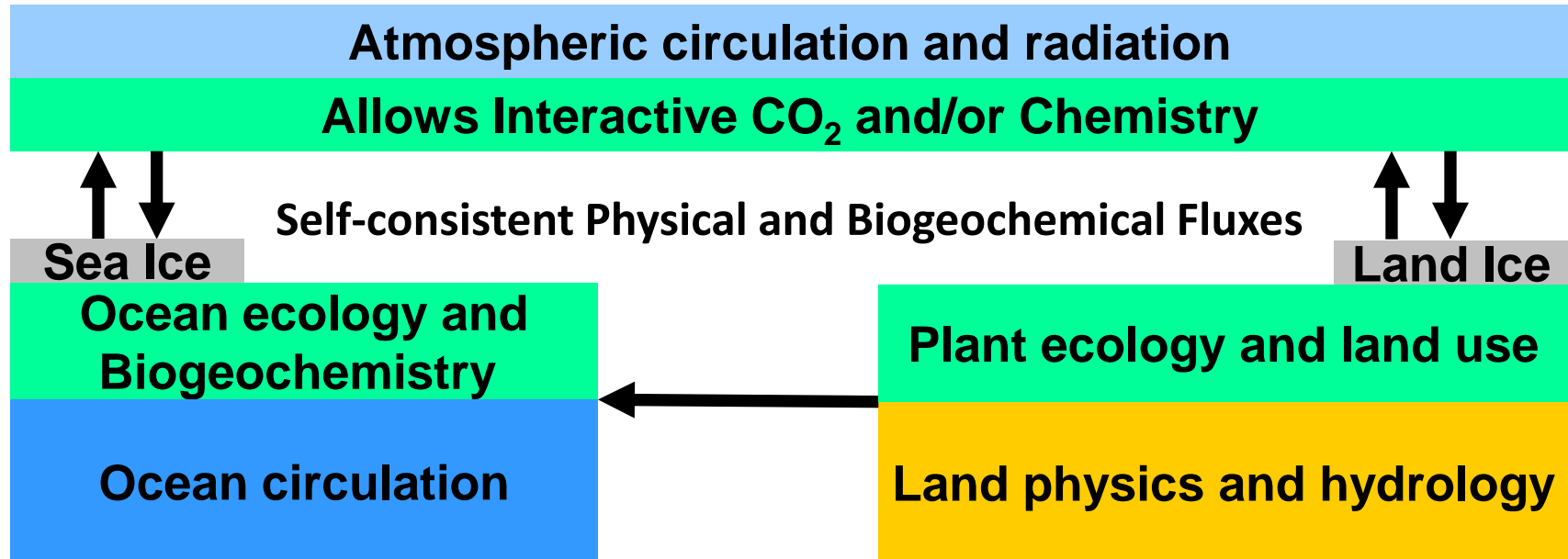


# GFDL's Earth System Models (ESMs) for Coupled Carbon-Climate and coupled Chemistry-Climate



- Broadly interdisciplinary effort
- Extends GFDL's applicability beyond physical climate
- Leverages Princeton, NOAA and larger community
- Invites collaboration with diverse impacts communities

# Key Messages in Chemistry, Carbon-Climate and Ecosystems

- GFDL coupled carbon-climate (ESMs) and coupled atmospheric chemistry-climate (CM3)
  - At the leading edge of model comprehensiveness and fidelity.
  - Improving understanding of processes determining biogeochemical distributions and change.
- GFDL's Models have been key contributors to CMIP5.
- Involve both fundamental developmental achievements and prolific contributions to improving scientific understanding.
- In the long term, these efforts move to realize NOAA's vision for an Earth System understanding of climate-human-ecosystem interactions and impacts

# Moving forward with GFDL's ESMs

- **Application:** Multi-member ensembles for detection and attribution, centennial-millennial scales, idealized sensitivity, diverse impacts application.
- **Comprehensiveness:** beyond closing the CO<sub>2</sub> cycle to fully comprehensive and self consistent representation of aerosol, Fe, CH<sub>4</sub> and N cycles, and ecosystems
- **Resolution:** Resolving regional atmosphere-land interactions and the ocean mesoscale for improved base state and change, and the human and marine applications
- **Prediction:** Integration with seasonal-decadal climate prediction effort, exploring opportunities for experimental biogeochemistry prediction

