Considerations for Designing an Numerical Experiment

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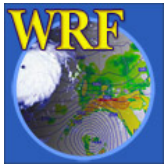
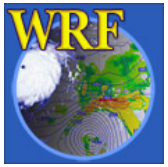
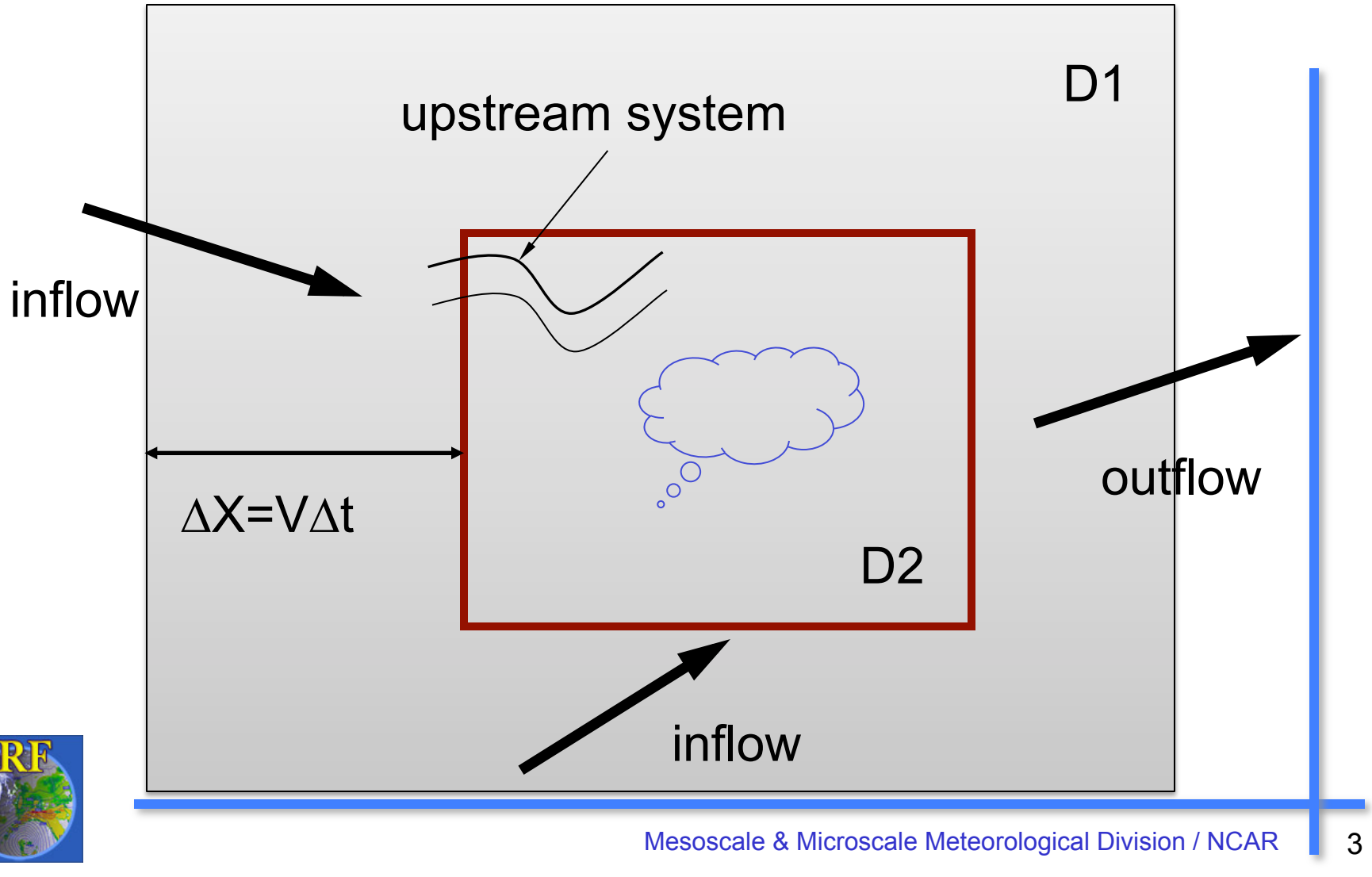


Domains

- How large do they need to be?
  - Depending on applications
    - Simulations for a few days: IC
    - Simulations for a few months, or years: BC
  - Domain sizes should not be too small: no less than 100x100
- Where to place my lateral boundaries?
  - Avoid steep topography
  - Away from my interest

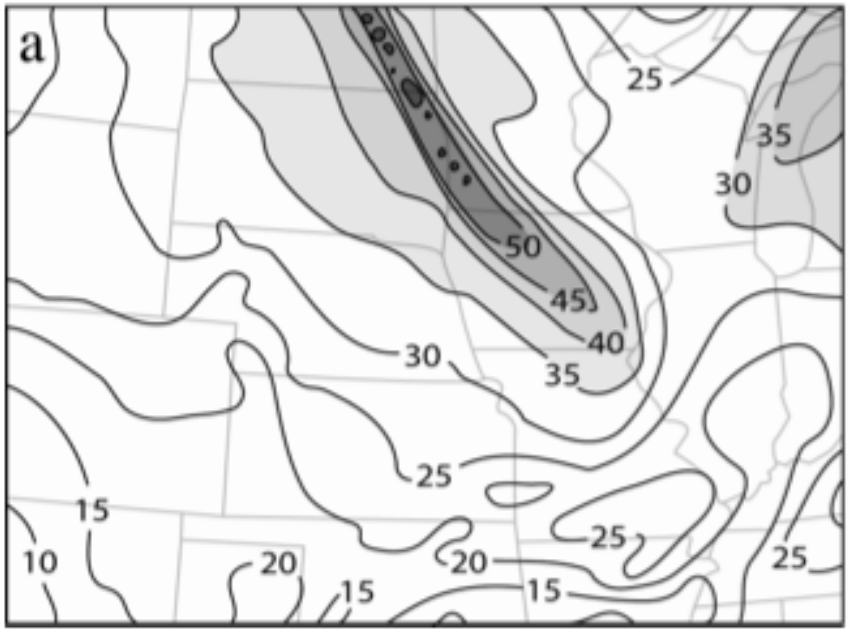


Note on Configuring Domains: Horizontal

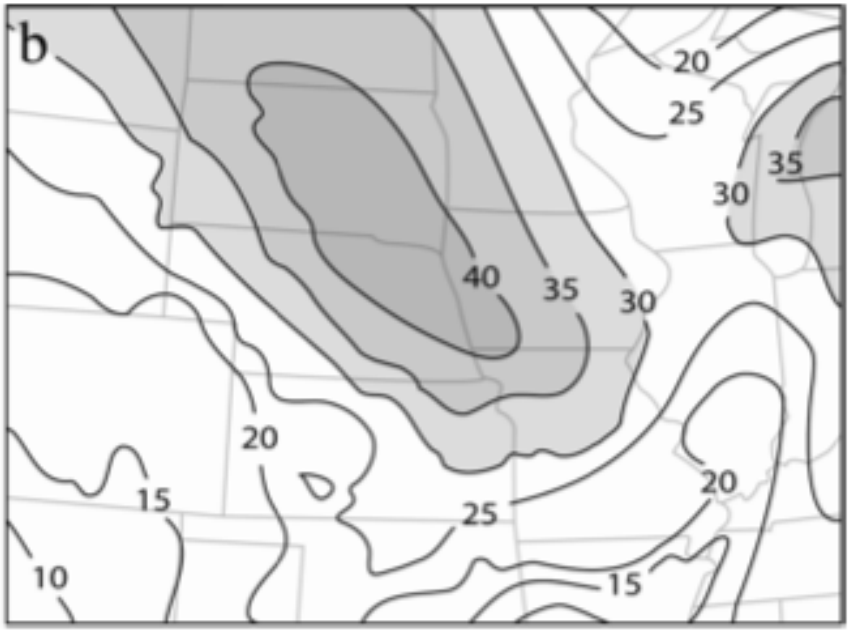


Note on Configuring Domains: Horizontal

Large regional domain



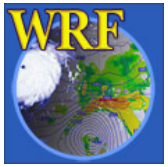
Smaller regional domain



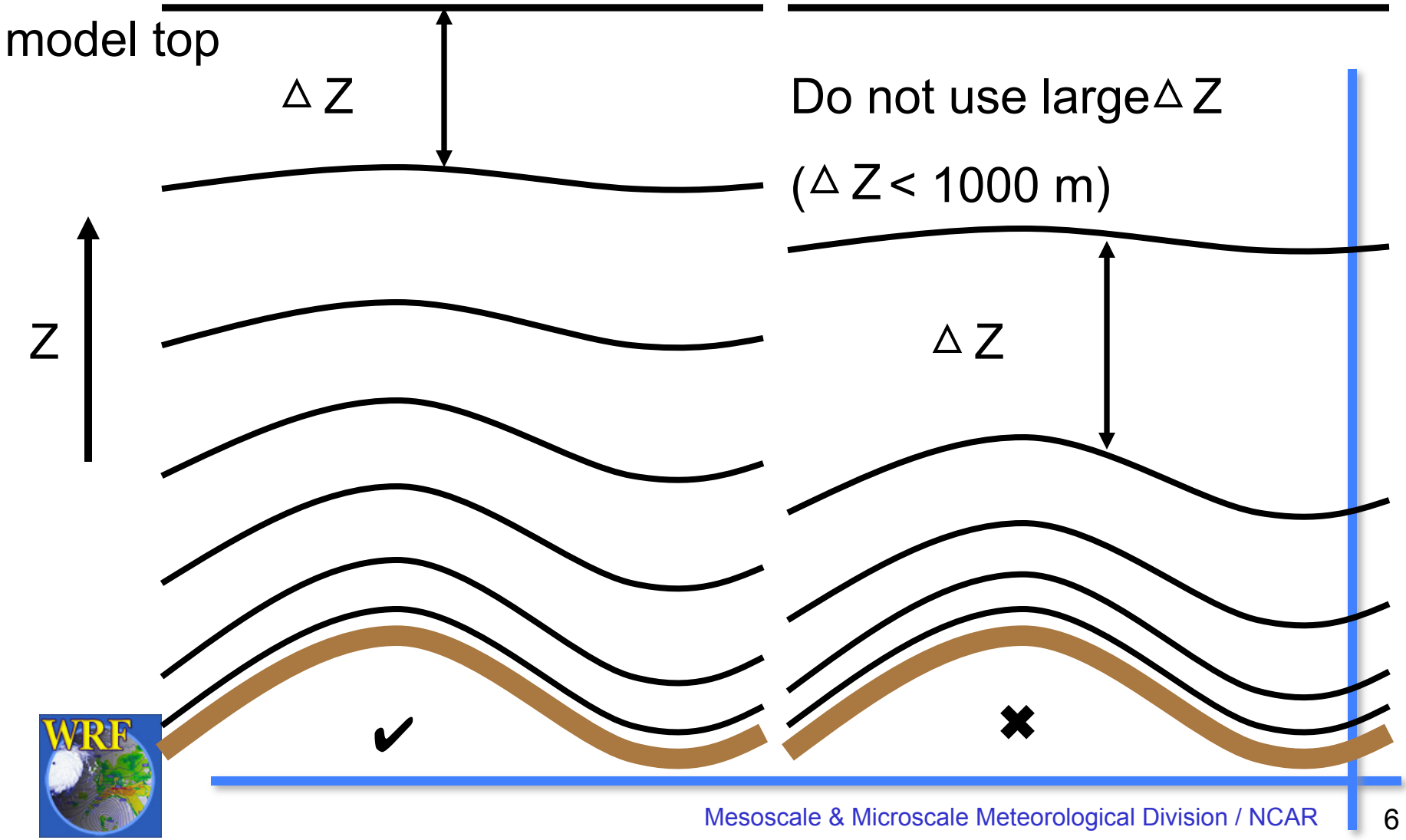
(From Warner, 2011)

Domains

- How many vertical levels should I use?
  - At least 30 or more levels
  - Vertical grid distance should not be larger than 1000 m:
    - Radiation, microphysics, less accurate LBDY
  - Related to horizontal grid size too: if finer horizontal grid size is used, consider adding a few more levels in the vertical



Note on Configuring Domains: Vertical



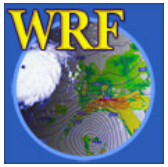
Nests:

- When should I use nests?

  For example,

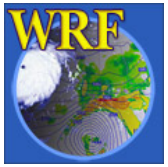
  – Input data resolution is too coarse

  – There isn't sufficient computing resources
- Nest domain sizes should not be too small;
- Nest boundary should be kept away from coarse domain boundary.



Input Data

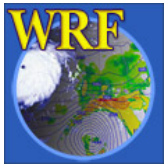
- Check land data:
  - landuse
- Know about the data:
  - Forecast data
  - Reanalysis data
  - Climate model data
- How frequent do I need to have boundary conditions
  - Usually more frequent is better



Model Options

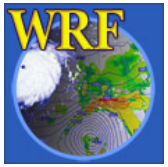
- What do I start with?
  - What other people have success with?
    - References, papers
  - Simple options first:

    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..

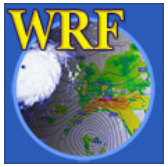
- Model results can be affected by many choices:
  - Domain configuration, both horizontal and vertical;
  - Input data.
- Model has limitations:
  - Physics



References:

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

Warner, T., 2011. Quality assurance in atmospheric modeling. *Bull. Amer. Met. Soc. (to appear)*



WRF USERS PAGE

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wrf-model.org

Public Domain Notice

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WRF Model Users Page

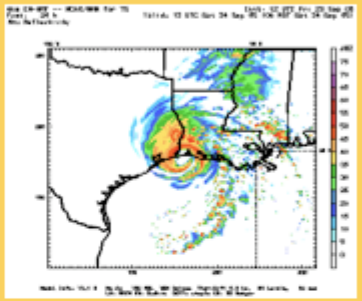
Welcome to the users home page for the Weather Research and Forecasting (WRF) modeling system. The WRF system is in the public domain and is freely available for community use. It is designed to be a flexible, state-of-the-art atmospheric simulation system that is portable and efficient on available 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.