## WRF-ARW Use Case

*Compiled Aug. 2020 by Model Data RCN Virtual Workshop 2*

*Summary*
*Weighted rubric score - N/A*
*Category* - Preserve few simulation workflow outputs

- Use Case Description
    - High-level overview of the use case
        - Semi-idealized WRF-ARW-based numerical simulations of tropical cyclones over land.
    - Science goals and basic workflow
        - Science goals: Test the sensitivity of overland tropical cyclone intensity change (in non- to weakly baroclinic environments) to soil characteristics (type, temperature, moisture - and thus heat capacity, thermal conductivity, etc.), land-surface physics (latent and sensible heat fluxes underneath the simulated cyclone vs. in the external inflow environment), and large-scale atmospheric moisture. More generally, the goal of this study is to reconcile differences in existing hypotheses posed to explain why some tropical cyclones are able to maintain or increase their intensity well inland.
        - Workflow: Involves some code modifications, primarily to the land-surface model (e.g., to fully disable radiative transfer and/or to partially or fully disable surface latent and sensible heat fluxes). Involves extensive initial-condition modifications to both atmospheric and land-surface parameters, primarily to homogenize the atmospheric and land-surface states.
- What use-case specific additional materials should be preserved and shared?
    - Data
        - Inputs to model
            - Description
                - GFS output: took a sounding and interpolated it to the model grid. If possible point to the NWP center that produced this data or responsible long-term institutional archive.
            - Total data volume preserved in a repository maintained by an outside data provider (e.g. NCEI): 1 MB (only need input soundings; text files)
        - Raw model output
            - Total data volume not preserved in a repository? (might be retained on PI's local working storage): 1-5 TB for ensembles/suites of convection-allowing simulations (keep for several years)

        - Processed model output
            - Description
                - Preserve processed hourly averaged files (2-D derived fields)
                - Optional: use GRIB to preserve diagnostic fields (share GRIB table with it as important metadata); has some advantages for disk resources when most of the field is 0 (e.g. precipitation)
    - Software
        - Model configuration
            - Namelist file
        - Preprocessing code
            - Code used for interpolation of sounding data
        - Model code
            - Changes to NOAH LSM to fully disable radiative transfer and/or to partially or fully disable surface latent and sensible heat fluxes - want to tar up the whole model (including WRF) to make it easier for reuse (or could store as container image)
        - Postprocessing code
            - Making available custom post-processing code. Link to open source post processing tools where these are available.
    - Other:
        - Documentation
            - Documentation is important for code. Use of diff command to track changes, and describe what was changed and why (at minimum), share tar-ball with these comments. Also share resulting publications as additional motivation for why changes were made. Zenodo used for sharing the tarball (easy to use, provides DOI for citation and tracking).
        - Visualizations or images [products intended to be used visually, distinguished from processed output that exists as numerical data]
            - N/A
- Why should these things be preserved and shared?
    - General
        - Sharing model code modifications back to the community as appropriate is a good practice.
        - Benchmarking could be made possible by 2-D diagnostic fields, to capture environment
    - Reasons why the things listed above are important
        - Note expected/intended audience and what they expect/need
            - Are there specific people who will be using the data downstream?
                - Most likely users: Colleagues and/or students conducting research in the same area. Need to be able to

successfully follow on this analysis.  Goal is not exact reproducibility.
                - Possible/aspirational users?
                    - N/A
            - Note any temporal considerations, such as particular products that become more/less useful over time
                - N/A
    - Could refer to individual rubric descriptors in this section - which descriptors are most important/useful to guide the preservation recommendations for each case?
        - N/A