

# Regional MPAS-JEDI

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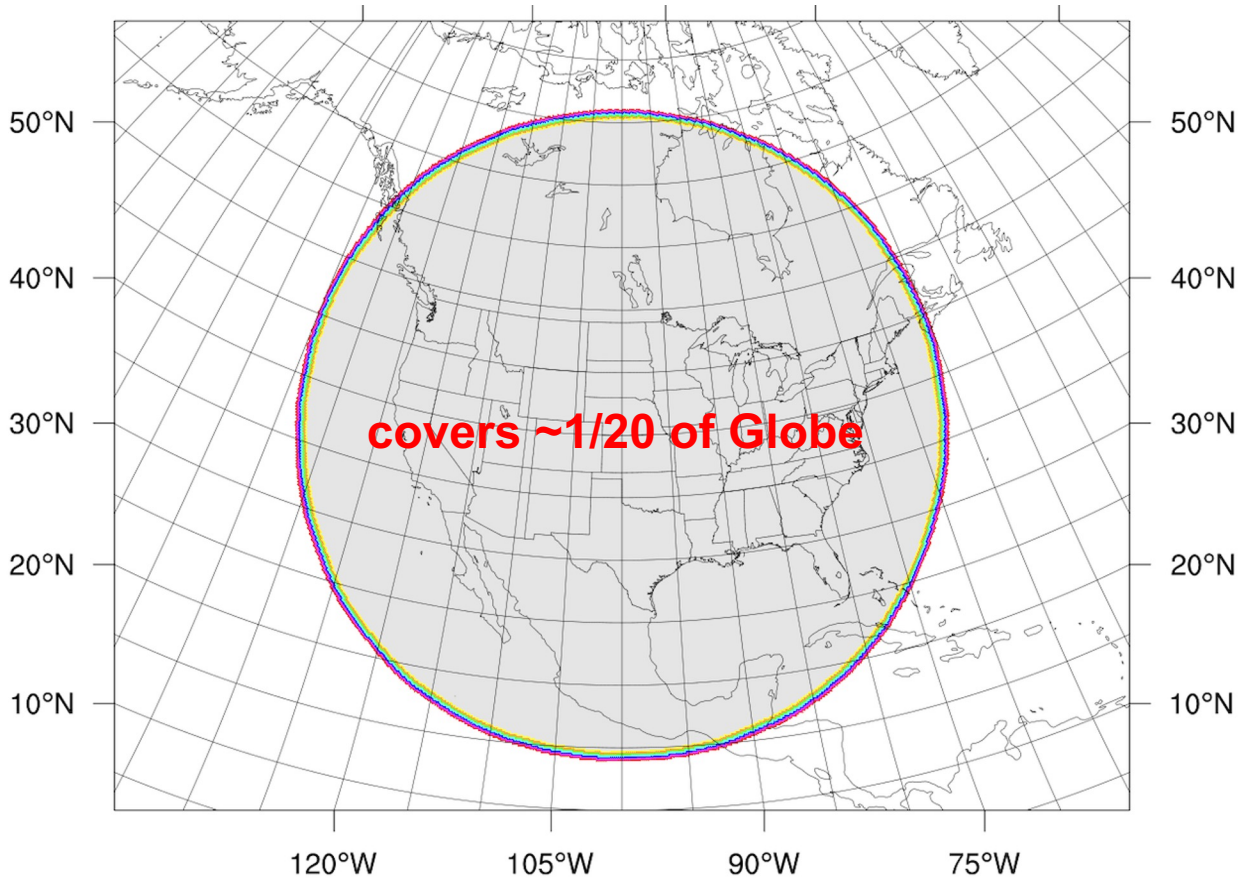


**MPAS-JEDI Tutorial, NCU, 25-26 October, 2023**



# Successfully ran 3 month-long regional MPAS-JEDI 3DEnVar cycling experiments at 15km, 7.5km, and 3.75km with 80-member ensemble input at 15km

## 2800 km radius centered over US

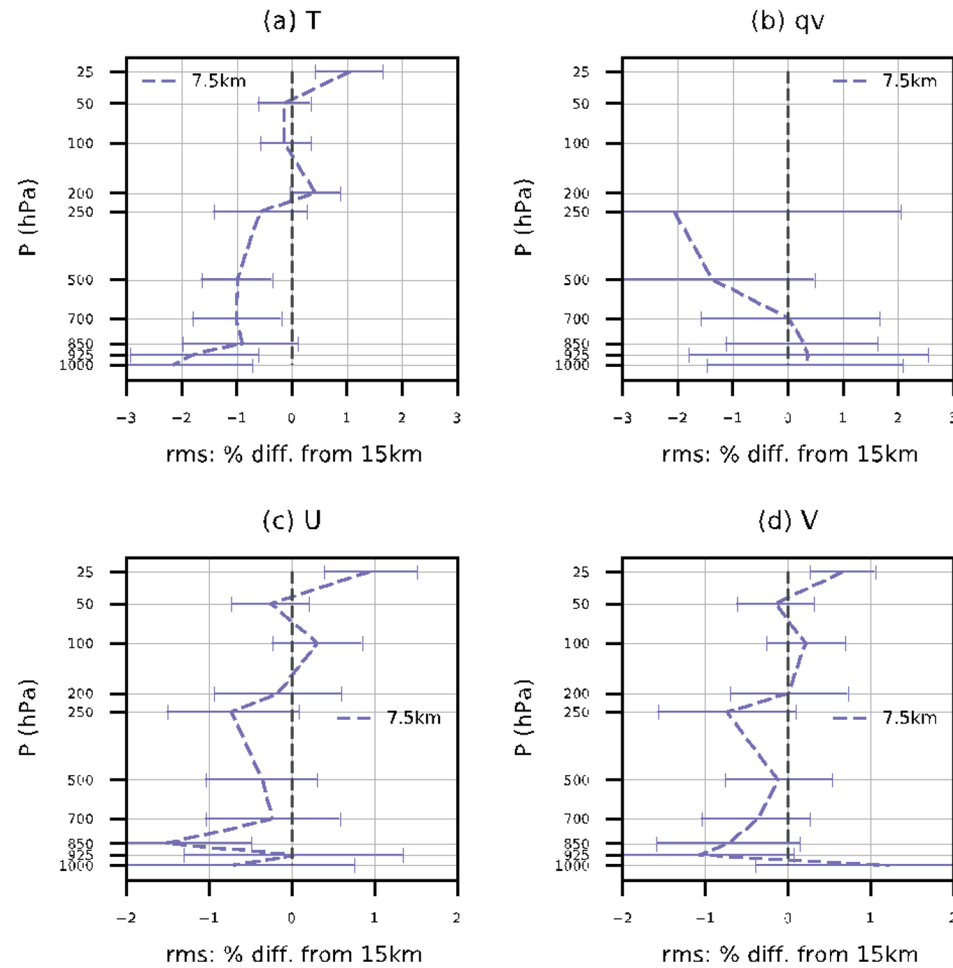
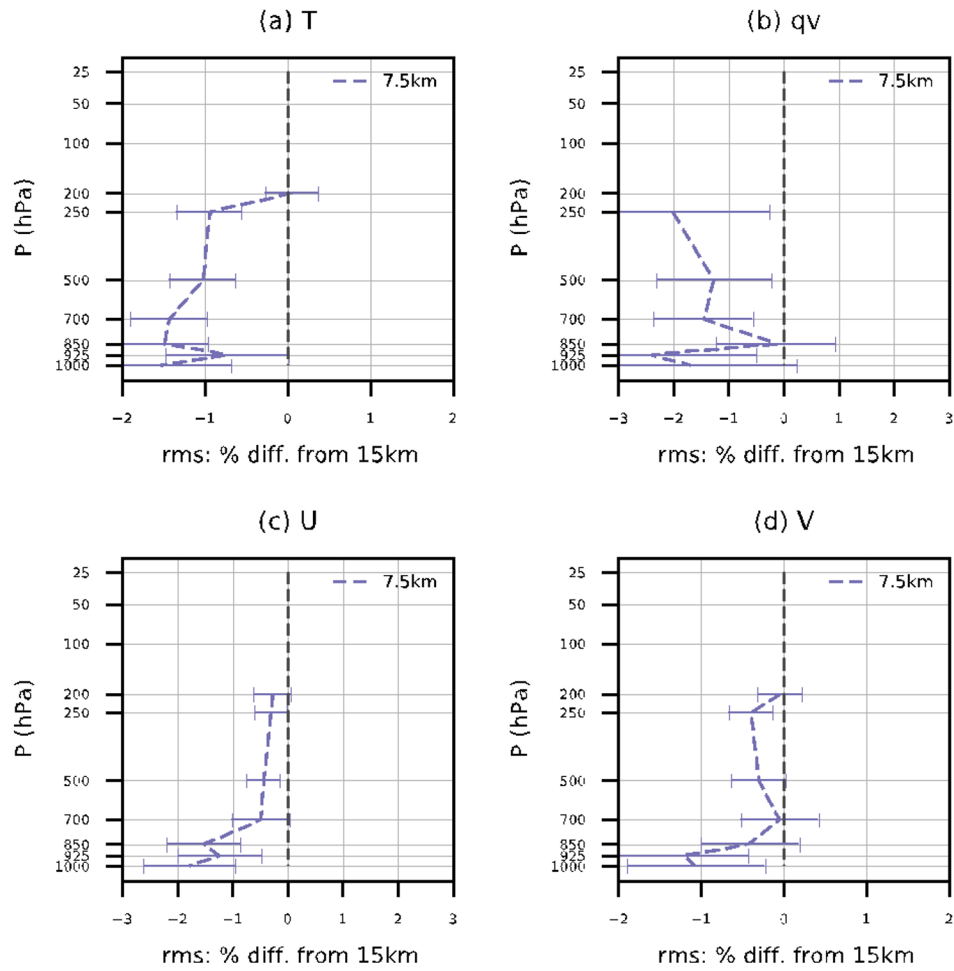


6-hourly cycling from 1 to 31 May, 2019

Assimilate: T/Q/U/V from radiosonde & aircraft, U/V from satellite track winds, GNSSRO refractivity, and surface pressure

3.75km mesh has >2M cells

# 7.5km 6-h forecast background fitting better to observations



Whole month  
Statistics for  
RMSE reduction

Aircraft

Radiosondes

# What are differences from global MPAS-JEDI?

## 1. namelist.atmosphere

```
&limited_area  
  config_apply_lbc = true  
/
```

## 2. streams.atmosphere

```
<immutable_stream name="lbc_in"  
  type="input"  
  io_type="pnetcdf,cdf5"  
  filename_template="lbc.$Y-$M-$D_$h.$m.$s.nc"  
  filename_interval="input_interval"  
  packages="limited_area"  
  input_interval="3:00:00" />
```

You need to set this, but no need of LBC file.

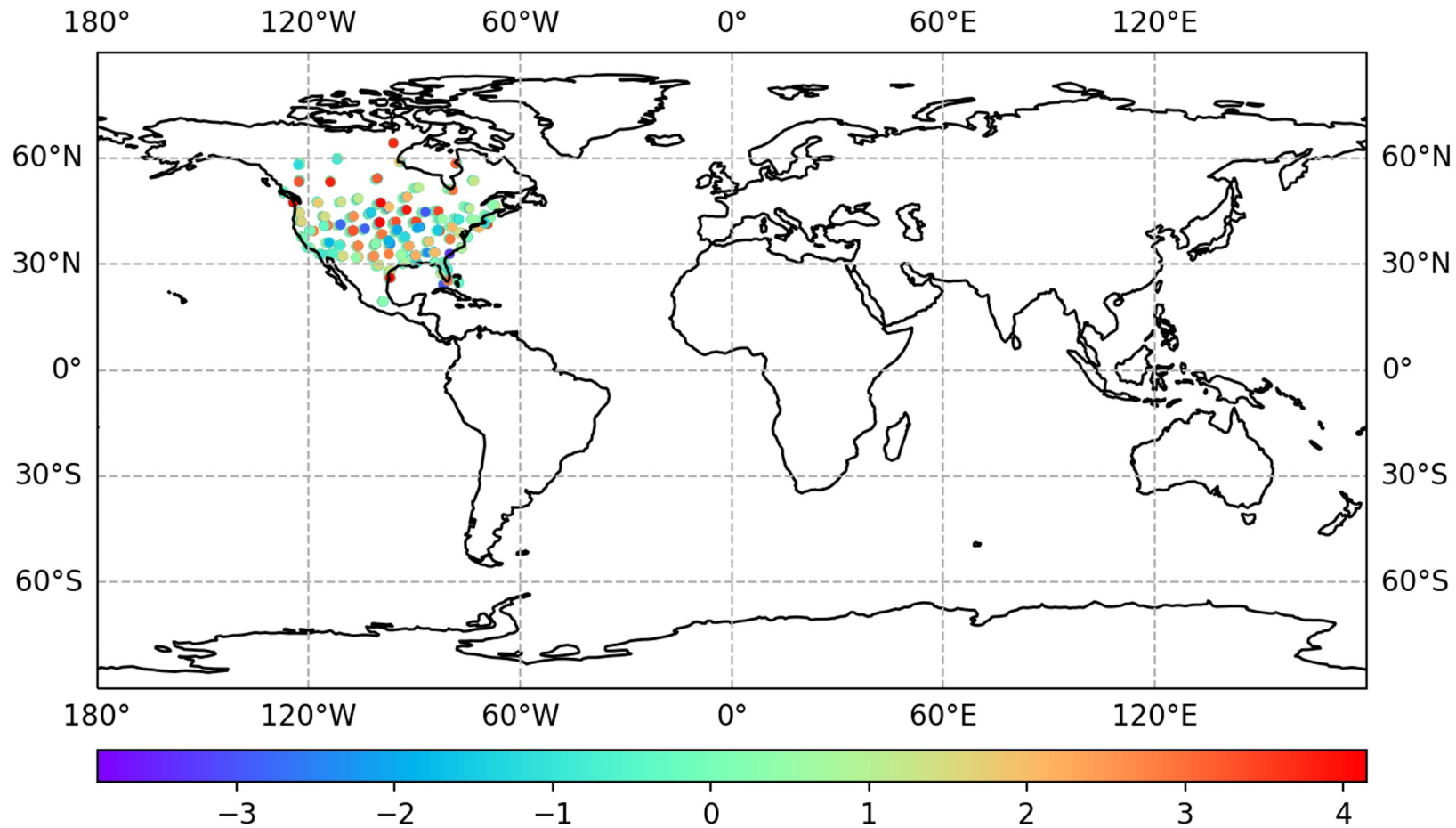
## 3. 3denvar.yaml

```
obs filters:  
- filter: Bounds Check  
  filter variables:  
  - name: airTemperature  
  - name: windEastward  
  - name: windNorthward  
  - name: specificHumidity  
  test variables:  
  - name: LAMDomainCheck@ObsFunction  
    options:  
      map_projection: circle # an option  
      save: true # will save the Derived  
      cenlat: 40.0 # central lat  
      cenlon: 260.0 # central lon  
      radius: 2750.0 # km  
      minvalue: 1.0 # will filter all obs ou
```

Reject obs outside a circular domain

# Regional QC filter (i.e., rejecting obs outside domain)

sondes airTemperature K nlocs:6077 nstation:89



# Limitation of regional MPAS-JEDI with current code

- Regional QC filter inside UFO only works for circular domain
- Need to develop more generic regional QC filter working for any shape of domain
  - Inside JEDI or some offline utility

## Regional MPAS-JEDI test case

- `cd /work/$USER/mpas_jedi_tutorial/conus15km`
- `sbatch run_conus15km.sh`
  - 15km 3DEnVar with only radiosonde obs and 5-member ensemble input
  - Use 4 nodes, take less than 1 min to finish