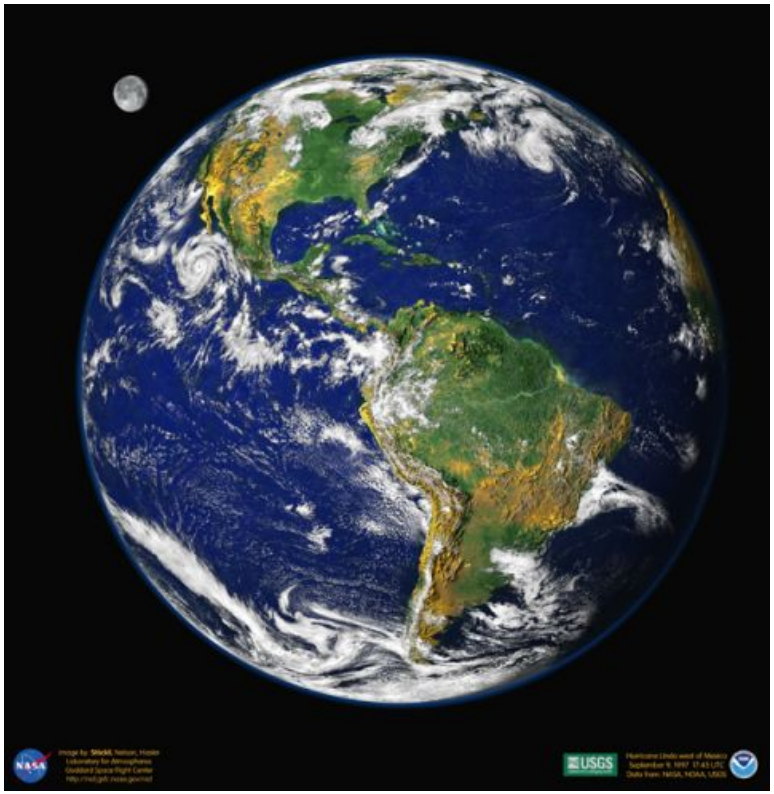
Long Transient Simulations of Glacial, Interglacial, and Future Climates

24th Annual CESM Workshop

June 17, 2019

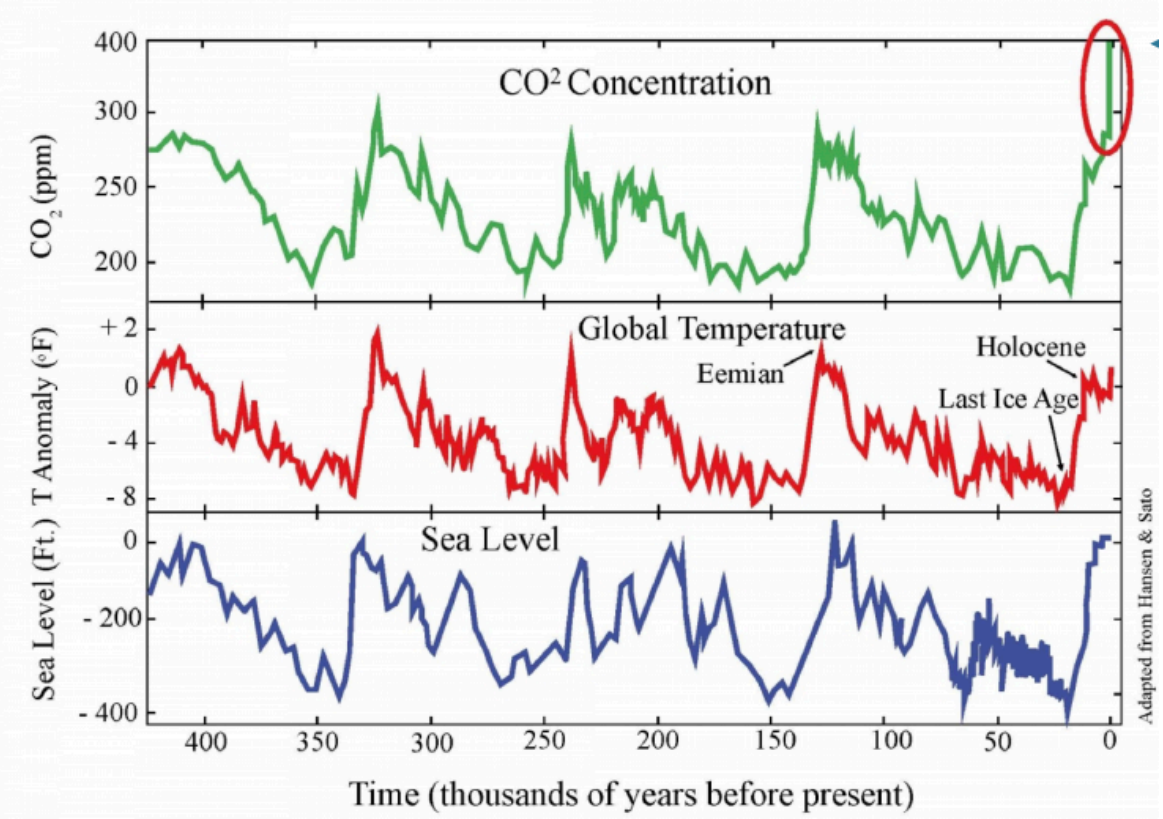


Credit: R. Stockli, A. Nelson, F. Hasler, NASA

Goals and Challenges

- Simulate the evolution of the Earth system on time scales of several centuries to many millennia, up to full glacial-interglacial cycles.
- **Prescribe** as little as possible:
  - Orbital parameters (precession, tilt, eccentricity)
  - Continent outlines, geothermal heat flux
  - Human greenhouse gas emissions (for recent and future climates)
- **Prognose** the rest:
  - Biogeochemical cycles
  - Dynamic vegetation
  - Ice sheet advance and retreat
  - Solid Earth rebound, sea level

Time scales and computation



Full glacial cycle: ~100 kyr

- CESM2 cost: ~3 million cpu-hour / 1 kyr
- CESM2 throughput: 1 kyr / month

Need acceleration strategies!