

Exp setup to evaluate qv processing for grib2

Rms difference is calculated for grib2 files by calculating rms diff of rh-converted qv or interpolated qv against qv with full levels

Three grib2 files tested:

Ops GFSv15 combined grib2:

ctrl (truth) – qv of 47 levels

1. orig-rh2qv – rh-converted qv of 47 levels (original rh2spfh conversion)
2. gfs-rh2qv – rh-converted qv of 47 levels (gfs rh2spfh conversion)

Ops GFSv16 uncombined grib2:

ctrl (truth) – qv of 41 levels

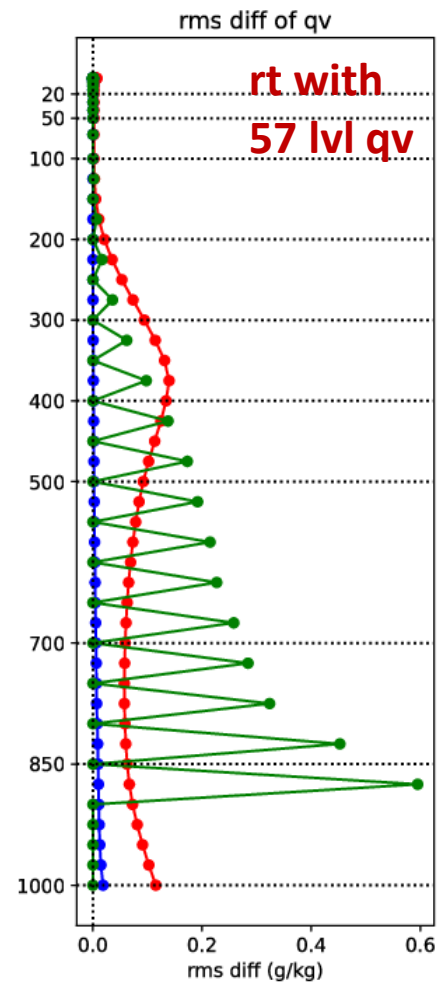
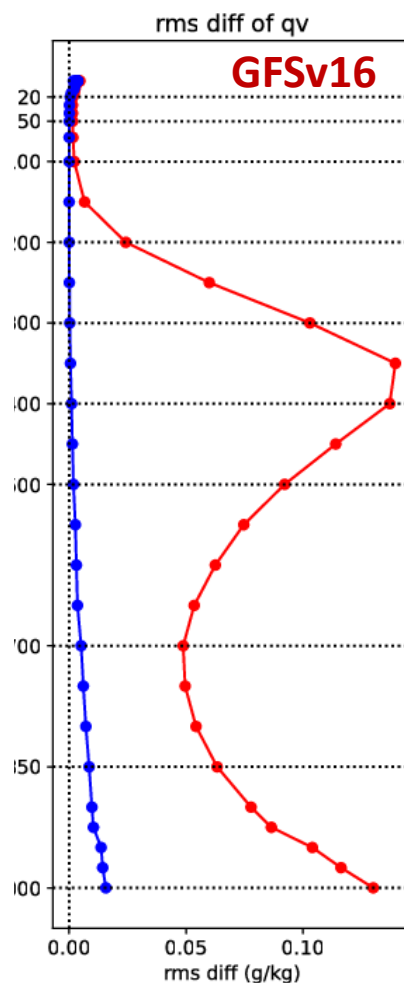
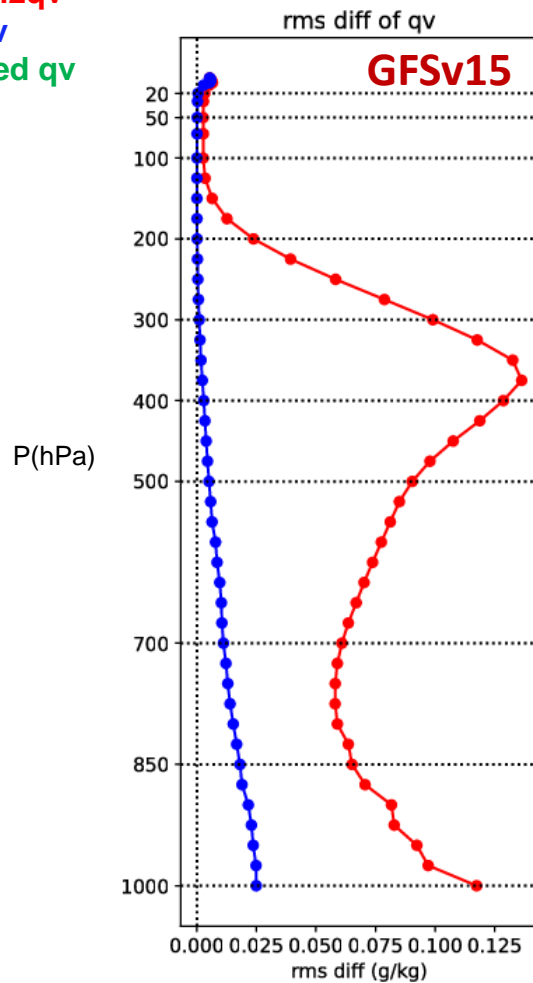
1. orig-rh2qv – rh-converted qv of 41 levels (original rh2spfh conversion)
2. gfs-rh2qv – rh-converted qv of 41 levels (gfs rh2spfh conversion)

RT C384 grib2:

ctrl (truth) – qv of 57 levels

1. orig-rh2qv – rh-converted qv of 57 levels (original rh2spfh conversion)
2. gfs-rh2qv – rh-converted qv of 57 levels (gfs rh2spfh conversion)
3. intrp-qv – interpolated qv from 41 to 57 levels

Original rh2qv
 GFS rh2qv
 Interpolated qv



Rms diff over whole domain between converted/interpolated qv and original qv

	GFSv15 grib2	GFSv16 grib2	RT C384 grib2
Intrp qv	N/A	N/A	0.1506710 g/kg
Original rh2qv	0.0758014 g/kg	0.0716379 g/kg	0.0726168 g/kg
GFS rh2qv	0.0113862 g/kg	0.0062228 g/kg	0.0059673 g/kg

Humidity processing for grib2:

For grib2 full level qv, use qv (e.g. GFSv15 combined, GFSv16 uncombined)

For grib2 qv with missing levels or not available, use rh with consistent conversion (e.g. GFSv15 uncombined, GFSv16 combined)

Two new parameters added to chgres_cube for grib2 processing:

Use_rh:

False: use qv when available; True: use rh no matter qv available or not

Calrh:

0: original rh to qv conversion; 1: GFSv15/16 consistent rh to qv conversion

GFSv15 uncombined: use_rh=True; calrh=1 (e.g. GFSv15 retro in 2019 spring)

GFSv15 combined: use_rh=False

GFSv16 uncombined: use_rh=False

GFSv16 combined: use_rh=True; calrh=1