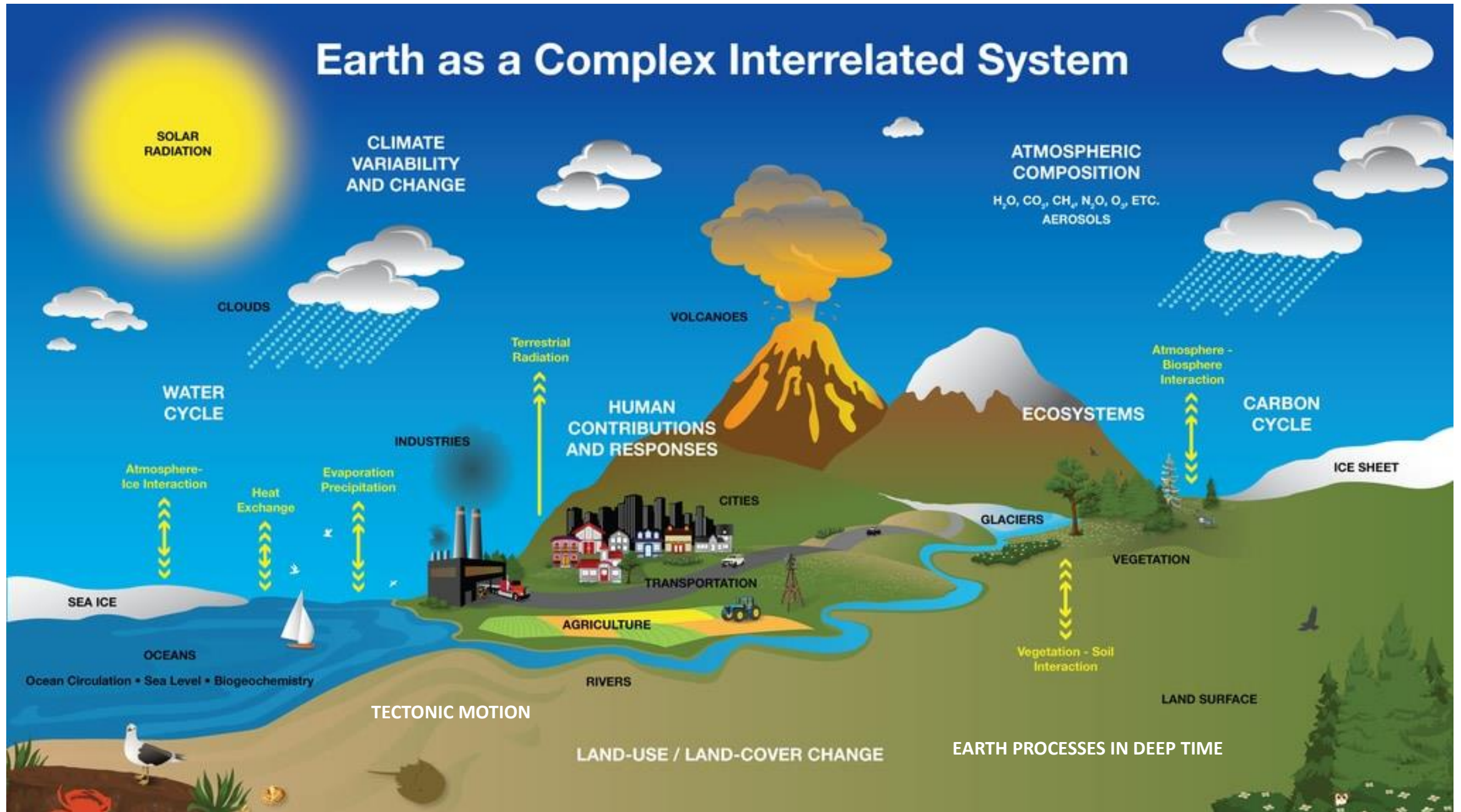


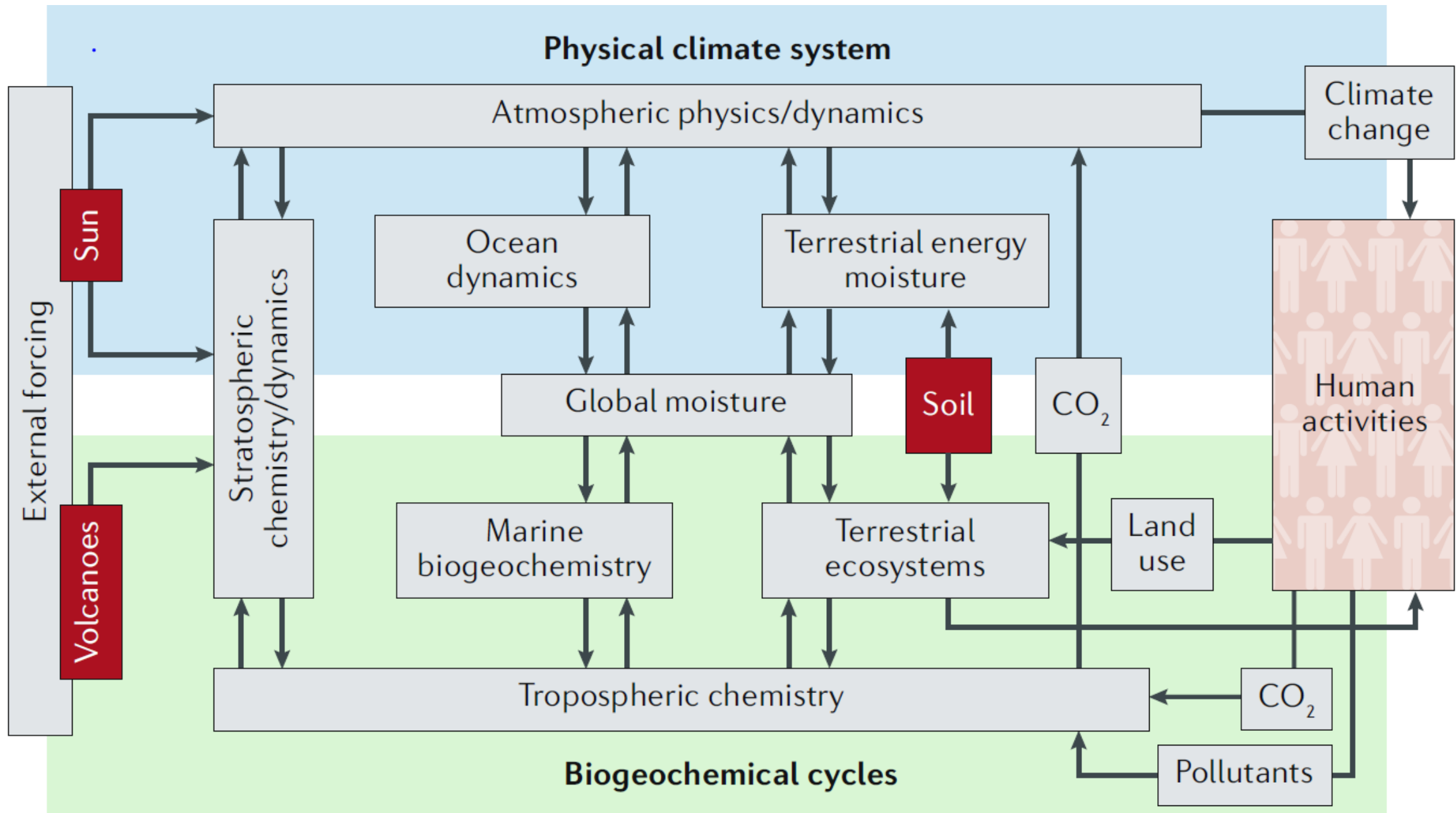
Advancing a Systems Approach to Studying the Earth: A Strategy for the National Science Foundation

**Bill Easterling, Assistant Director for Geosciences
National Science Foundation**



Earth as a Complex Interrelated System





“Bretherton Diagram”

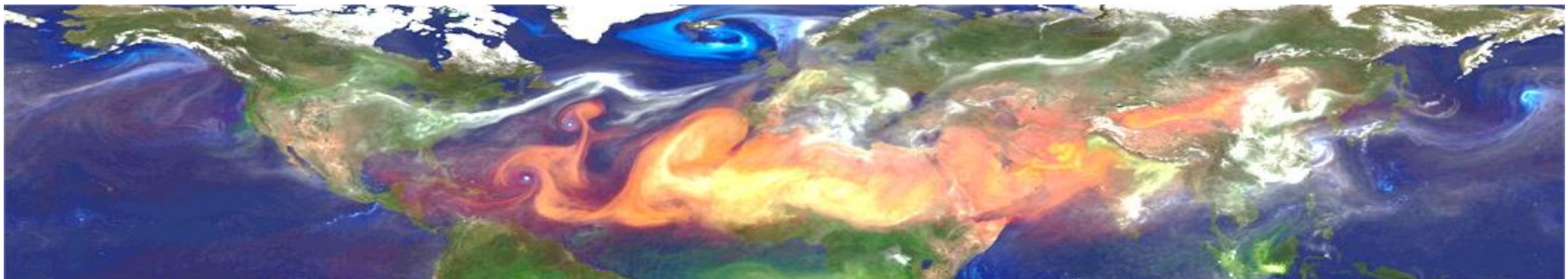
Source: National Research Council, 1986

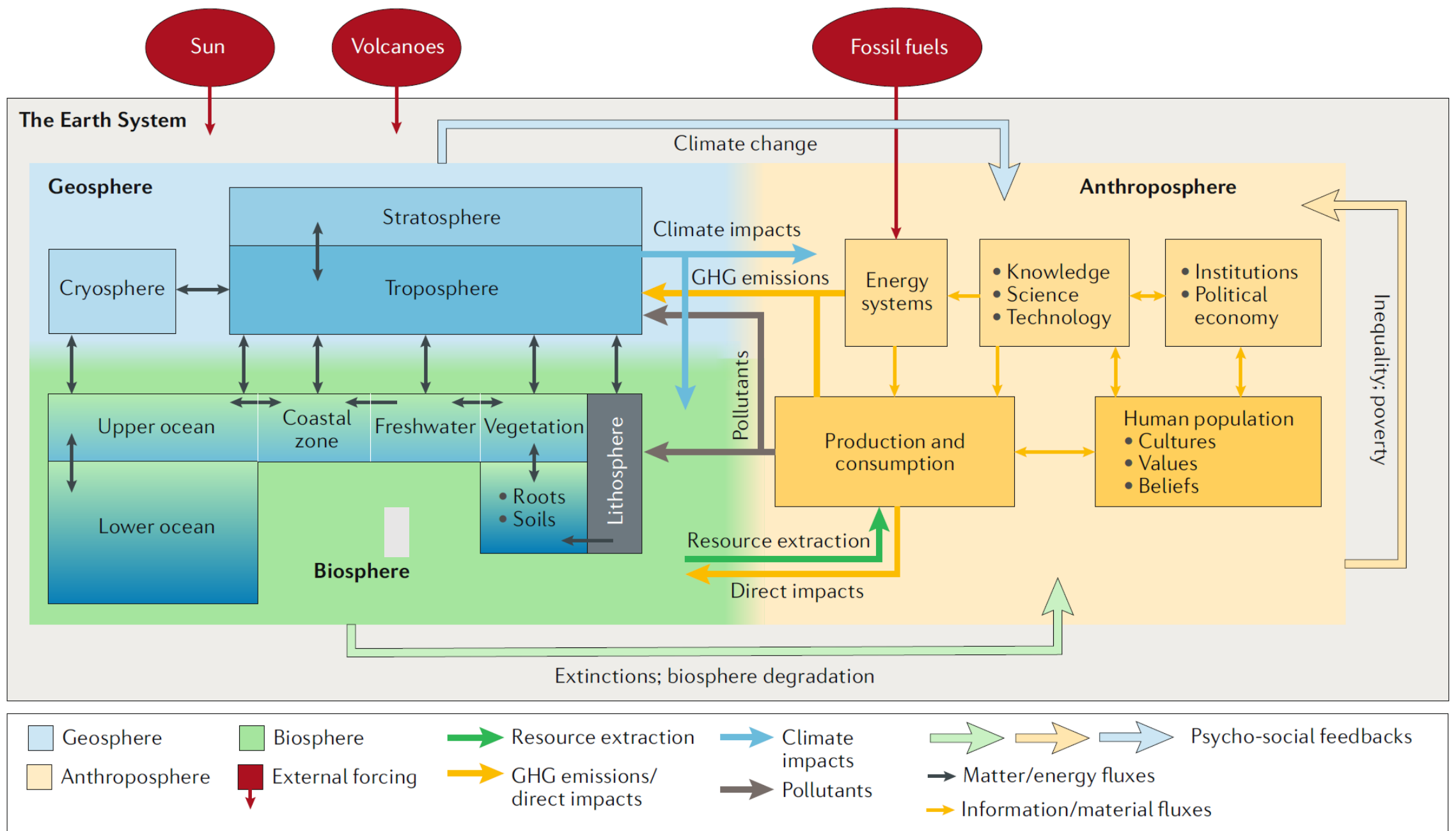
Why Renewed Emphasis on Earth System Science?

Advances in observing, modeling, and computing capabilities offer promise of large leaps in understanding how the Earth system is changing and the consequences for life on Earth.

ESS enables:

- Discoveries not possible when studying Earth system components in isolation.
- Synthesis of disciplinary knowledge into a holistic model.
- Improved forecasting to anticipate and to mitigate impacts from natural hazards.





Updated Bretherton Diagram

Source: Steffen et al 2020

Earth System Science supports Administration, NSF, and Community Priorities



- White House (OSTP) priority: *Earth System Predictability*
- NSF Big Ideas (e.g., Growing Convergence Research)
- GEO programs (e.g., Coastlines and People (CoPe)).
- GEO Research Frontiers.



National
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ESS Facility Leveraging Opportunities

Academic Research Fleet



Seismological Facility for the Advancement of
GEoscience (SAGE)



National Ecological Observatory Network (NEON)



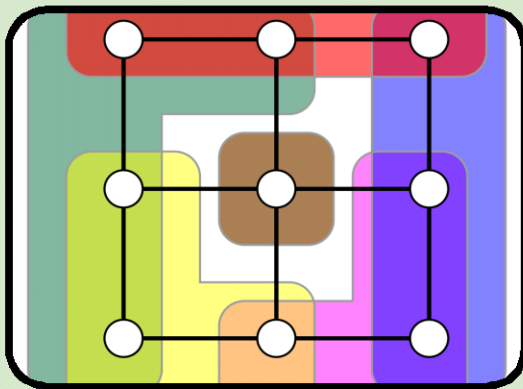
Geodetic Facility for Advancement of GEoscience (GAGE)



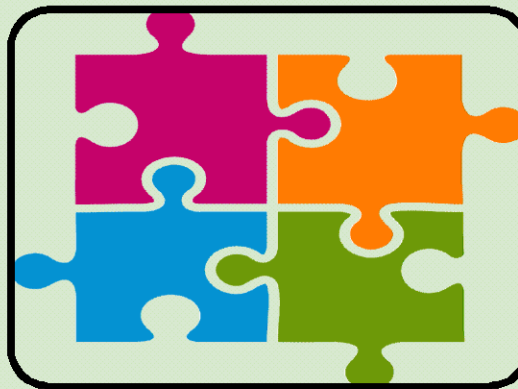


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Earth System Science Study – DRAFT Objectives



Develop framework
to enable NSF Earth
System research &
fully exploit
facilities.



Advise NSF on how
to integrate
workforce training
and innovative Earth
System education
opportunities to
enhance
engagement in
STEM.



Identify Earth
System science
synergies between
NSF and other
federal agencies.



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NASEM Earth System Science Study – Organizational Framework

