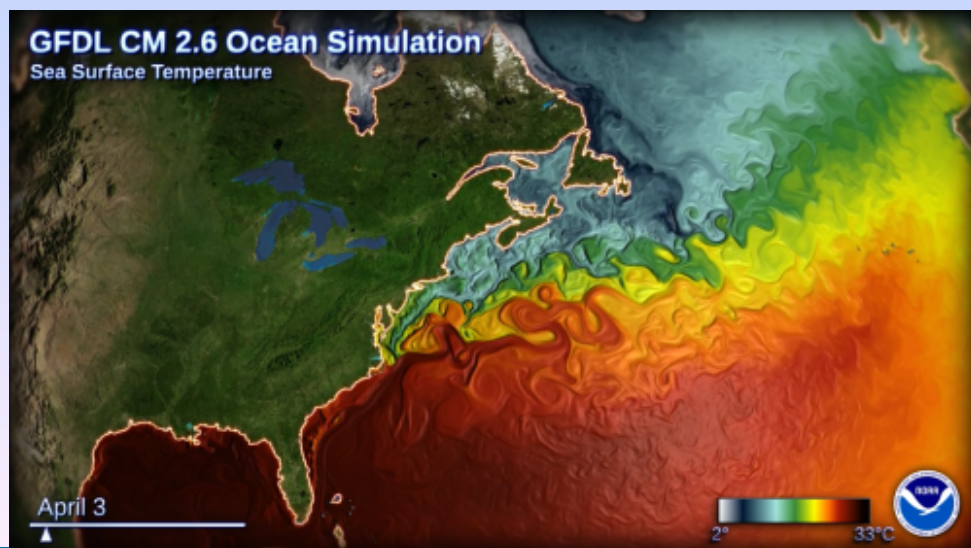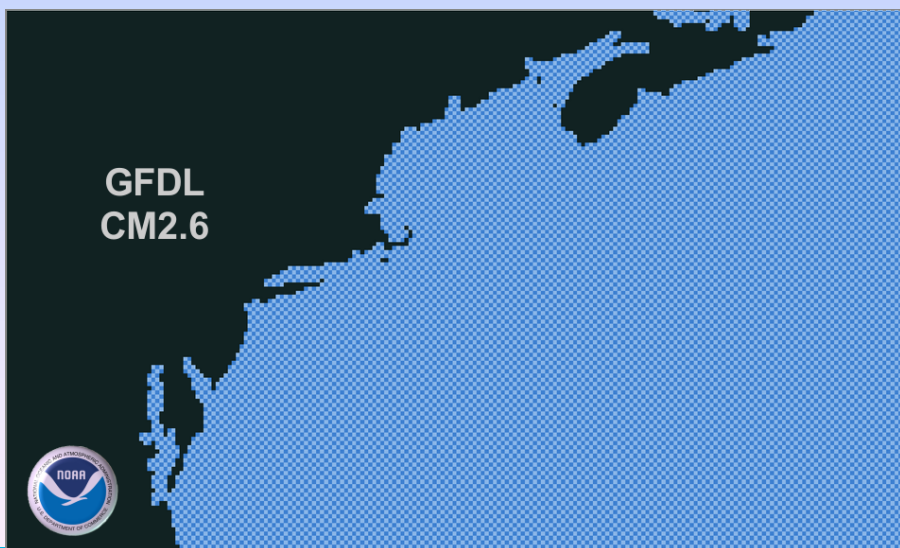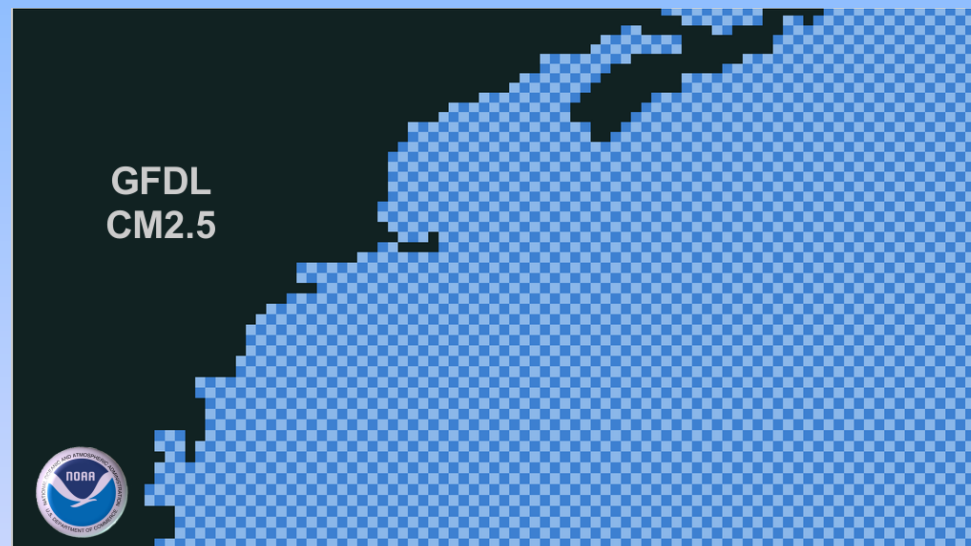# NCRC Grid Allocation Management
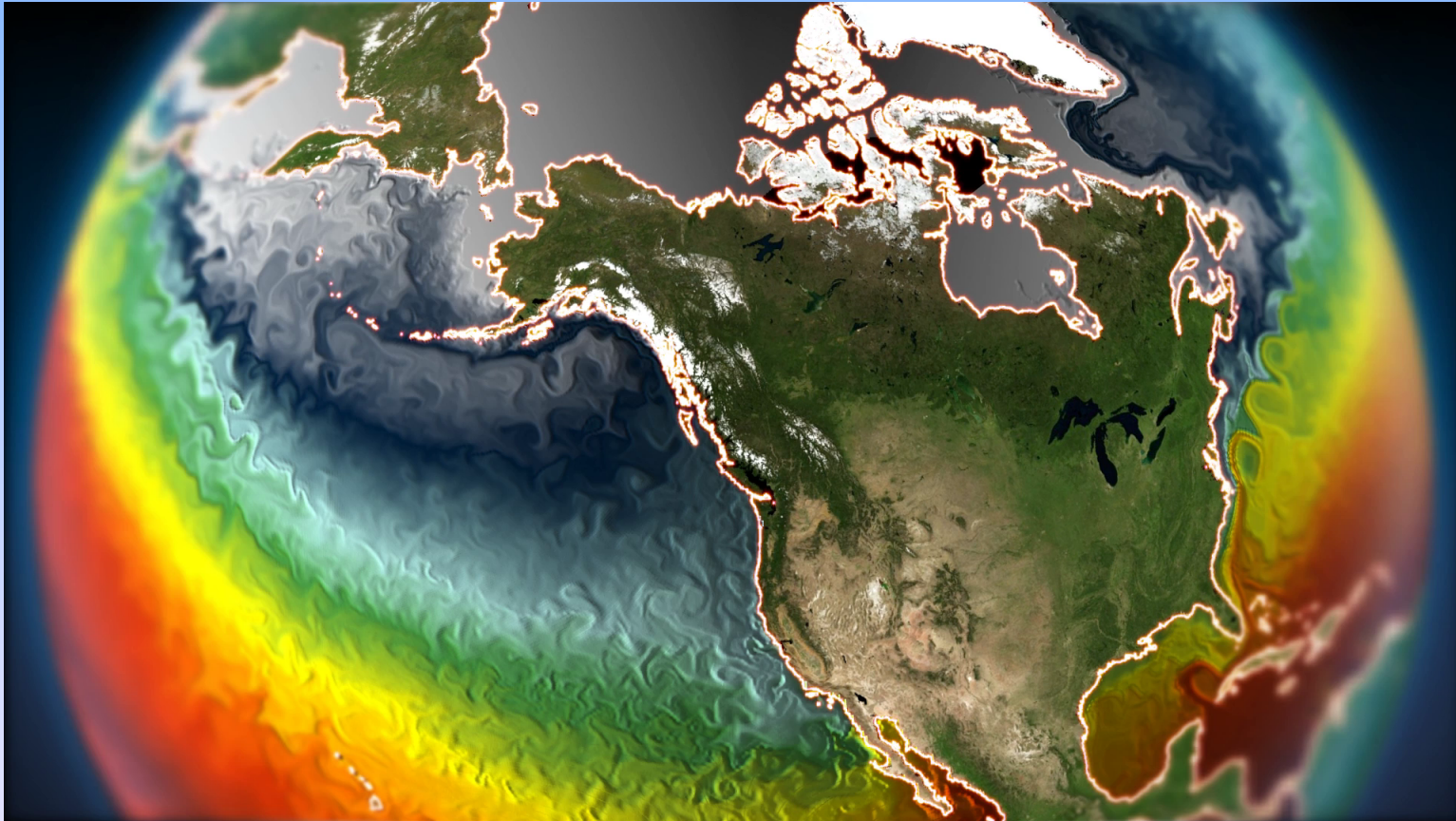
High Resolution Coupled Models

GFDL CM2.1

GFDL CM2.5

GFDL CM2.6

GFDL CM 2.6 Ocean Simulation
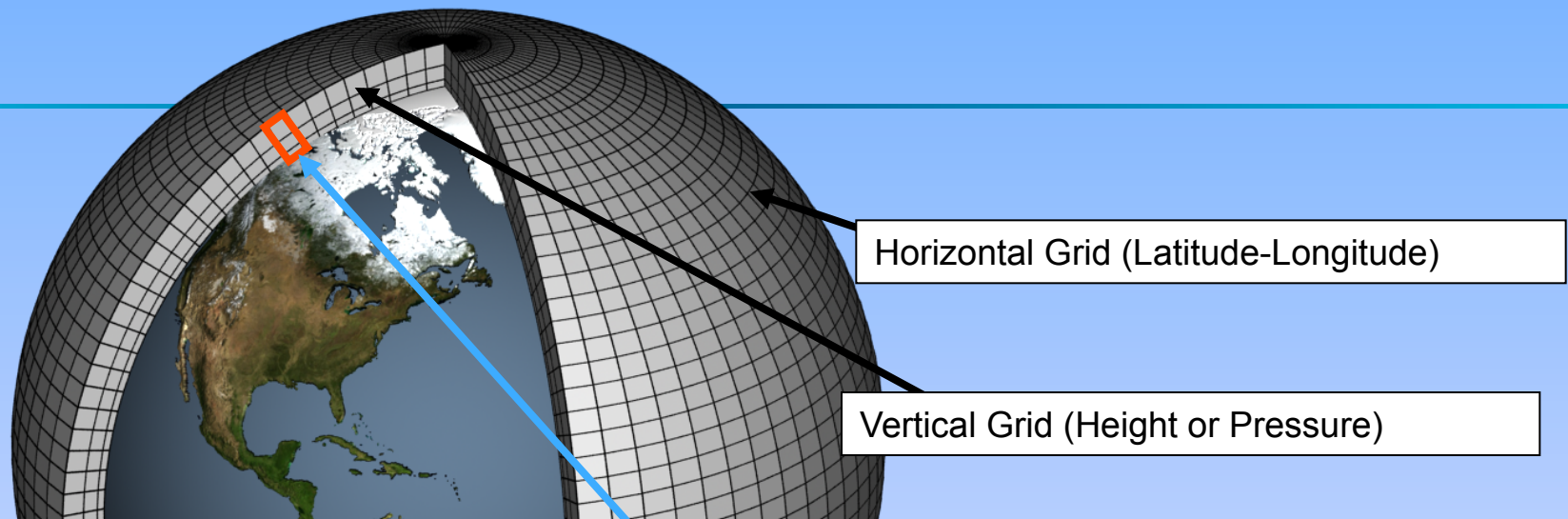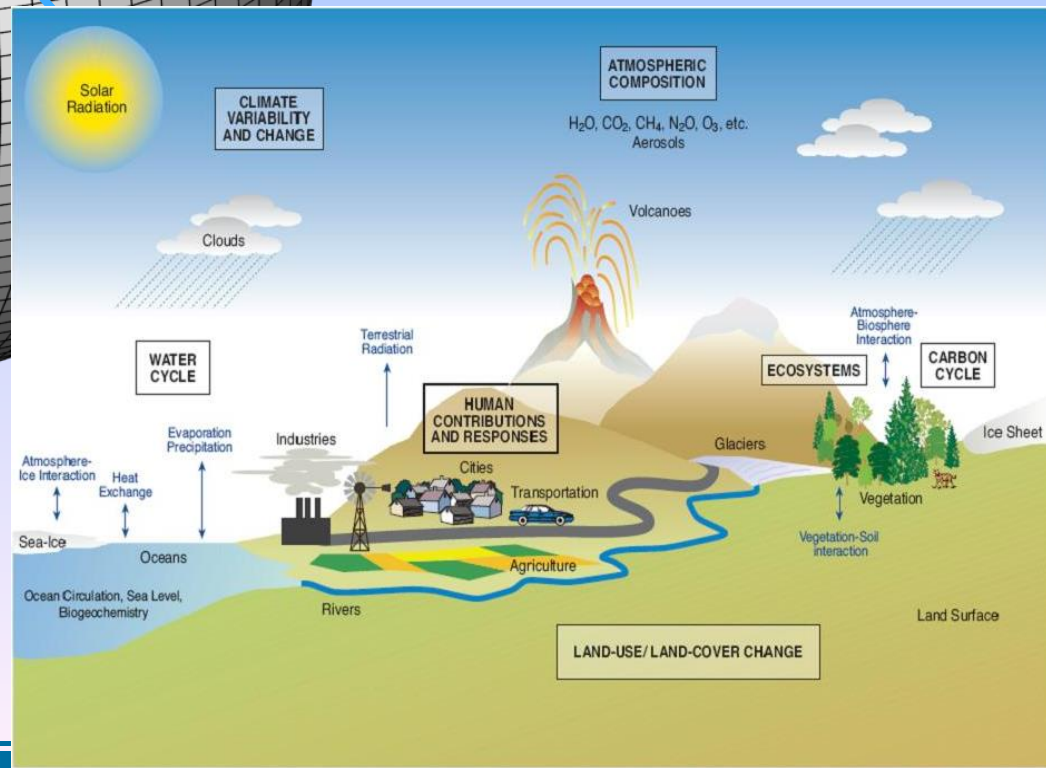Sea Surface Temperature

April 3

2° 33°C
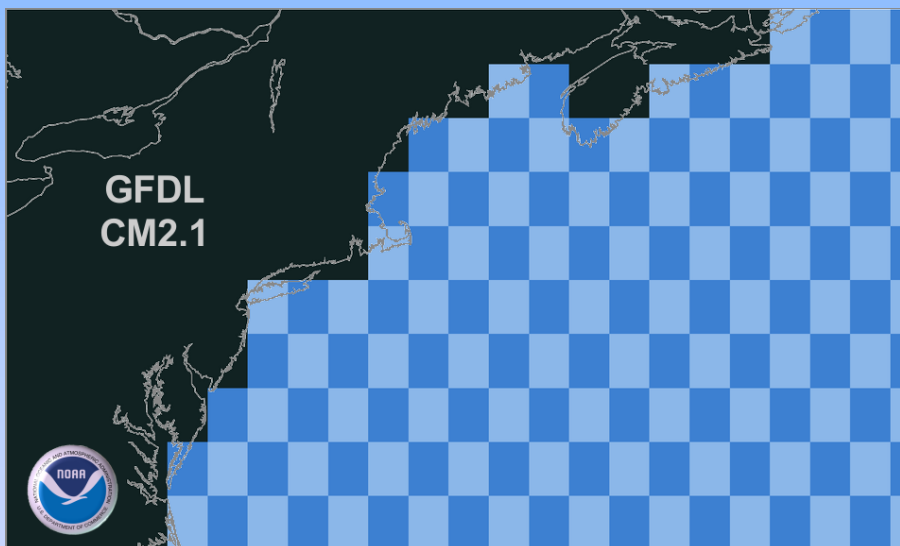
Schematic Global Climate Model

Horizontal Grid (Latitude-Longitude)

Vertical Grid (Height or Pressure)

A GCM is a mathematical representation of the major climate system components and their interactions. The GCM equations operate on a global grid and are solved on a computer.

High Performance Computing
Locations

Seattle

West Virginia –
National Centers for
Environmental Prediction

West Virginia –
Development HPC
System

Princeton

New Jersey –
Geophysical Fluid
Dynamics Laboratory

Indianapolis

Boulder

Fairmont

Colorado – Earth Systems
Research Laboratory

Asheville

Oak Ridge

Maryland –
National Centers for
Environmental Prediction

Tennessee –
ORNL/NCRC

△ HPC Advanced Network

● Operational HPC Systems

■ Existing Applied Research and
Development (R&D) HPC Systems

★ New Applied R&D HPC Systems
(Recovery Act)

R&D Allocations

- 3 Centers + Programs
  - On Gaea we allocate to 3 centers and 2 programs
- 4 R&D HPC sites
- Centers use different allocation methods

Goals

- Allocate across the enterprise with a "single" allocation system
  - Allow for for different methods
  - Centralize reporting and allocation management
- Unify projects
- Unify the user database
- Provide allocations monthly
- Translate site colloquiums into enterprise terms for high level reporting

Projects

- That's the easy part right?

- As specified by NOAA:

  - Understanding and porting of climate codes

- As specified by the lab:

  - "f" group

The NOAA/NCRC Grid Environment

- Gaea
  - Two compute partitions
  - Supporting infrastructure
- GFDL
  - Pan – post processing and analysis
  - Data Archive
- Stats:
  - About 15K jobs per day
  - 317 TB transferred from Gaea to the GFDL archive each month

Gaea

- Each compute partition is treated as a separate system

- Each has chargeable infrastructure

- Currently treating the entire production workflow as a charged resource

  - All production jobs are charged until post-processing begins

Gaea

- Dual running

  - 50% split of allocation to add a second run for verification purposes

  - Standard procedure for new systems

  - Sometimes needed for extended duration

Current Gold Implementation

- One instance located at GFDL
  - Collects data for Gaea and the rest of the NCRC grid
  - 2 Grid points, multiple moab instances
- One instance located at NESCC
  - Collets data for Zeus
  - Just entered production

Allocations Implemented

- Each group has up to three allocations
  - One for each partition, and a verification allocation
- Users and workflow developers found this unsatisfactory
- Looked for a streamlined way to allow for multiple allocations to a single project

Allocations Implemented

- Each project group gets a single project
    - Each project gets an account for each system
    - The correct system allocation is charged by system name
    - Each queue has a qos called dual
- The result is that the users can be assigned a default project and charge the correct allocation

Allocations Implemented

- Needed to add an additional report to show dual runs

    - Shows overall time assigned to verification running

- Current reporting was not able to track this

- This is partially being put into production this month

    - Changes will continue next month, once moab patches are tested

What Worked

- Gold is very customizable

- Supports allocation schemas

- Works with multiple instances

- Support (ok, Scott) is good

What Needs Improvement

- Sometimes Moab and Gold don't agree with each other

    - Charging queue time

    - Internal system charging

- Reporting has been a challenge

    - Reset the monthly deposits for each month

    - Infinite allocations

    - Accounts with less than zero

    - Built in tools are somewhat unusable

    - Performance is an issue

What Needs Improvement

- Adding "features" is somewhat costly
- Users have lost confidence in the product because of the volume of issues

The Future

- Structure partitions into single projects with multiple accounts

- Create debit and credit accounts for different resources

- Provide a reporting instance of Gold across the NOAA R&D HPCS

- Translate the site data into enterprise data

- Moab Accounting Manager

Summary

- Support for the product line is good

- Gold provides a good base for implementing NOAA's reporting and accounting goals

- There are some places where Gold can be improved to increase usability and functionality

- Reporting is the biggest issue that we have run into, and we are working constantly on improving it

Thank You

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