The AMPS Archive on the Earth System Grid

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AMPS— The Antarctic Mesoscale Prediction System

Real-time NWP capability to support Antarctic weather forecasting and science

- Priority: U.S. Antarctic Program (USAP) weather support
- Funding: National Science Foundation Office of Polar Programs
- User groups
 - 1) USAP and other forecasters
 - 2) Field campaigns
 - 3) Researchers
 - \rightarrow Use of AMPS archive



USAF C-17 Ice Runway, McMurdo

http://www.mmm.ucar.edu/rt/amps

AMPS Archive

Repository of AMPS Output

Contents: Model forecast data and plots

- Period: 2001-Present
- Location: NCAR High-Performance Storage System (HPSS)

• Applications: Research and Planning

(1) Regional climatologies

Ex: Dry Valleys / Ross Island region

(2) Site studies and climatologies for facility / camp planningEx: Pegasus airfield study

(3) Case and long-term studies

Ex: Severe weather events, regional precip

Application of Archive for Planning: Site Weather

- Investigation: Weather at alternate sites for Pegasus airfield
- Sites Investigated: Alternates 1 and 2
- Archive data analyzed

 Period: 2008–2011
 field seasons

 Fields analyzed

 Wind
 Wind
 Temp (T)
 Dewpoint temp (T_d)
 RH
 Precip





Wind speed (kt) statistics from AMPS: 2008/09, 2009/10, 2010/11 seasons. Blue= data min/max. Black/gray blocks= $10^{th}-90^{th}$, $25^{th}-75^{th}$ percentiles. Green= mean (hrs 12-24); yellow = median; red= $\pm 1\sigma$.

AMPS Archive Access— **Problems**

Prerequisites to Archive Access on NCAR MSS / HPSS

1) NCAR computer account

2) NCAR computer resources: GAUs or Core-hours

Issues

– Applying for account: administrative overhead

– Obtaining allocation of resources / computer time

AMPS Archive Access— Problems (cont'd)

Previous Approaches

(1) Requesters added to existing accounts

Problems:

(i) Time required to get user information and have users added to authorized scientist list

(ii) Resources of accounts depleted by multiple users

(iii) AMPS not set up to support the research of all requesters

(2) Scientific visits to NCAR to access and process data

(3) Limited on-line materials: The Ohio State University

- On-line data

Time series and gridded data— 6 hourly data, monthly means

Solution: The Earth System Grid (ESG)

 AMPS collaboration with NCAR's Computational and Information Systems (CISL) Lab
 → CISL experience with ESG

Earth System Grid Federation—

 Collaboration to develop software to disseminate model output and data for environmental and climate science

 Includes: DOE, NASA, NOAA, NSF, Max Planck Inst., British Atmos. Data Center, Aust. Nat'l Univ.

• Earth System Grid (ESG)— Cyberinfrastructure to access posted data collections

Solution: The Earth System Grid (ESG) (cont'd)

"ESG Gateway" Effort at NCAR

– ESG Gateway: Portal to scientific datasets

Datasets (examples)

• CCSM / CESM

(Community Climate System Model / Community Earth System Model data)

NARCCAP

(North American Regional Climate Change Assessment Program)

(Regional climate models over N. Amer.)

http://www.earthsystemgrid.org

Earth System Grid— Home Earth System Grid Home Search Data Account About Contact Us 🚦 Login ESG Gateway at the National Center for Atmospheric Research Search: All ≎ for: [Search To conduct a search, select a category from the pull down menu and/or enter free text into the text box. Search Categories Global Climate Models Quick Links + Type Community Earth System Model **Community Earth System Model (CESM)** Getting Started Guide Project CCSM 4.0 Model Output Create Account Browse Catalogs AMPS CCSM 3.0 Model Output AMPS (85) Search for Data CCSM (3847) Parallel Climate Model (PCM) CMIP5 (2807) GeoMIP (63) ESG Data Gateways NARCCAP (122) – Regional Climate Models NCL (60) Project ESG-BADC Gateway PCM (487) **NARCCAP: North American Regional Climate** ESG-NCI Gateway PMIP3 (9) **Change Assessment Program** ESG-NERSC Gateway list **PvNGL** (18) ESG-ORNL Gateway **PyNIO** (20) ESG-PCMDI Gateway **TAMIP** (192) ESG-WDCC Gateway NARCCAP cesm portal (10) NASA JPL Gateway PCMDI9 Gateway Institute Analysis & Visualization Software + Model Other Gateways NCL: NCAR Command Language + Experiment ACADIS (Arctic) **PyNGL: Python Interface to the NCL Graphic** + Frequency Libraries + Product PyNIO: Python Interface for Multi-format Geoscientific Data I/O + Realm + CF Variable www.earthsystemgrid.org/home.htm + Variable Name + Ensemble

Earth Syst	tem Grid— AMPS Project					
	arth System Grid Home Search Data Account About Contact Us Login					
Project: AMPS	Description of AMPS Project for ESG					
Summary Administration	www.earthsystemgrid.org/project/amps.html					
Description: The	Antarctic Mesoscale Prediction System (AMPS) is an experimental, real-time numerical weather prediction capability that provides					
Homepage: http://	://www.mmm.ucar.edu/rt/amps/information/amps_esg_data_info.html					
Nested Collections	Earth System Grid					
AMPS Archive.	Home Search Data Account About Contact Us Login					
	• WRF Output— Grid identifier					
	AMPS Archive 45, 60 = Size (km) of coarsest grid					
	Summary History Administration					
	Identifier: ucar.mmm.amps					
	Related URLs: <u>AMPS Information Page</u>					
	Palated Activities					
	Project - AMPS					
	Nested Collections					
	AMPS WRF 45 Output					
The Antarctic Mesoscale Prediction System (AMPS) WRF 45 Output						
	The Antarctic Mesoscale Prediction System (AMPS) WRF 60 Output					
and the second second second						

ESG AMPS Archive Collection AMPS Archive Data Published: WRF Forecasts - AMPS WRF 60 / 20 / 6.7 / 2.2-km (Mar. 2006–Nov. 2008) - AMPS WRF 45 / 15 / 5 / 1.67-km (Oct. 2008–Jan. 2013) - AMPS WRF 30 / 10 / 3.3 / 1.1-km (Jan. 2013- Recent) Largest grid size in given configuration • File Types *wrfout*_: Native-format WRF output (netCDF) *wrf_grib_* : GRIB-format version of selected fields/levels

*products*_: Forecast plots, graphics, and tables (2008)

ESG Archive Dataset Information

www.mmm.ucar.edu/rt/amps/information/ amps_esg_data_info.html

AMPS ESG (Earth System Grid) Dataset Information

Background

The AMPS archive contains forecast model output and related files from the Antarctic Mesoscale Prediction System. The Earth System Grid (ESG) currently makes available certain archive data, that from AMPS forecasts using the WRF (Weather Research and Forecasting) model (2006–Present). The datasets currently published to the ESG are: WRF model output in native (WRF) format (netCDF), GRIB versions of selected model fields at selected vertical levels, and forecast plots/graphics/tables. As with the actual AMPS archive, it is possible that particular forecast output times might not appear in the ESG collection: these would reflect missed forecasts. For information on the AMPS archive, please see the note at the bottom of this page.

The WRF forecast output available through the ESG is as follows. The earlier data from the 60/20/6.67/2.22-km grid AMPS configuration contains the native-format WRF output only (*wrfout* files). The later data from the 45/15/5/1.67-km grid AMPS configuration contains WRF output plus additional data/products: GRIB-format files of selected output fields (*wrf_grib* files) and the plots from the forecasts that were posted to the AMPS page (*products* files). The model fields that are in the GRIB files are listed here: <u>GRIB fields</u>. The GRIB parameter numbers, field units, and field abbreviations are also shown in this document.

ESG Dataset: AMPS WRF 60 Output



Forecast output from the AMPS WRF 60/20/6.67/2.22-km grid configuration (Dates: 06 Mar 2006-03 Nov 2008)

- Complete forecast fields for 60-km grid, AMPS domain 1 (3-hrly, 0-72 hrs, approx. 850 MB compressed)
- Complete forecast fields for 20-km grid AMPS domain 2 (3-hrly, 0-72 hrs, approx. 2500 MB compressed)
- Complete forecast fields for 6.7-km gri Frequency n 3 (1-hrly, 0-36 hrs, approx. 650 MB compressed)

- Complete forecast fields for 6.7-km grid, AMPS domain 6 (1-hrly, 0-36 hrs, approx. 2025 MB compressed)



Archive Download

(1) Login —
 OpenID: Sent by ESG —
 upon registration —

Login https://www.earthsystemgrid.org/myopenid/xxxxxx

Enter your OpenID:

Your OpenID is a URL.

Example: https://www.earthsystemgrid.org/myopenid/joe_smith

Login

Forgot your OpenID: <u>Retrieve it</u> Need an account: <u>Register</u>

(2) File download

Fields grouped by forecast initialization time

Download Individual Files		(3) Option:	Scriptir	ng dow	nloads	using wge			
Files can be: downloaded through a Browset downloaded in bulk via a <u>WGET</u> script, or requested from deep storage archives.									
* Attention Safari users, due to a known SSL limitation in the Safari browser, you will not be able to directly download files though Safari at this time. Both Firefox and Chrome are possible alternative browsers. We apologize for any inconvience caused.									
Sub Select File Results	File Download Selection								
Multiple files selectable	ucar.mnm.amps.wrf_45.201208 992 File(s)				Download ALL Selected File(s)				
Use * for a wildcard character.		File	Size	Format	Location	Direct Download			
Regular Expressions will not work at this time		products_2012080100.tar_0	1.15 GB	NetCDF	SRM				
Sub-Select		products_2012080112.tar_0	1.15 GB	NetCDF	SRM				
		products_2012080200.tar_0	1.14 GB	NetCDF	SRM				
		products_2012080212.tar_0	1.13 GB	NetCDF	SRM				

ESG Archive File Listings



Latest Archive Entries (30 / 10 / 3.3 / 1.1-km output)							
New Storage Format							
1) Single times / file 2) NetCDF-4 f	2) NetCDF-4 format						
– Smaller files (Note size!)							
- Users can select only the times wanted							
NB: More individual files							
AMPS 30/10/3.3-km WRF forecasts, beginning 14 Jan 2013 12Z							
Complete model output fields for 30-km grid, AMPS domain 1 (3-hr	y, 0-120 hrs; approx.						
 Complete model output time; 9 Gb per forecast). Complete model output fields for 10-km grid, AMPS domain 2 (3-hr 650 Mb per output time; 26 Gb per forecast). 	y, 0-120 hrs; approx.						
 Complete model output fields for 3.3-km grid, AMPS domain 3 (1-h 675 Mb per output time; 26 Gb per forecast). 	rly, 0-36 hrs; approx.						
HPSS Directory:/AMPSRT/WRF_30/ <yyyymm>/<yyyymmddhh></yyyymmddhh></yyyymm>							
Note: We have switched to archiving individual WRF output files, i.e., we no longer create tarballs of sets of WRF output files. The WRF output files now use NetCDF-4, with internal compression. NetCDF4-aware programs will be needed to read the WRF output files.							

Summary: AMPS Archive on the ESG

Open web access to archive contents

- Registration → Access password
- No NCAR computer account required
- File downloads via requests
- Data available: WRF-based output since 2006
 - Output from primary AMPS forecast grids
 - File types
 - (i) Model output
 (ii) GRIB model output
 (iii) Graphical forecast products



• Future: Ongoing additions of 30 / 10 / 3 / 1-km AMPS output from current configuration