NAEFS data exchange

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NAEFS Global Data Exchange

Current NAEFS global data exchange:

- 80 fields
- 10 upper air levels
- 1 degree spatial resolution
- 6 hour time resolution

Initial proposal for NAEFS hi-res global data exchange:

- 0.5 degree data (raw) exchange for the first 8 or 10 days for a number of selected variables for the surface and for upper air levels through 850hPa
- Every 3 hours output for the first 8 or 10 days (how many days are necessary?)

Specific requests for additional variables and for high resolution global data

- FNMOC has requested vorticity at 850mb and 500mb, and NCEP's tracker would use vorticity, if available, at these levels and 700mb. At NCEP, model dynamical variables are vorticity and divergence, which the postprocessor converts to winds, which the tracker converts back to vorticity if winds but not vorticity are available.
- Wave modelers have requested high resolution (space and time) fields of 10m wind and 2m temperature out to at least 240h.
- The developer of NCEP's tropical storm tracker has requested 6-hourly output to 384 hours (already provided at 1 degree by GEFS but not by GFS, the high resolution control). We need to know how far into the forecast 3-hourly data would be useful for the tracker.
- AFWA has requested ensemble winds at 300mb and 400mb to improve flight planning for fuel savings.

NAEFS Global Grid Exchange Variables for 1.0d

Update: June 2013

Variables	Levels and Categories	Total 80
GHT	Surface, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	11
TMP	2m, 2mMax, 2mMin, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	13
RH	2m, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	11
UGRD	10m, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	11
VGRD	10m, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	11
PRES	Surface, PRMSL	2
PRCP	APCP, CRAIN, CSNOW, CFRZR, CICEP	5
FLUX (surface)	LHTFL, SHTFL, DSWRF, DLWRF, USWRF, ULWRF	6
FLUX (top)	ULWRF (OLR)	1
PWAT	Total precipitable water at atmospheric column	1
TCDC	Total cloud cover at atmospheric column	1
CAPE	Convective available potential energy, Convective Inhibition	2
SOIL/SNOW	SOILW(0-10cm) , TMP(0-10cm down), WEASD(water equiv. of accum. Snow depth), SNOD(surface)	4
Other	850 hPa vertical velocity	1
Notes	Current NAEFS grids at 1*1 degree	

NAEFS Global Grid Exchange Variables for 0.5d

Update: June 2013

Variables	Levels and Categories	Total 80/34
GHT	Surface, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	11/(4)
TMP	2m, 2mMax, 2mMin, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	13/(6)
RH	2m, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	11/(4)
UGRD	10m, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	11/(4)
VGRD	10m, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	11/(4)
PRES	Surface, PRMSL	2/(2)
PRCP	APCP, CRAIN, CSNOW, CFRZR, CICEP	5/(5)
FLUX (surface)	LHTFL, SHTFL, DSWRF, DLWRF, USWRF, ULWRF	6/(0)
FLUX (top)	ULWRF (OLR)	1/(0)
PWAT	Total precipitable water at atmospheric column	1/(1)
TCDC	Total cloud cover at atmospheric column	1/(1)
CAPE	Convective available potential energy, Convective Inhibition	2/(2)
SOIL/SNOW	SOILW(0-10cm) , TMP(0-10cm down), WEASD(water equiv. of accum. Snow depth), SNOD(surface)	4/(0)
Other	850 hPa vertical velocity	1/(1)
Notes	Current NAEFS grids at 1*1 degree Initial plan for NAEFS grids exchange at 0.5*0.5 degree	

NAEFS Global Grid Exchange Variables for 0.5d

Update: December 2013

Variables	Levels and Categories	Total 83/42
GHT	Surface, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	11/(5)
TMP	2m, 2mMax, 2mMin, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	13/(6)
RH	2m, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	11/(4)
UGRD	10m, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	11/(6)
VGRD	10m, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	11/(6)
PRES	Surface, PRMSL	2/(2)
PRCP	APCP, CRAIN, CSNOW, CFRZR, CICEP	5/(5)
FLUX (surface)	LHTFL, SHTFL, DSWRF, DLWRF, USWRF, ULWRF	6/(0)
FLUX (top)	ULWRF (OLR)	1/(0)
PWAT	Total precipitable water at atmospheric column	1/(1)
TCDC	Total cloud cover at atmospheric column	1/(1)
CAPE	Convective available potential energy, Convective Inhibition	2/(2)
SOIL/SNOW	SOILW(0-10cm) , TMP(0-10cm down), WEASD(water equiv. of accum. Snow depth), SNOD(surface)	4/(0)
Other	850 hPa vertical velocity, 500, 700, 850 hPa vorticity	4/(4)
Notes	Current NAEFS grids at 1*1 degree Initial plan for NAEFS grids exchange at 0.5*0.5 degree Additional variables used by current tropical storm tracker	

NAEFS Global Grid Exchange Variables for 0.5d

Update: December 2013

Variables	Levels and categories	Total 83/47
GHT	Surface, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	11/(7)
TMP	2m, 2mMax, 2mMin, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	13/(9)
RH	2m, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	11/(4)
UGRD	10m, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	11/(6)
VGRD	10m, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	11/(6)
PRES	Surface, PRMSL	2/(2)
PRCP	APCP, CRAIN, CSNOW, CFRZR, CICEP	5/(5)
FLUX (surface)	LHTFL, SHTFL, DSWRF, DLWRF, USWRF, ULWRF	6/(0)
FLUX (top)	ULWRF (OLR)	1/(0)
PWAT	Total precipitable water at atmospheric column	1/(1)
TCDC	Total cloud cover at atmospheric column	1/(1)
CAPE	Convective available potential energy, Convective Inhibition	2/(2)
SOIL/SNOW	SOILW(0-10cm) , TMP(0-10cm down), WEASD(water equiv. of accum. Snow depth), SNOD(surface)	4/(0)
Other	850 hPa vertical velocity, 500, 700, 850 hPa vorticity	4/(4)
Notes	Current NAEFS grids at 1*1 degree Initial plan for NAEFS grids exchange at 0.5*0.5 degree Additional variables used by current tropical storm tracker Additional variables for new tracker to analyze storm phase	

NAEFS Global Grid Exchange Variables for 0.5d

Update: March 2014

Variables	Levels and categories	Total 91/53
GHT	Surface, 10, 50, 100, 200, 250, 300, 400, 500, 700, 850, 925, 1000 hPa	13/(8)
TMP	2m, 2mMax, 2mMin, 10, 50, 100, 200, 250, 300, 400, 500, 700, 850, 925, 1000 hPa	15/(10)
RH	2m, 10, 50, 100, 200, 250, 500, 700, 850, 925, 1000 hPa	11/(4)
UGRD	10m, 10, 50, 100, 200, 250, 300, 400, 500, 700, 850, 925, 1000 hPa	13/(8)
VGRD	10m, 10, 50, 100, 200, 250, 300, 400, 500, 700, 850, 925, 1000 hPa	13/(8)
PRES	Surface, PRMSL	2/(2)
PRCP	APCP, CRAIN, CSNOW, CFRZR, CICEP	5/(5)
FLUX (surface)	LHTFL, SHTFL, DSWRF, DLWRF, USWRF, ULWRF	6/(0)
FLUX (top)	ULWRF (OLR)	1/(0)
PWAT	Total precipitable water at atmospheric column	1/(1)
TCDC	Total cloud cover at atmospheric column	1/(1)
CAPE	Convective available potential energy, Convective Inhibition	2/(2)
SOIL/SNOW	SOILW(0-10cm) , TMP(0-10cm down), WEASD(water equiv. of accum. Snow depth), SNOD(surface)	4/(0)
Other	850 hPa vertical velocity, 500, 700, 850 hPa vorticity	4/(4)
Notes	Current NAEFS grids at 1*1 degree Initial plan for NAEFS grids exchange at 0.5*0.5 degree Additional variables used by current tropical storm tracker Additional variables for new tracker to analyze storm phase and for AFWA flight planning	

NAEFS Global high resolution test data

- ftp://ftp.emc.ncep.noaa.gov/gmb/rwobus/naefs/com/gens/prod/
- Extracted from production SREF boundary condition files derived from GEFS
- Only for first 90 hours
- Contains most of the fields proposed for high resolution data exchange
- We need to know which of these variables are needed in NAEFS:
  - At 0.5 degree resolution?
  - At 3 hour intervals?
  - How many days into the forecast are these needed?
- Send feedback to richard.wobus@noaa.gov

NAEFS Regional Ensemble Data exchange

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Outline

- Introduction
- Motivation
- Challenge
- Strategy

Introduction

North American Ensemble Forecast System (NAEFS)

A new weather modeling system run jointly by the Meteorological Service of Canada and the U.S. national weather service to provide NWP products to weather forecasters in both countries

Regional ensemble

NCEP short range ensemble forecast system (SREF)

CMC regional ensemble prediction system (REPS)

Motivation

As part of the extension of NAEFS activities, develop a strategy that would allow CMC and NCEP to exchange/share grib2 format data from their respective short range ensemble systems(NCEP-SREF and CMC-REPS)

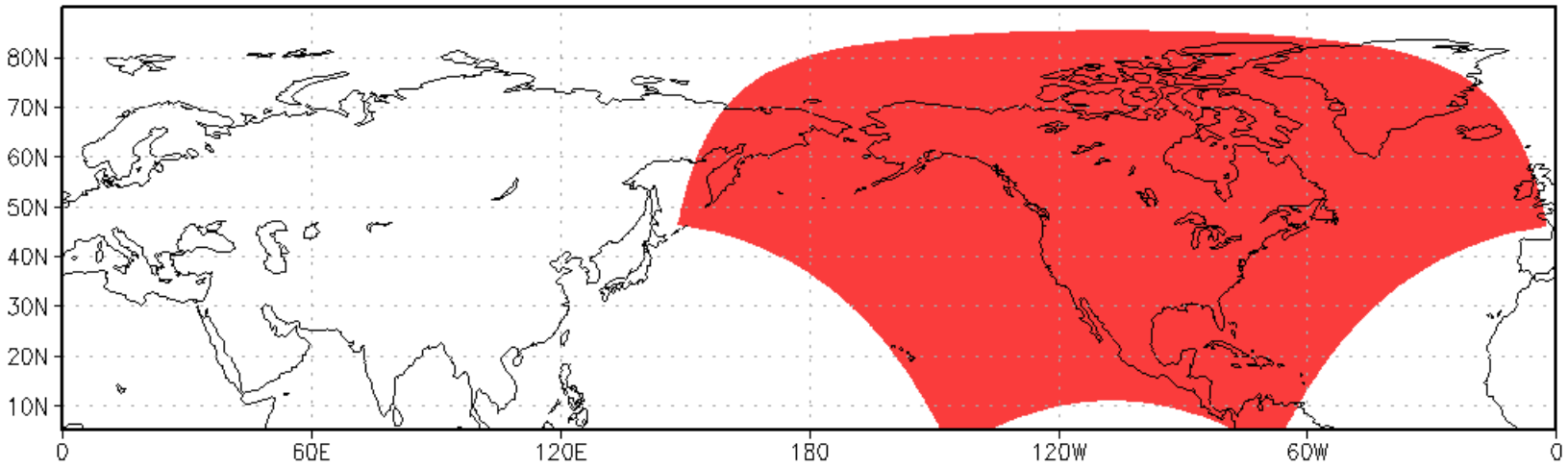
Challenge

- Native grids of NCEP-SREF and CMC-REPS are different in resolution and do not cover the same geographical area for all grid points
- The domain need to cover as much as possible of North America , including Mexico and surrounding area

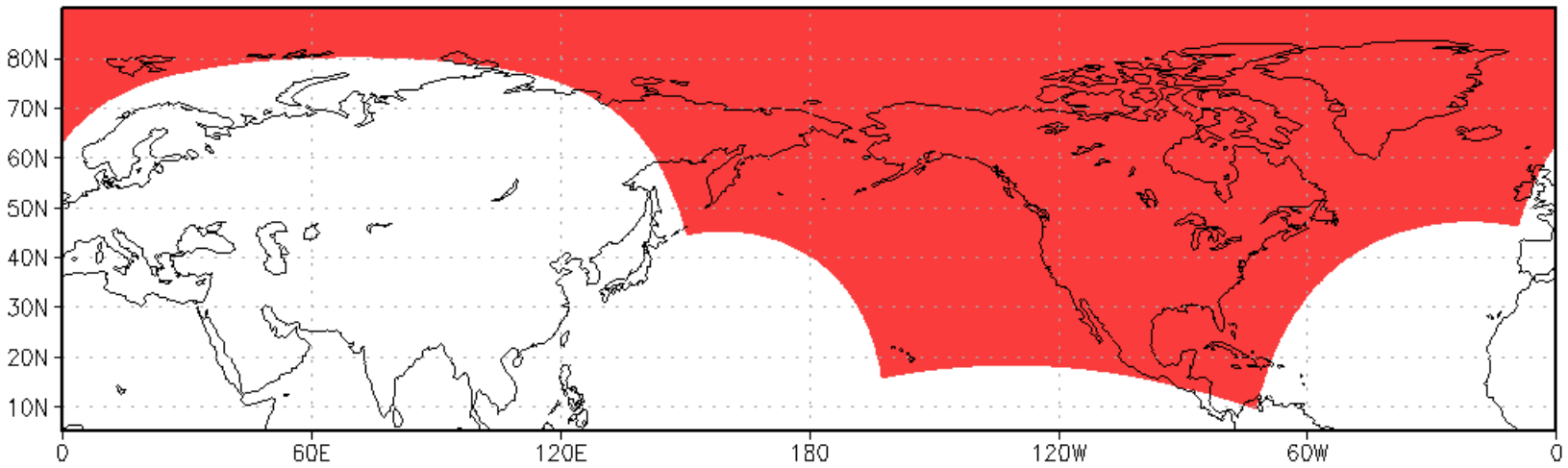
Strategy

- Each center interpolates their short range ensemble data on native grid to a lat-lon grid
- The chosen lat-long grid domain covers all data points of NCEP-SREF and CMC-REPS
- Resolution of lat-long grid is at about 15km
- It is left to each center to take the responsibility of obtaining and manipulating data from the other center's latitude longitude grid
- Data locations that are on both grids could potentially be combined for NAEFS calculations
- Suggestions on domain, grid resolution, and exchange variables are welcome before we finalize this exchange plan

NCEP SREF DOMAIN



CMC REPS DOMAIN



GrADS: COLA/IGES

NAEFS (NCEP+CMC) Regional Ensemble
Exchange Variables Draft: Step 1

Variables	GRIB file	Total = 104
GHT	surface, 250, 300,500, 600,675,700,725,750,775,800,825,850, 875,900,925,950, 975,1000 hPa	19
TMP	2m, 300,500, 600,675,700,725,750,775, 800,825,850, 875,900,925,950, 975,1000 hPa	18
RH	2m, 300,500, 600,675,700,725,750,775, 800,825,850, 875,900,925,950, 975,1000 hPa	18
UGRD **VGRD**	10m, 250, 300,500, 600,675,700,725,750,775, 800,825,850, 875,900,925,950, 975,1000 hPa	38=19x2
TD	2m,300,500,700,850hPa	5
PRES	PRMSL	1
Categorical Precip	RAIN,FRZR,ICEP,SNOW	4
PRCP	PRCP	1
PWAT		0
FLUX (surface)		0
FLUX (top)		0
AVIATION		0
CONVECTION		0
Notes	(1) 3-hrly output frequency (2) To be added to the output of the CMC model (easy config change)	

NAEFS (NCEP+CMC) Regional Ensemble
Exchange Variables Draft: Step 2

Variables	GRIB file	Total = 115
GHT	surface, 250, 300,500, 600,675,700,725,750,775,800,825,850, 875,900,925,950, 975,1000 hPa	19
TMP	Tpbl,2m, 300,500, 600,675,700,725,750,775, 800,825,850, 875,900,925,950, 975,1000 hPa	19
RH	2m, 300,500, 600,675,700,725,750,775, 800,825,850, 875,900,925,950, 975,1000 hPa	18
UGRD **VGRD**	10m, 250, 300,500, 600,675,700,725,750,775, 800,825,850, 875,900,925,950, 975,1000 hPa	38=19x2
TD	2m,300,500,700,850hPa	5
PRES	PRMSL	1
Categorical Precip	RAIN,FRZR,ICEP,SNOW	4
PRCP	PRCP	1
PWAT	**Total precipitable water at atmospheric column**	1
FLUX (surface)	**LHTFL, SHTFL, DSWRF, DLWRF, USWRF, ULWRF**	6
FLUX (top)	**ULWRF (OLR)**	1
AVIATION		0
CONVECTION	**CAPE, LI, CIN**	3
Notes	(1) 3-hrly output frequency (2) We don't have 2mMax, 2mMin currently. But we would like to ask for if CMC happen to have them. **(3) New variables for step 2**	

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