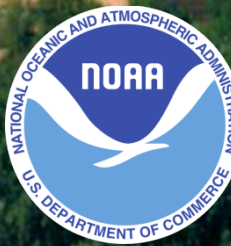# NOAA Earth System Research Laboratory
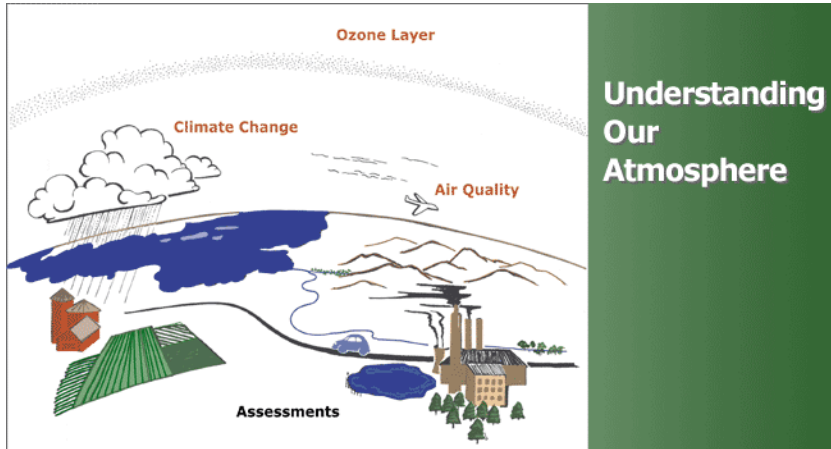
Boulder, Colorado

NOAA Earth System Research Laboratory
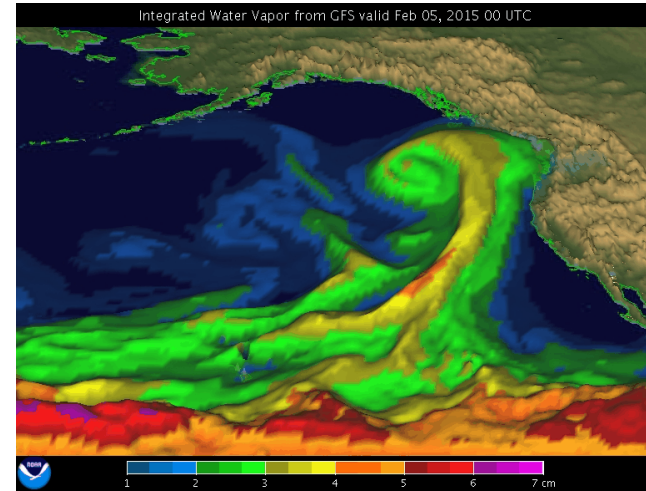
Boulder, Colorado

"To observe, understand and predict the Earth system through research that advances NOAA's environmental information and service from minutes to millennia on global-to-local scales."
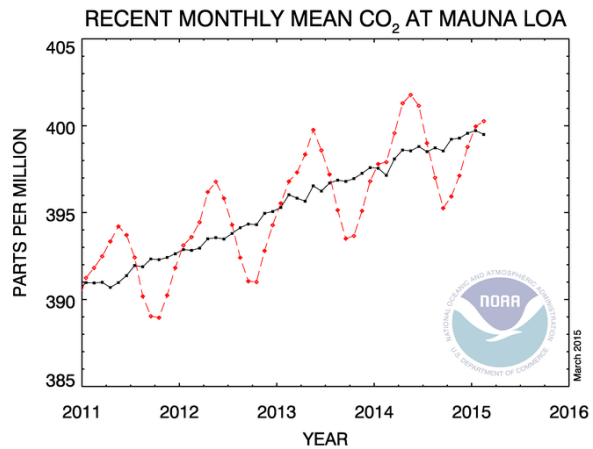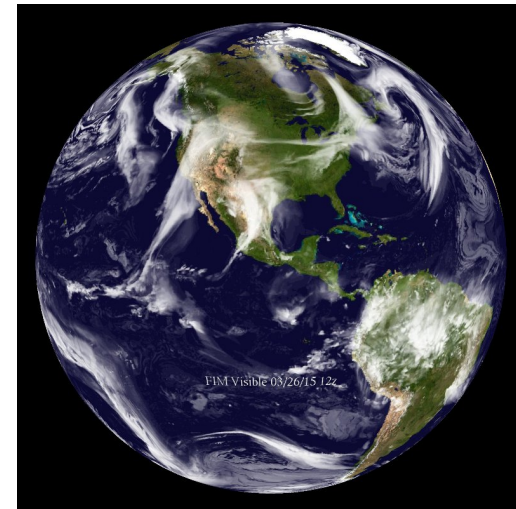
Earth System Research Laboratory

Chemical Sciences Division

Physical Sciences Division

Global Monitoring Division

Global Systems Division

The Earth System Analyzer:

Using all of the Data to Improve NOAA's Mission Capabilities

Alexander E. MacDonald

NOAA
Earth System Research Laboratory

Earth System Analyzer: Components

Planetary Domain

Domains of Action

Atmosphere

Interface

Oceans

ICE   LAND SURFACE   HYDROLOGY

Analysis Model

Assimilation

Observations

Physical   Chemical   Biological

Domains of Science
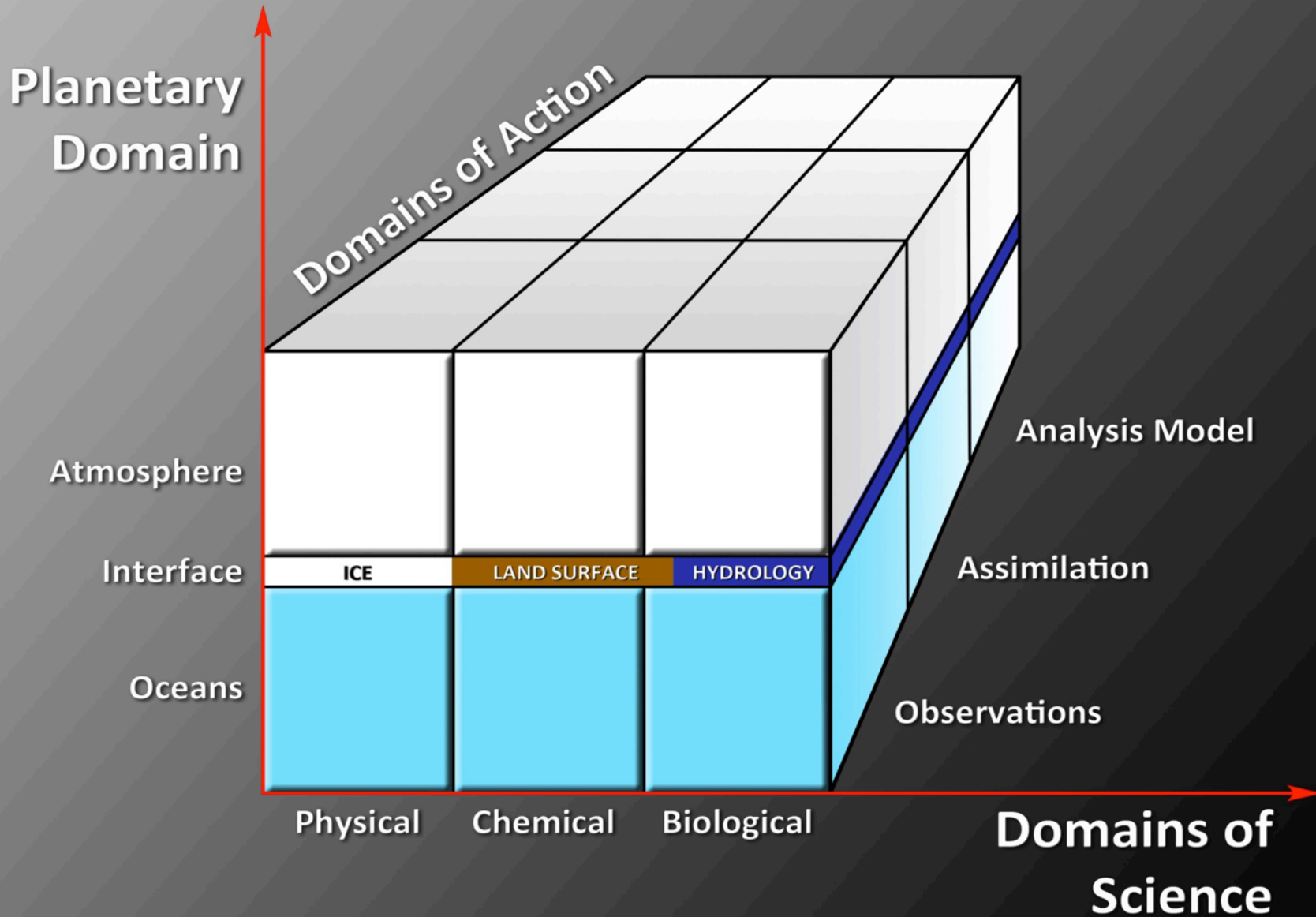
Chemical:

There are about a hundred atmospheric constituents that need to be tracked.

Biology:

The most complex part of the Earth System.
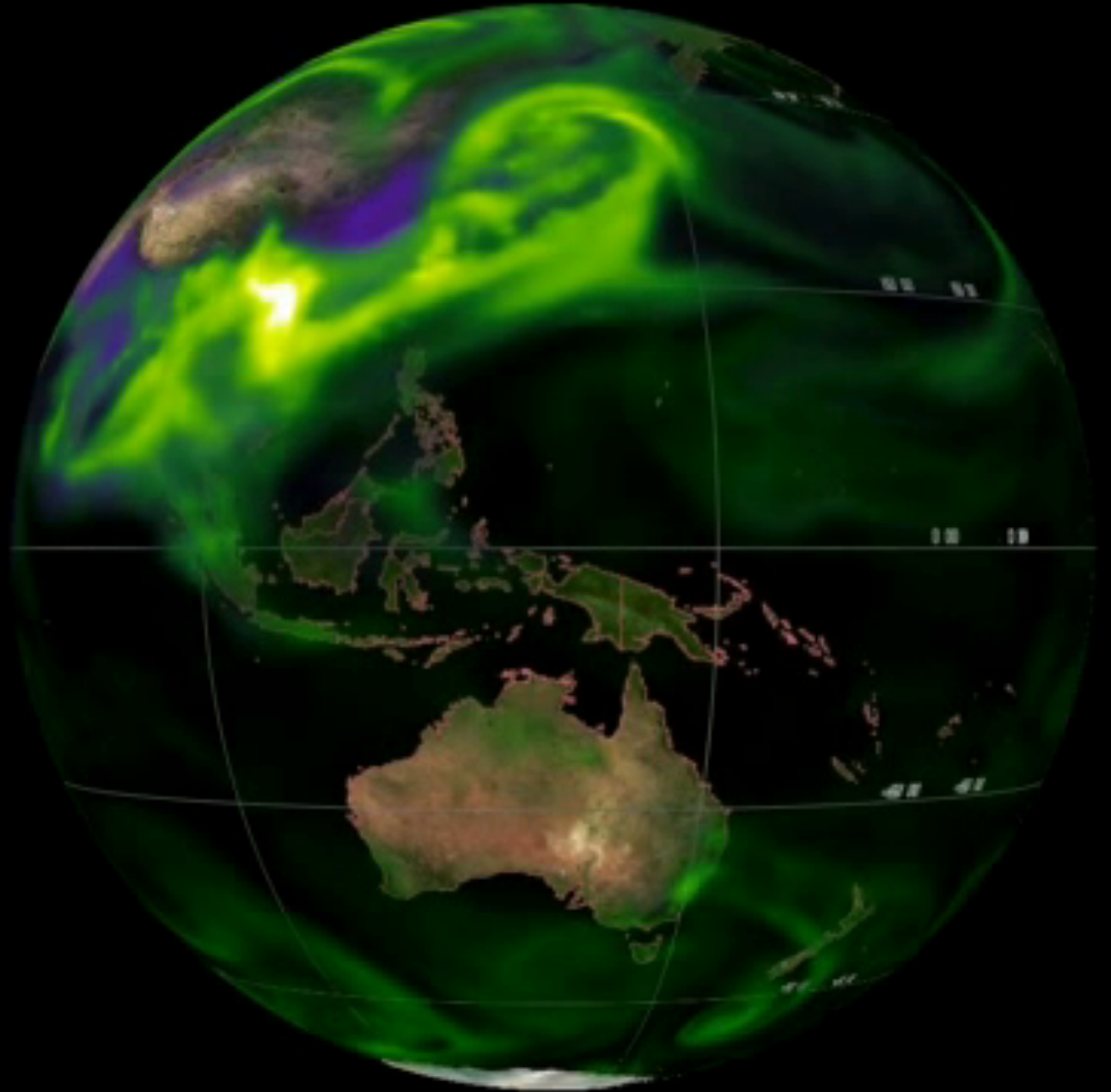
Suomi NPP VIIRS

Boreal Summer
21 June 2012
through
20 Sep. 2012

Chlorophyll (mg/m^3)

0.01   0.05   0.2   5
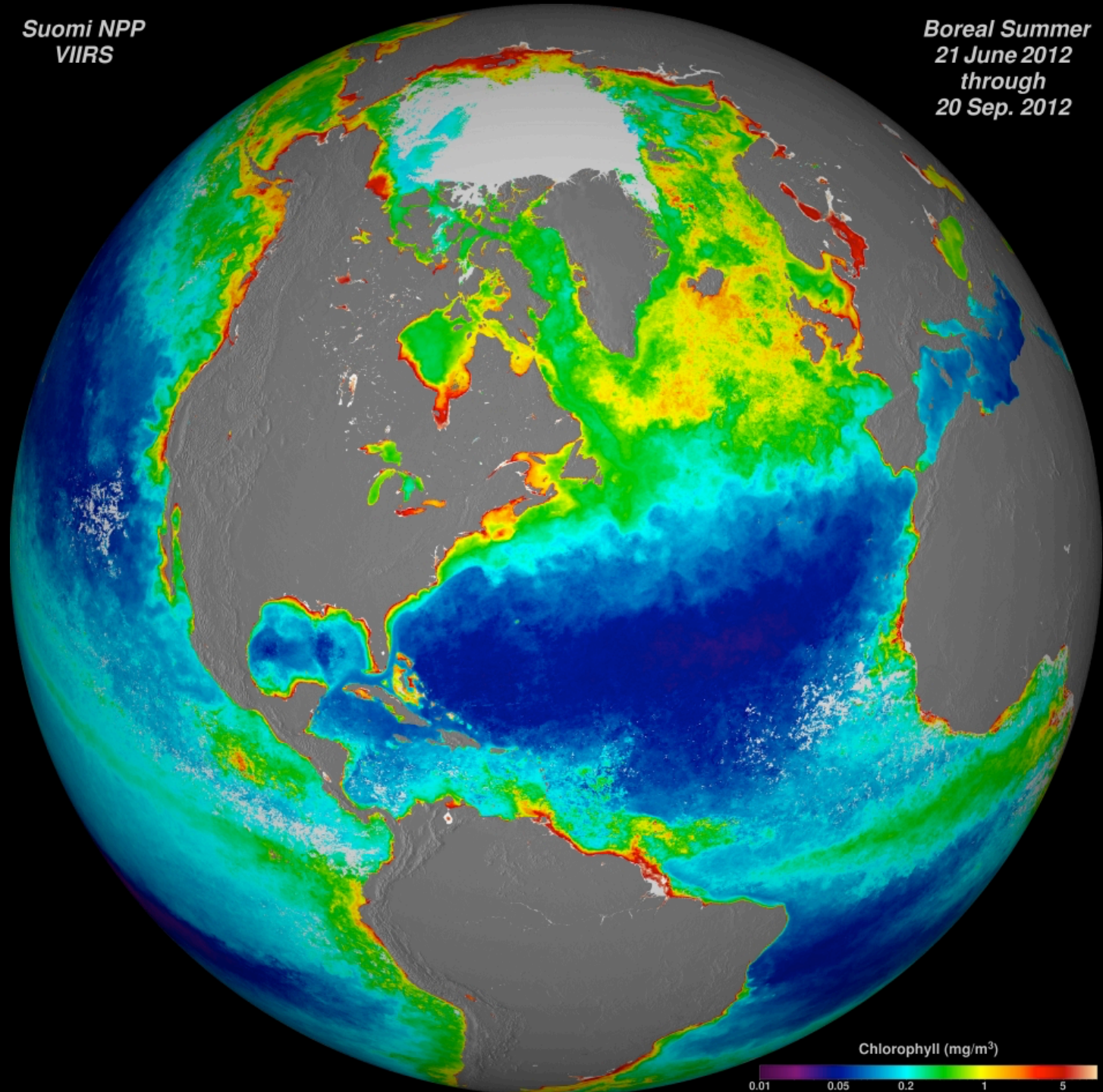
ESRL FIM model prediction compared to actual satellite data for 7 days.

Predicted

Observed
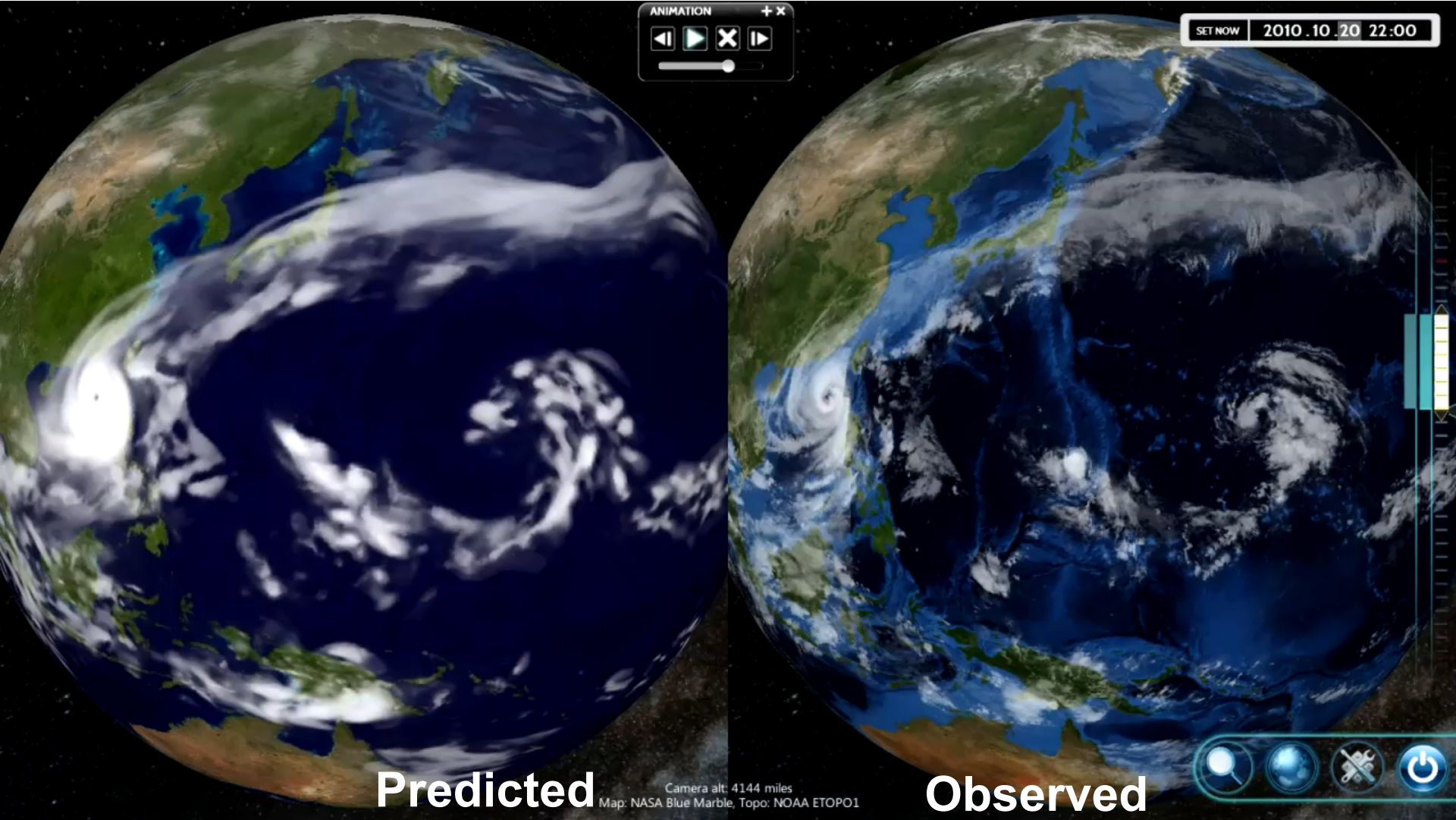
Sources of Geophysical Predictability

Predictability Forcing/Initial State

Initial Value Models

Climate Models

[Assimilation, Full Global Data]

[Emphasis on Forcing]

Prediction Phenomena

Convection   Mid-latitude Waves   Tropical Waves   Ocean Anomalies   Radiation Changes

Initial State

Forcing

1 week   1 month   3 months   1 year   3 years   10 years   30 years   300 years

.1 day   1 day   10 day   100 day   1000 day   10,000 day   100,000 day