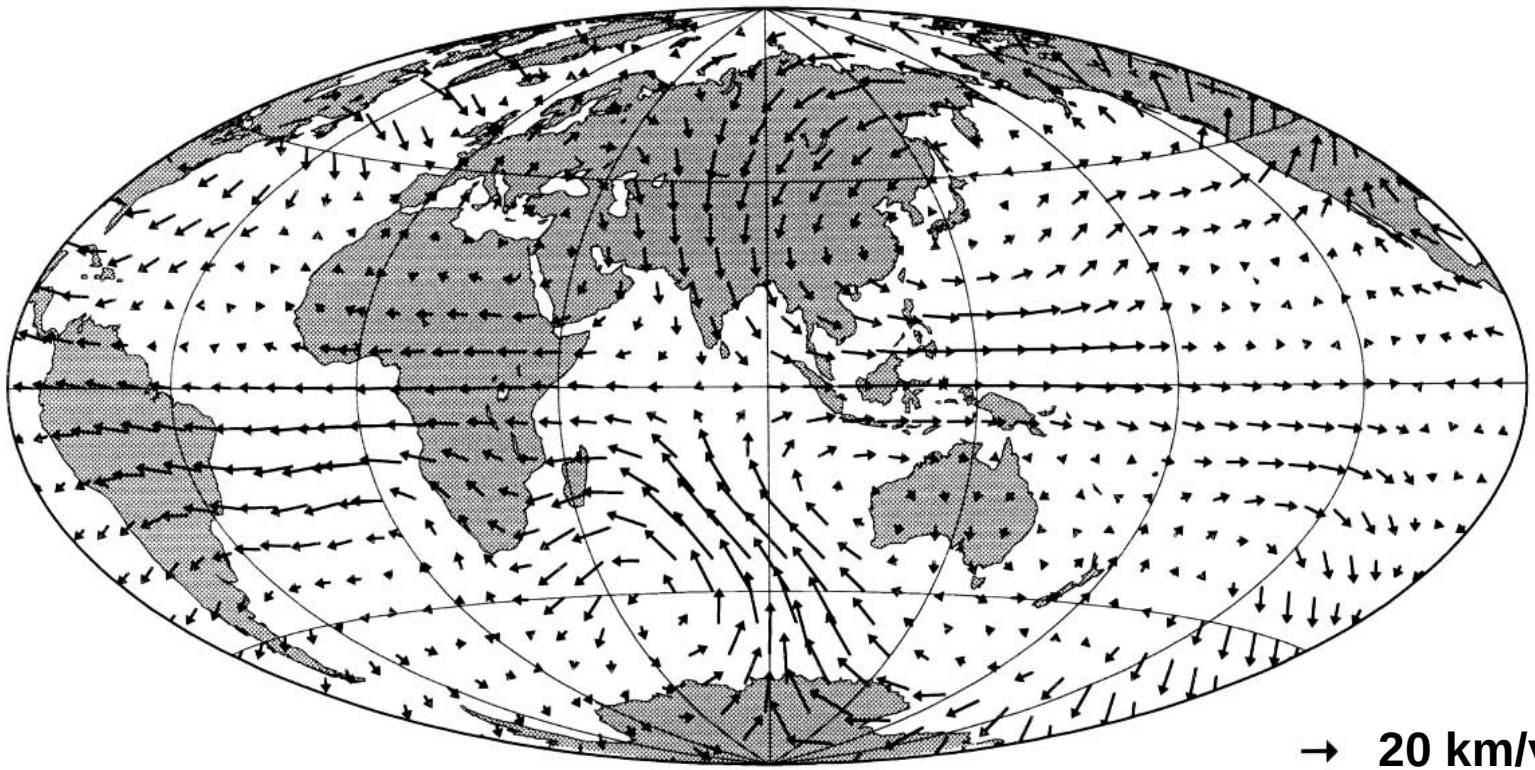
# Radial magnetic field 1990 at Earth surface
# red = inward, blue = outward



Radial magnetic field at the core-mantle boundary 100 yr apart

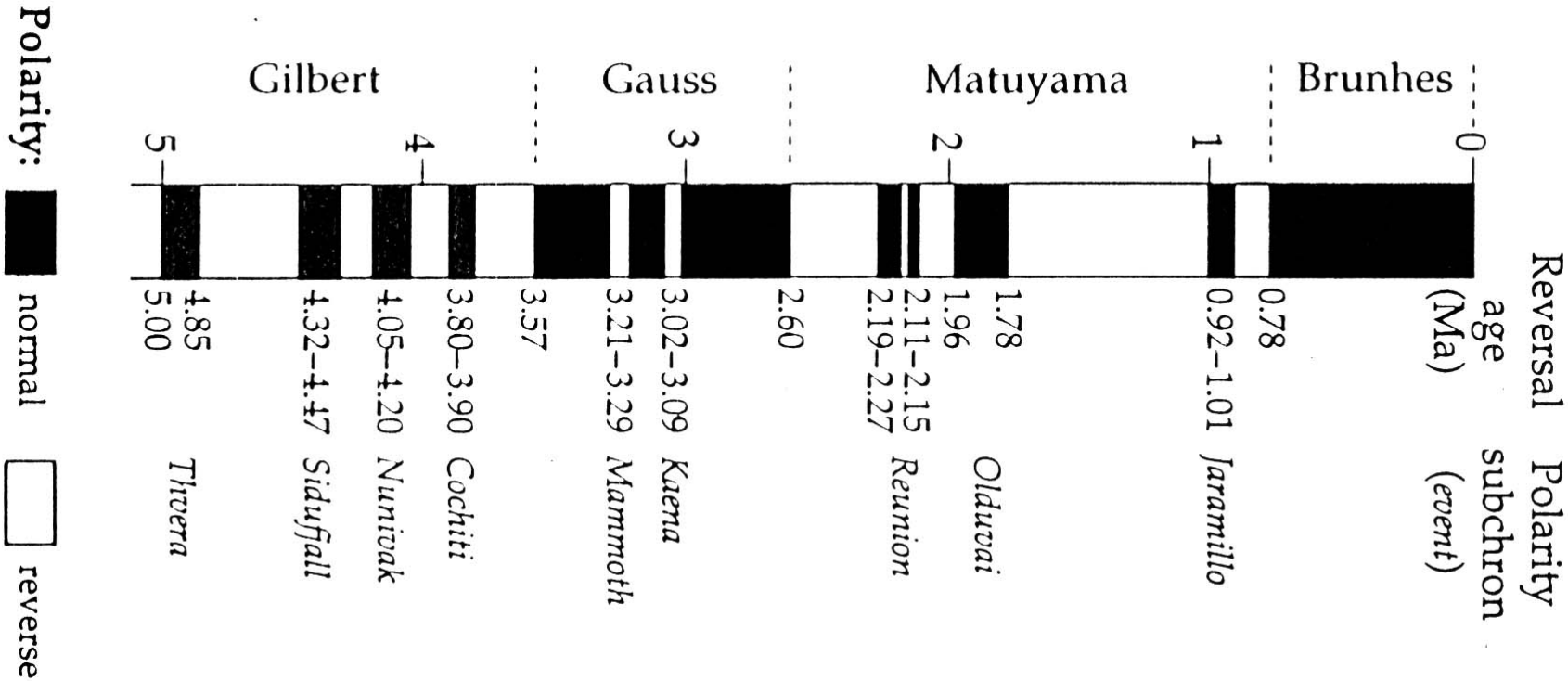


# Fluid motion at the core surface

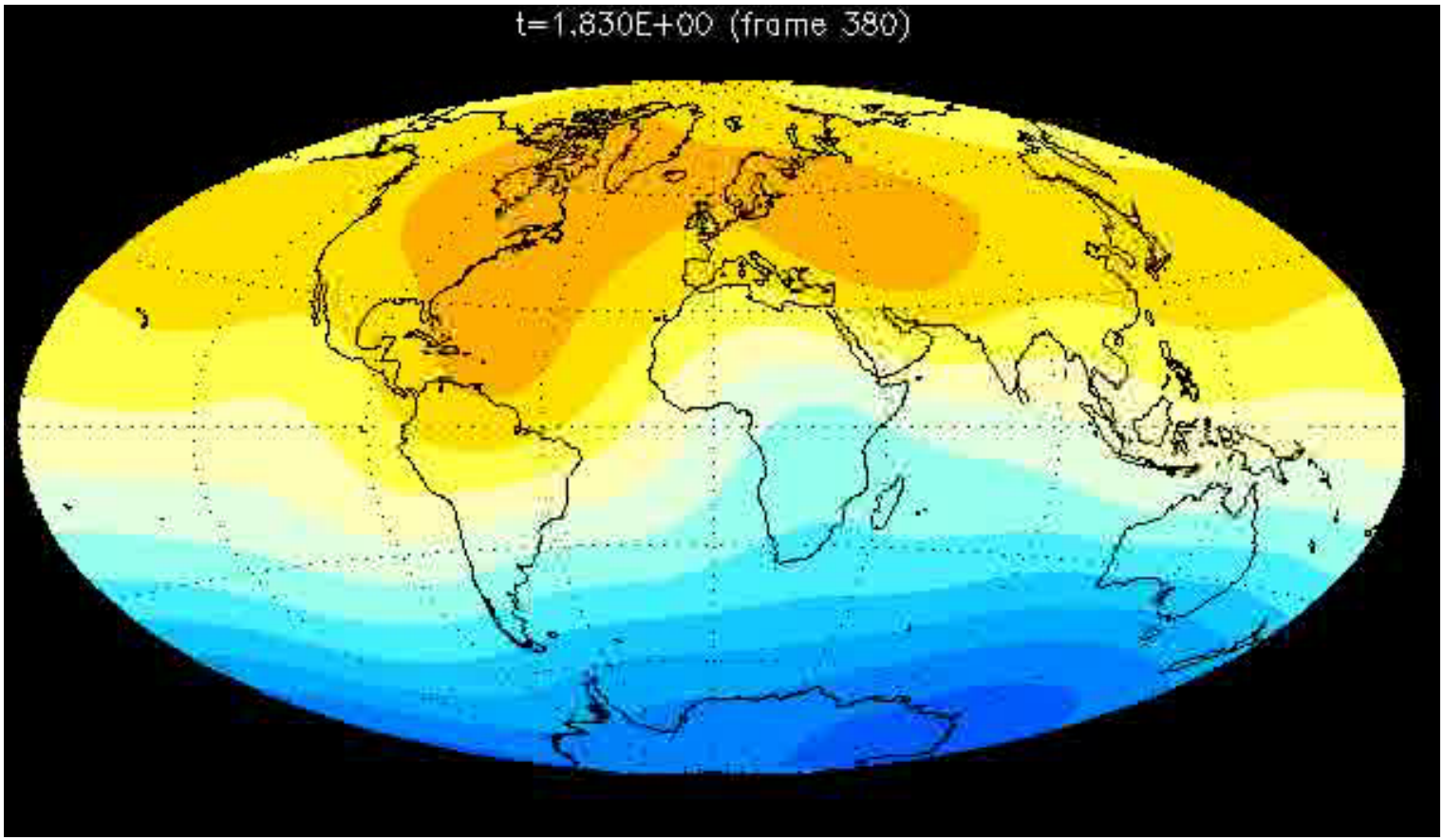


→ **20 km/year**

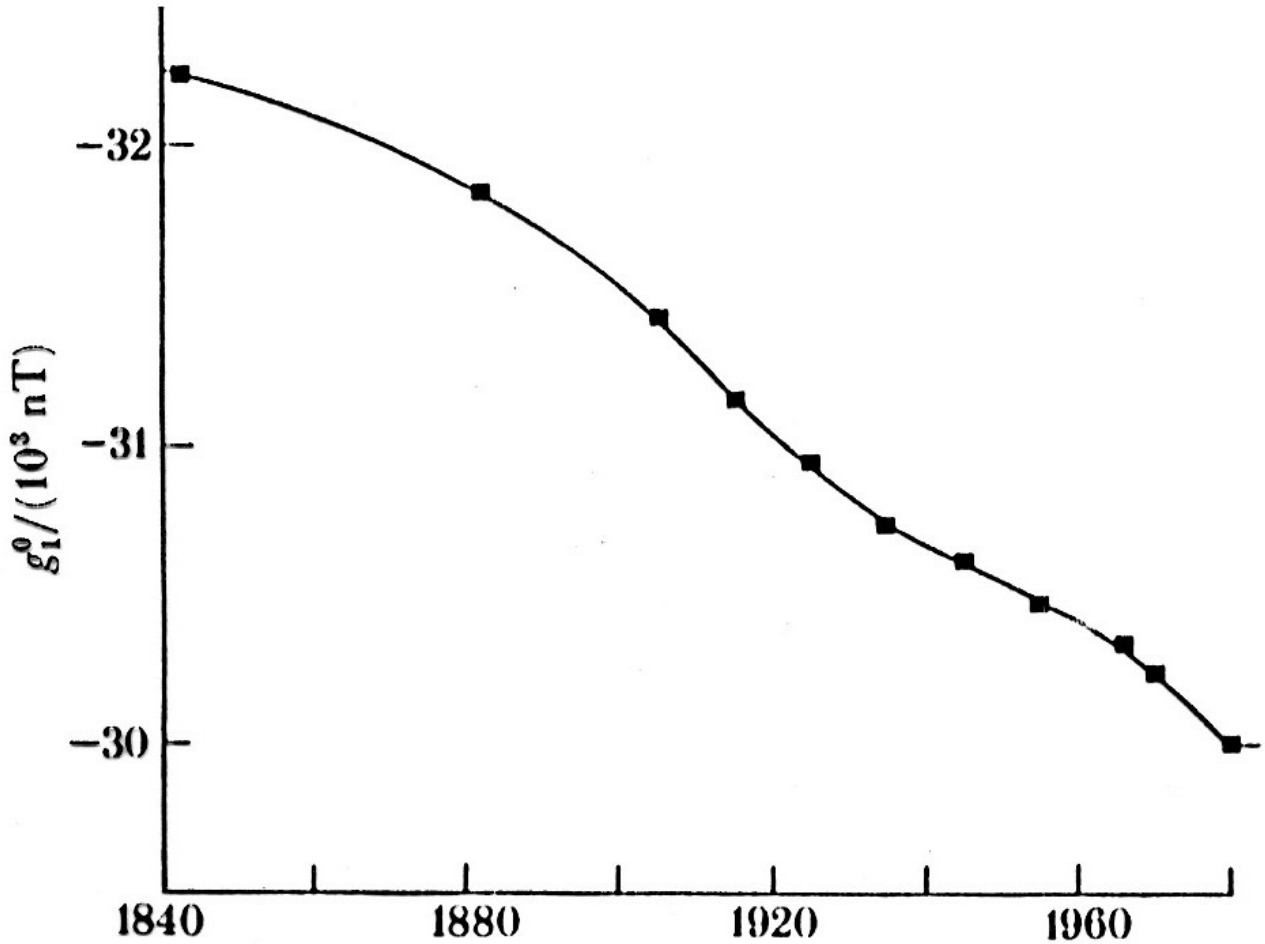
# Polarity of Earth‘s dipole during the past 5 Myr



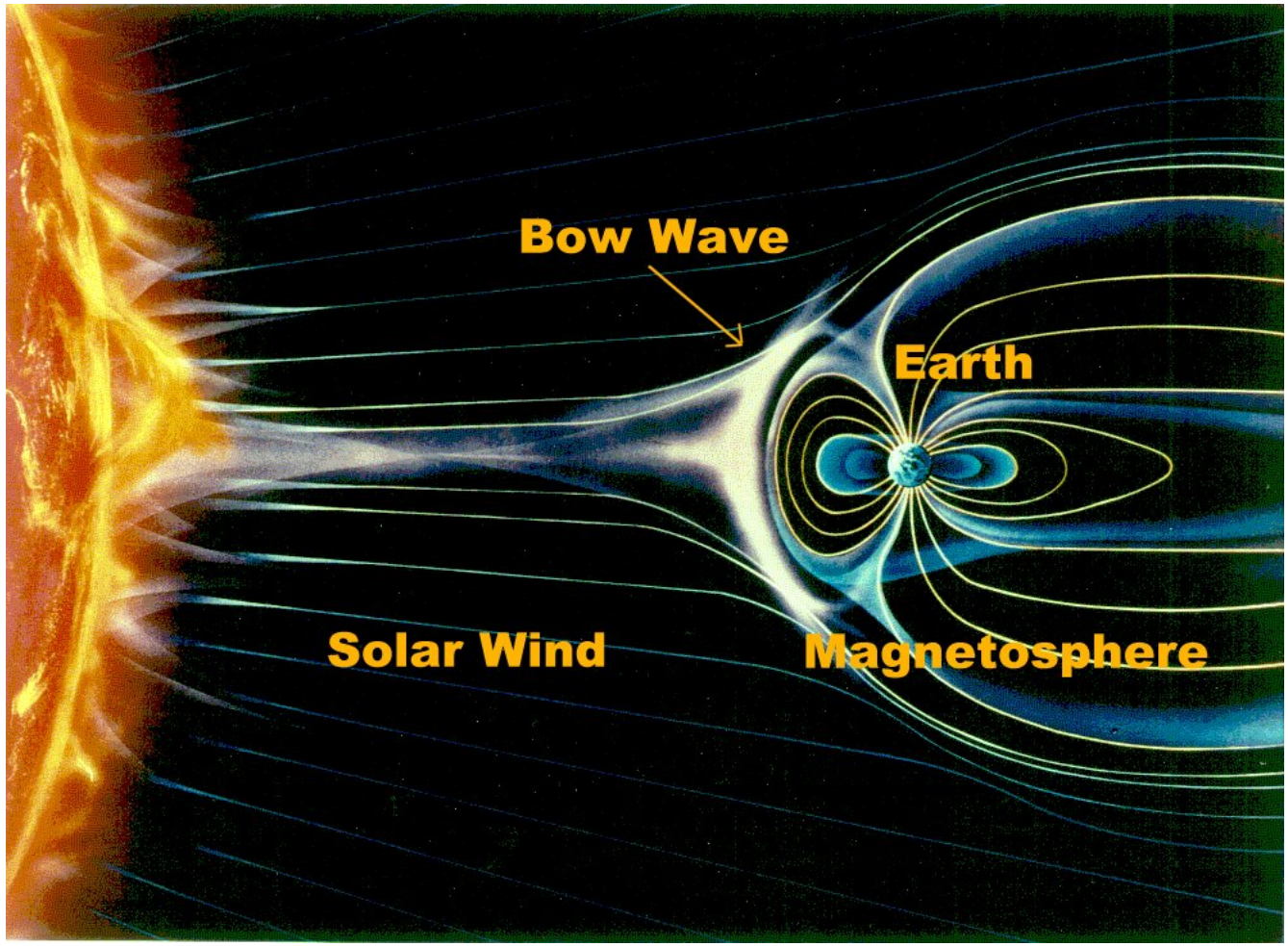
# Simulation of a geomagnetic reversal




Radial magnetic field at Earth‘s surface.  Duration of animation ≈ 2000 yr




Decrease of geomagnetic dipole moment with time




Magnetic field shields Earth from the energetic solar wind particles
They may erode a planetary atmosphere, if they impact directly


Aurora