Warn-on-Forecast System Use Case

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

- Use Case Description
    - High-level overview of the use case
        - This use case consists of model data covering 25 days during which the Warn-on-Forecast System (WoFS) was run during Spring of 2020. The WoFS is an on-demand, experimental, convection-allowing (3-km grid-spacing) ensemble forecast system with a rapidly updating data assimilation system aimed at extending lead times for hazardous weather. WoFS runs over movable limited area domains (900 x 900 km) providing forecasts to 6 h, and uses the Advanced Research Weather Research and Forecasting Model (WRF-ARW).
    - Science goals and basic workflow
        - The use case is a prototype configuration for WoFS, with the idea that a similar type of system will be transitioned to operations in the NWS in the next few years. The use case serves as a baseline against which skill for future configurations can be assessed. The dataset also provides various forecast fields for testing forecast diagnostics, post-processing, and visualization strategies. The workflow includes pre-processing of observational datasets (e.g., radar, satellite, surface observations, aircraft, etc.), data assimilation, forecast integration, post-processing, and visualization via a web-viewer.
- What use-case specific additional materials should be preserved and shared?
    - Data
        - Inputs to model
            - Description
                - Observations that are assimilated include Multi-Radar, Multi-Sensor (MRMS) reflectivity, MRMS radial velocity, GOES-16 ABI cloud water path & all sky radiances, NCEP prepbufr, and Oklahoma Mesonet data (when available).
                - Background data is derived from (1) the 9-member, 31-h forecasts of the 0600 UTC initialized High-Resolution Rapid Refresh Ensemble (HRRRE), (2) 36-h forecasts of the 1200 UTC initialized HRRRE, and (3) 36-member, 1-h forecasts from the HRRR Data Assimilation System (HRRRDAS).
                - Input files produced by the WoFS include, (1) 36-member WRF boundary files (9-member HRRRE forecast

duplicated thrice) from 0600 and 1200 UTC HRRRE, (2) 36-member WRF input files (from 36-member HRRRDAS) at initialization time. At every 15-min WoFS cycling period, 36 WRF inputs are produced (following data assimilation), 72 WRF output (prior & posterior) are produced, and a text file is produced with info from each assimilated observation.
                - Total data volume preserved in a repository by the PI: 81 TB
            - Raw model output
                - Description
                    - For each WoFS forecast cycle (every 30 minutes from 1700 to 0300 UTC), pertinent WRF variables are output every 5-minutes for all 18 members in standard WRF netcdf format (i.e., “wrfouts”).
                - Total data volume not preserved in a repository (might be retained on PI’s local working storage): 200 TB
            - Processed model output
                - Description
                    - Important environmental fields and storm diagnostics extracted with post-processing software are saved in the form of “summary files”, which are only a fraction of the size of the raw output.
                - Total data volume preserved in a repository by the PI: 45 TB
    - Software
        - Model configuration
            - Includes namelists and configuration files
        - Preprocessing code
            - Includes WRF pre-processing and GSI data assimilation
        - Model code
            - Includes specialized version of WRF-ARW
        - Postprocessing code
            - Includes specialized python codes for creating the summary files and computing various diagnostics
    - Other
        - Documentation
            - Detailed documentation for running the code has been written and is available.
        - Visualizations or images [products intended to be used visually, distinguished from processed output that exists as numerical data]
            - Visualizations and web images are available from the URL: https://wof.nssl.noaa.gov/realtime/.
- Why should these things be preserved and shared?
    - General

        - To test changes to model/DA/preprocessing - if WRF input and WRF boundary condition files are saved, it is easy to replicate the simulation runs and produce the raw output if needed.
        - The model source code absolutely should be preserved and shared because it's been heavily modified from publicly available versions.
    - 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?
                - WoFS model developers, scientists developing AI and machine-learning algorithms for post-processing, and forecasters interested in potential utility.
            - Possible/aspirational users?
                - Students, emergency managers, etc.
        - 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