WRF Modeling System Flow Chart
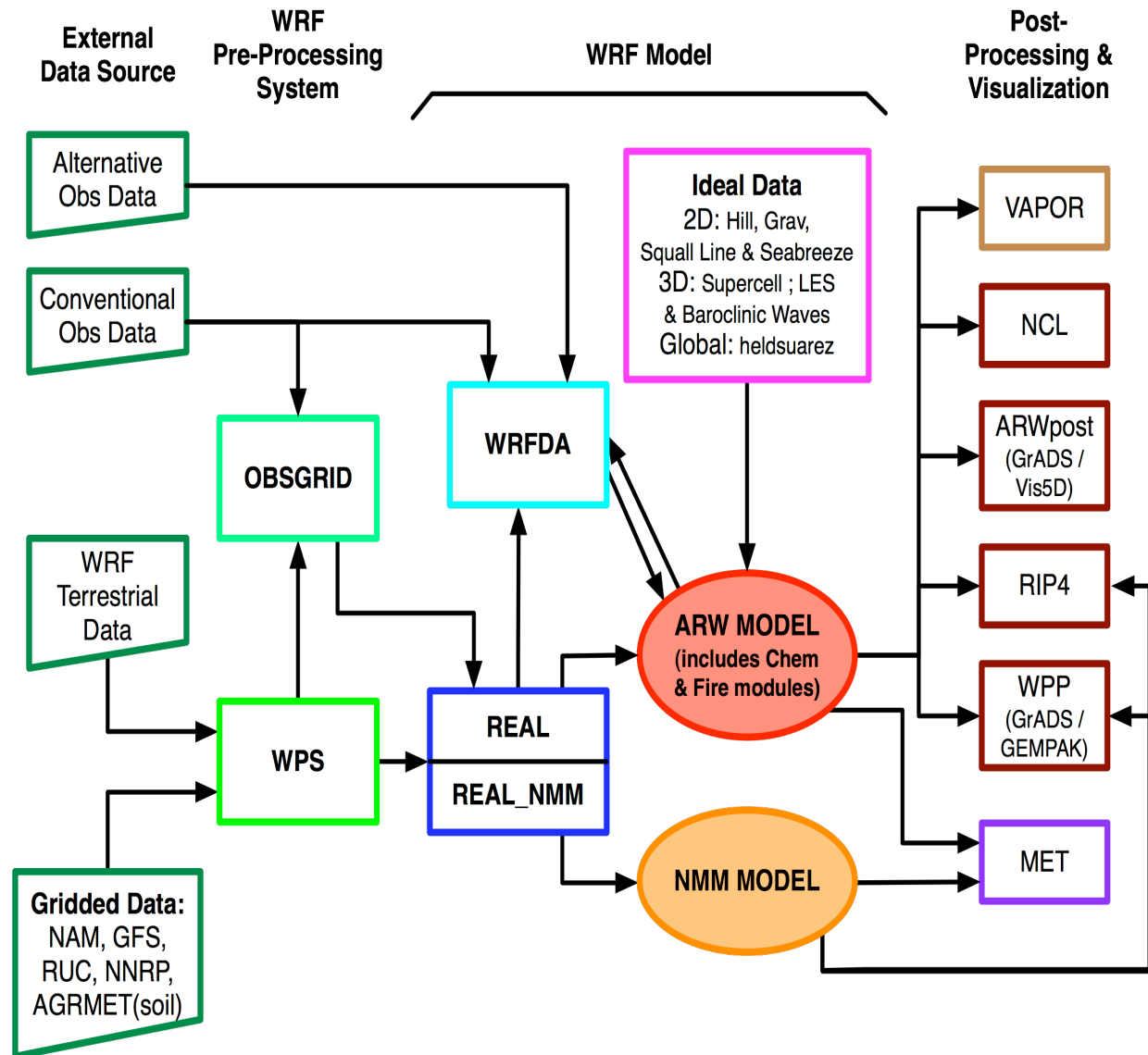
Modeling System Data Flow

WPS.TAR

WRF.TAR

(meteorological data)

(IC only)

ungrib

ideal

(grid & geographic data)

(IC & BC)

geogrid → **metgrid** → **real** → **wrf**
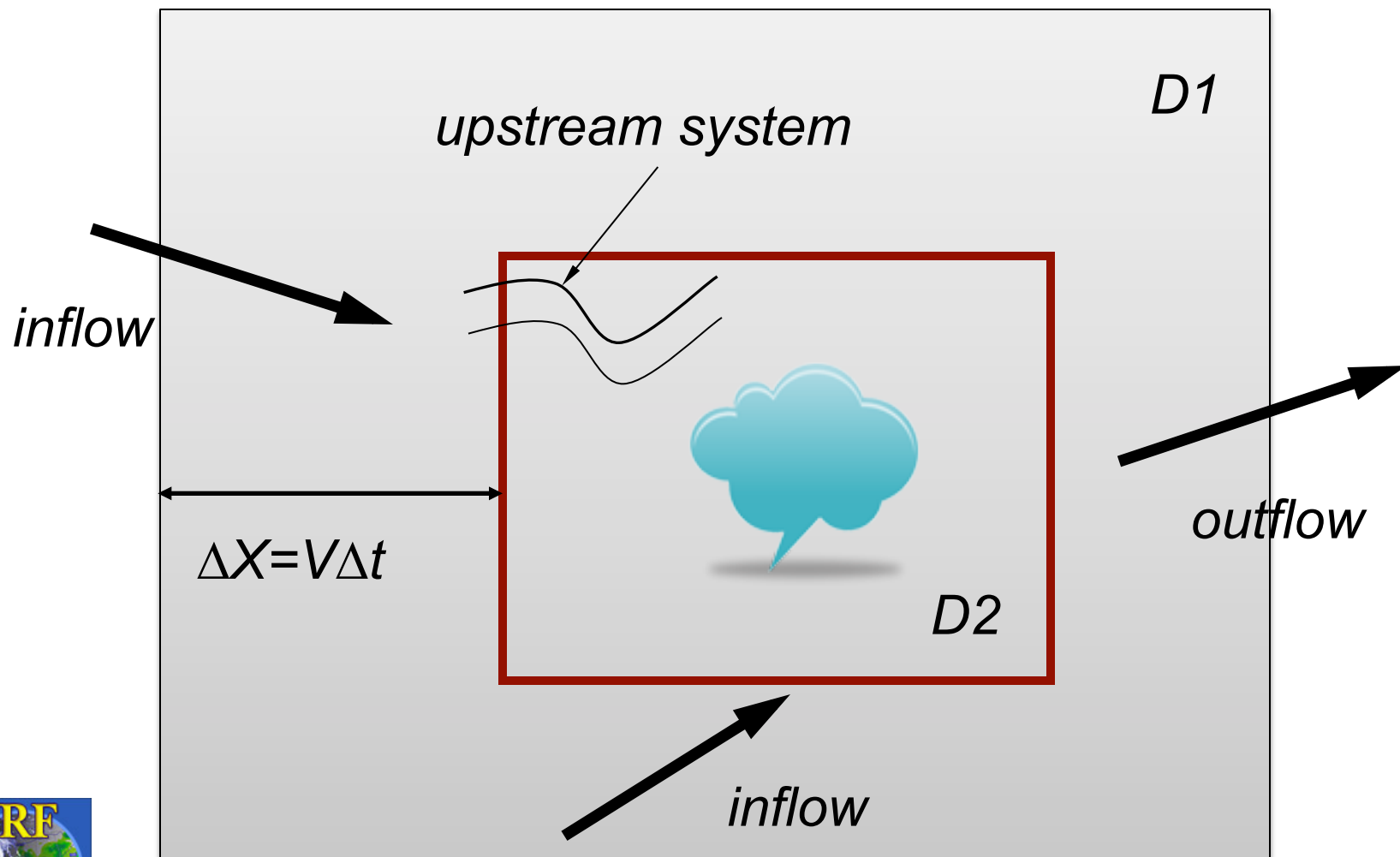
horizontal interpolation

+

obsgrid

(observations)

vertical interpolation

auxiliary program
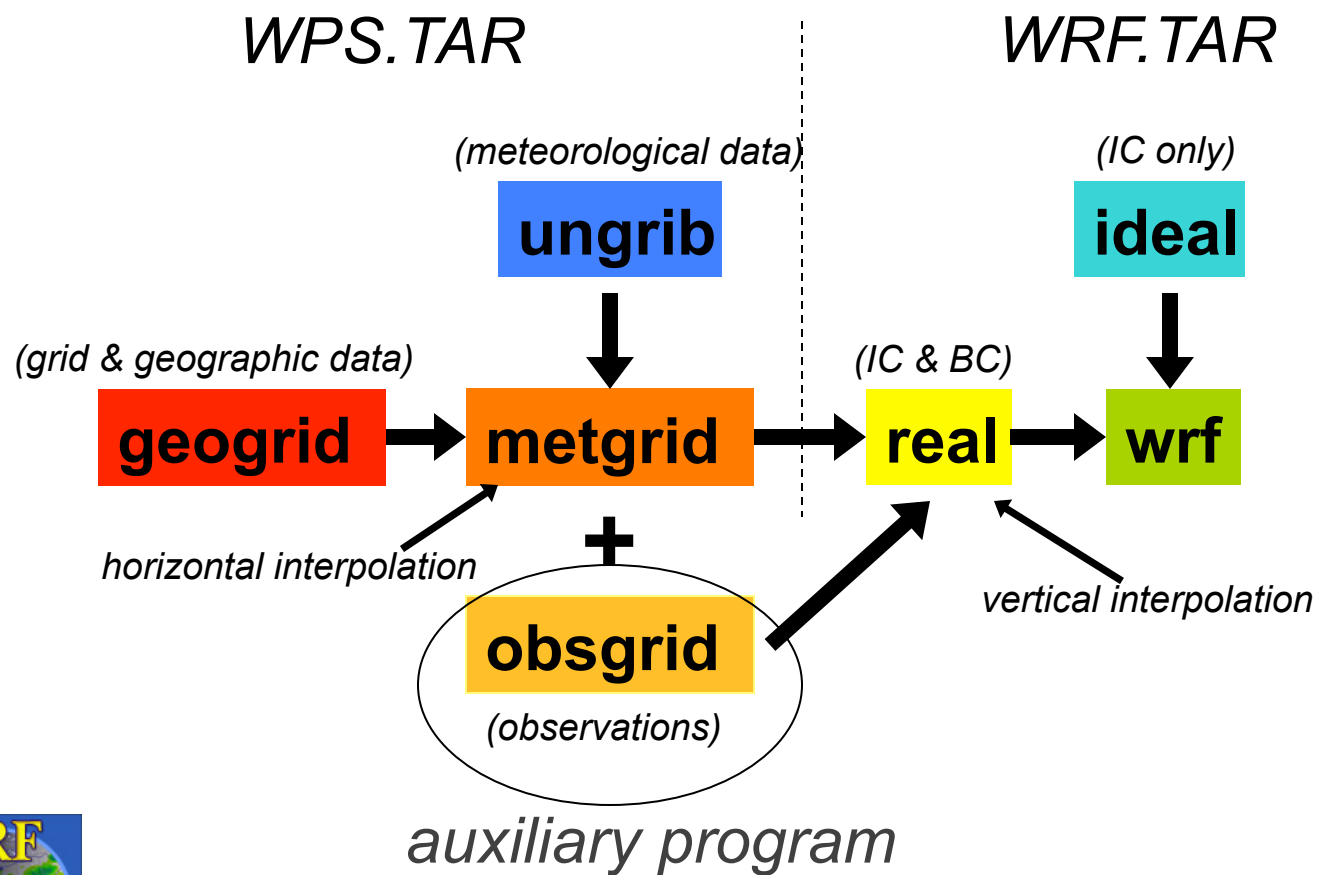
Domains

- How large do they need to be?
  - Depending on applications
  - Domain sizes should not be too small: no less than 100x100
  - Experimentation

- Where to place my lateral boundaries?
  - Avoid steep topography
  - Away from my interest

# *Note on Configuring Domains: Horizontal*

Domains

- ## How many vertical levels should I use?
    - ### Related to horizontal grid size too
    - ### No more than 1000 m:
        - #### Radiation, microphysics

- ## Make ΔZ as uniform as possible away from boundary layer
    - ### Let program real compute it for you

- ## Where should I place model top?
    - ### 50 mb or 5000 Pa

Note on Configuring Domains: Vertical

model top

$\triangle Z$

Z

Do not use large $\triangle Z$

($\triangle Z < 1000$ m)

$\triangle Z$

✔

✘
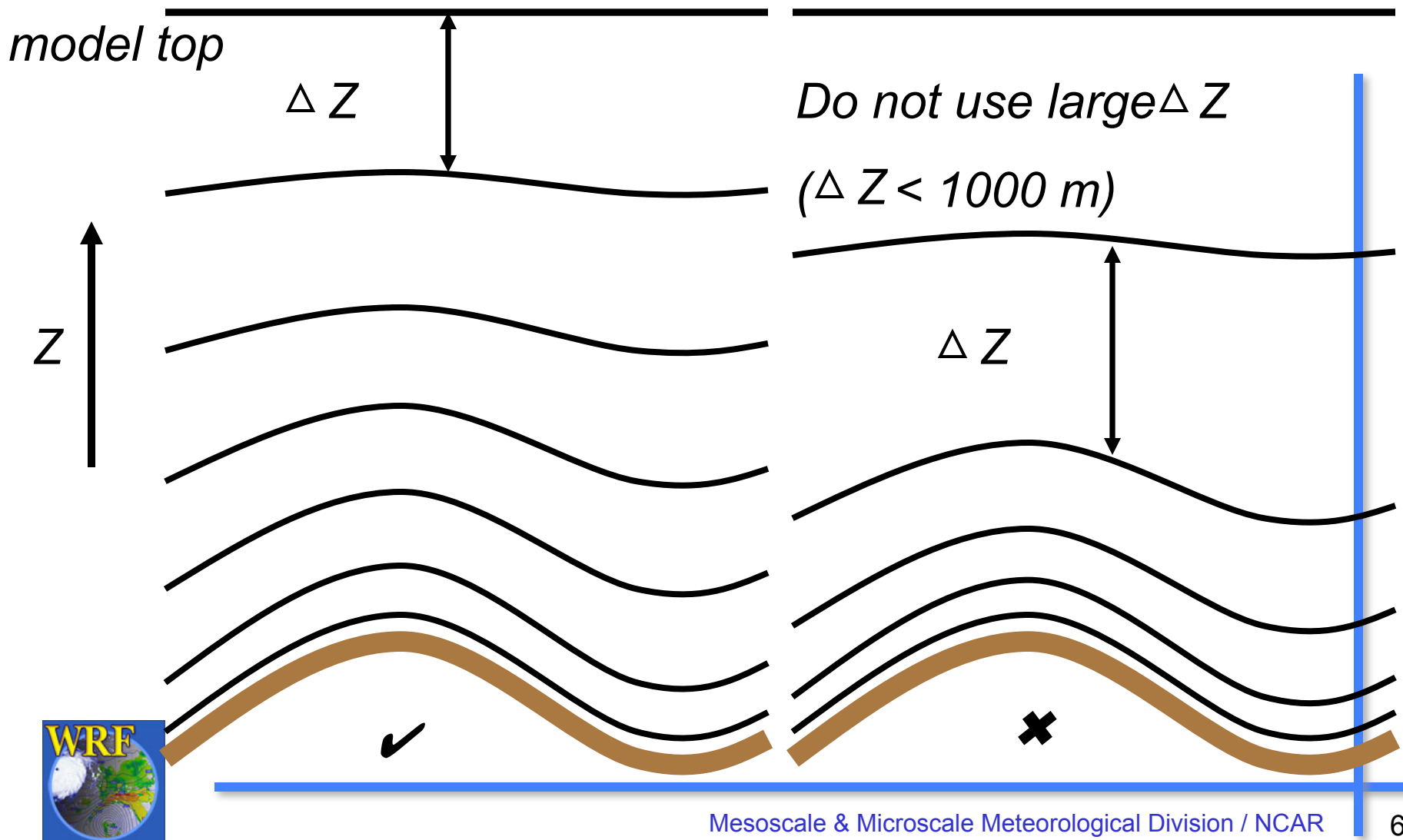
Nests:

- ## When should I use nests?

  – Input data resolution is too coarse

  – Would like to simulate convection, topography-
  and/or landuse-forcing, etc.

  – Would like to provide better boundary conditions
  for the area of interest: boundary conditions from
  external sources are typically 3 – 6 hourly, while
  nested boundary conditions are in minutes (coarse
  domain time step)

  – There isn't sufficient computing resources

Nests:

- Nest domain sizes should not be too small either
  - No less than 100x100
  - Avoid boundary zones that are about 10 grid point wide
  - Avoid 'sweeping' effect from lateral boundaries
  - Aviod placing nest boundaries over high mountains

Input Data

- Check land data:
  - landuse

- Know about the data:
  - Forecast data
  - Reanalysis data
  - Climate model data

- How frequent do I need to have boundary conditions
  - Usually more frequent is better

Model Options

- ## What do I start with?

  - ### What other people have success with?

    - References, papers

  - ### Simple options first:

    For example,

    - Graupel may not be important if dx >> 10 km

    - mixed layer ocean model may not be needed if the modeled track isn't correct

    - Use interpolated data from weather service before trying to add your own data

Bottomline..

- Model results can be affected by many choices

- Model has limitations:
  - Input data
  - Physics

Reference Book:

Numerical Weather and Climate Prediction, 2011. By Thomas Warner, Cambridge University Press.

Search

WRF MODEL USERS PAGE

Welcome to the users home page for the Weather Research and Forecasting (WRF) modeling system. The WRF system is in the public domain and is freely available for community use. It is designed to be a flexible, state-of-the-art atmospheric simulation system that is portable and efficient on available parallel computing platforms. WRF is suitable for use in a broad range of applications across scales ranging from meters to thousands of kilometers, including:

- Idealized simulations (e.g. LES, convection, baroclinic waves)
- Regional and global applications
- Parameterization research
- Data assimilation research
- Forecast research
- Real-time NWP
- Hurricane research
- Coupled-model applications
- Teaching

The Mesoscale and Microscale Meteorology Division of NCAR is currently maintaining and supporting a subset of the overall WRF code (Version 3) that includes:

- WRF Software Framework (WSF)
- Advanced Research WRF (ARW) dynamic solver, including one-way, two-way nesting and moving nests, grid and observation nudging
- WRF Pre-Processing System (WPS)

WRF FORECAST
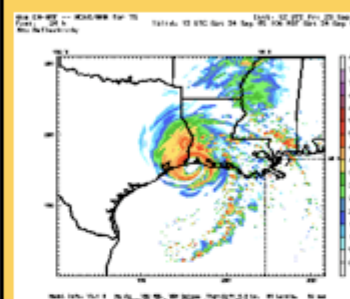
WRF Real-time forecast (*old site*)

ANNOUNCEMENTS

WRF Version 3.3 Release (4/6/2011)

'Known Problems' posts for V3.3 (posted 4/8/11)

12th WRF Users' Workshop: June 20 - 24, 2011. Registration is open..

New Users' tutorial, July 11 - 22. Registration is open.

'Known Problems' posts for V3.2 and V3.2.1 WRF (12/13/10)

Program, extended abstracts, and presentations from the 11th WRF Users' Workshop, June 21 - 25, 2010.

planetWRF released.

Miscellaneous Information for Users

- Become a registered user
- Visit Users' web pages
  - Check code updates, bug reports, updated documents, Version 3
  - Check upcoming events, like annual workshop
- Write to wrfhelp@ucar.edu for WRF related problems / feedback
- Participate in annual users' workshop (June)

Good Luck!

If you are staying for next week's tutorials, please keep your name tags.
If you are leaving, please return the name tags for recycling. THANKS!