Comparison of Rn/Pb Simulations using GEOS 4 AGCM 4x5 and 2x2.5 Met Fields

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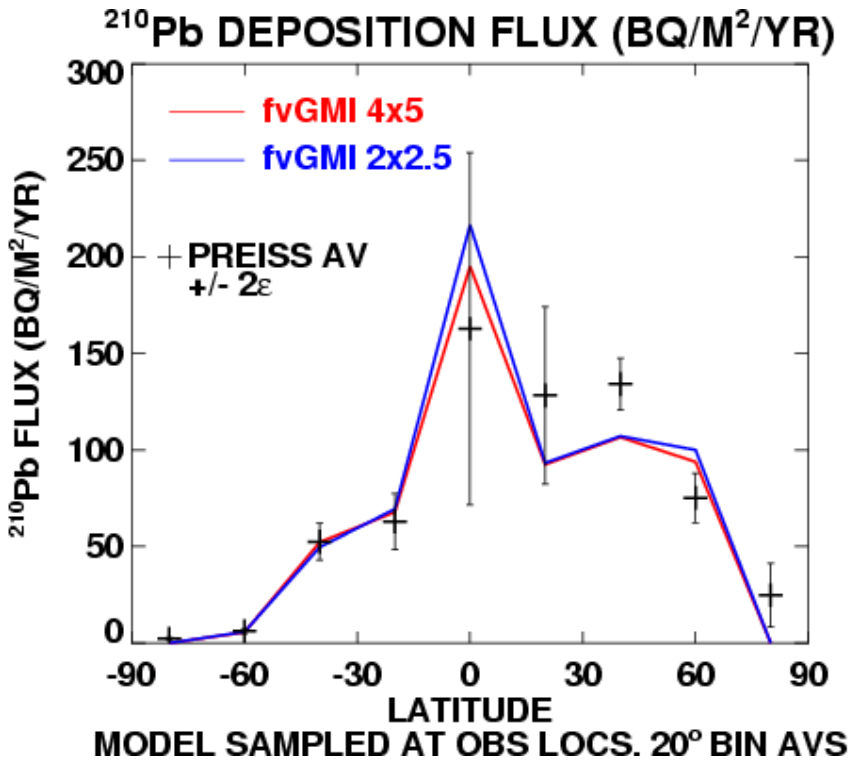
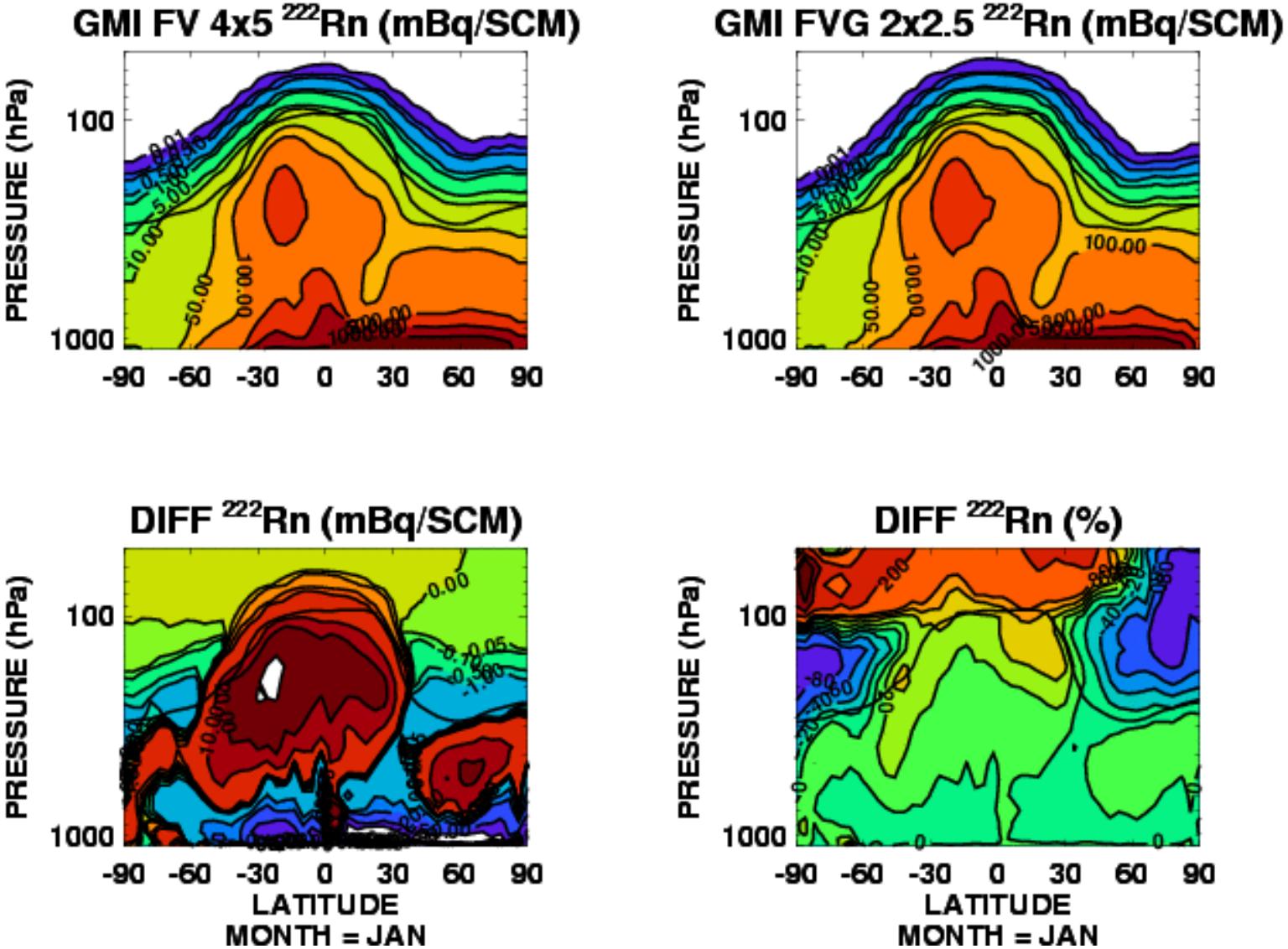
(Thanks to Steve Steenrod for creating the met fields, doing the runs, redoing the runs, etc. etc.)

- Compare 5th year of 5-year Rn/Pb runs (94-98).
- Runs completed late July, 2005 - should be OK.
  - gmr_fv42_new2_9801.const.nc
  - gmr_fv42_new4_9801.const.nc
- Questions:
  - What are the differences?
  - What do the differences indicate?
  - Does 2x2.5 agree better with observations?

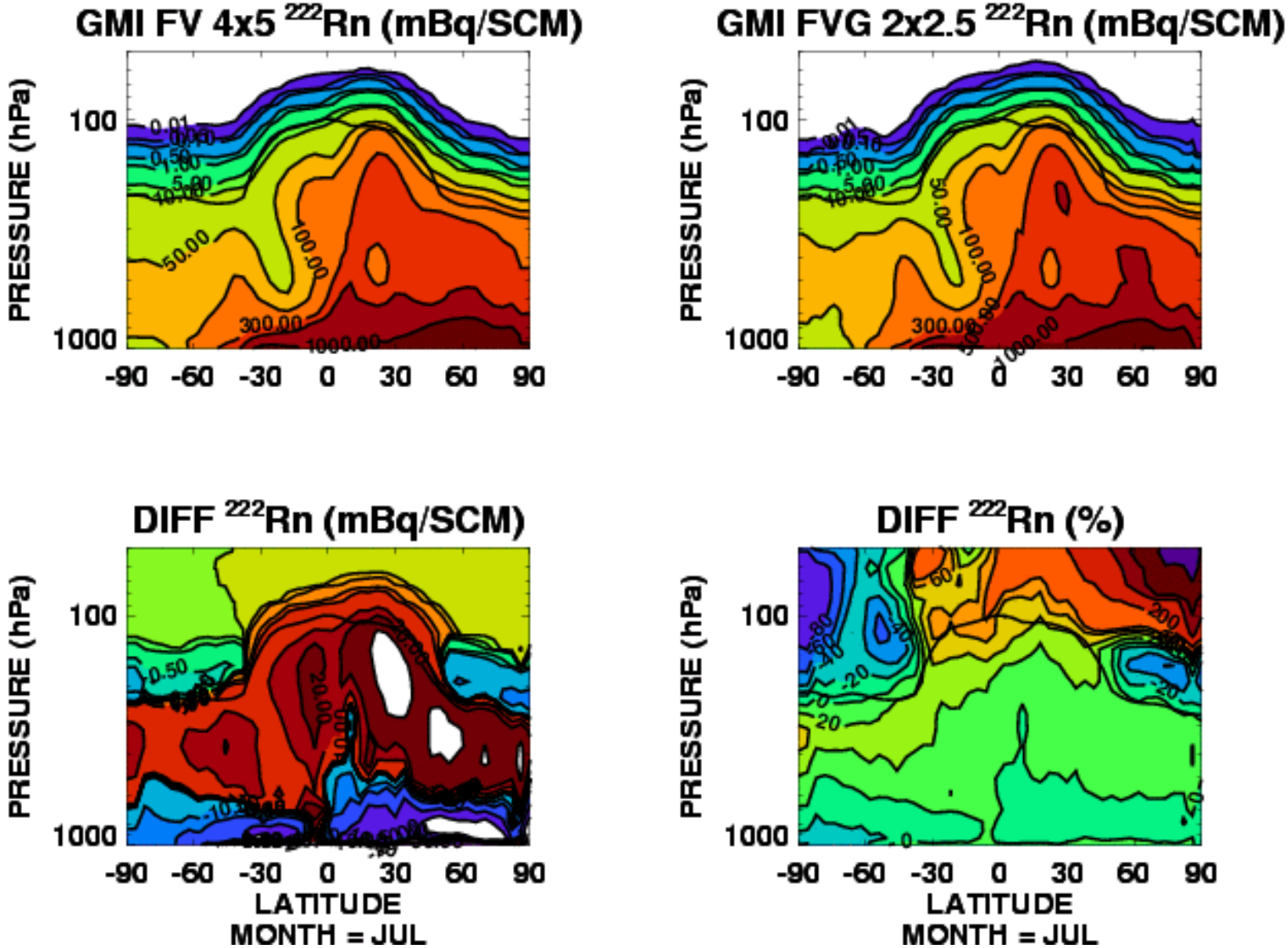


	Globally averaged Wet Deposition	Globally averaged Dry Deposition	Globally averaged Total Deposition
4x5	70.3 Bq m^{-2}	4.3 Bq m^{-2}	74.6 Bq m^{-2}
2x2.5	68.9 Bq m^{-2}	4.9 Bq m^{-2}	73.7 Bq m^{-2}

Zonal mean Rn-222 in January, with differences (absolute and percent)



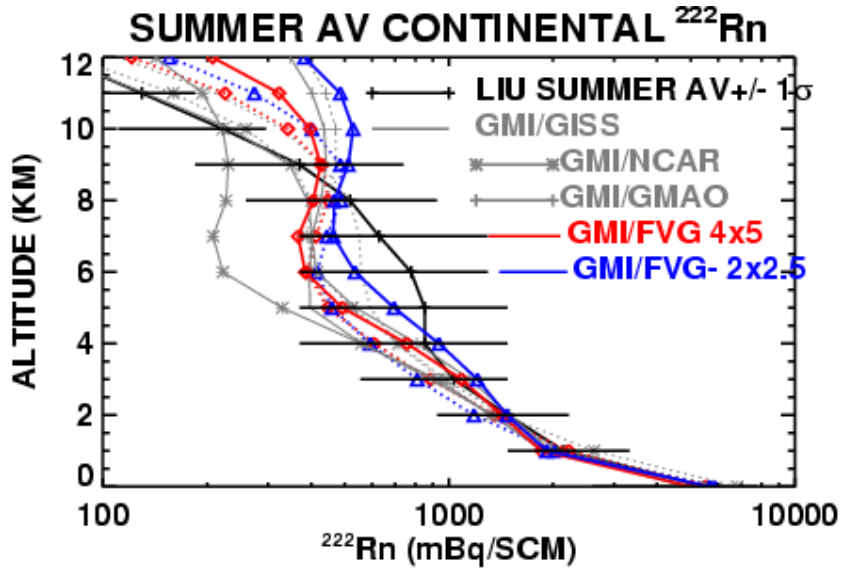
Zonal mean Rn-222 in July, with differences (absolute and percent)

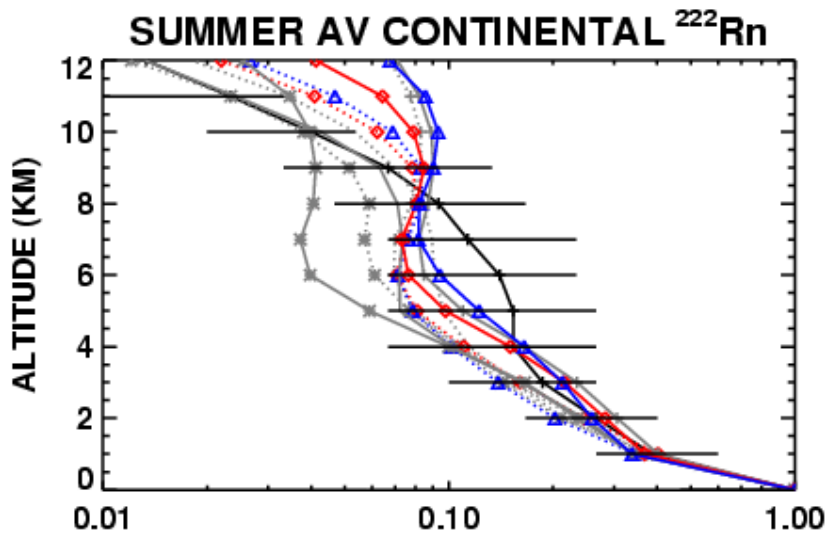


Comparison to Liu [1984] summer rn-222 climatology

Solid - model sampled at Liu profile locations

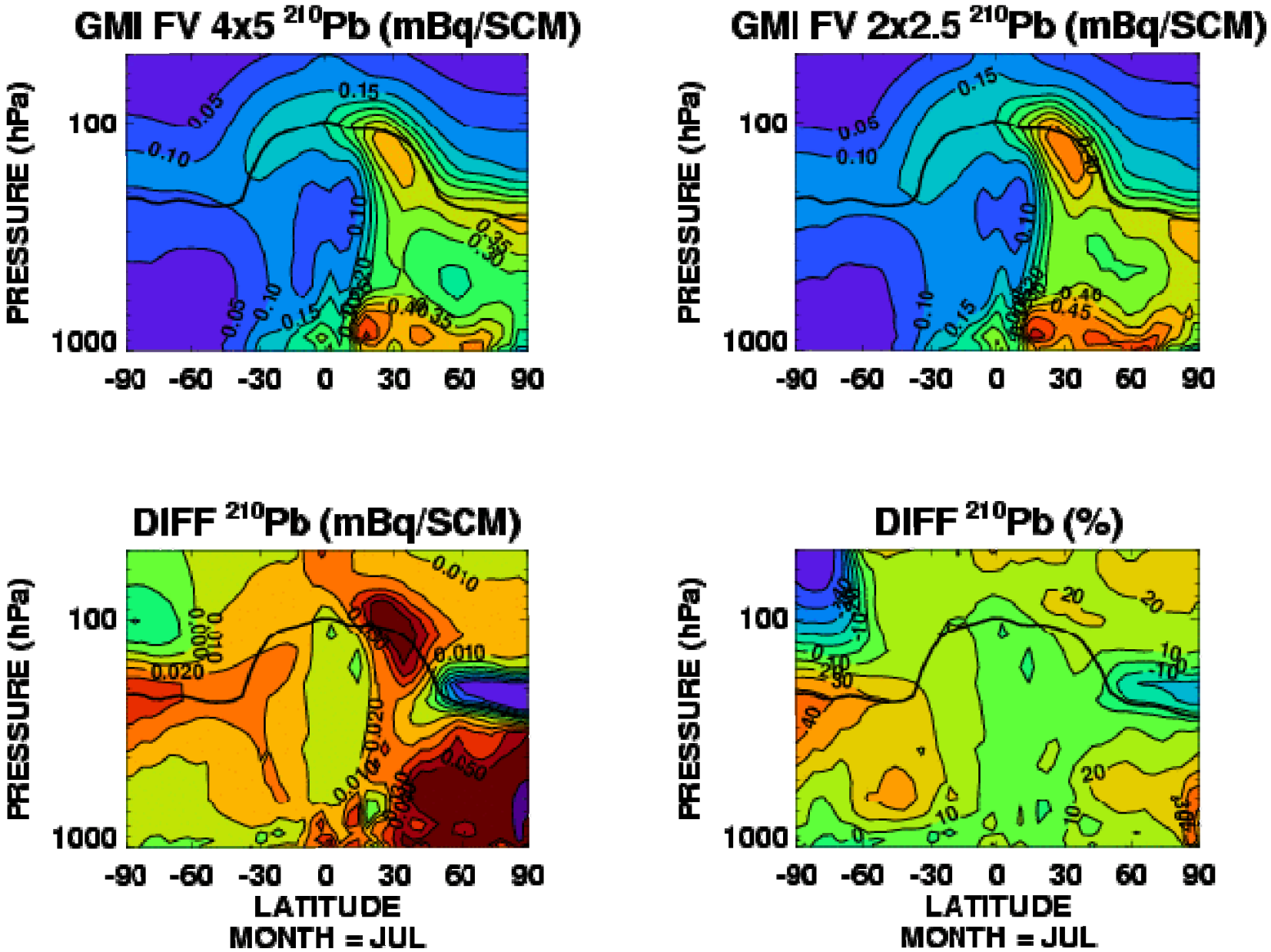
Dotted - North America continental average

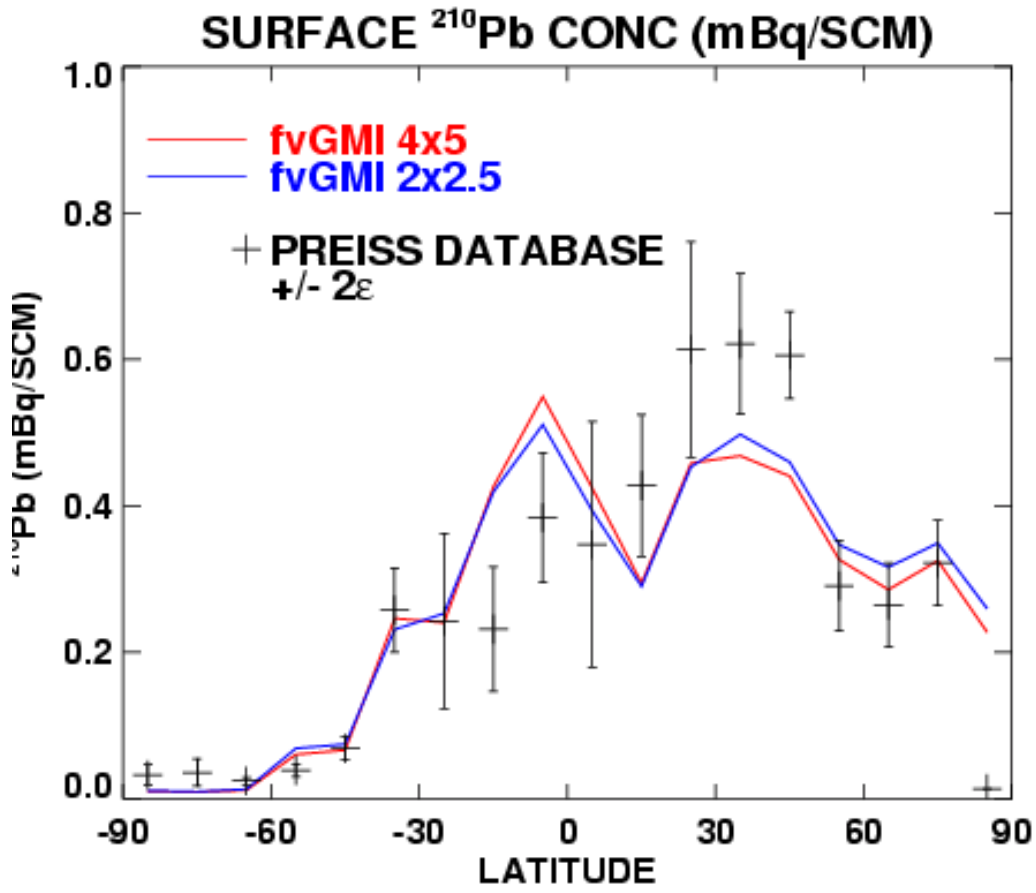


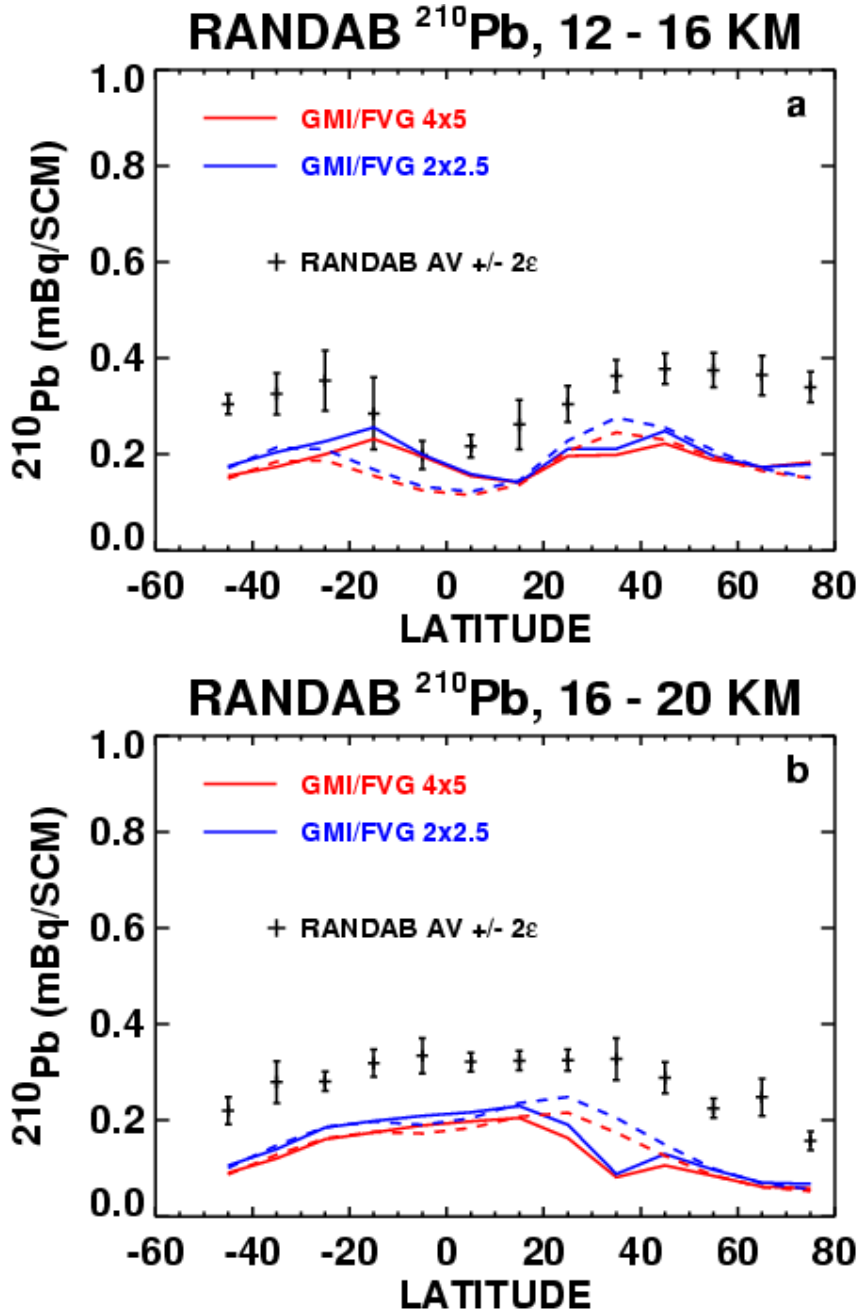


Relative to Surface Value

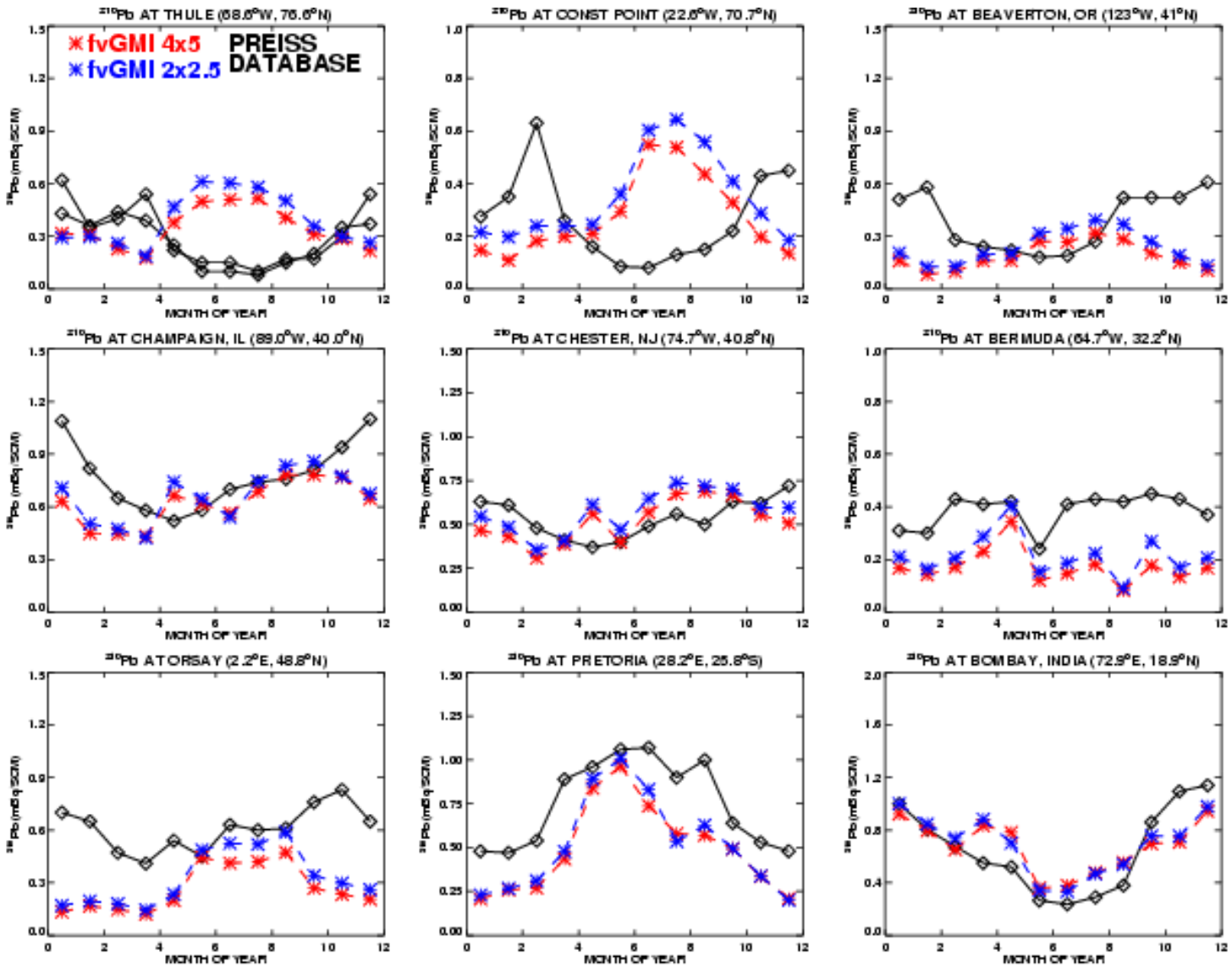
Zonal mean Pb-210 in July, with differences (absolute and percent)




SURFACE ^{210}Pb CONC (mBq/SCM)
fvGMI 4x5
fvGMI 2x2.5
PREISS DATABASE
+/- 2ε
^{210}Pb (mBq/SCM)
1.0
0.8
0.6
0.4
0.2
0.0
-90
-60
-30
0
30
60
90
LATITUDE



Solid - sample mean
Dashed - zonal mean


fvGMI 4x5
fvGMI 2x2.5
PREISS DATABASE
210Pb AT THULE (68.6°W, 76.6°N)
210Pb AT CONST POINT (22.6°W, 70.7°N)
210Pb AT BEAVERTON, OR (123°W, 41°N)
210Pb AT CHAMPAIGN, IL (89.0°W, 40.0°N)
210Pb AT CHESTER, NJ (74.7°W, 40.8°N)
210Pb AT BERMUDA (64.7°W, 32.2°N)
210Pb AT ORSAY (2.2°E, 48.8°N)
210Pb AT PRETORIA (28.2°E, 25.8°S)
210Pb AT BOMBAY, INDIA (72.9°E, 18.9°N)
210Pb (mBq/SCM)
MONTH OF YEAR

Conclusions

- 2x2.5 simulation shows increased stratospheric residual circulation and increased tropospheric vertical transport compared to 4x5 simulation.
    - Comparison to Liu climatology shows differences similar to those seen in previous runs (deficit in 4-8 km region, high above 8 km).

- Small changes in surface Pb-210 concentrations; 2x2.5 run retains deficit at midlatitudes seen in 4x5 simulation.
    - Too-small Rn-222 source function at NH midlatitudes?
    - Too much scavenging?
    - Too little wintertime BL stability?

- UT/LS Pb-210 concentrations small compared to observations in both simulations; little difference between simulations.
    - Too much sedimentation? STE?

- High latitude summertime Pb-210 concentrations very high compared to observations.
    - Suggests Rn-222 emission at high lats during summer; need to change Rn-222 source function.