

NU-WRF Development and Support at NASA GSFC

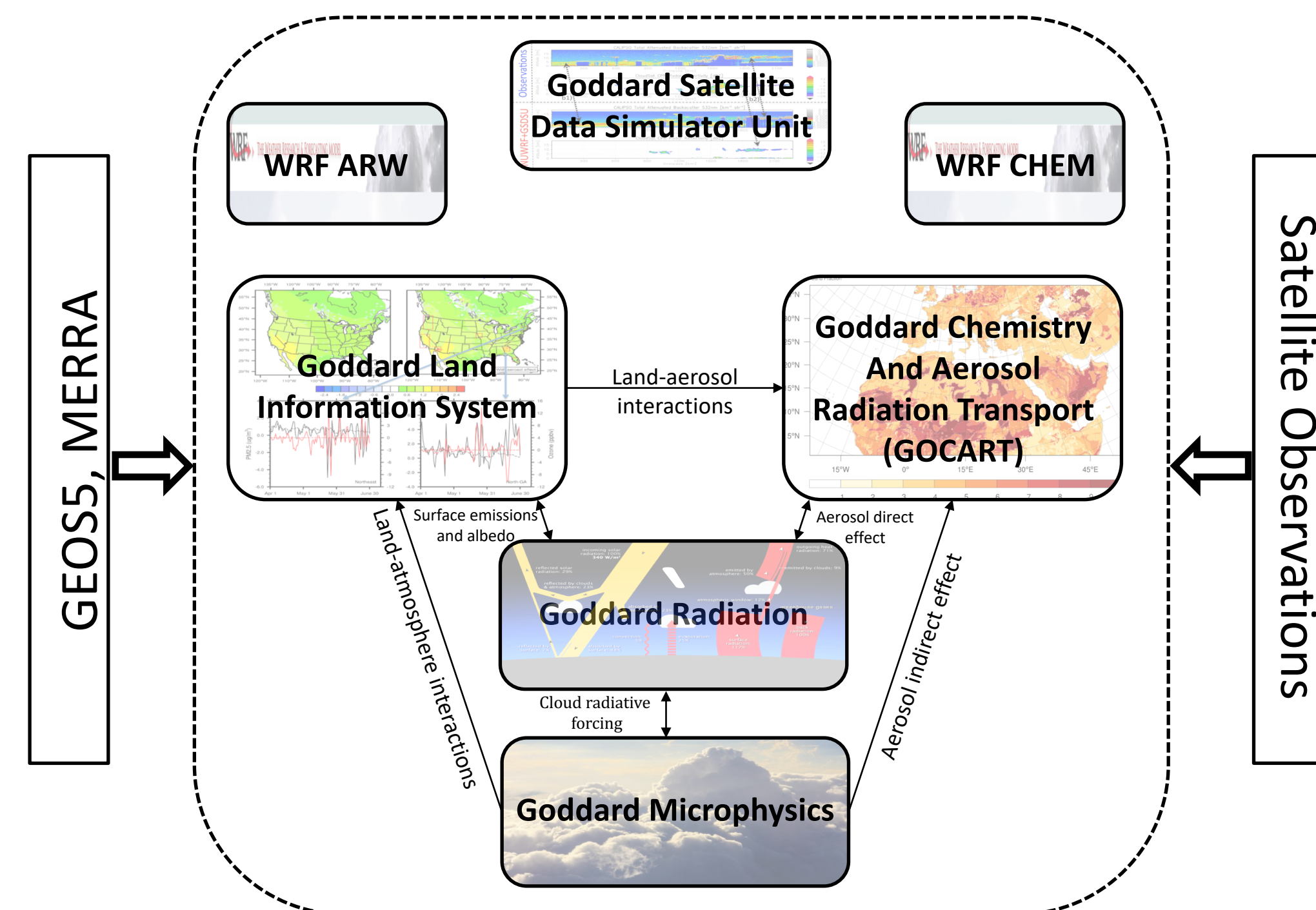


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What is NU-WRF?

The **NASA-Unified Weather Research and Forecasting (NU-WRF) model** is an observation-driven regional earth system modeling and assimilation system at satellite-resolvable scale.



NU-WRF has been developed by integrating

- Goddard Bulk Microphysics
- Goddard SW/LW radiation
- WRFchem GOCART model
- GSFC Land Information System
- G-SDSU

NU-WRF can be driven by GEOS-5 forecasts and/or MERRA global analyses

Software Engineering

This project involves multiple teams from different organizations with evolving research goals. Therefore, software engineering best practices are needed for software life-cycle management and testing, and to ensure reliability of the data being generated.

- NU-WRF uses **Git** for revision control. Repository is on a NASA machine but there are plans to move project to GitHub.
- **Python-based regression testing framework** is used on 40 use cases to test if any code changes have unintentionally changed the science results or made the software unstable.
- **Python-based build mechanism** facilitates the compilation of model components and portability of the model.
- **System requirements:** Linux, Intel compiler, SGIMPT or Intel MPI. Compiles/runs on MAC with some modifications to scripts/configuration files.

Regression testing of NU-WRF Charney patch 1 code base				
Repository: /gpfsm/dnb02/ccruz/devel/nu-wrf/code/nu-wrf.git				
Branch: develop --- Build type: release				
BUILD and/or RUN NAME	COMPILER	RESULT	BASELINE	
chem	intel-sgimpt	b+	-	-
kpp	intel-sgimpt	b+	-	-
scn	gnu-mvapich2	b+	-	-
scn	intel-sgimpt	b+	-	-
wrf	intel-sgimpt	b+	-	-
chem_3iceg_2014rad_gocart	intel-sgimpt	r+	+	+
chem_3iceh_2014rad_gocart	intel-sgimpt	r+	+	+
chem_4ice_2014rad_gocart	intel-sgimpt	r+	+	+
chem_casaco2	intel-sgimpt	r+	+	+
chem_eros_dyn	intel-sgimpt	r+	+	+
chem_eros_dyn_noah36_modis_merra2_lis_spinup	intel-sgimpt	r+	+	+
chem_gfed4_gocart	intel-sgimpt	r+	+	+
chem_gfed4_gocart	intel-sgimpt	r+	+	+
kpp_gfed4_gocart	intel-sgimpt	r+	+	+
kpp_gfed4_gocart	intel-sgimpt	r+	+	+
wrf_3iceg_2014rad	intel-sgimpt	r+	+	+
wrf_3iceg_2014rad_lake	intel-sgimpt	r+	+	+
wrf_3iceh_2014rad	intel-sgimpt	r+	+	+
wrf_4ice_2014rad	intel-sgimpt	r+	+	+
wrf_4ice_2017rad	intel-sgimpt	r+	+	+
wrf_arw_hatrina	intel-sgimpt	r+	+	+
wrf_arw_simple	intel-sgimpt	r+	+	+
wrflls_noah36_lusttk_modis_merra2	intel-sgimpt	r+	+	+
wrflls_noah36_modis_gdas	intel-sgimpt	r+	+	+
wrflls_noah36_modis_merra2	intel-sgimpt	r+	+	+
wrflls_noah36_modis_merra2_lis_spinup	intel-sgimpt	r+	+	+
wrflls_noah36_modis_merraland	intel-sgimpt	r+	+	+
wrflls_noah36_and_merra2	intel-sgimpt	r+	+	+
wrflls_noah36_usgs_merra2	intel-sgimpt	r+	+	+
wrflls_scn	intel-sgimpt	r+	+	+
Time taken = 03:12:53				
Legend:				
+ : task success				
F : task failure				
C : created baseline				
b : _build_ task				
r : _run_ task				
v : _verification_ task				
- : Not available				
Notes:				
intel compiler version: 17.0.4.196				
gnu compiler version: 6.3				
Results in: /discover/nobackup/projects/nu-wrf/regression_testing/gitrepo/results				
Commits from last day:				

Software Availability

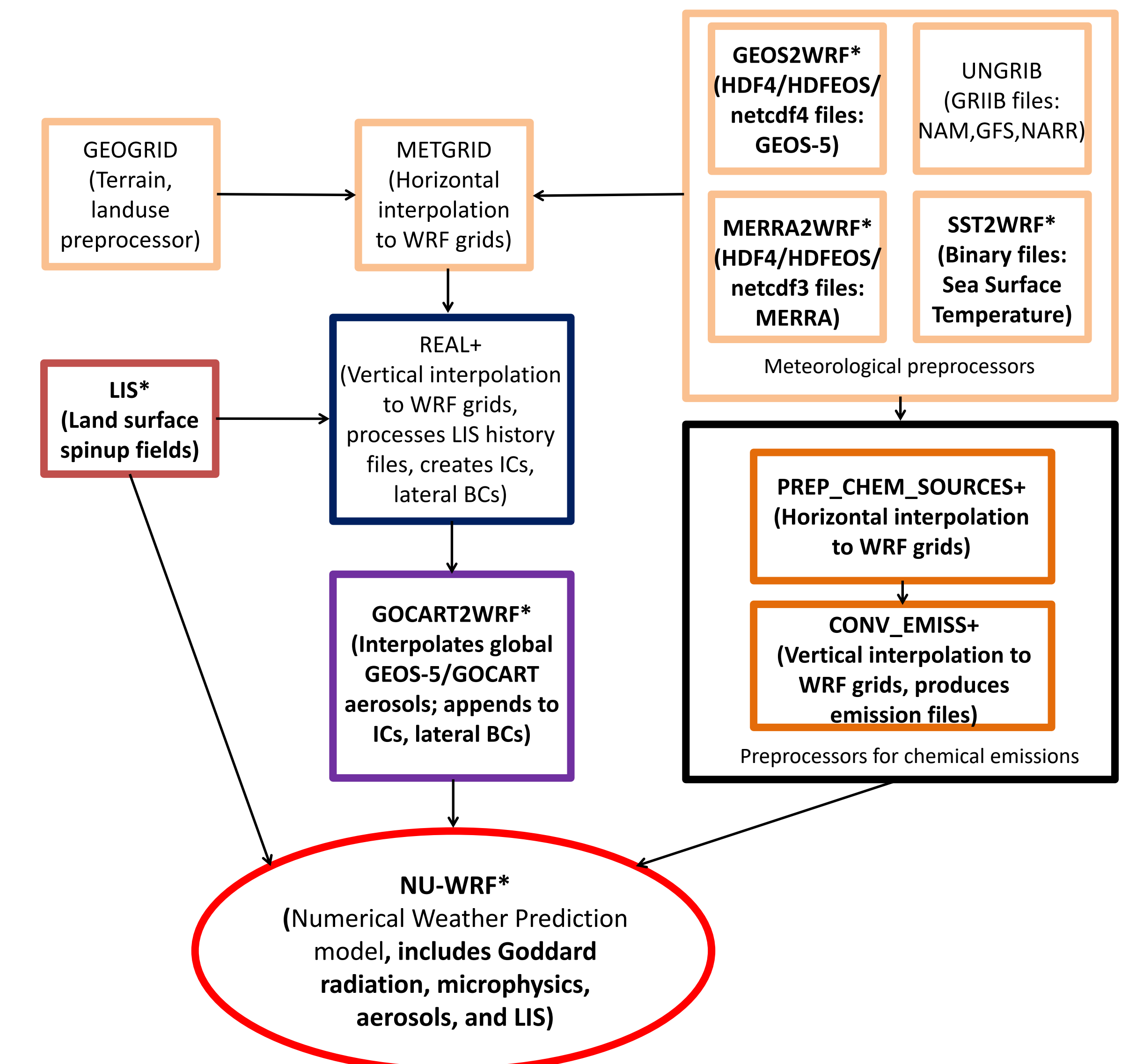
NU-WRF Source is available from GSFC via a Software Usage Agreement. See: <https://nuwrf.gsfc.nasa.gov/software>
Email to: carlos.a.cruz@nasa.gov
For more information about NU-WRF see: <https://nuwrf.gsfc.nasa.gov>

NU-WRF Components

NU-WRF contains the following components and utilities:

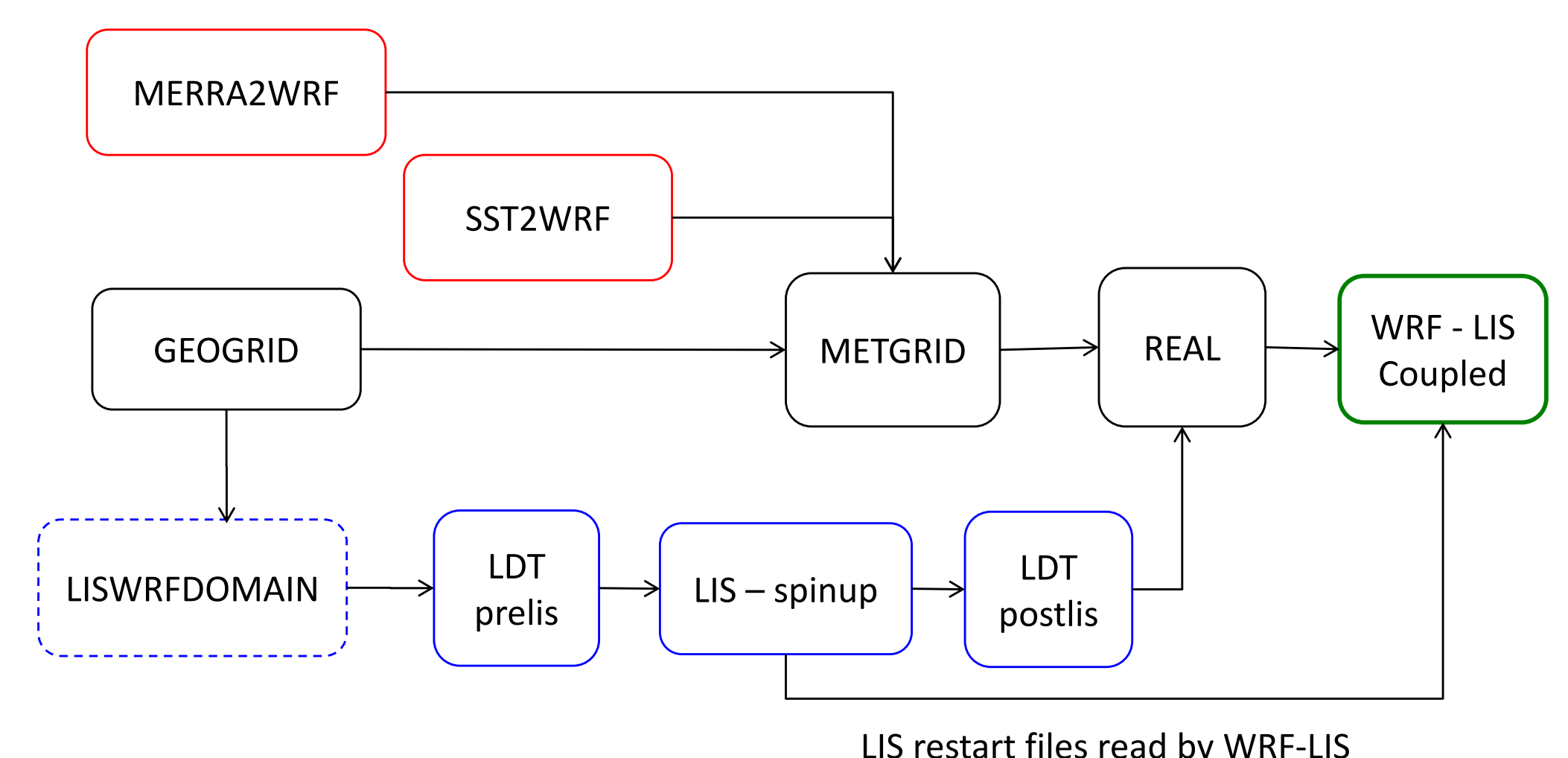
- ARWpost (WRF ARW post processor)
- GSDSU (Goddard Satellite Simulator)
- MET (Model Evaluation Tools)
- RIP4 (Read/Interpolate/Plot version 4)
- UPP (Unified Post Processor)
- WPS (WRF Preprocessing System)
- WRF
- LIS (Land Information System)
- LDT (Land Data Toolkit)
- LVT (Land Visualization Toolkit)
- Utilities → NU-WRF preprocessors:
 - casa2wrf
 - geos2wrf
 - gocart2wrf
 - lis4scm
 - lisWrfDomain
 - ndviBareness4Wrf
 - prep_chem_sources
 - sst2wrf

NU-WRF Preprocessing Steps

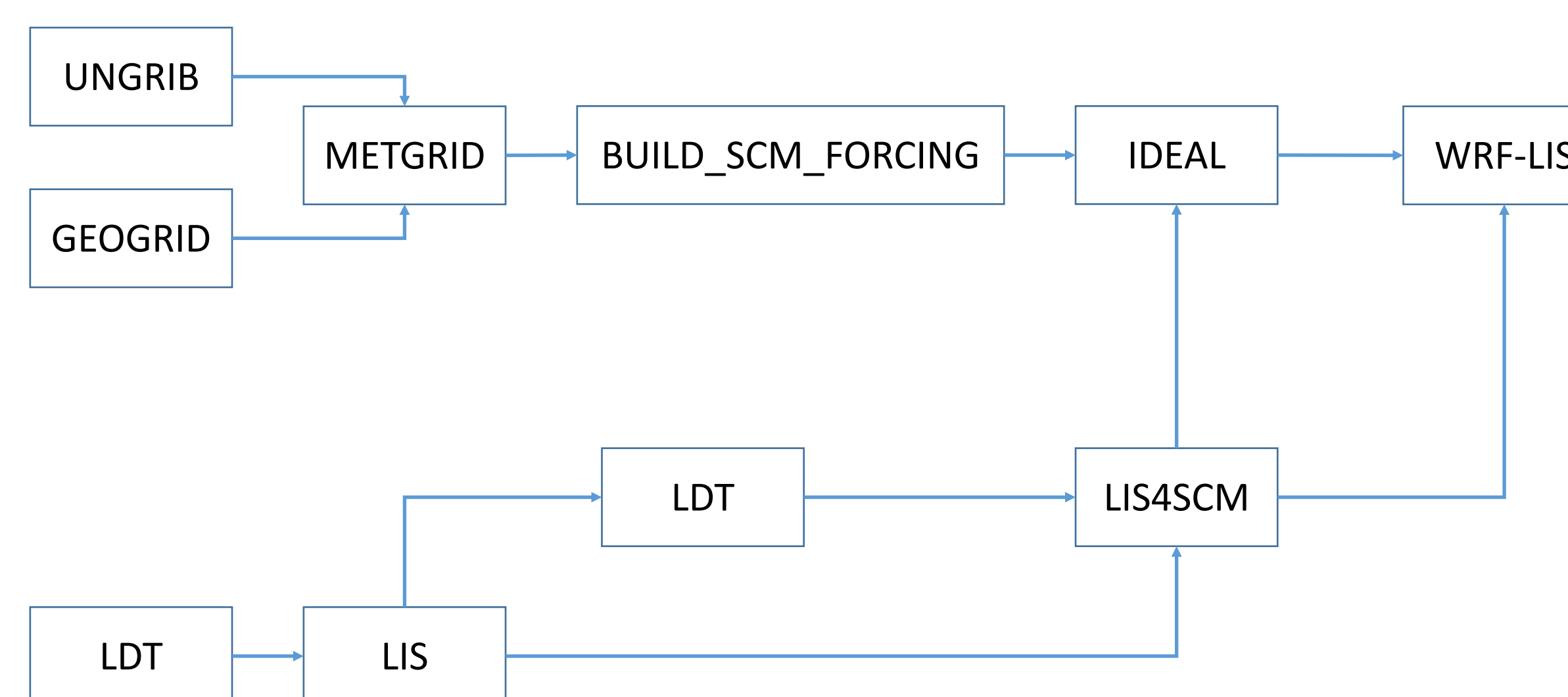
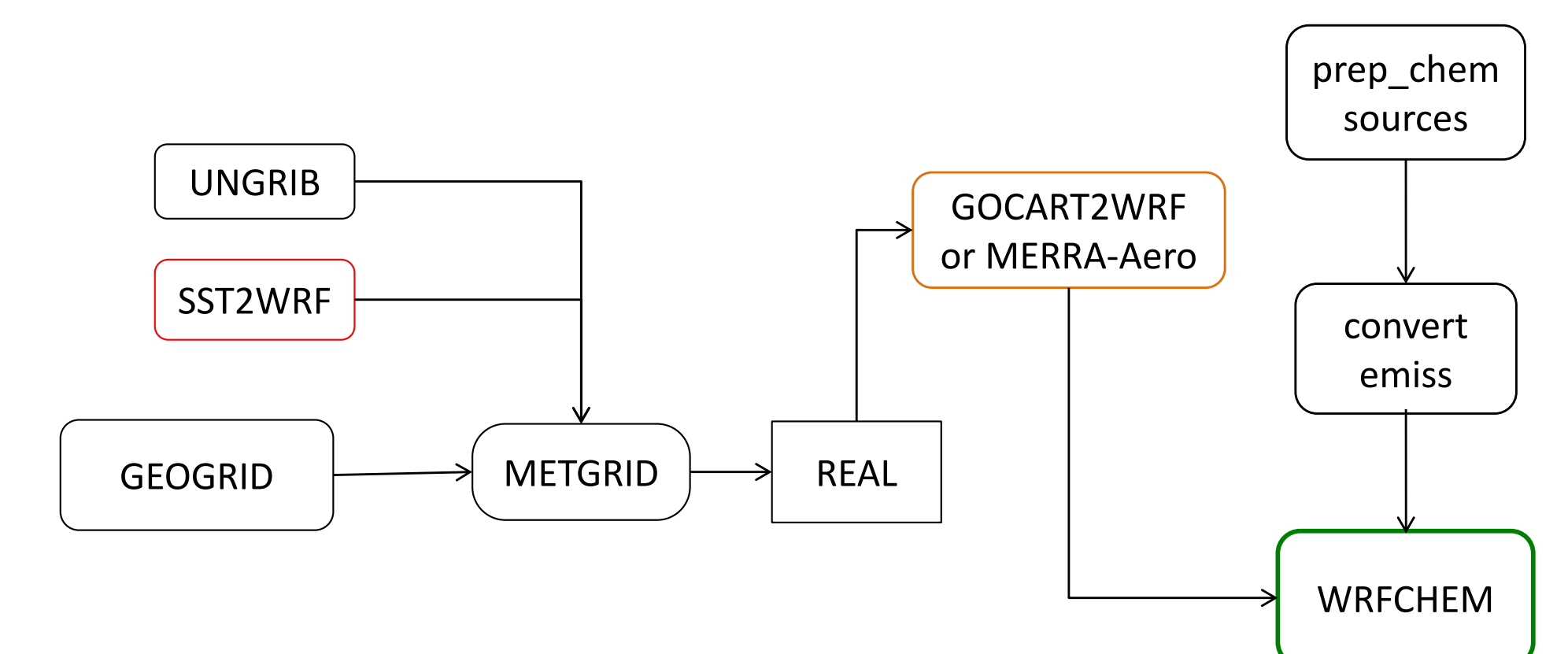


NU-WRF Workflows

MERRA2WRF / WRF-LIS coupled workflow



GOCART Aerosol, Emission, and WRF-Chem workflow (can combine with WRF-LIS, MERRA, GEOS, and/or SST workflows)



New WRF-LIS Single Column Model workflow

WRF-LIS runs with horizontally homogeneous fields with unstaggered 2x2 grid

Acknowledgments

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