

The HWRF Development Process

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Developmental Testbed Center

In collaboration with the HWRF Developers Committee

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Acknowledgments to DTC staff (M. Biswas, L. Carson, H. Shao, D. Stark, M. Hu, K. Fossell), EMC HWRF team, and HWRF users and developers





Calendar: Operational Implementation

Activities	Approximate dates
Development of upgrades	Ongoing
Final development of proposed upgrades	September - December
Test of individual proposed upgrades	December - March
Final test of combined proposed upgrades	March
Pre-implementation test at NCO	April
HWRF operational implementation (AL & EP)	May
HWRF public release	August

WRF public release

GSI public release



HWRF distributed development

- Examples of HWRF activities currently going on
 - DTC: changes to compilation/configuration to support public
 - EMC: ensemble capability in python scripts
 - ESRL/OU/EMC: regional HWRF ensemble (EnKF) in DA
 - URI: alternate ocean initialization based on NCODA
 - UCLA: new eddy-mixing formulation in PBL scheme
 - DTC: updates to WRF from community (sync with v3.6.1)
 - EMC: improvements to vortex initialization
 - CIMMS: upgrades to UPP synthetic satellite images
 - etc.

Q: How do we move forward together with distributed developments?!?

A: With effective communication and a robust HWRF code management!



Communications

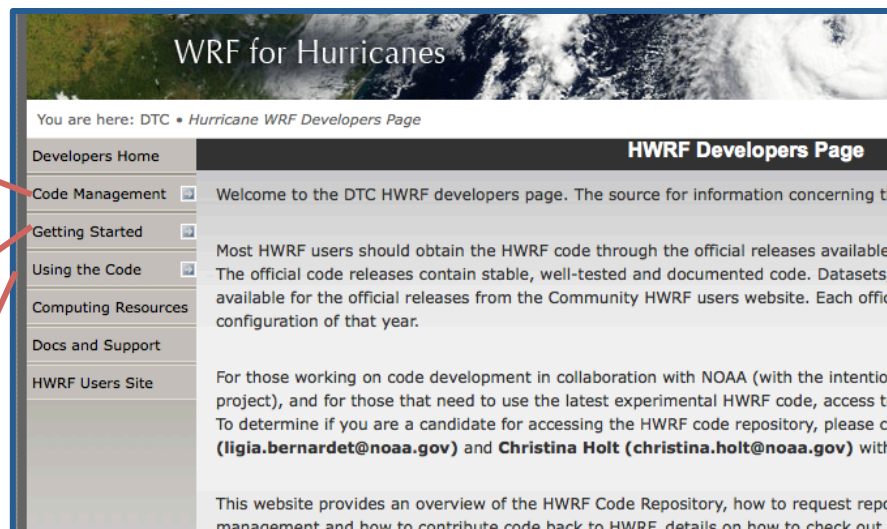
- HWRF Developers Committee
 - Membership: 2 from DTC, 2 from EMC
 - All developers welcome to meetings (Monday noon ET)
 - Forum for discussion, plans, and updates for development
 - Including testing, evaluation, and technical aspects
- Mailing list for exchanging information about development
 - hwrf_developers@rap.ucar.edu
 - All those with HWRF repository access are members
- Additional meetings scheduled as needed
 - Example: developers of HWRF regional ensemble with EnKF are meeting weekly now because of fast development phase

HWRF Developers Website

Code Management	Overview
Getting Started	Code Development Process
Using the Code	Roles and Responsibilities
Computing Resources	Testing

Getting Started	Obtaining Repository Access
Using the Code	Repository Structure
Computing Resources	Code Structure

Using the Code	Checking Out the Code
Computing Resources	Development Branches
Docs and Support	Build & Install
HWRF Users Site	Running HWRF



The screenshot shows the 'HWRF Developers Page' with a navigation menu on the left and main content on the right. The navigation menu includes: Developers Home, Code Management, Getting Started, Using the Code, Computing Resources, Docs and Support, and HWRF Users Site. The main content area has a header 'WRF for Hurricanes' and a sub-header 'HWRF Developers Page'. The main text reads: 'Welcome to the DTC HWRF developers page. The source for information concerning th... Most HWRF users should obtain the HWRF code through the official releases available... The official code releases contain stable, well-tested and documented code. Datasets, available for the official releases from the Community HWRF users website. Each offic configuration of that year. For those working on code development in collaboration with NOAA (with the intention project), and for those that need to use the latest experimental HWRF code, access to To determine if you are a candidate for accessing the HWRF code repository, please co (Ilgia.bernardet@noaa.gov) and Christina Holt (christina.holt@noaa.gov) with This website provides an overview of the HWRF Code Repository, how to request repo management and how to contribute code back to HWRF details on how to check out

Extensive resources for developers: <http://www.dtcenter.org/HurrWRF/developers>



The centralized HWRF repository

- With one command the HWRF repo can be obtained
`svn co https://svn-dtc-hwrf.cgd.ucar.edu/trunk HWRF`
- One more command for GSI and another command for HYCOM
- What is included
 - End-to-end python scripts
 - Tools for automation using the Rocoto Workflow Manager
 - Source for components
 1. WRF: atmospheric model
 2. WPS: global model pre-processor
 3. HWRF-utilities: libraries, utilities, and vortex initialization
 4. GSI: data assimilation
 5. MIPOM-TC: ocean model
 6. HYCOM (optional)
 7. Coupler
 8. UPP: postprocessor
 9. GFDL Vortex Tracker



Origin of components

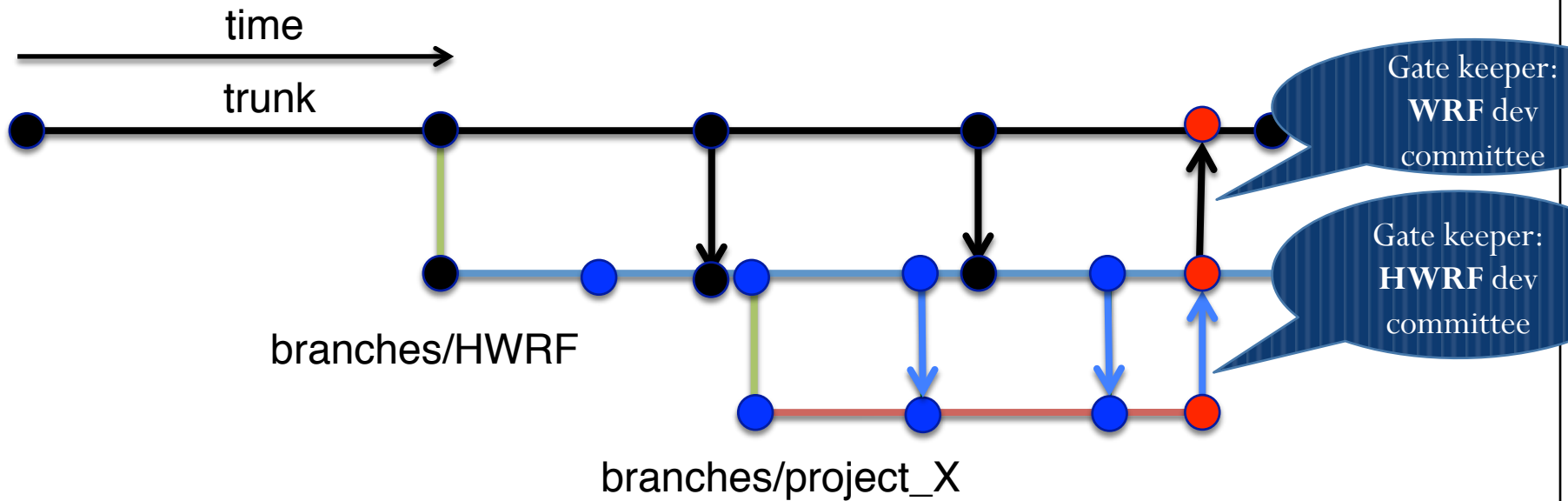
Component	SVN code repository
WRF	https://svn-wrf-model.cgd.ucar.edu
WPS	https://svn-wrf-wps.cgd.ucar.edu/
HWRF-utils	https://svn-dtc-hwrf-utilities.cgd.ucar.edu
Coupler	https://svn-dtc-ncp-coupler.cgd.ucar.edu
MPIPOM-TC	https://svn-dtc-pomtc.cgd.ucar.edu
HYCOM	https://svn-dtc-hycom.cgd.ucar.edu
UPP	https://svn-dtc-unifiedpostproc.cgd.ucar.edu
Tracker	https://svn-dtc-gfdl-vortextracker.cgd.ucar.edu
GSI	https://svnemc.ncep.noaa.gov/projects/gsi
	https://gsi.fsl.noaa.gov/svn/comgsi

Source code for components comes from their own repositories

In HWRF repo, these are *externals*, that is, *links* to other repos

Important because code is not being duplicated, helps avoids divergence

Example for WRF development



- WRF repository is hosted at NCAR, gets contributions for non-HWRF groups
- Branches/HWRF is used for centralizing all HWRF development
 - DTC updates it periodically from trunk (black arrows)
- Branches/projects are used by members of a project for development
 - Developers update them periodically from branches/HWRF
- When development is ready/tested, it gets committed to trunk

Important! Avoids divergence



Access for developers

- Account on SVN repositories (takes 2 weeks)
 - EMC arranges access to EMC GSI repository
 - DTC arranges access to all other repositories
- HFIP PIs can apply for accounts/projects on NOAA's Jet
 - Follow instructions at <https://rdhpcs-s.noaa.gov/acctmgmt>
 - Let Robert Gall (robert.gall@noaa.gov) know you're applying
 - Contact Nysheema Lett (Nysheema.Lett@noaa.gov) for a NOAA email address if you don't have one
 - Jet Questions go to Jet Help Queue (rdhpcs.jet.help@noaa.gov)
 - For help determining needed resources, email Christina or Ligia

Helpful Jet documentation: <https://sites.google.com/a/noaa.gov/oar-jetdocs/>

Great resource for svn: <http://svnbook.red-bean.com/>



What else is needed to run HWRF?

- Fix files (topography, microphysics tables etc.)
 - Available from DTC
- Input datasets (GFS, GDAS, GFS ensemble, obs etc.)
 - Available in NOAA HPSS but a challenge in other platforms
- Two running options:
 - Simple, step by step: use *wrappers* to submit python scripts
 - Instructions are available in [HWRF Users' Guide v3.6a](#)
 - Automated: use *Rocoto Workflow Manager*
 - Documentation available here: <http://rdhpcs.noaa.gov/rocoto/>
 - Details for using with HWRF: `HWRF / README . rocoto`
 - **Training will be provided by DTC in a few weeks**



New Object-Oriented Python scripts

- Recently developed by EMC and DTC
 - At least 3x less lines than previous ksh scripts
 - Modular, small blocks make it easier to reuse code
 - No hardcodes, all configuration is abstracted
- Partially implemented in 2014 operational HWRF
- End-to-end now available in HWRF repo and public release

It is not necessary to know Python to run HWRF.
For introducing changes to HWRF workflow, familiarity with Python and HWRF is required.

Documentation in public wiki:
<https://wiki.ucar.edu/display/DTCHWRF/DTC+HWRF+Scripts+Home>



HWRF Public Release

You are here: DTC • Hurricane WRF Users Page

WRF For Hurricanes

Welcome to the users page on WRF for Hurricanes. The [Weather Research and Forecasting \(WRF\)](#) Model is designed to serve both operational forecasting and atmospheric research needs. It features two dynamic cores, multiple physical parameterizations, a variational data assimilation system, ability to couple with an ocean model, and a software architecture allowing for computational parallelism and system extensibility. WRF is suitable for a broad spectrum of applications, including tropical storms.

Two robust configurations of WRF for tropical storms are the NOAA operational model [Hurricane WRF \(HWRF\)](#) and the National Center for Atmospheric Research (NCAR) [Advanced Research Hurricane WRF \(AHW\)](#). In this website users can obtain codes, datasets, and information for running both HWRF and AHW.

The [Developmental Testbed Center](#) and the [Mesoscale and Microscale Meteorology \(MMM\)](#) Division of NCAR support the use of all components of AHW and HWRF to the community, including the WRF atmospheric model with its Preprocessing System (WPS), various vortex initialization procedures, the Princeton Ocean Model for Tropical Cyclones (MPIOM-TC), the [Gridpoint Statistical Interpolation \(GSI\)](#) three-dimensional ensemble-variational data assimilation system, the [NOAA National Centers for Environmental Prediction \(NCEP\)](#) coupler, the [NOAA Geophysical Fluid Dynamics Laboratory \(GFDL\)](#) Vortex Tracker, and various postprocessing and products utilities.

The effort to develop AHW has been a collaborative partnership, principally among NCAR, the [Rosenstiel School at the University of Miami](#), and the [Air Force Weather Agency \(AFWA\)](#).

Events
No Upcoming Events


Announcements


- 8 September 2014
[Release v3.6a of the HWRF system](#)
- 16 September 2013
[Release v3.5b of the GFDL Vortex Tracker](#)

Organizations contributing to this website

Developmental Testbed Center (DTC)
NCAR's Mesoscale & Microscale Meteorology Division (MMM)

Sponsors of WRF for Hurricanes

 NCAR
National Center for Atmospheric Research (NCAR)

 National Oceanic and Atmospheric Administration (NOAA)

Yearly releases, code downloads, datasets, documentation, helpdesk

800 registered users

Stable, tested code

Operational and research capabilities (idealized simulation, alternate physics)

Ideal for users, not developers

Current release: HWRF v3.6a (2014 operational)

2014 Tutorials: College Park, MD and May in Taiwan (36 participants from 10 countries)



Extensive release documentation

NCAR/TN- 477+STR
NCAR TECHNICAL NOTE

February 2010

Scientific Documentation for the NMM Solver

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NOAA/OST, Silver Spring, MD

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National Centers for Environmental Prediction, Camp Springs, MD


**Community HWRM
Users' Guide V3.6a**


September 2014

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NOAA/ESRL/GSD, Developmental Testbed Center and CIRES/UCI

Richard Yablonsky
University of Rhode Island

Please send questions to: wrfhelp@ucar.edu


Developmental Testbed Center

DEVELOPMENTAL TESTBED CENTER 

**Hurricane Weather Research and Forecasting
(HWRf) Model:
2014 Scientific Documentation**

September 2014 – HWRf v3.6a

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Users Guide: http://www.dtcenter.org/HurrWRF/users/docs/users_guide/HWRf_v3.6a_usersguide.pdf
 HWRf Sci Doc: http://www.dtcenter.org/HurrWRF/users/docs/scientific_documents/HWRfV3.6a_ScientificDoc.pdf
 NMM Solver Sci Doc: http://www.dtcenter.org/HurrWRF/users/docs/scientific_documents/NMM_scientific_2-2-10_final.pdf



Summary

- DTC facilitates access to HWRF code for users and developers
- Lots of resources, websites, and documentation
- It is very important that developers follow code management so new code becomes available for operational testing
- We are here to help! Please contact us if you would like more information about the development process

A blue speech bubble with a white outline, pointing towards the top left. Inside the bubble, the word "Questions?" is written in a white, serif font.

Questions?