

**NORTHROP GRUMMAN**



# GMI Status



GODDARD SPACE FLIGHT CENTER

**Gary S. Wojcik**

Software Integration and Visualization Office

**GMI Computing Leader  
Northrop Grumman  
Information Technology-TASC**

**GMI Science Meeting  
March 17-19, 2008  
UC-Irvine**

## Outline

- **SIVO GMI personnel**
- **SIVO GMI Duties**
- **SIVO support to GMI Community**
- **GMI Accomplishments since 6/2007**
- **GMI User's Guide**
- **GMI Website Updates**
- **Modeling Guru**
- **Current Tasks**
- **Implementing advecCore (replaces TPCore)**
- **GMI Workflow Tool**

## Personnel

- **Gary Wojcik (0.5 FTE)**
  - Northrop Grumman
    - GMI Computing Leader
    - SIVO Program Manager (contractors)
- **Jules Kouatchou (1.0 FTE)**
  - AMTI, Programmer/developer
- **Megan Damon (0.7 FTE)**
  - Northrop Grumman, Programmer/developer
- **Lara Clemence (0.1 FTE)**
  - GST, Webpage designer

## GMI Duties

- **Assist GMI community with the code**
  - **Standard assistance**
    - Obtaining
    - Building
    - Running
  - **Specialized assistance**
    - Converting/Developing/Implementing modules in ESMF framework
    - Parallelization/Optimization
  - **Code change requests**
    - Require user input
    - Must follow SIVO coding standards



## **GMI Duties**

- **Perform requested runs**
  - **Obtain run specifications**
  - **Set up namelists**
  - **Stage input data**
  - **Perform any necessary testing**
  - **Monitor run progress**
  - **Validate output**
  - **Document run details**
- **Process, archive, and distribute data**
- **Manage the GMI CVS repository**



## **SIVO Support to GMI Community**

- **Bldg 33 GMI Scientists**
- **GMAO**
- **Georgia Tech**
- **Boeing**
- **AER**
- **University of Michigan**
- **NASA-Langley**
- **PNL**
- **Harvard**
- **UC-Irvine**

# Accomplishments

- **Completed Model Runs**
  - **Aura2 Combo w/ Forecast metfields**
  - **Aura2 2001 & 2006**
  - **FVGCM Combo 5 years (1994-1998)**
  - **Aura3 (2004-2006)**
  - **Aura4 (2004-2006)**

# Accomplishments

- **New code features/functionality**
  - **Added surface output for the station profiles**
  - **Implemented GA Tech cloud/aerosol code (not yet validated)**
  - **Updated KMG package (setkins)**
  - **Capability to output total and tropospheric column values**
  - **Capability to select specific output levels**
  - **Capability to select specific subdomain to output**

## Accomplishments

- **New emissions features**
  - **Added hourly emissions capability**
    - Anthropogenic NO<sub>x</sub>
    - Biomass burning--all species
  - **Added MEGAN emissions**
- **Implemented new lightning algorithm**
  - Updated vertical NO<sub>x</sub> profile
  - New metfield-specific coefficients
- **LLNL ESM code structure has been removed**

# Accomplishments

- **Namelist Sections Reorganized/Renamed**
  - nIGmiControl
  - nIGmiMetFields
  - nIGmiSpeciesConcentration
  - nIGmiTracer
  - nIGmiDiagnostics
  - nIGmiRestart
  - nIGmiAdvection
  - nIGmiConvection
  - nIGmiDiffusion
  - nIGmiDeposition
  - nIGmiEmission
  - nIGmiLightning
  - nIGmiChemistry
  - nIGmiPhotolysis

## Accomplishments

- **Redesign process of producing netCDF files**
  - Easier to maintain/update
  - Standard interface with the rest of the code
- **HTAP Data Processed/Submitted**
  - **Aerosol:**
    - SR1, SR6EA, SR6EU, SR6NA, SR6SA, SR6bNE, SR6bNW, SR6bSE, SR6bSW, SR6dAF, SR6dAS, SR6ME, SR6zEA, SR6zEU, SR6zNA, SR6zSA
  - **Full Chemistry:**
    - SR1, SR2, SR3EA, SR3EU, SR3NA, SR3SA, SR4EA, SR4EU, SR4NA, SR4SA, SR5EA, SR5EU, SR5NA, SR5SA, SR6EA, SR6EU, SR6NA, SR6SA

## Accomplishments

- **Assisted GMAO integration of Combo code into GEOS5**
  - **Desirable to keep codes consistent**
  - **Changes have been made to GMI and GEOS5 codes**
  - **Changes to GMI code are (will be) mainly science-related**

# Accomplishments

- **Other Accomplishments**
  - **GMI User's Guide substantially updated**
  - **Updated GMI website**
    - **Run summaries posted**
    - **Production run summary spreadsheet posted**
    - **New banner/navigation on home page**
  - **Began populating **Modeling Guru****
  - **Model version numbers available**
  - **Open-sourcing the GMI code**
  - **Updated ChainRuns script**

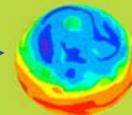


## GMI User's Guide II

- Can be generated from the checked-out code
  - Go to:  
**.../gmi\_gsfc/Documents/Tutorials/UserGuide**
  - Type '**make**' from the command line to produce User's Guide as a pdf
  - Requires LaTeX to be installed (currently on NCCS systems)
  - Valid for code versions beginning Jan 2008
  - Available on the GMI Website "What's New" section
- A 'living' document to be updated as needed

# GMI Website (<http://gmi.gsfc.nasa.gov/gmi.html>)

Rotating  
Globe



## Global Modeling Initiative

Home  
About GMI  
Projects & Publications  
Current Projects' Status  
Models  
Model Evaluation  
Meetings and Reports  
Sourcemotel Login

The Global Modeling Initiative (GMI) is part of the NASA Modeling Analysis and Prediction (MAP) program. GMI investigations support the development and integration of a state-of-the-art modular 3-D chemistry and transport model (CTM) that includes full chemistry for both the troposphere and stratosphere. The GMI model is involved in assessment of anthropogenic impacts, such as those from aircraft, future changes in atmospheric composition, and the role of long-range transport of pollution.

The GMI model serves as a testbed for different meteorological fields, emissions, microphysical mechanisms, chemical mechanisms, deposition schemes, and other processes determining atmospheric composition, both gas-phase and aerosol. This enables GMI to work in close collaboration with the chemistry-climate modeling community. GMI seeks to understand and constrain the uncertainties in model results through intercomparison of simulations and through comparison with observations.

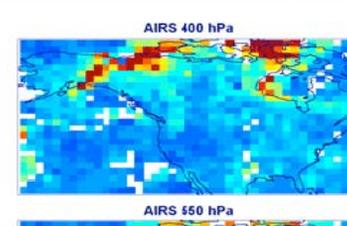
The GMI model is compliant with the Earth System Modeling Framework (ESMF), thus facilitating incorporation of new model components. The model has been integrated with meteorological fields from free-running GCMs and from the GEOS-4 Data Assimilation System (DAS). Recent simulations with GEOS-4-DAS include the AURA period (2004-present); output is available to the scientific community for analysis.

### What's New

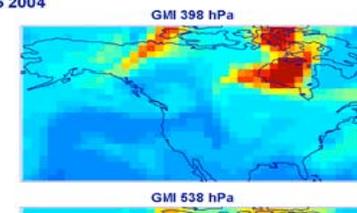
*Aura4 simulation with a modified Pickering and Allen lightning parameterization and updated emissions is available on [dirac.gsfc.nasa.gov](http://dirac.gsfc.nasa.gov) for Feb. 2004–Dec. 2006*

*Next GMI Science Team Meeting will be held March 17-19, 2008 in Irvine, CA. Agenda is now available.*

*Updated GMI User's Guide: for code versions beginning in January 2008*



JUL 06 2004



Reorganized Navigation

What's New  
(with Links, including  
GMI User's Guide II)

# GMI Website

Links to Production  
Run Spreadsheet  
(via **Modeling Guru**)

Links to Run Summary  
Documentation  
(via **Modeling Guru**)

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## Global Modeling Initiative

GMI Home > Projects & Publications > Project Descriptions

**Project Descriptions**

This section describes the major projects completed since GMI's inception. The order is chronological with the most recent listed first. All output may be obtained by anonymous ftp to dirac.gsfc.nasa.gov. The output directories listed also contain 'README' and namelist files that give more detailed information about the simulation.

**Combo Model - AURA Period (Aura3)**

**Met fields:** GEOS-4-Data Assimilation System, 2° lat x 2.5° lon x 42 levels (lid at 0.01 hPa)  
Time Period: Feb. 2004-Apr. 2007  
Aura3 Directory: /pub/gmidata2/output/gmic/aura3  
Aura2 Directory: /pub/gmidata2/output/gmic/aura2

This run was previously called 'ap1.0HO2Aura2'. The met fields used are a 3-hr time averaged DAS product. This simulation has the new Pickering and Allen lightning parameterization with its original NOx profile. It includes the HO2 heterogeneous uptake reaction that was turned off in Aura2. Tropospheric aerosol inputs used are from 2004-2006 GOCART simulations. JPL06 reactions rates are used, however, photolysis cross sections were not updated. The previous run of the Aura period, 'Aura2', differs only in that it used the original GMI lightning parameterization and the HO2 uptake reaction was turned off. Schoeberl et al. [2007] compare tropospheric column O3 (TCO) from the aura2 run with an Aura OMI/MLS-derived TCO product. For more information, read the Aura3 production run summary.

**Combo Model - AURA Period - Forecasts**

**Met fields:** Forecasts from GEOS-4-DAS first-look analyses, 2° lat x 2.5° lon x 42 levels (lid at 0.01 hPa)  
Time Period: July 1, 2004-June 30, 2005  
Directory: /pub/gmidata2/output/gmic/aura2for12h and ../aura2for24h

These simulations use the Aura2 version of the code (see above) with GEOS-4-DAS instantaneous forecast met fields (6-hr updates) that were generated from 6-hr time-averaged DAS analyses. 'for12h' used 18-30 hr forecasts, updating the forecast sequence every 12 hrs. 'for24h' used 12-36 hr forecasts, updating the forecast sequence every 24 hrs.

**Combo - Model GCM Met fields 1994-1998 (FvgcmCombo)**

**Met fields:** GEOS-4-GCM, 2° lat x 2.5° lon x 42 levels (lid at 0.01 hPa)



# GMI Website

## ■ Production Run Spreadsheet

Chemistry Mechanism	Family	Cases	Years	Metfields	Spatial resolution	Lightning	Biomass burning source	Isoprene emission	Ship Emission	Other emission
Combo	Aura4		2004 -2006	geos4das	2x2.5	Dale 2008 - ap1.2	GFEDv2 year-specific with d variation; Yevich biofuel	Guenther et al 2006, no scal		Aura harvard ship - adjust Nox NOx fossil fuel variation; - MEG emissions; - Chinese seasonalif emissions from Streets; - 2004 boreal emissions bug fix
	Aura4 spinup		2004 (3X)	geos4das	2x2.5		GFEDv2 year-specific; Yevich biofuel	Guenther et al 2006, no scal		
		aura4Spinup1	2004 -1			Dale 2006 - ap1.0				Aura harvard ship - 2000-1 fos emissions (EDGAR+others); ad
		aura4Spinup2	2004 -2			Dale 2006 - ap1.0 (mod)				Aura harvard ship - 2000-1 fos emissions (EDGAR+others); ad
		aura4Spinup3	2004 -3			Dale 2006 - ap1.0 (mod)				Aura harvard ship - 2000-1 fos emissions (EDGAR+others); ad
	Aura4 no NO lightning		2004-2006	geos4das	2x2.5	none	GFEDv2 year-specific with d variation; Yevich biofuel	Guenther et al 2006, no scal		Aura harvard ship - adjust Nox NOx fossil fuel variation; - MEG emissions; - Chinese seasonalif emissions from Streets; - 2004 boreal emissions bug fix
	Aura4 with o vertical profi		2004	geos4das	2x2.5	Dale 2008 0 ap1.2 (mod)	GFEDv2 year-specific with d variation; Yevich biofuel	Guenther et al 2006, no scal		Aura harvard ship - adjust Nox NOx fossil fuel variation; - MEG emissions; - Chinese seasonalif emissions from Streets; - 2004 boreal emissions bug fix
	Aura4 read N from lightning from file only		2004 -2005	geos4das	2x2.5	read NO from lightning from file only	GFEDv2 year-specific with d variation; Yevich biofuel	Guenther et al 2006, no scal		Aura harvard ship - adjust Nox NOx fossil fuel variation; - MEG emissions; - Chinese seasonalif emissions from Streets; - 2004 boreal emissions bug fix

# GMI Website

## ■ Run Summary Documentation

### **Aura 3 Combo (2004 – 2006) Production Run Summary**

#### Status

Available as of 10/16/2007 on the anonymous ftp site:

*output/gmic/aura3*

#### Purpose

To test the effects of the ap1.0 lightning algorithm (Allen, 2006) and the HO2 uptake reaction in combination with the aura code integrations. Please note: David Considine's H2 fix for combo did **not** make it into these runs.

#### Corrections from Original Aura run

- Convection fix for the "creation" of all of the advected species in the upper troposphere. This creation occurred about 6 times per year.
- Soil NOx fix
- Correct fertilizer scale, vegetation type, precipitation, and leaf area index input
- Correct forcing boundary conditions for 2003, 2004 and 2005

#### General Model Configuration

- Years: 2004 – 2006
- 30 minute model time step
- Updated boundary conditions to reflect the year 2004

## Modeling Guru

- **A collaborative, knowledge-sharing environment for NASA's scientific modeling community**
  - **Forums for discussions, questions, & feedback**
  - **Online "Wiki" documents for collaborative writing**
  - **Excellent Search features**
  - **Email/private messages**
  - **Instant Messaging (coming soon)**
- **Available at: <http://modelingguru.nasa.gov>**
- **Running on *Clearspace* by *Jive Software***

# Modeling Guru

- Modeling Communities
- Post/Read discussions and questions
- Create, share, and upload documents
- Receive email notifications
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GMI

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- Space Science Models
  - DYNAMO
- Atmospheric Dynamic Models
  - GEOS-DAS
  - GEOS
  - GCE
  - GISS ModelE
  - IVCore
- Atmospheric Chemistry Models**
  - GEOS-CHEM
  - GMI
- Ocean Models
  - Poseidon
  - MOM4
  - MIT OGCM
- Solid Earth Models
- MAP Modeling Environment (MAPME) Workflow Tool
- Languages, Libraries & Tools
- Software Development
- Modeling Guru FAQs, Feedback & General Questions

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**What's New** [Go to: Discussions Documents Blog Posts](#)

**ANNOUNCEMENT:**  
**SIVO Seminar Series on Fortran 2003** by [GMB](#) at Jan 20, 2008 9:02 AM  
SIVO is hosting a biweekly series on the Fortran 2003 standard. The next session on "Extensions to I/O" will be on Tuesday, March 11th. Additional information as well as materials for the seminars will be available [here in Modeling Guru](#). Participants are also encouraged to use Guru's [Languages, Libraries & Tools](#) community for further discussions on the standard.

- GEOS-5 Workflow Tutorial**  
38 minutes ago in [MAP Modeling Environment \(MAPME\) Workflow Tool](#) by [rburns](#)
- GMI Tutorial and User's Guide II**  
1 hour ago in [GMI](#) by [sewicks](#)
- Re: mpi parallelization of the GISS version of the HYCOM ocean model**  
1 week ago in [GISS ModelE](#) by [danz](#)
- GMI Production Run Spreadsheet**  
8 hours ago in [GMI](#) by [mrdamos](#)
- Aura4 Production Run Summary**  
1 day ago in [GMI](#) by [mrdamos](#)
- Running a GEOS GCM 10yr simulation**  
1 day ago in [GEOS](#) by [scruz](#)
- Description of resolution codes**  
1 day ago in [GEOS](#) by [scruz](#)
- Example of adding a new export field to a component**  
1 day ago in [GEOS](#) by [scruz](#)
- Aura3 Production Run Summary**  
2 days ago in [GMI](#) by [mrdamos](#)
- FVGCN Production Run Summary**  
2 days ago in [GMI](#) by [mrdamos](#)

RSS feed of this list [More](#)

## Modeling Guru

- **Accessing the site**
  - **Have an NCCS account?**
    - You are already a registered user
    - Can read/make posts or add/edit documents
  - **No NCCS account?**
    - Register for site access on-line
    - <http://modelingguru.nasa.gov>
    - Can still read discussions/documents on public areas of the site without an account

# Modeling Guru

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  - GISS ModelE
  - fvCore
- Atmospheric Chemistry Models**
  - GEOS-CHEM
  - GMI

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- [Frequently Asked Questions](#)
- [Posting Policy](#)

Request an account here

(It may take up to 24 h for you to be able to make posts)

Refer to the Tutorial and Quick Tour

## Current Tasks

- **Model Runs**
  - **GEOS-1/GISS runs of  $^7\text{Be}$  and  $^{210}\text{Pb}$  (Hongyu Liu)**
    - Examine cross-tropopause exchange
  - **Stratospheric photolysis runs**
    - Examine differences between using fastJx and the look-up table
  - **Resolution doubling tracer runs**
    - Explore convergence of GMI (Lin and Rood) and UCI (Second Order Moments) advection algorithms
  - **Indonesian wildfire runs**
    - Examine impact on large Indonesian wildfires on tropospheric ozone, separate from the impact of lightning and dynamics

## Current Tasks

- **Science/Code Changes**
  - Adding gas phase/aerosol coupling
  - Updating JPL06 cross-sections
  - Adding stratospheric water transport
  - Replacing TP Core with **advecCore**
  - Updating fastJx

## Current Tasks

- **Science/Code Changes**
  - **Updating code to be consistent with GEOS-5**
    - Passing tropopause level to PSC routine
    - Add option to use predicted CH<sub>4</sub>/H<sub>2</sub>O instead of climatology values (with H<sub>2</sub>O and H<sub>2</sub>OCOND being transported)
  - **Updating code to use GEOS-5 metfields**
- **GMI Workflow Tool**
  - **A system that provides end-to-end support for setting up and running complex model experiments**

## Current Tasks

- **Data Processing**
  - **GEOS-5 Metfields**
    - Currently testing processing scripts in a crontab
    - Processing to begin soon
  - **HTAP runs and processing**
    - Processing TP1x (CO-like tracer, 50-days lifetime, additional tracers for NMHC clock)
    - Fixing a couple of problems with previously processed data
    - Future runs will only be done if GMI can gain scientific information from them



## Implementing advecCore

- **Latest version of the Lin and Rood scheme**
- **Updated GMI code will require ESMF libraries to run properly**
- **ESMF benefits**
  - **Models can be broken into smaller pieces or components**
  - **Allows earth system models to be built, assembled, and reconfigured easily**
  - **Allows scientists to focus on science**

## Implementing advecCore

- **Information gathering**
  - ✓ **Status of old TPCore**
  - ✓ **Variables needed by advecCore**
  - **Requirements for GMI to run advecCore**
    - **Working with Will Sawyer**
- **Initial coding**
  - ✓ **Initialized the message passing interface (MPI) through ESMF**
  - ✓ **Introduced the ESMF clock to drive the GMI code**
  - ✓ **Implemented empty ESMF initialize/run/finalize methods**
  - **Routines to produce variables needed by advecCore**

## Implementing advecCore

- **ESMF advecCore Implementation**
  - Initialize method
  - Finalize method
  - Interfaces between advecCore and GMI
  - Run method
  - Debugging and testing



## GMI Workflow Tool

- Developed from the generic framework used for the **GEOS-5 Workflow Tool**
  - Developed under MAP Modeling Environment (MAPME)
  - <http://map.nasa.gov/software.html>
- See Megan for a demo of GEOS-5 Workflow Tool

## GMI Workflow Tool

- **Uses the NASA Experiment Designer (NED)**
  - **GUI with “behind the scenes” scripts to do model runs “end to end”**
    - **Set up namelist file**
    - **Submit job**
    - **Graphically display run progress**
    - **View output data graphically**
- **Will require an NCCS account**
- **Updated prototype by April 30, 2008**

# GMI Workflow Tool

## ■ NED

NED 1.0.1.8 User: gswojcik Mode: USER

File Search Tools Database Submission

Configuration View

Workflow Property		Information
Name	GEOSGCM	
Unique ID Prefix		
Unique ID	GEOSGCM_mrdamon_2008_Feb_20_19_19_35_0674	
Description	GEOS-5 global climate model	
Modified By	mrdamon	
Modification Date	Mon Feb 25 11:19:16 EST 2008	
Validation Script	GEOsgcm/bin/GEOS5Validation.clp	
Submission Script	GEOsgcm/bin/SubmitGEOSCdpScript.bash	
Notes	None	

Name	Description	Pre-Processor	Output Type	Output File
Basic settings	Minimal settings for GEOS5		BASH Shel Transform	exp_env.bash
GCM Components	GEOS-5 GCM component list - NOT CURRENTLY ENABLED!		DAGI Shel Transform	exp_env.bash
Workflow setup	Create temporary work space		BASH Shel Transform	exp_env.bash
Installation settings	Install GEOS5 from CVS or use pre-built from archive		BASH Shel Transform	exp_env.bash
Layout/Batch information	GEOS5 layout and batch settings		BASH Shel Transform	exp_env.bash
System variables	GEOS-5 system variables		BASH Shel Transform	exp_env.bash
Model Parameters	Model parameters		DAGI Shel Transform	exp_env.bash

Status	Affects	Description
--------	---------	-------------

Left sidebar tree view:

- GEOSGCM
  - Basic settings
  - CCM Components
  - Workflow setup
  - Installation settings
  - Layout/Batch information
  - System variables
  - Model Parameters
    - DATELINE
    - ANALYSIS
    - OCEAN\_IM
    - OCEAN\_JM
    - OCEAN\_LM
    - EXPDSC
  - HISTORY.rc
  - cap.tmpl
  - fvcore\_layout.tmpl
  - AGCM.tmpl

# GMI Workflow Tool

## ■ Namelist GUI

Universal Experiment Designer: GMICombo-build.ued

6. do_wetchem	Boolean	<input type="checkbox"/>
7. loss_opt	Integer	0
8. do_AerDust_Calc	Boolean	<input checked="" type="checkbox"/>
9. AerDust_Effect_opt	Integer	0
10. AerDust_infile_name	String	_agcm_kg_per_m3_2%5x2x42.nc
11. h2oclim_opt	Integer	2
12. h2oclim_infile_name	String	2o_ch4_clim_2%5x2x42_fvccm.nc
13. sad_opt	Integer	2
14. lbssad_opt	Integer	3
15. lbssad_infile_name	String	ata/sad_dbc_2%5x2x42_2000.nc
16. forc_bc_opt	Integer	2
17. forc_bc_years	Integer	100
18. forc_bc_start_num	Integer	34
19. forc_bc_kmin	Integer	1
20. forc_bc_kmax	Integer	2
21. forcedBcSpeciesNames	ArrayList String	<input type="checkbox"/> CH2O <input checked="" type="checkbox"/> CH4 <input type="checkbox"/> CO <input type="checkbox"/> H <input type="checkbox"/> H2 <input type="checkbox"/> HCOOH <input type="checkbox"/> HNO2 <input type="checkbox"/> HNO3 <input type="checkbox"/> HN <input checked="" type="checkbox"/> N2O <input type="checkbox"/> NO <input type="checkbox"/> NO2 <input type="checkbox"/> NO3 <input type="checkbox"/> N2O5 <input type="checkbox"/> O <input type="checkbox"/> O1D <input type="checkbox"/> O3 <input type="checkbox"/> OH <input type="checkbox"/> Cl2 <input type="checkbox"/> ClO <input type="checkbox"/> Cl2O2 <input type="checkbox"/> ClONO2 <input type="checkbox"/> HCl <input type="checkbox"/> HOCl <input type="checkbox"/> OClO <input checked="" type="checkbox"/> CH3Br <input checked="" type="checkbox"/> CH <input checked="" type="checkbox"/> HCFC22 <input checked="" type="checkbox"/> HCFC141b <input checked="" type="checkbox"/> HCFC142b <input checked="" type="checkbox"/> CF2Br2 <input checked="" type="checkbox"/> CF2ClBr <input checked="" type="checkbox"/> CF3Br <input checked="" type="checkbox"/> H2402 <input type="checkbox"/> A302 <input type="checkbox"/> AC <input type="checkbox"/> ETO2 <input type="checkbox"/> ETP <input type="checkbox"/> GC03 <input type="checkbox"/> GLYC <input type="checkbox"/> GLYX <input type="checkbox"/> GP <input type="checkbox"/> GPAN <input type="checkbox"/> HAC <input type="checkbox"/> IAL <input type="checkbox"/> KO2 <input type="checkbox"/> MACR <input type="checkbox"/> MAN2 <input type="checkbox"/> MAO3 <input type="checkbox"/> MAOP <input type="checkbox"/> MAP <input type="checkbox"/> MCO3 <input type="checkbox"/> MEK <input type="checkbox"/> MG <input type="checkbox"/> PP <input type="checkbox"/> PPN <input type="checkbox"/> PRN1 <input type="checkbox"/> PRPE <input type="checkbox"/> PRPN <input type="checkbox"/> R4N1 <input type="checkbox"/> R4N2 <input type="checkbox"/> R4O2 <input type="checkbox"/> R4I <input type="checkbox"/> RIP <input type="checkbox"/> ROH <input type="checkbox"/> RP <input type="checkbox"/> VRO2 <input type="checkbox"/> VRP <input type="checkbox"/> ACET <input type="checkbox"/> N2 <input type="checkbox"/> O2 <input type="checkbox"/> Tot
22. forc_bc_infile_name	String	b2002_ch4latvar_1970_2069.asc

Task Properties

Task Name: nlGmiChemistry

Task Description: GMI Chemistry section

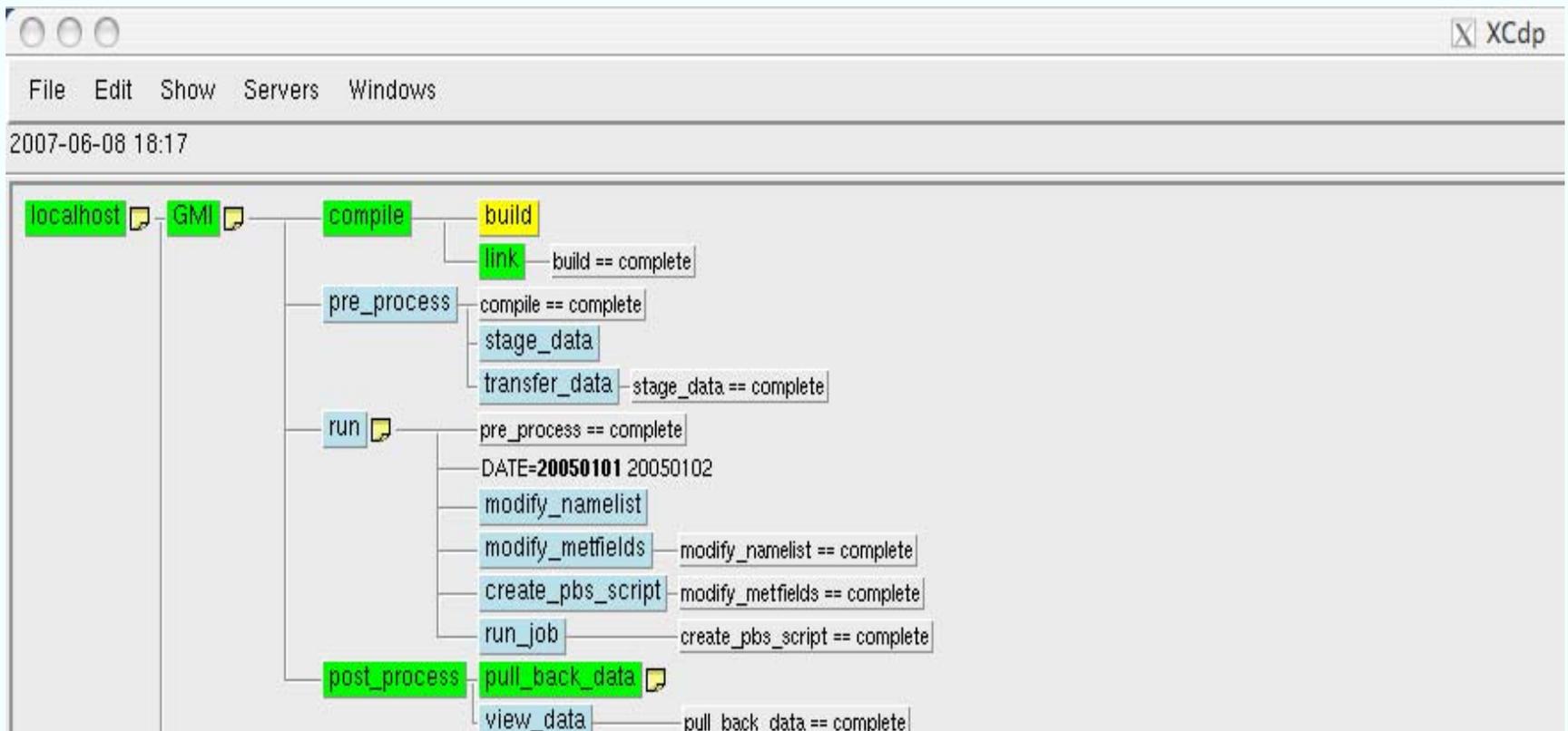
Task Script:

Variable Script: ne/mrdamon/workflow/workflow/cfg/gmi/GMI/combo.in

Variable Script Type: FORTRAN Namelist

# GMI Workflow Tool

## ▪ Run Monitoring and Restarting



***NORTHROP GRUMMAN***



**Thank you!**

**[gary.s.wojcik@nasa.gov](mailto:gary.s.wojcik@nasa.gov)**

**(240) 778 5699**