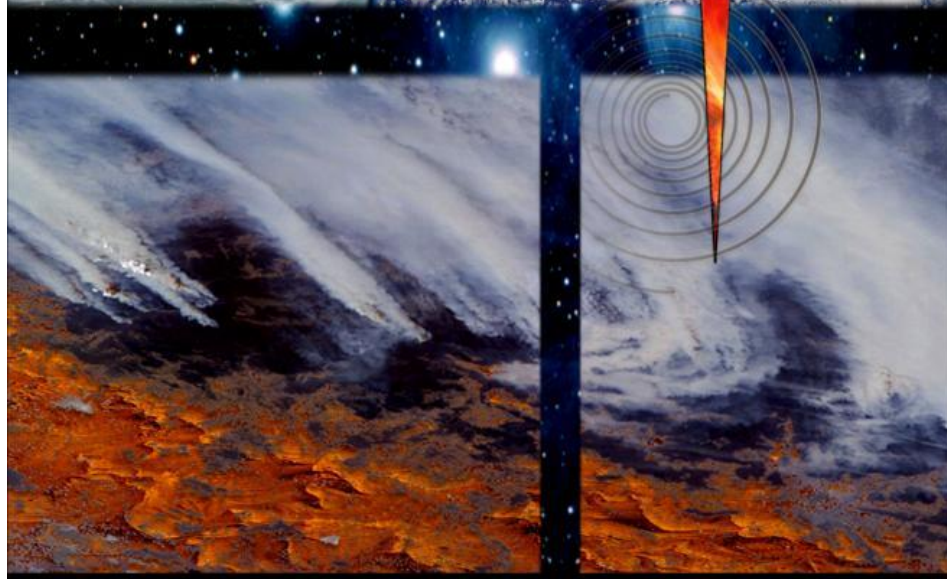
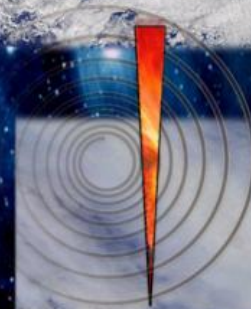


International Centre for Earth Simulation



Modelling the Whole Earth System – a challenge whose time has come!

ICES Biennial Workshop
Geneva 12 November 2013

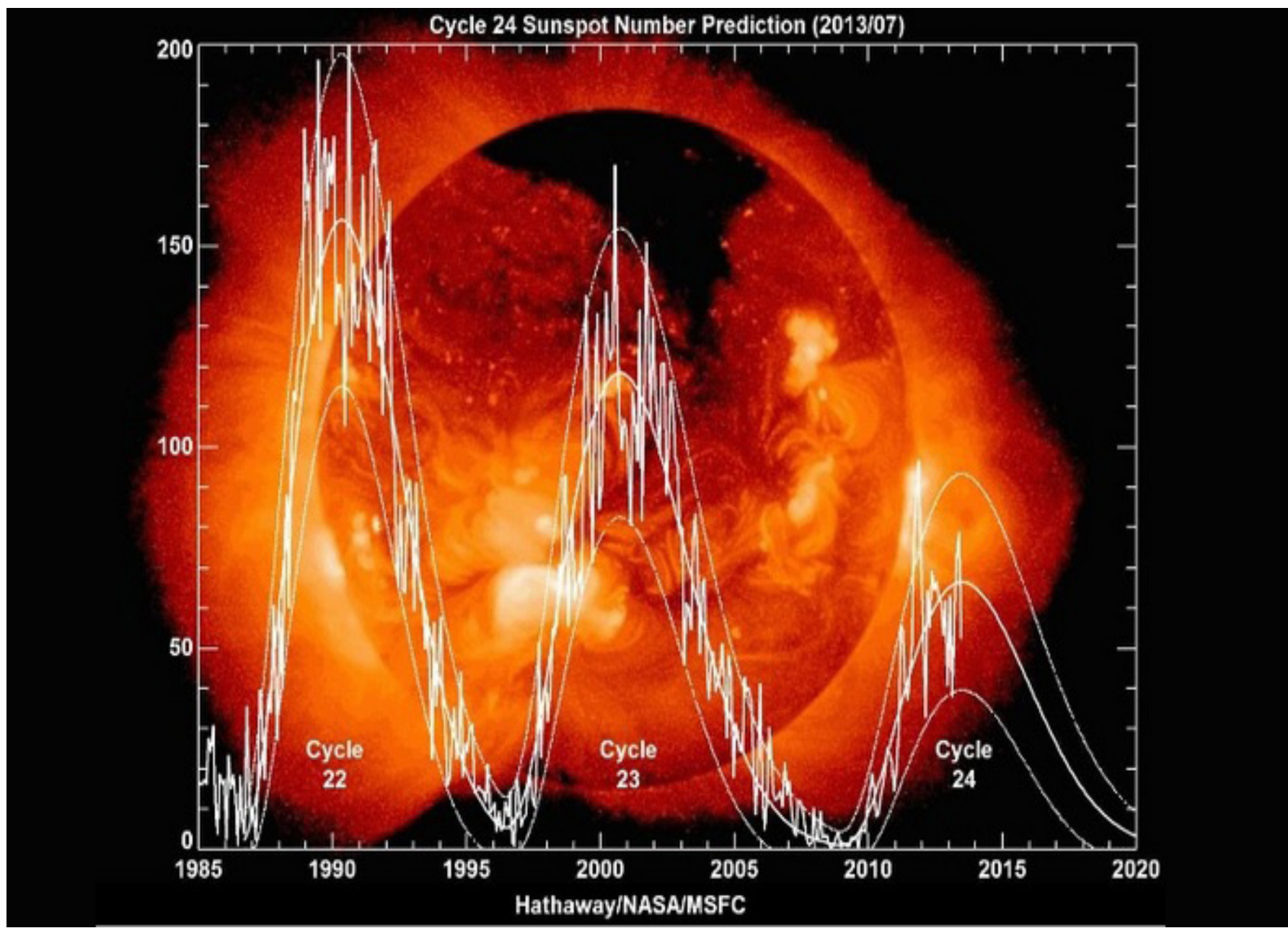
Our Earth & Moon make a beautiful coupled system



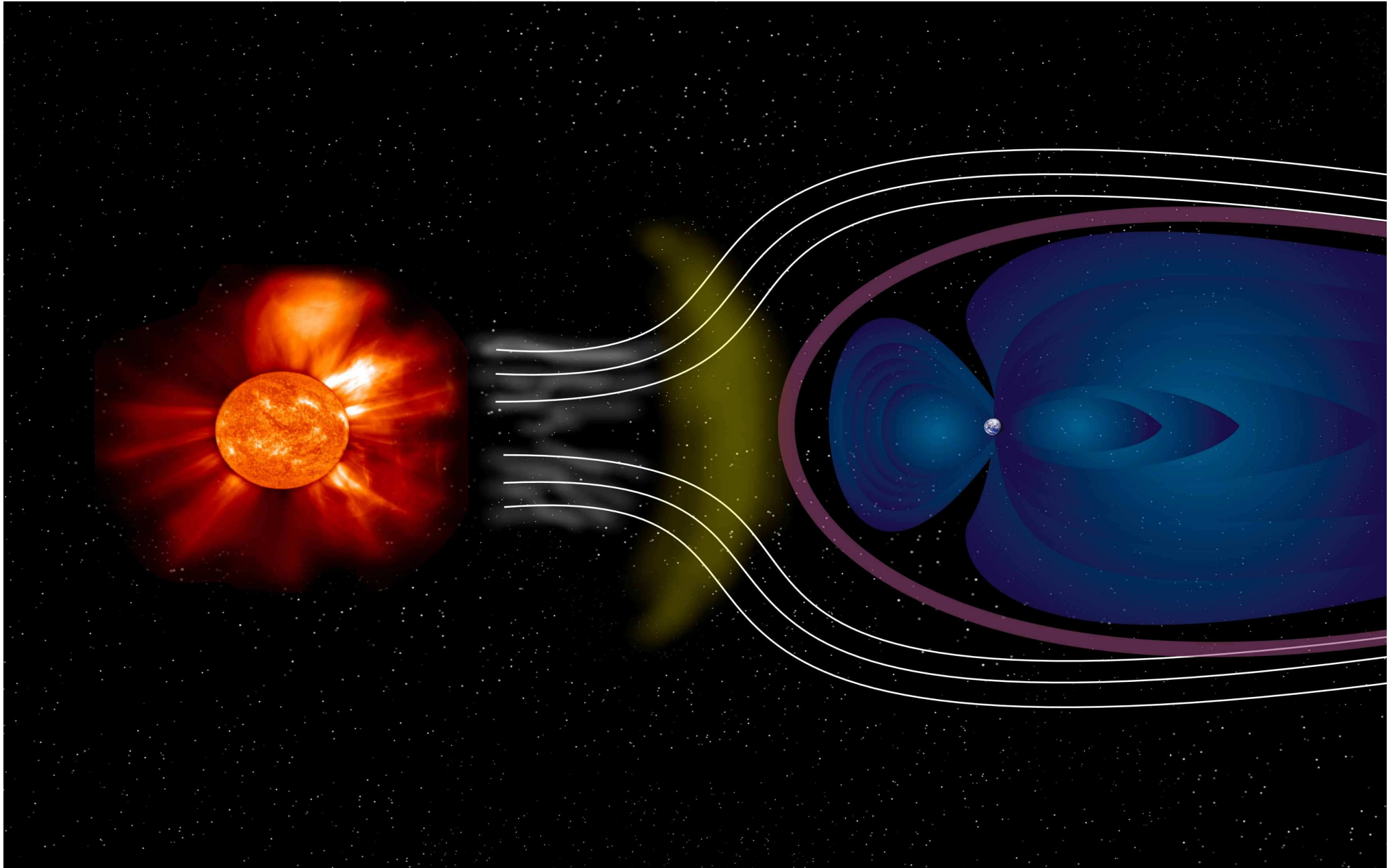
Both are under the strong influence of the Sun!



... and the Sun has a variable 11-year sunspot cycle



The Earth's magnetosphere acts as a deflection shield



Our climate is mainly driven by Ocean-Wind coupling



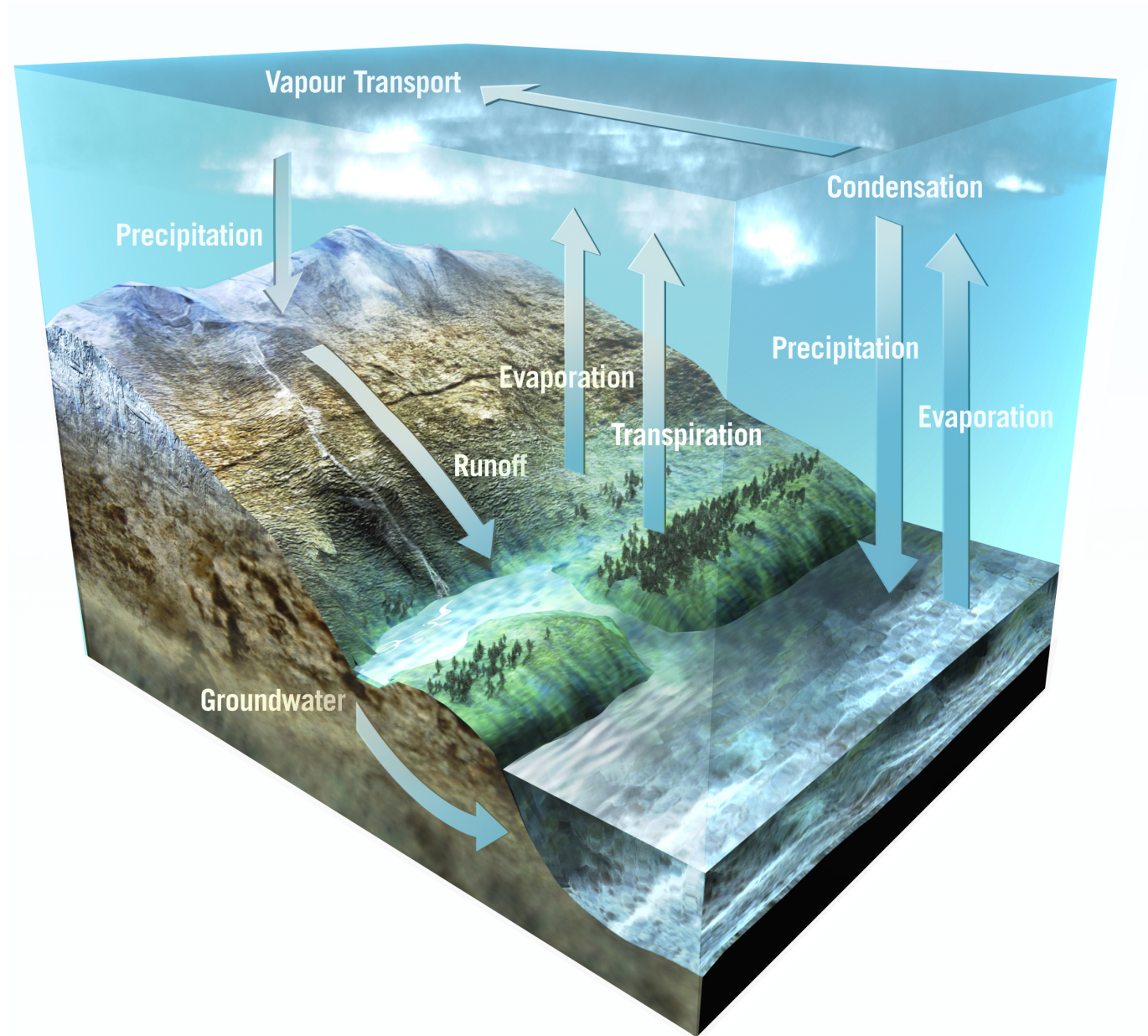
Taking energy out of the wind system is not a freebie!



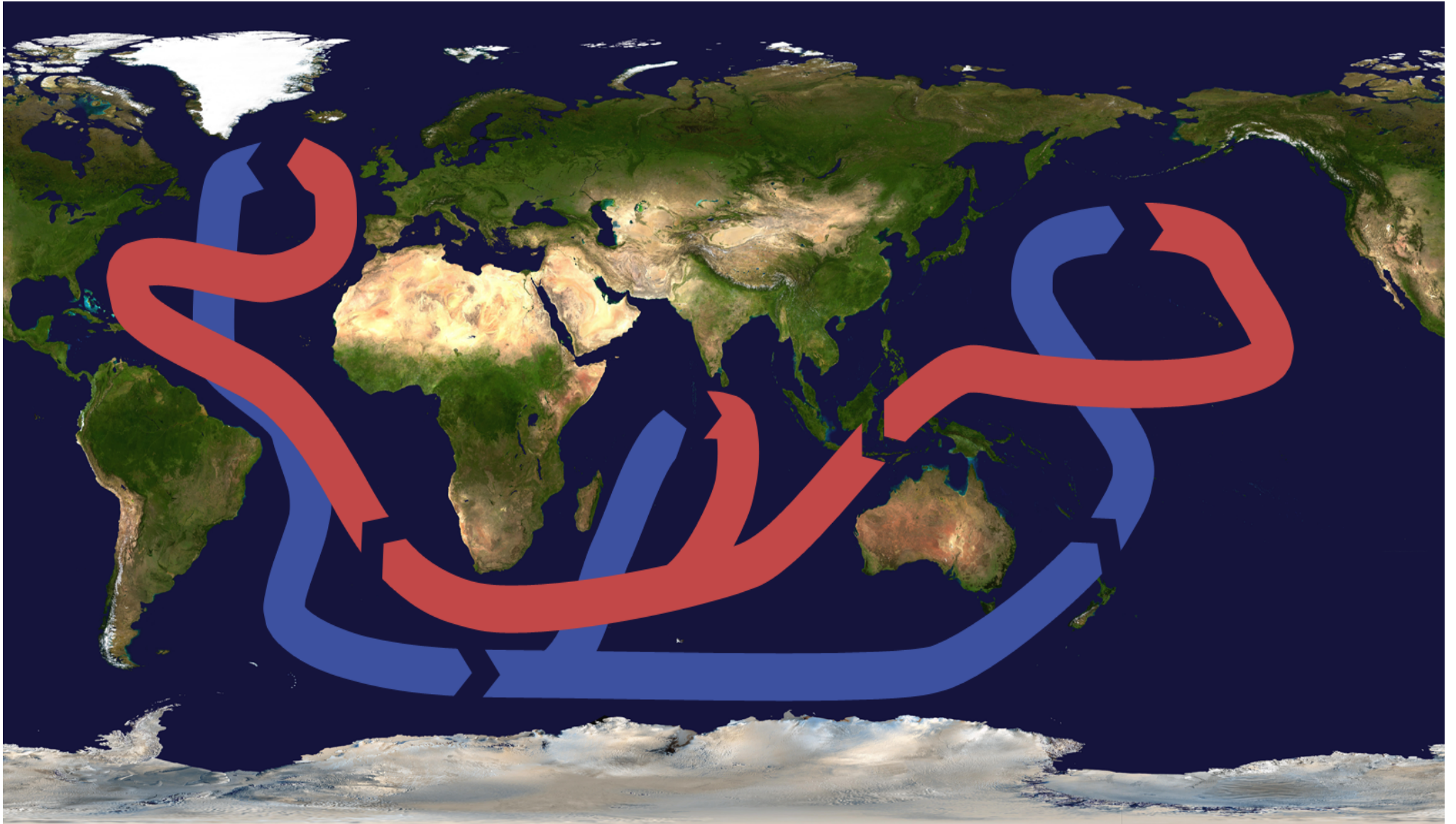
Convection & Cloud Physics are still a puzzle



... as is the global cycling of C-N-P-S-H₂O-etc.

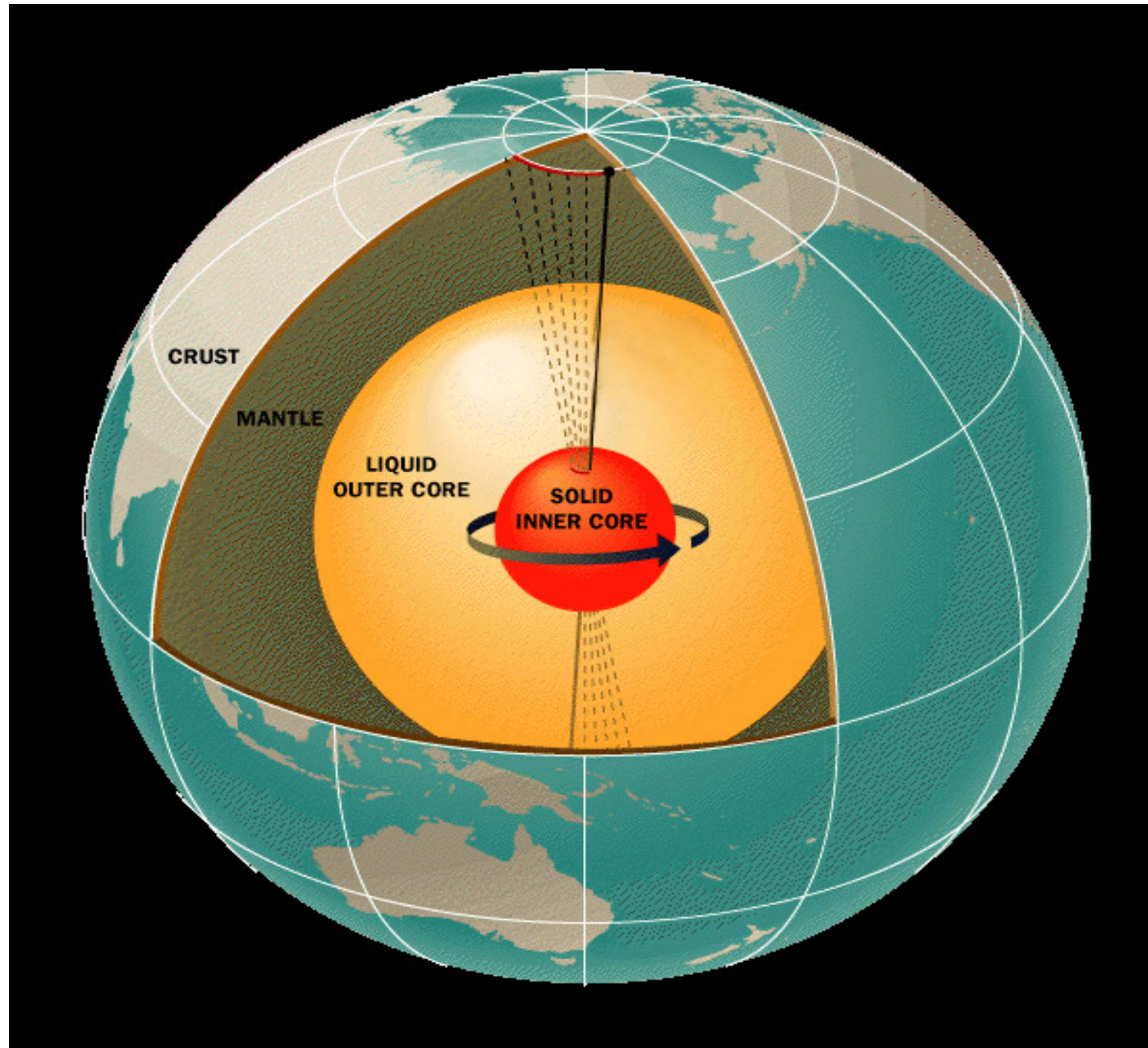


The Global Ocean Conveyor Belt has big impact on climate



Thermohaline circulation by Brisbane CC BY-SA 3.0 using
NASA Goddard Space Flight Center images from Visible Earth

... and the Earth's dynamic core is full of mysteries



Earth's magnetic axis drifts and sometimes flips!

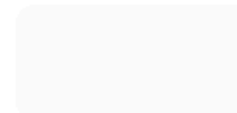
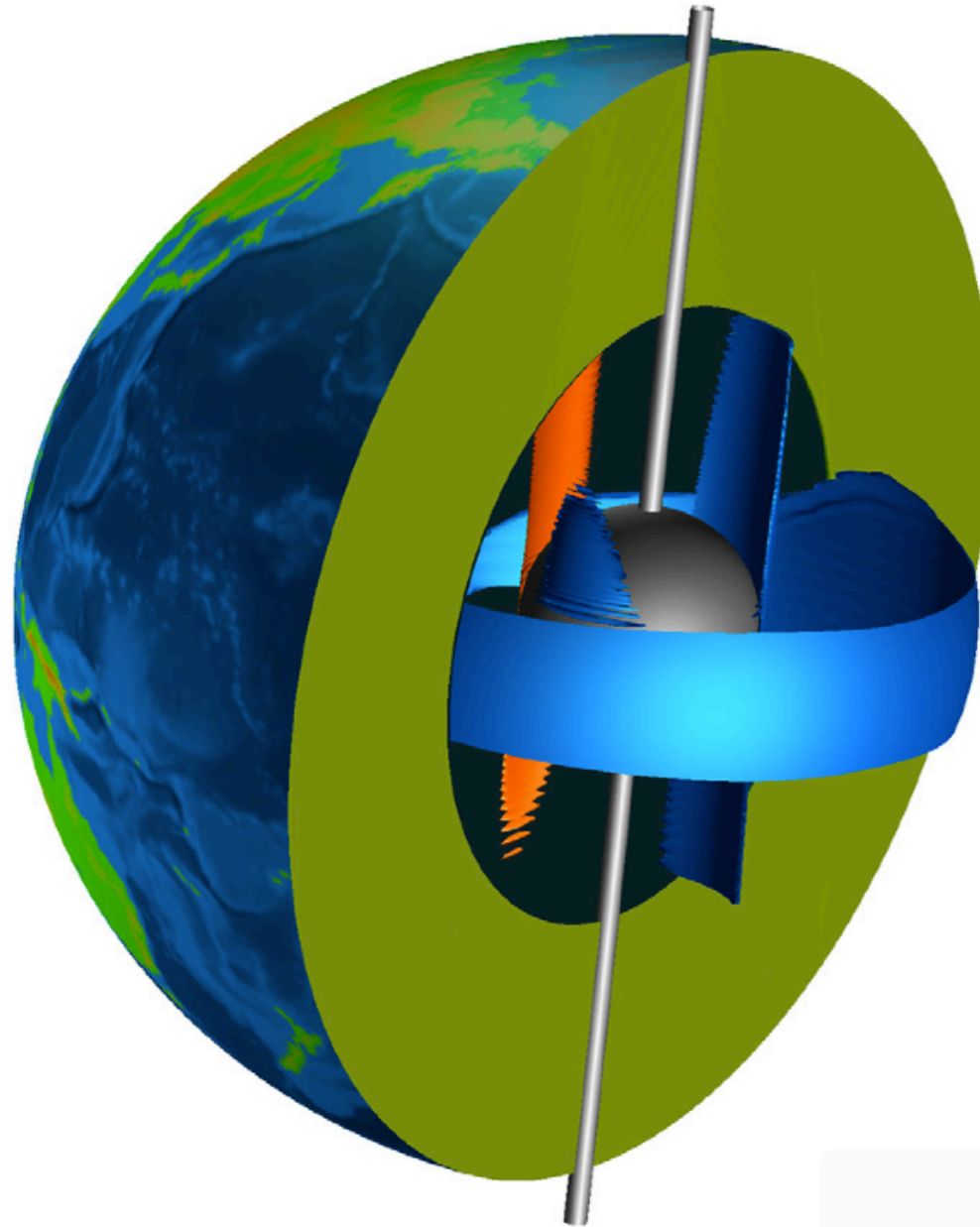
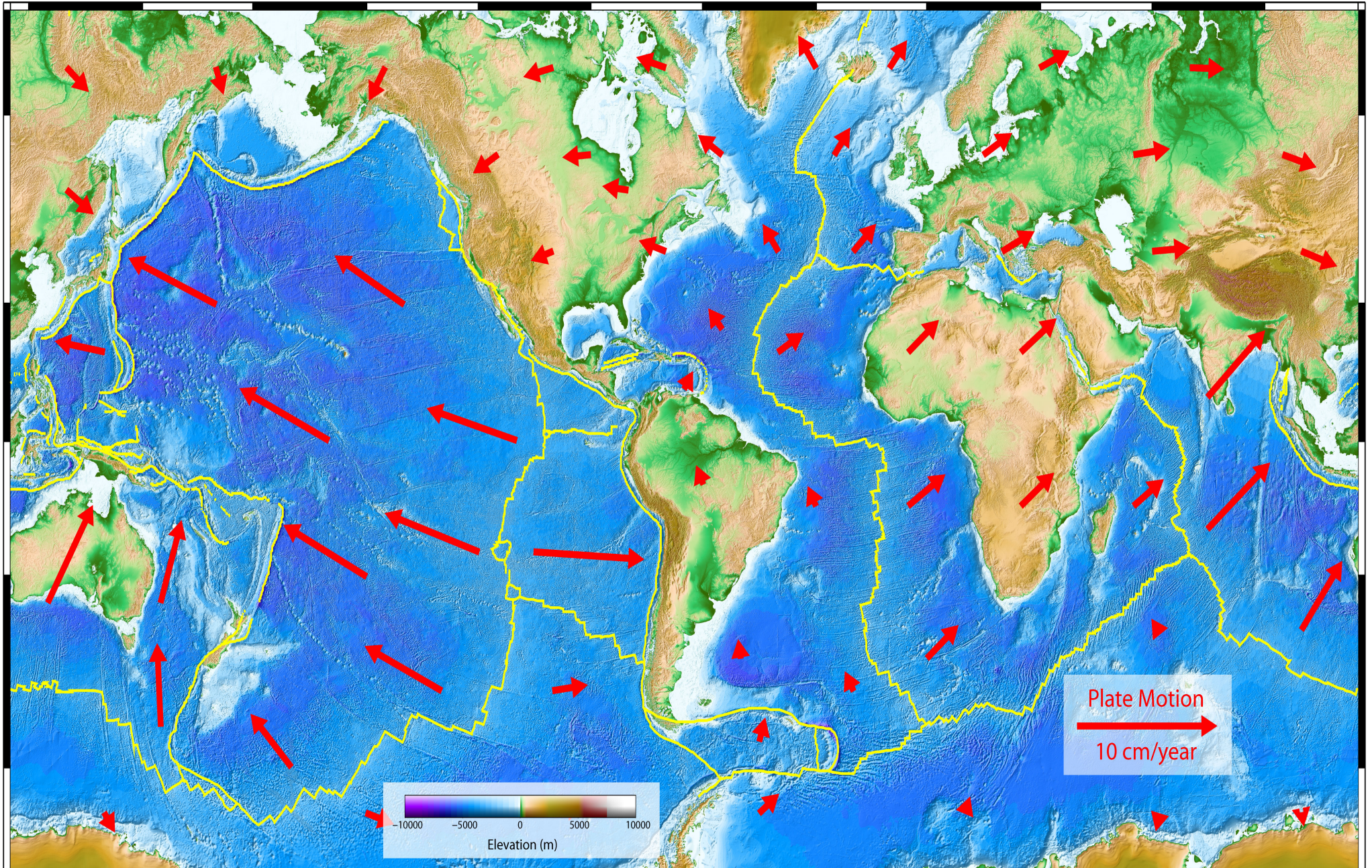


Plate Tectonics, Continental Drift & Subduction prevail



Subduction zones create volcanoes



Image Credit : US Geological Survey

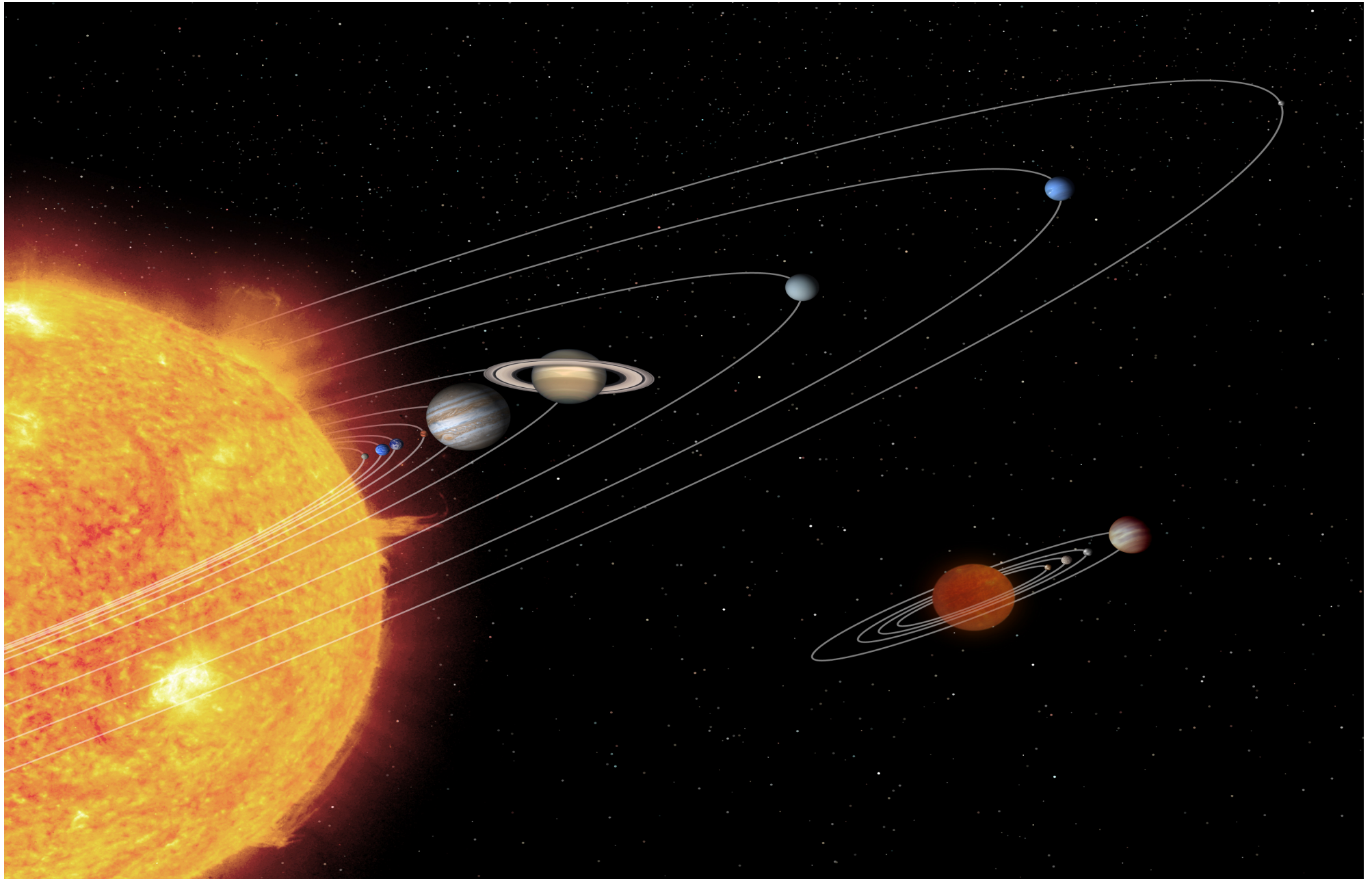
The Ring of Fire includes 452 major volcanoes!



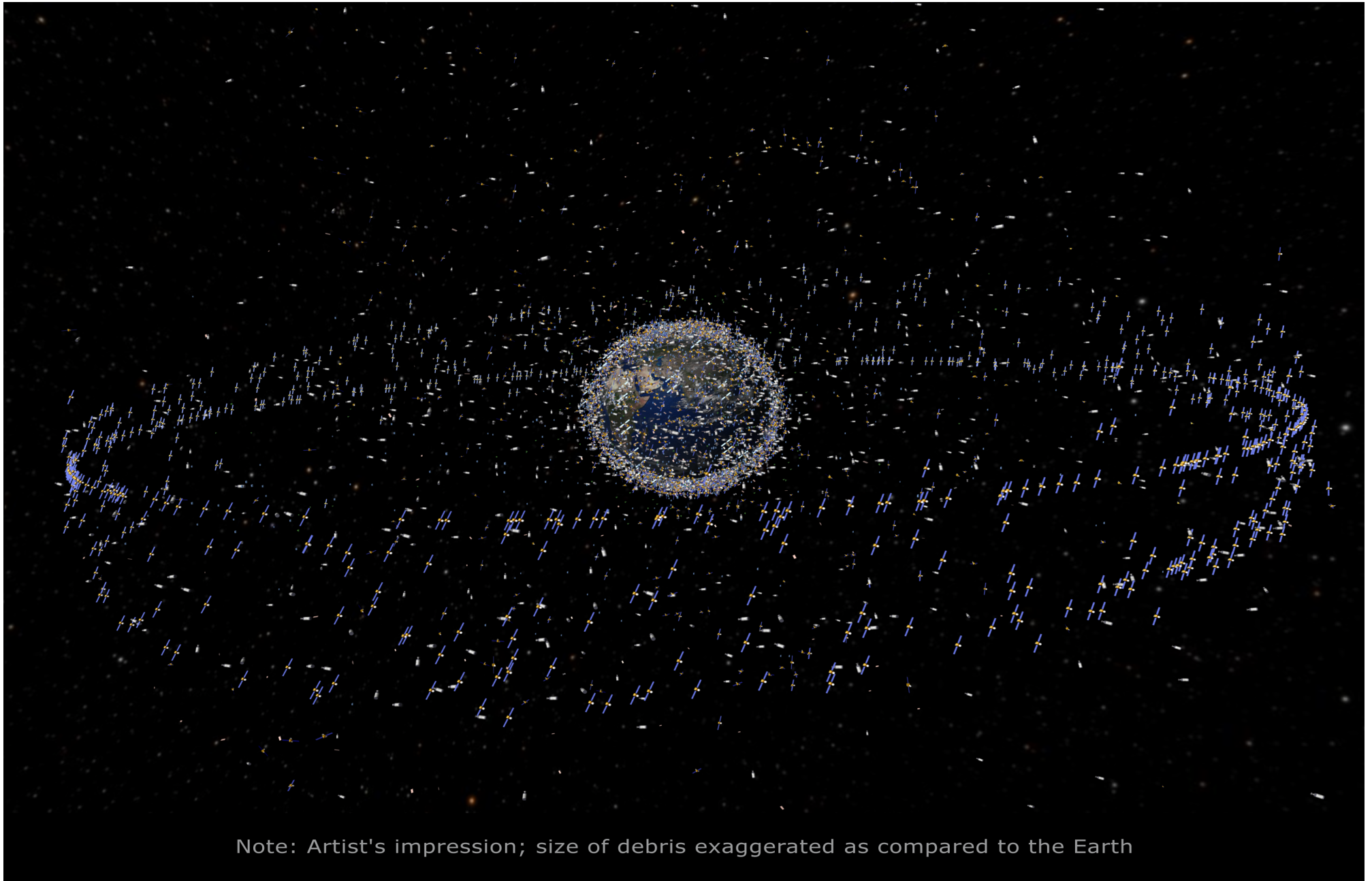
Daily, an average 20 volcanoes out-gas aerosols & CO₂



Our Solar System is dynamically interconnected



There are millions of NEOs capable of striking Earth



Note: Artist's impression; size of debris exaggerated as compared to the Earth

Such as the meteorite over Chelyabinsk 15.02.2013



ICES is more than a research program, it's about ...

- Insights into risk & predictability
- Public safety and policy guidance
- Long term food, water, energy security

*ICES is global, independent, for public good,
not-for-profit & philanthropically funded!*



**Helping guide the successful transformation of human society
in an era of rapid climate change and frequent natural disasters.**

www.icesfoundation.org

And ICES is about Connecting the Sciences

- Modelling & Simulation with HPC
- Statistics, algorithms, software
- Interactive visual narratives

*We are fast approaching big data Earth Science,
and an era of exascale computing resources:*

exaflops and exabytes

10^{18}