Regional MPAS-JEDI

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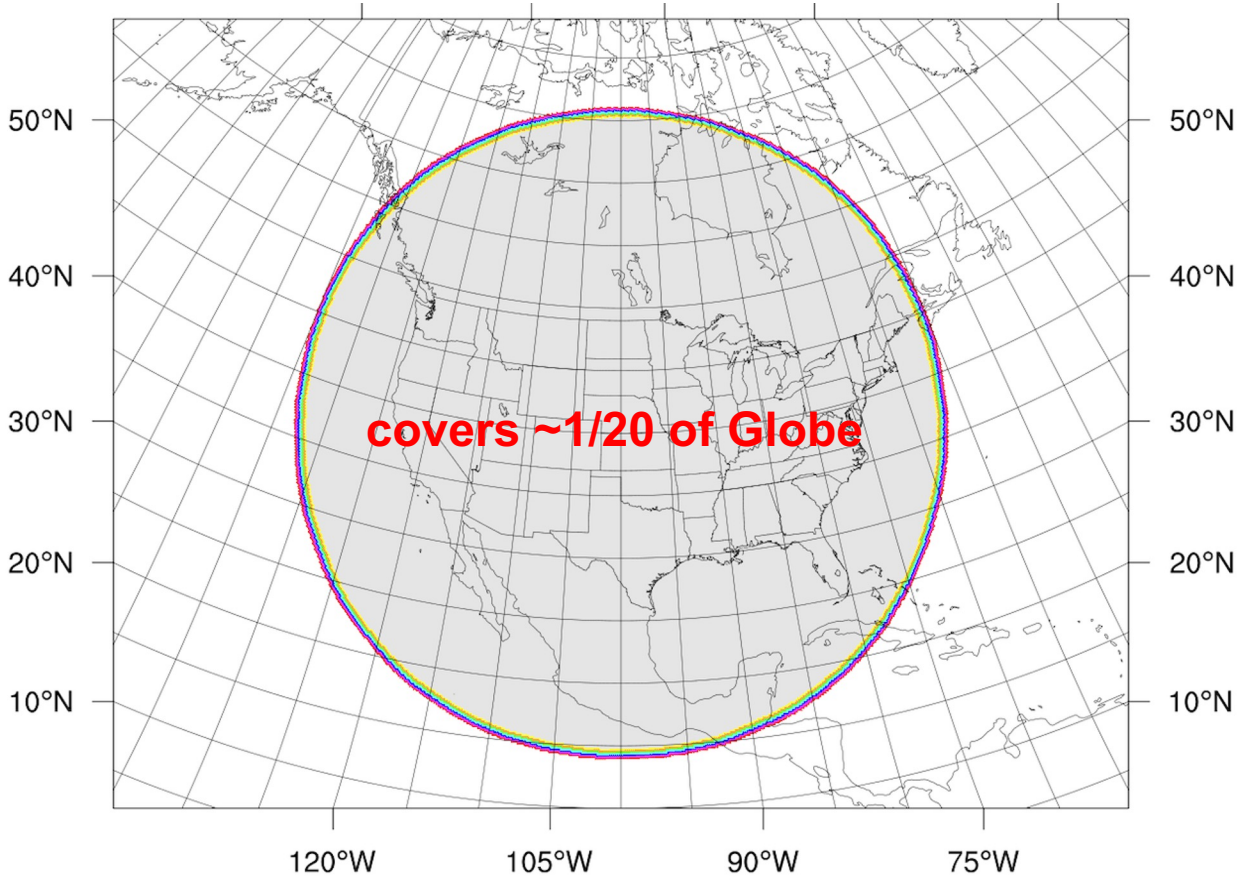
Successfully ran 3 month-long regional MPAS-JEDI 3DEnVar cycling experiments at 15km, 7.5km, and 3.75km with 80-member ensemble input at 15km

2800 km radius centered over US

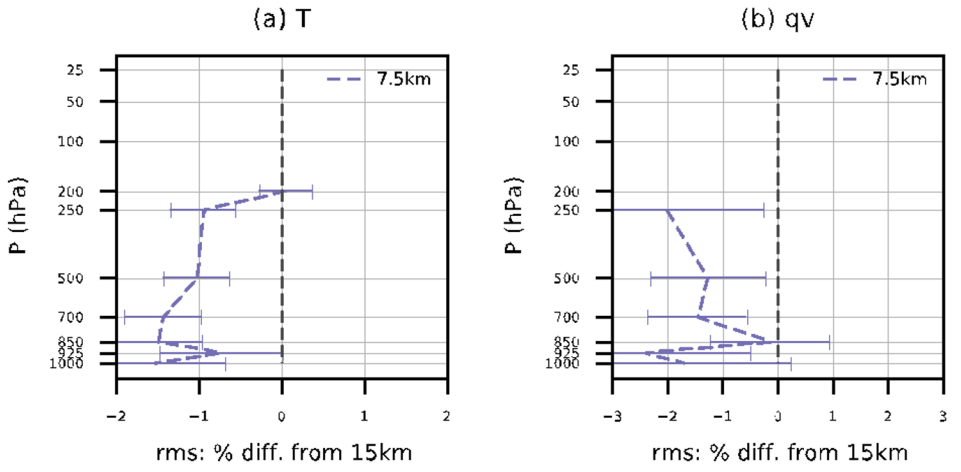


6-hourly cycling from 1 to 31 May, 2019

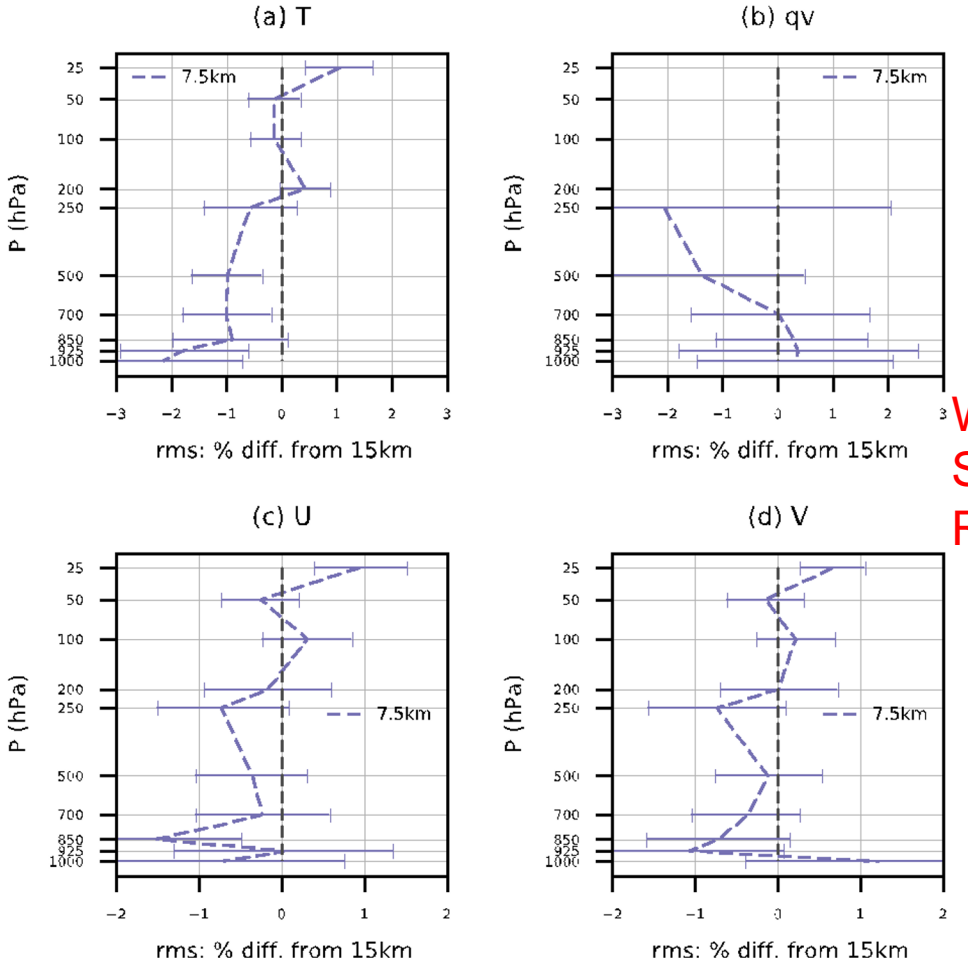
Assimilate: T/Q/U/V from radiosonde & aircraft, U/V from satellite track winds, GNSSRO refractivity, and surface pressure

3.75km mesh has >2M cells

7.5km 6-h forecast background fitting better to observations



Aircraft



Radiosondes

Whole month Statistics for RMSE reduction

What are differences from global MPAS-JEDI?

1. namelist.atmosphere

```
&limited_area
   config_apply_lbcs = 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" />
```

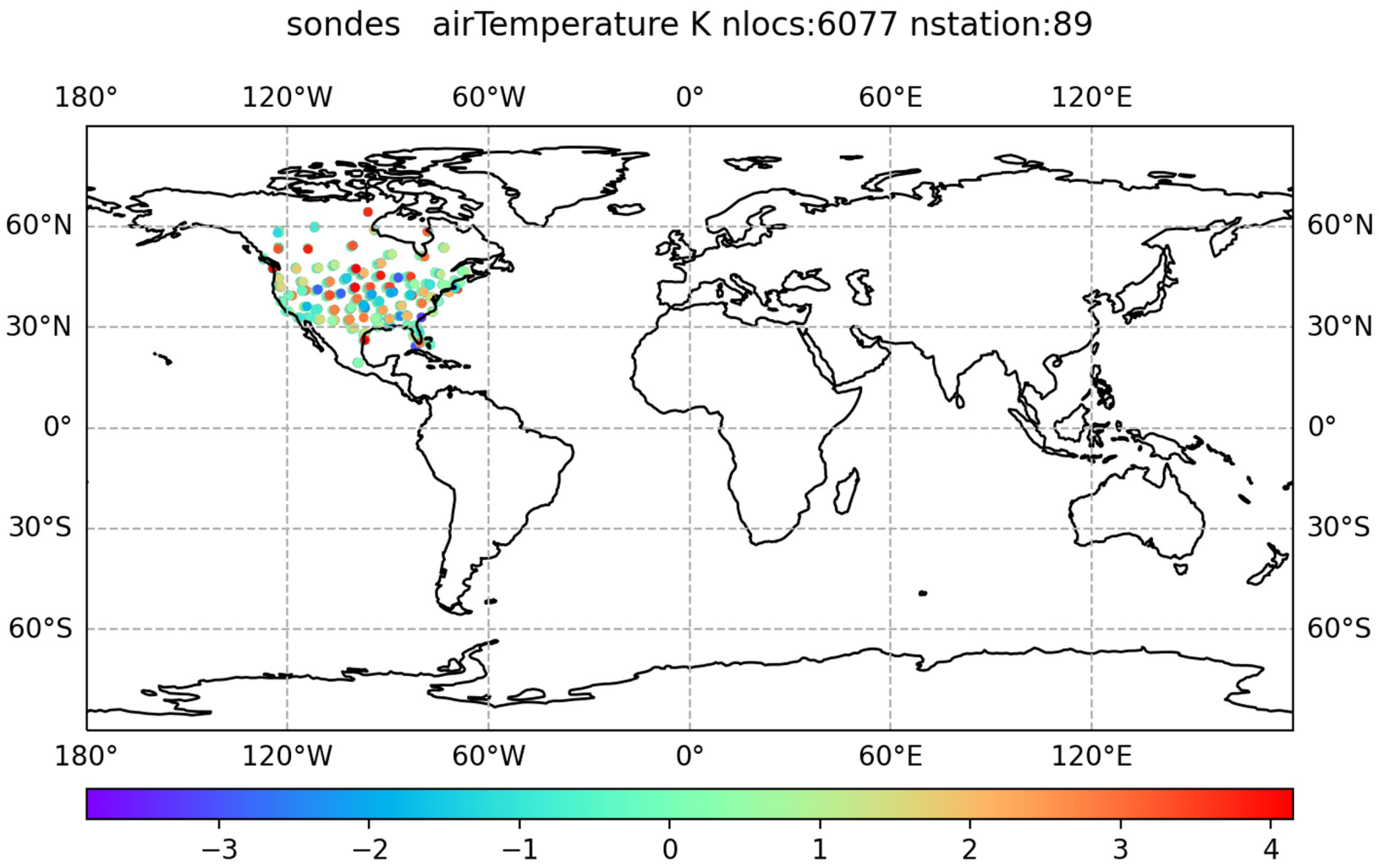
You need to set this, but no need of LBC file.

3. 3denvar.html

```
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)



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 /glade/scratch/$USER
- cp –r /glade/scratch/liuz/mpas_jedi_tutorial/conus15km .
- qsub run_conus15km.csh
  - 15km 3DEnVar with only radiosonde obs and 5-member ensemble input
  - Use 4 nodes, take less than 1 min to finish