The Unified Post Processor

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1 NCAR

2 NOAA/ESRL/GSD/CIRES
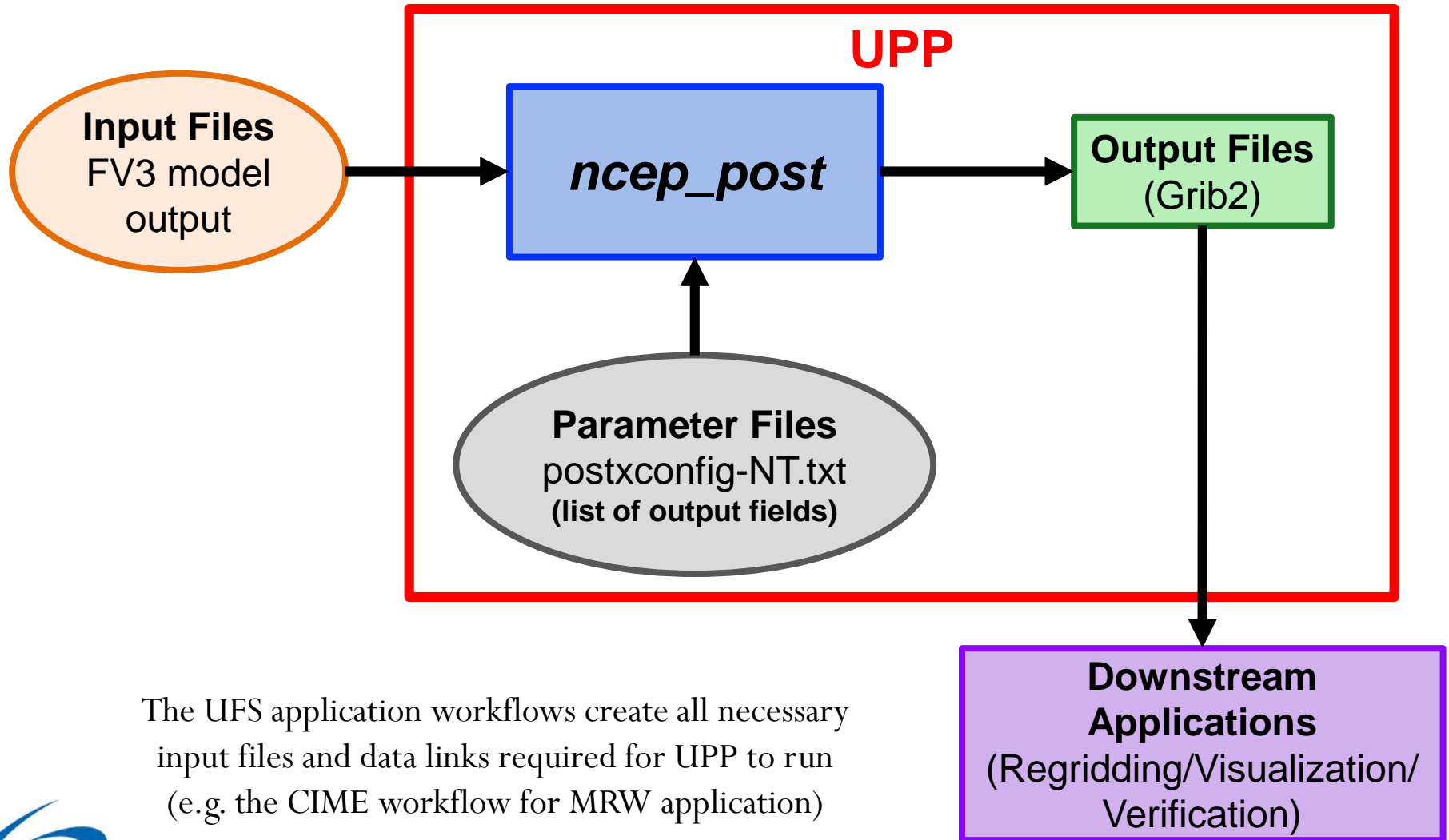
3 NCEP/EMC

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Overview

- UPP was developed at the National Centers for Environmental Prediction (NCEP)

- Used operationally to post-process forecast output for a variety of models

- Included as the post-processing component for the UFS weather applications
  - UFS MRW v1.0.0 released on 3/11/2020
  - UFS SRW: TBD (Nov 2020)

- Support and documentation for UPP provided through the Developmental Testbed Center (DTC)
  - https://upp.readthedocs.io/en/latest/Introduction.html

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Functionalities

- The UPP ingests FV3 forecast files in binarynemsiompiio and NetCDF format
  - Interpolates from model's native vertical coordinate to NWS standard output levels (e.g. pressure, height, mslp)
  - Computes diagnostic output quantities such as CAPE, RH, Radar Reflectivities, as well as derived satellite brightness temperatures for various instruments and channels via the Joint Center for Satellite Data Assimilation (JCSDA) Community Radiative Transfer Model (CRTM)
  - Outputs requested fields in standard WMO Grib2 format

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Components

UPP

Input Files
FV3 model output

ncep_post

Output Files
(Grib2)

Parameter Files
postxconfig-NT.txt
(list of output fields)

Downstream Applications
(Regridding/Visualization/Verification)

The UFS application workflows create all necessary input files and data links required for UPP to run (e.g. the CIME workflow for MRW application)
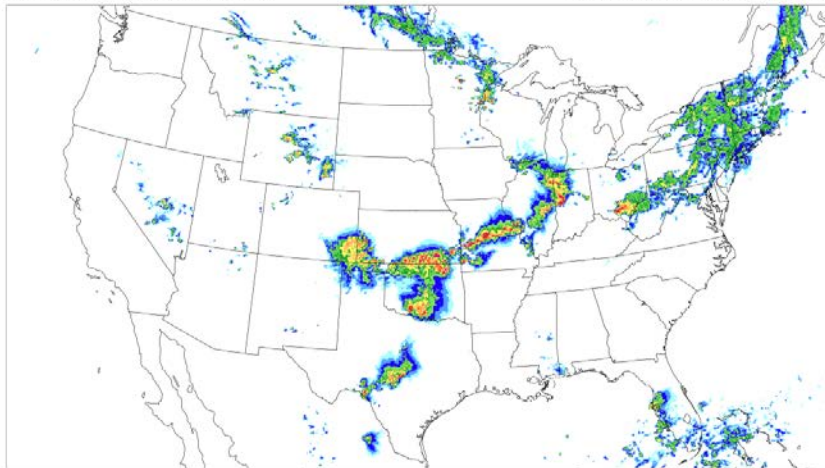
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Downstream Applications

- The WMO standard Grib2 output can be used in a number of downstream applications

Ongoing Activities

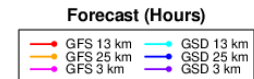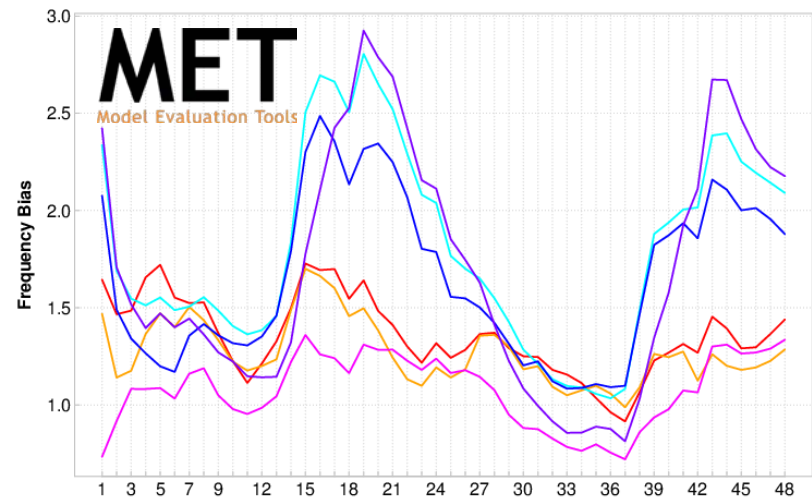- Recent initiative to further *unify* the UPP by merging separate repositories and consolidating directory structures and building methods between applications

- Refactor project at EMC
  - Year 1 (FY19/20): Clean up and modernize code, develop reusable and interoperable modules, and document variable dependencies
  - Year 2 (FY21/22): Increase parallelism by adding decomposition in the X direction, validation and evaluation by code managers and developers of all models supported by UPP

Summary

- The UPP is key component of UFS weather applications used to post-process model output into relevant forecast fields in standard Grib2 format

- Capable of processing hundreds of products similar to operations

- Standard output easily ingested in many downstream applications for visualization, verification, etc

- Work underway to unify the UPP, enabling more fluid release procedures, and easing collaboration efforts to facilitate R2O and O2R

- Refactor project in progress to clean up, modernize, and modularize the code as well as improve documentation