

Goddard Space Flight Center

# Very Brief GEOS-5 Overview

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MODIS Science Team Meeting

Sheraton Silver Spring

21 May 2015



# GEOS-5

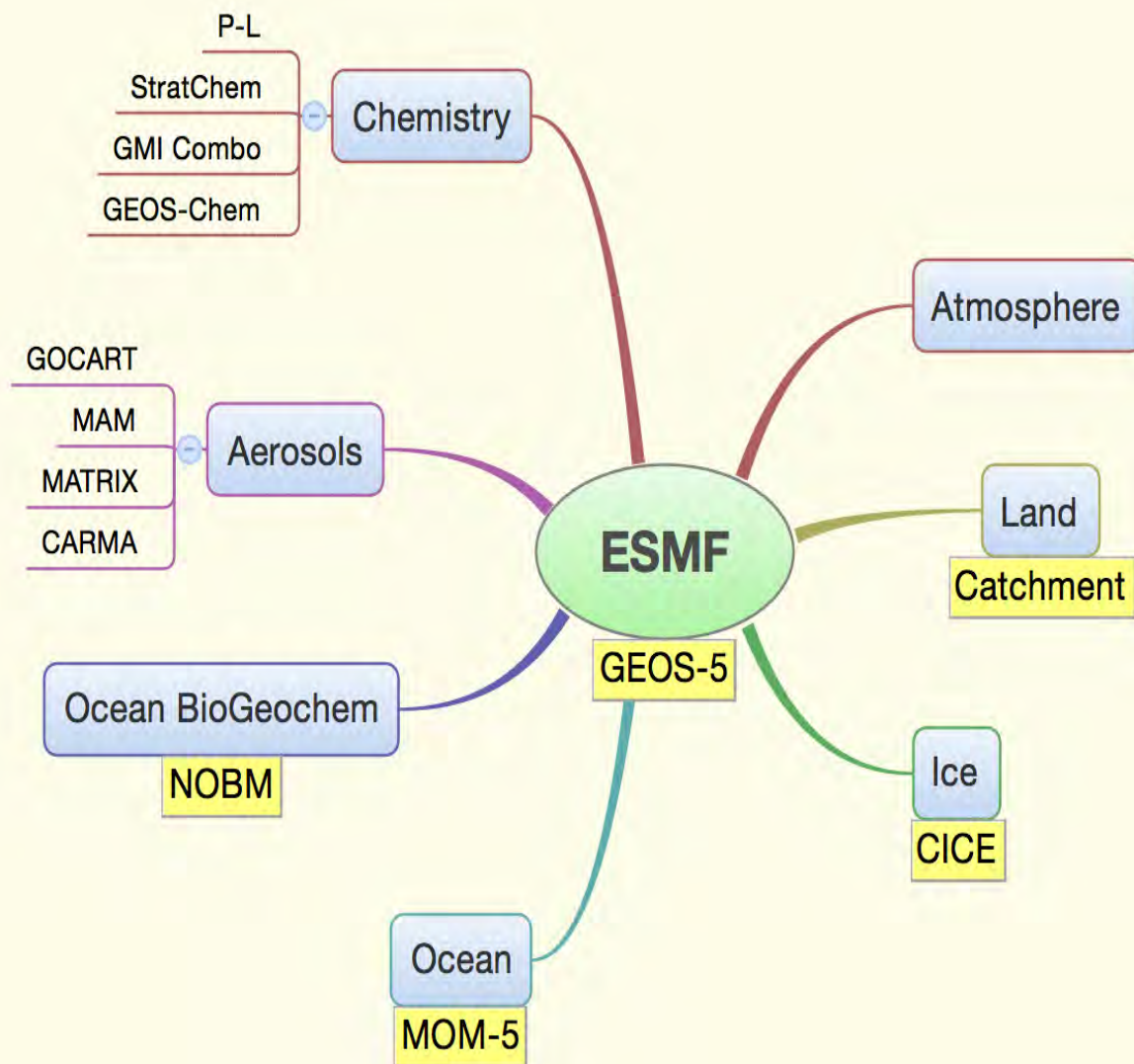
# Earth System Model

Components coupling via the Earth System Model Framework (ESMF)

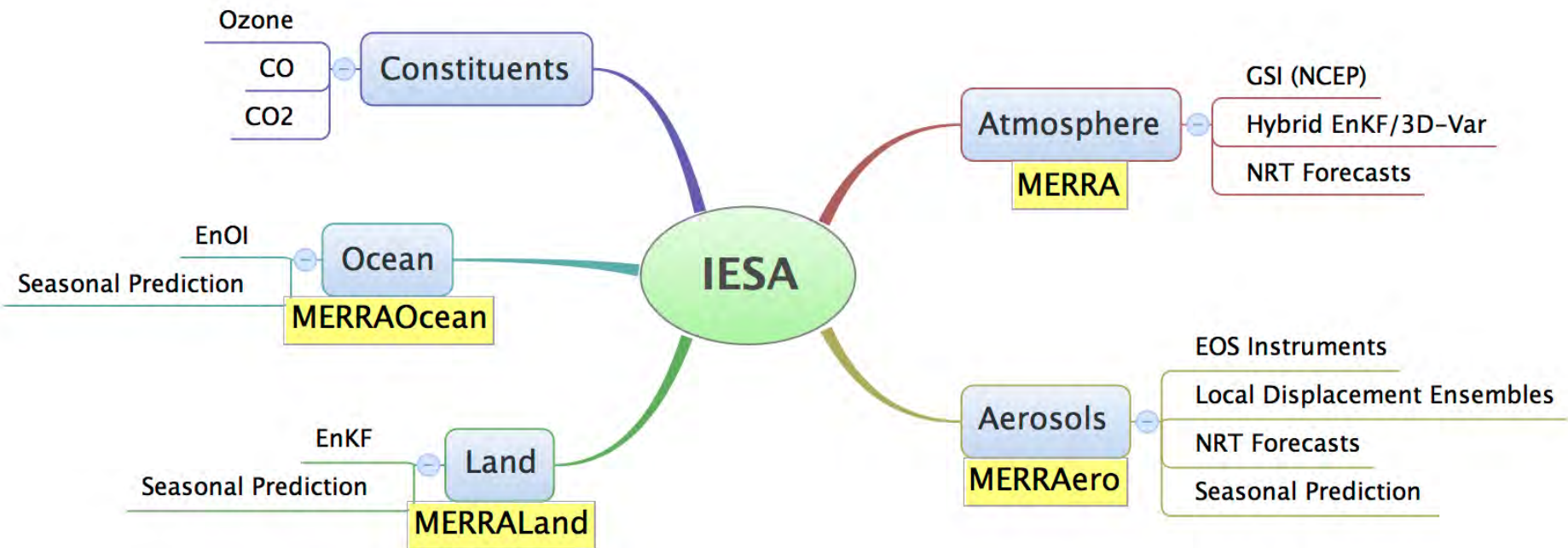
Aerosol and chemistry radiatively coupled to GCM

### Applications:

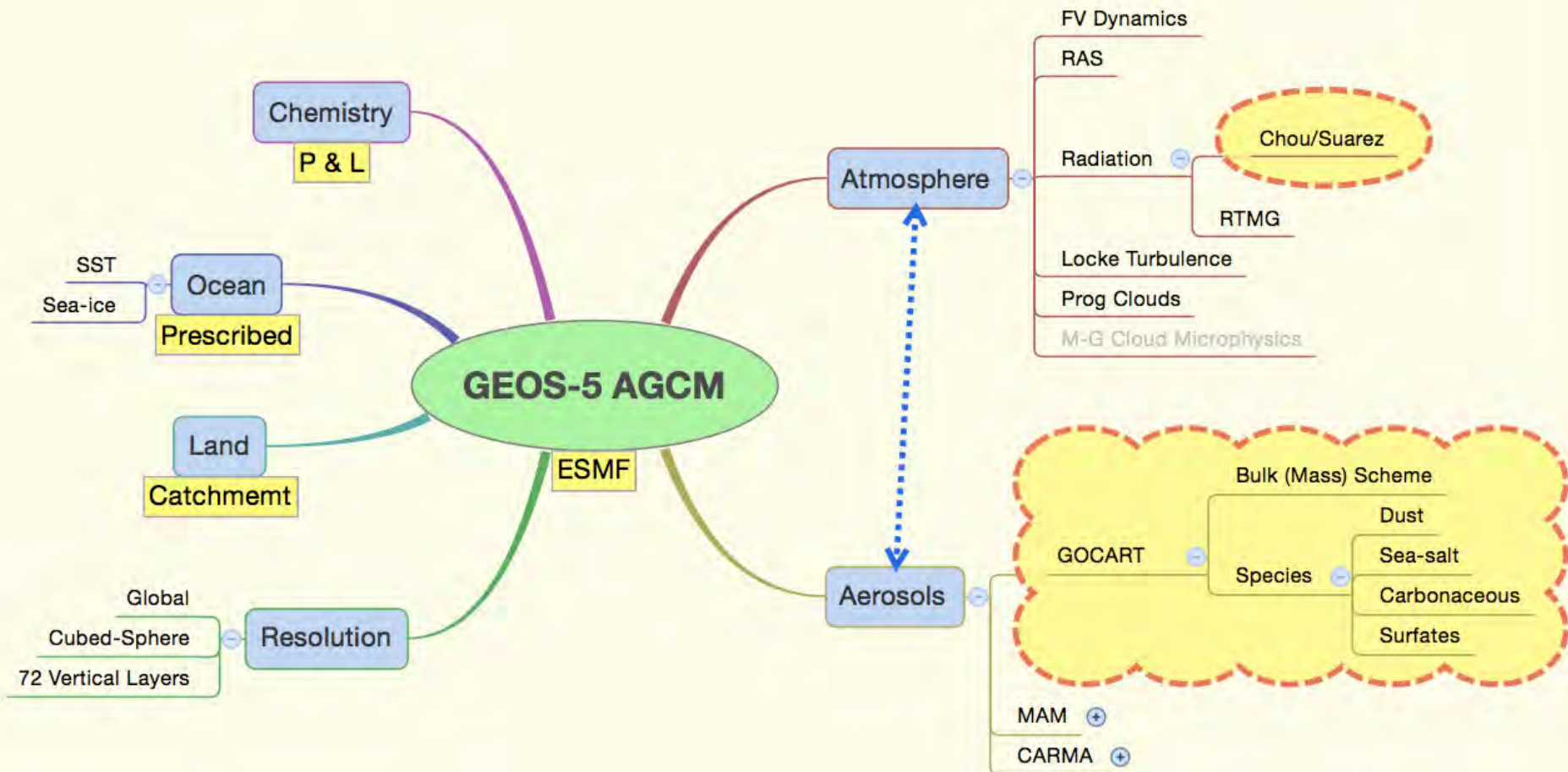
- Seasonal forecasts
- Weather and aerosol NRT forecasts
- Reanalysis
- Observing System Simulation Experiments (OSSEs)



# GEOS-5 Data Assimilation



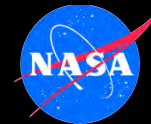
# GEOS-5 Model Configuration for NRT Data Products



Global, 72 Levels, top at 0.01 hPa



# http://gmap.gsfc.nasa.gov



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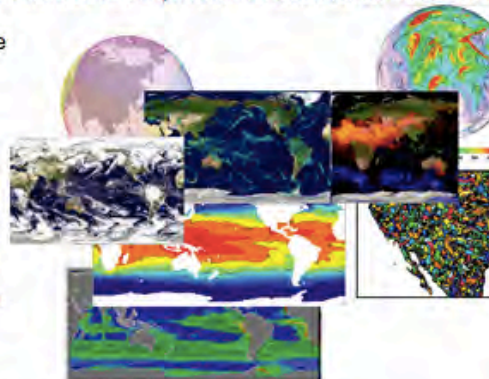
Intranet (internal)

Extranet (login required)

### Overview

Welcome to the GMAO's Research Web Site

The **Global Modeling and Assimilation Office (GMAO)** is a component of the Earth Sciences Division in Goddard's Sciences and Exploration Directorate. Our research and development activities aim to maximize the impact of satellite observations in climate, weather and atmospheric composition prediction using comprehensive global models and data assimilation. To achieve this goal, the GMAO develops models and assimilation systems for the atmosphere, ocean, and land surface, generates products to support NASA instrument teams and the NASA Earth science program, and undertakes scientific research to inform system development pathways.



### What's New

CO<sub>2</sub> Global Transport Simulation from GEOS-5 Nature Run



#### \* GEOS-5 Nature Run Data Portal \*

Images, animation, and data from GMAO's GEOS-5 Nature Run (Ganymed Release) non-hydrostatic 7km global mesoscale simulation are available on GMAO's G5NR data portal page.

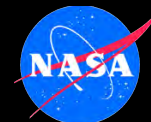
#### \* GEOS-5 FP Upgraded \*

The GEOS-5 FP system was



# GMAO Products

- GMAO generates GEOS-5 data products in near real time or reanalysis modes in support of diverse user communities. Starting in February 2013, GEOS-5 forward processing is conducted in two separate streams. These are called (1) Forward Processing (FP) and (2) **Forward Processing for Instrument Teams (FP-IT)**.
- The FP stream generates forecasts as well as assimilation products using the most current system approved for near-real-time production. FP products are primarily used for real time support for NASA field campaigns, support for NASA science, GEOS system evaluation, and interaction with other data assimilation centers. The FP system is updated as the GEOS system improves and is transitioned to production status.
- **The FP-IT stream generates only assimilation products.** FP-IT processing uses a "semi-frozen" GEOS-5 system to ensure long-term continuity and reproducibility. FP-IT products serve primarily the NASA EOS Instrument Teams who require stable products over a long period of time. Reprocessing of historical periods using the FP-IT system is conducted as needed in coordination with Instrument Teams.



<http://gmap.gsfc.nasa.gov/products>

**GEOS-5 Atmospheric Assimilation Products**

<b>GEOS-5 Product Identifier</b>	<b>Product Description</b>	<b>GEOS-5 Version Used</b>	<b>Periods Covered</b>	<b>Data Access</b>	<b>Documentation</b>
<b>GEOS-5 FP</b>	NRT assimilation (DAS), 10-d fcst at 00z, and 5-d fcst at 12z (See schedule above.)  See <a href="#">details</a> (spatial resolution, frequency, input data, known problems,...)  [ <a href="#">Processing Timeline</a> ]	<b>5.13.1</b>	5/1/2014 - on-going	Latest version of forecasts (recent 6 months) and DAS available on NCCS data portal**  For technical information on data access, see the associated "README" file.	File Specifications:  GEOS-5 FP, GEOS-5 FP-IT, 5.7.2 (V1.6), 5.2.0, 5.1.0, 5.0.1, MERRA  GEOS-5 File Specification Variable Definition Glossary  Technical Report: The GEOS-5 Data Assimilation System - Documentation of Versions 5.0.1, 5.1.0, and 5.2.0  GEOS-5 ADAS System Changes: From GEOS-5.2.0 (MERRA) to GEOS-5.11.0
	Archived forecast and DAS data  See <a href="#">details</a>	<b>5.13.0</b>	8/20/2014 - 5/1/2015		
	Archived forecast and DAS data  See <a href="#">details</a>	<b>5.11.0</b>	6/11/2013 - 8/20/2014		
<b>GEOS-5 FP-IT</b>	NRT Assimilation products (See schedule above.)  See <a href="#">details</a>  [ <a href="#">Processing Timeline</a> ]	<b>5.9.1</b>	1/1/2000 - on-going	Near-realtime distribution to operational users via GES DISC *	

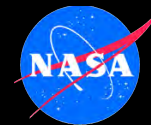


# Summary of GEOS-5 Reanalysis Activities



Name	Nominal Resolution	Period	Aerosol Data	Available
MERRA-1	50 km	1979-present	NONE	now
MERRAero	50 km	2002-present	MODIS C <sub>5</sub>	now
FP for Inst. Teams	50 km	1997-	MODIS C <sub>5</sub>	In progress
NCA	25 km	2010-11	MODIS C <sub>5</sub> , MISR	Now
MERRA-2	50 km	1979-present	AVHRR, MODIS C <sub>5</sub> , MISR, AERONET	Summer 2015
MERRA-2 Dynamical Downscaling	12.5 km	2000-2015	AVHRR, MODIS C <sub>5</sub> /C <sub>6</sub> , MISR, AERONET	Q4 2015





# Summary

- GMAO generates GEOS-5 data products in near real time or reanalysis modes in support of diverse user communities:
  - GEOS-5 FP-IT is the semi-frozen NRT system used for supporting several instrument teams
  - Every time the FP-IT is upgraded, all data is reprocessed for the EOS period as to produce a consistent data product
- MERRA-1 and MERRA-2 reanalyses cover the satellite ERA (1980-present).