GMI Combo Updates: Incremental testing of modifications

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Gary Wojcik, and Jose Rodriguez
…and contributions from many GMI team members

In early 2007, we updated many aspects of the GMI-Combo Model. We did this by implementing one change at a time so we could see the effects of each change.

The first simulation is the baseline run (test 1). It is very close to the Combo version used in all 2006 runs, *but with a few bugs fixed.*

Test 1:

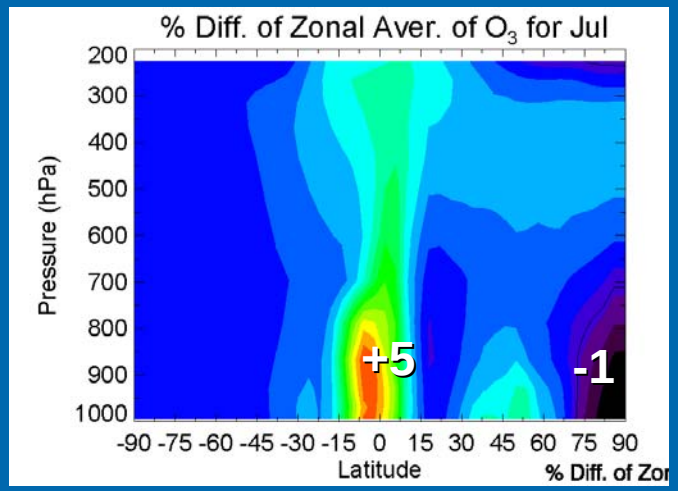
- This version uses JPL-02, 117 species combo mechanism, old tropopause definition (synoz=150)
- Fixed a bug in the soil NOx input file (file's grid was read in wrong)
- O_3 station data now being written out correctly (had been truncated in height)
- Fixed convection coding error that sometimes generated new highs of tracer mixing ratios

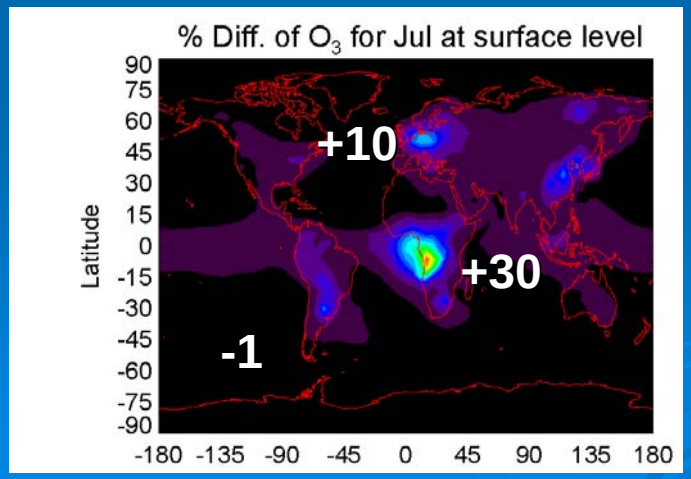
Updates to the GMI-Combo Model: a test run was performed for each change implemented

- TEST 2: Added new tropopause definition (used to determine where tropo and strat het chem reactions are applied)
- TEST 3: Same as above, and increased to 124 species in the mechanism (ACTA, EOH, GLYX, HCOOH, MOH, RCOOH, and ROH)
- TEST 3b: Same as above, but turning off a certain het chem rxn (HO_x loss)
- TEST 4: Same as above, but updating to JPL-06
- TEST 5: Same as above, but setting H_2 to 500 ppbv everywhere (it had been accumulating)

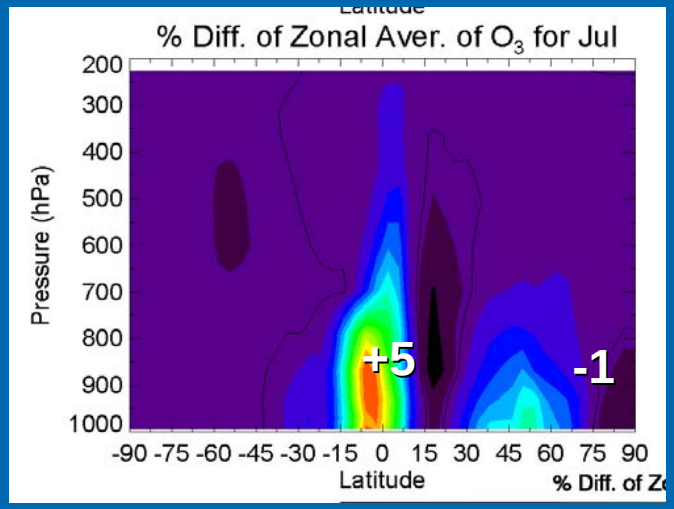
Ozone Differences (%) - July

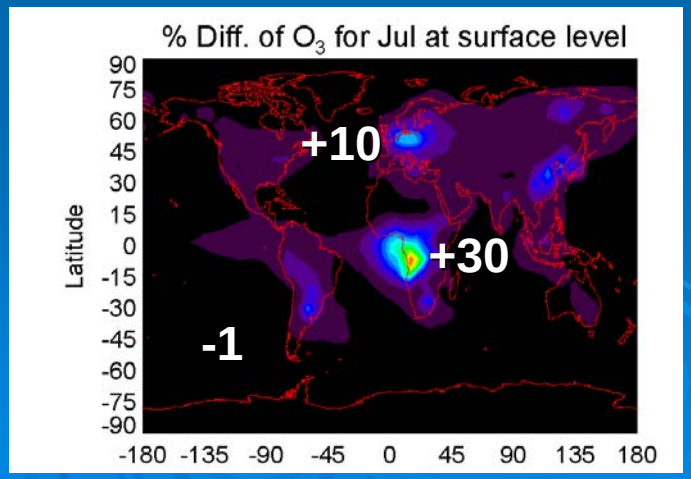
All Changes (test 5 – test 1)





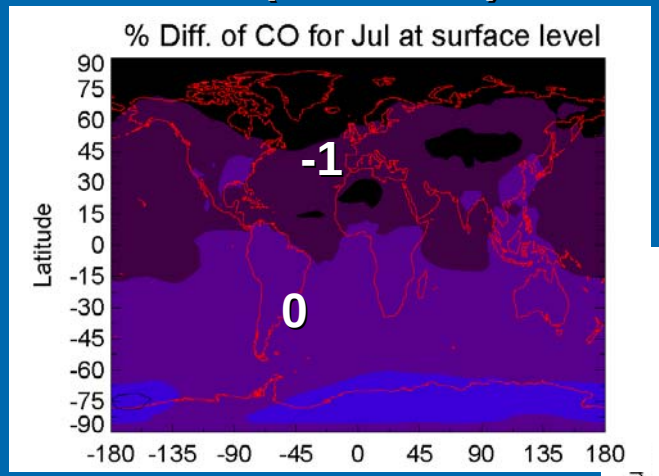
Het Chem Change (test 3b – test 3)





CO – July Surface Changes (%)

JPL-06 (Test 4-3b)



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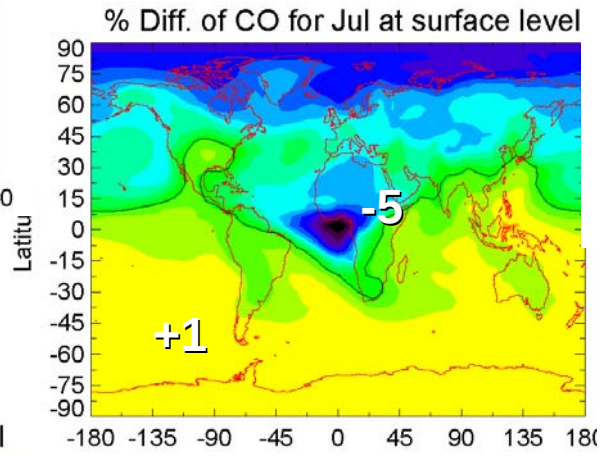
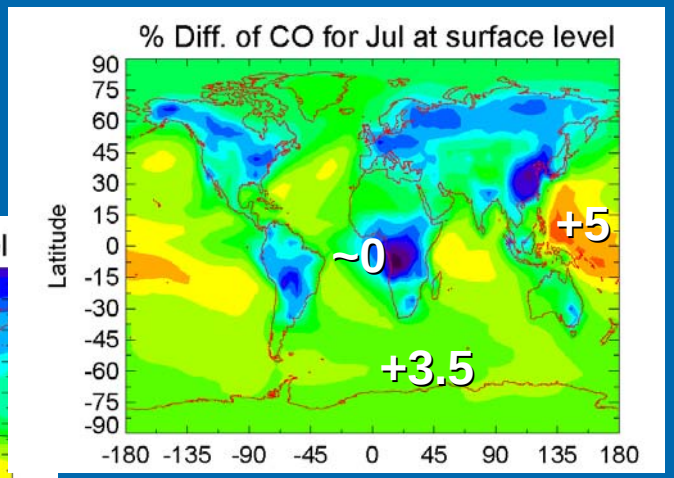
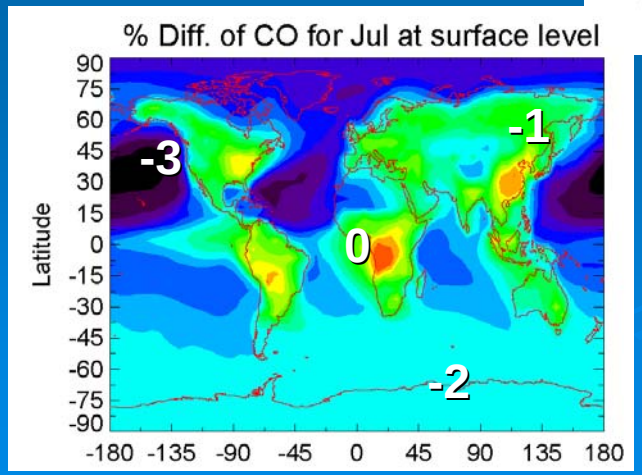


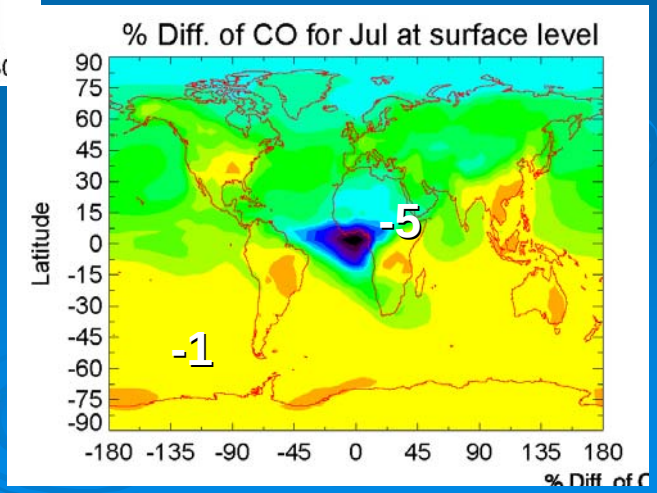
Add 7 Species (Test 3-2)



H_2 Fix (Test 5-4)

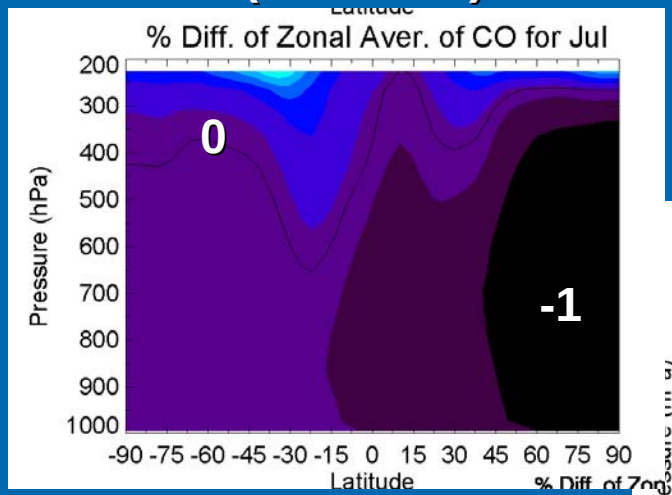


Het Chem (Test 3b-3)



CO - July Vertical Changes (%)

JPL-06 (Test 4-3b)



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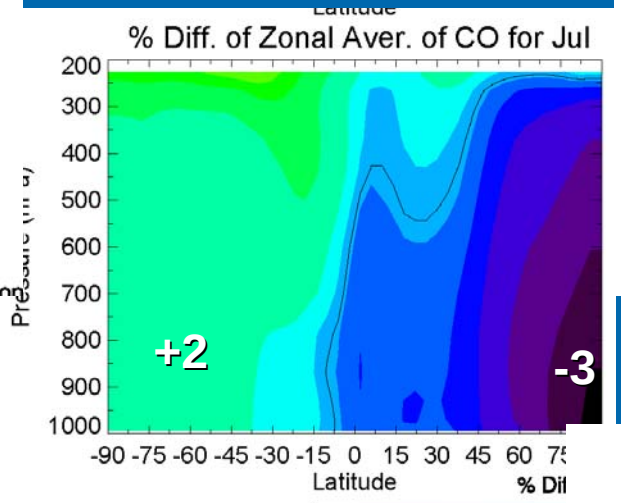

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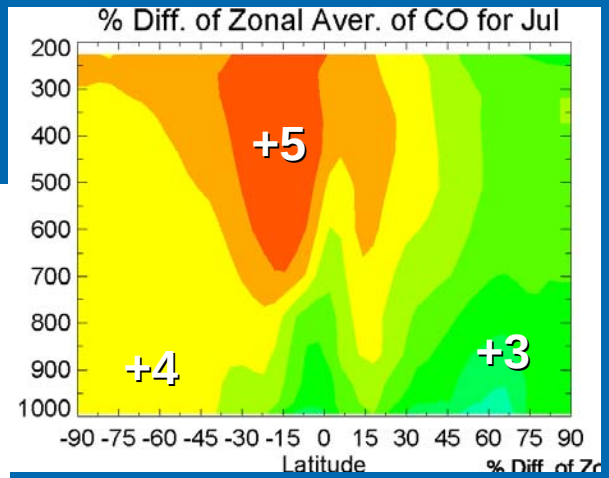

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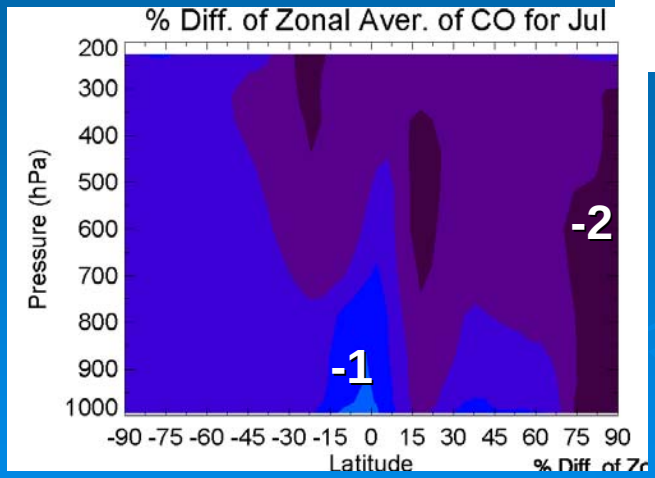
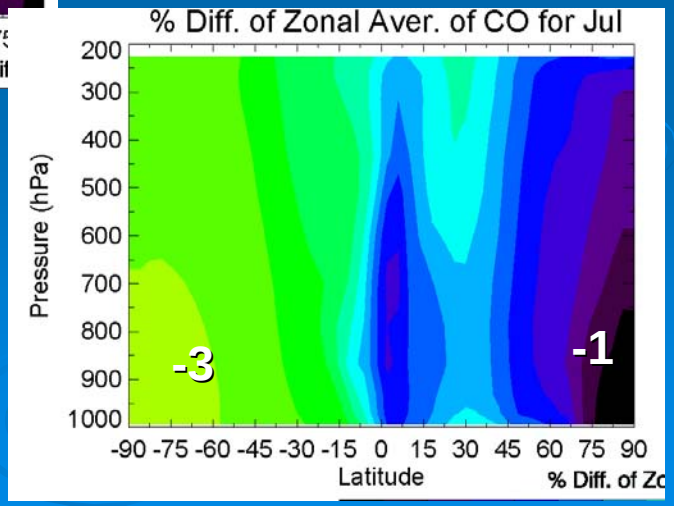
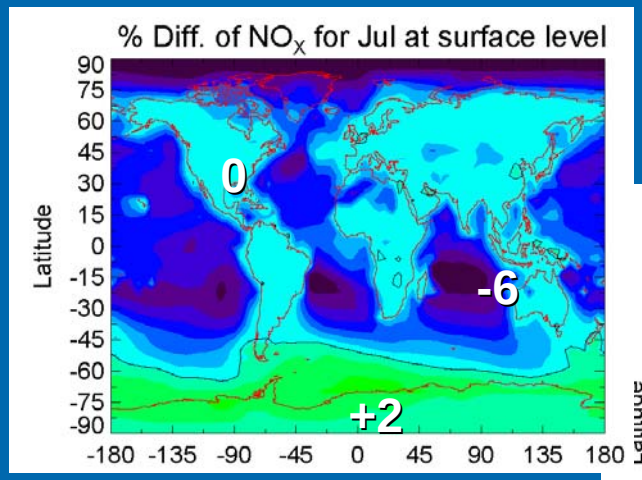


Het Chem (test 3b-3)



NO_x – July Surface Changes (%)

JPL-06 (Test 4-3b)



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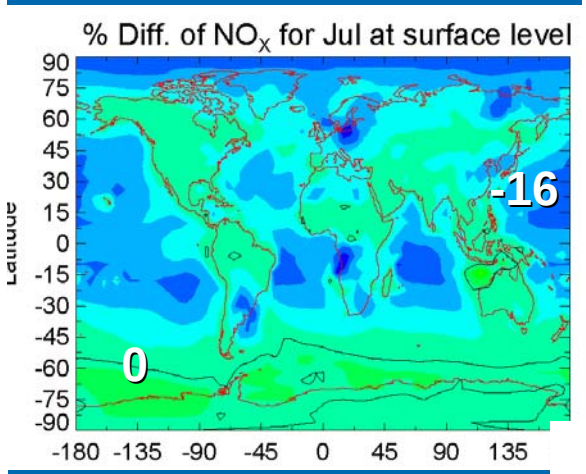

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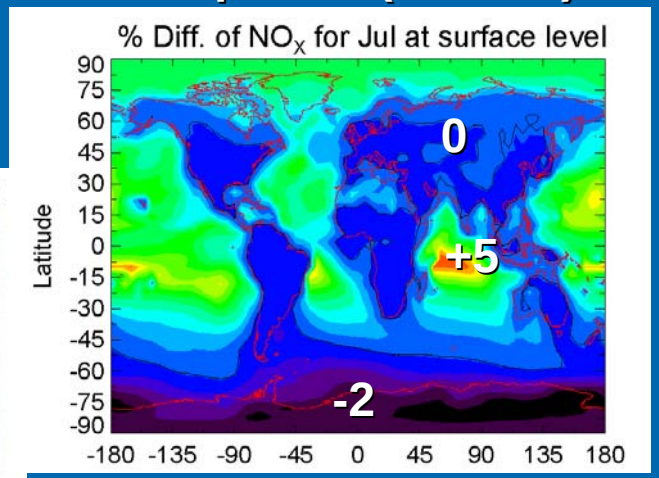

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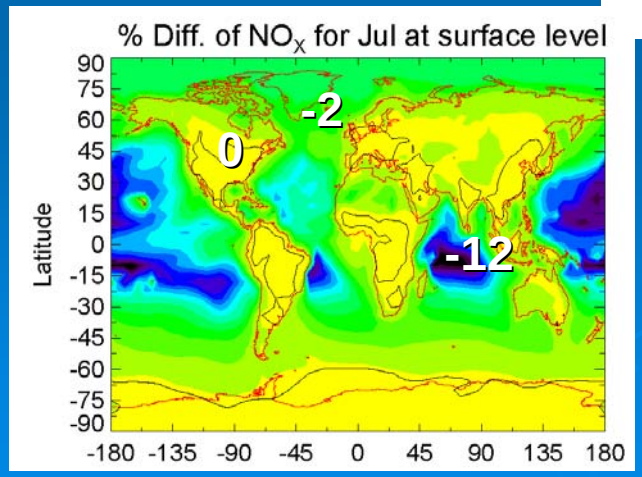
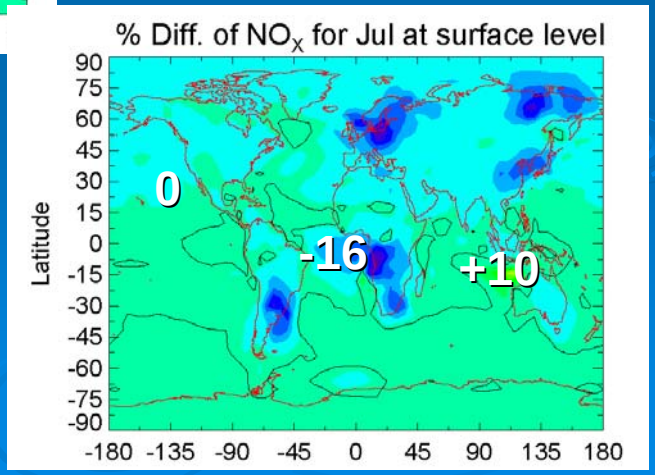
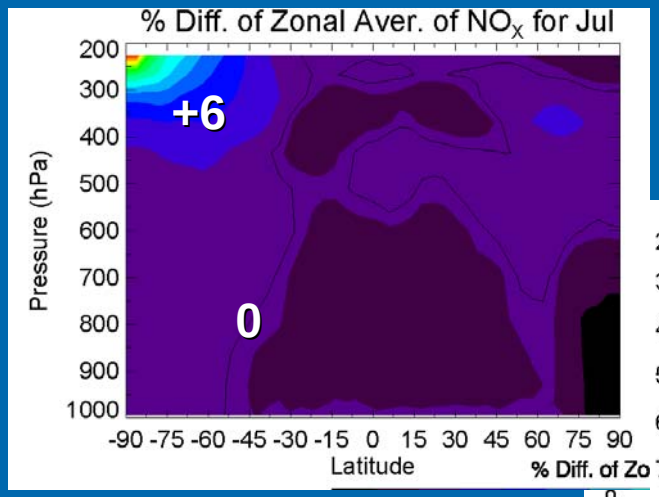


Het Chem (test 3b-3)



NO_x – July Vertical Changes (%)

JPL-06 (Test 4-3b)



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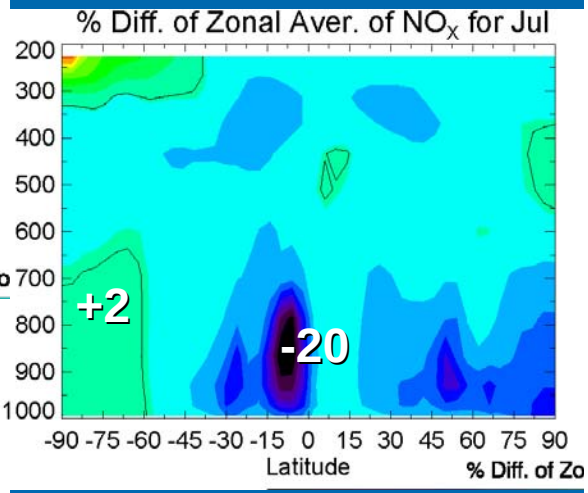

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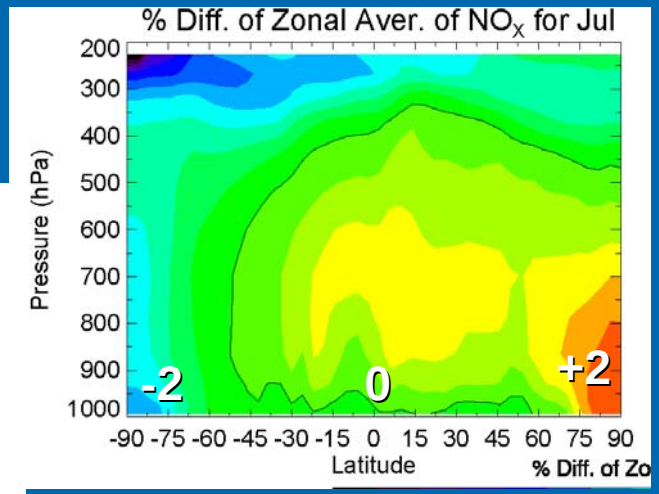

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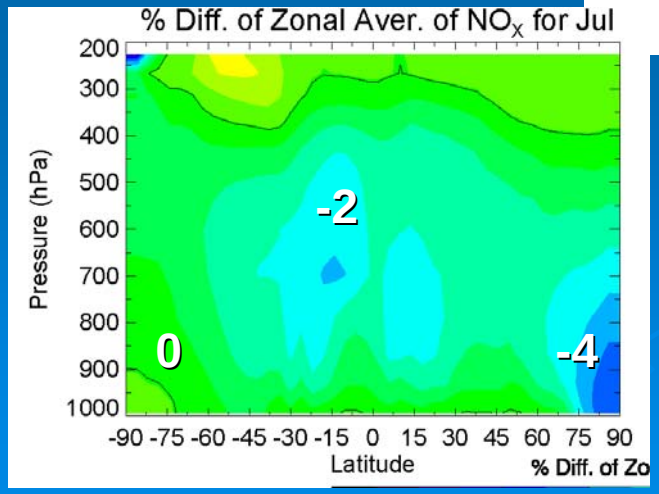

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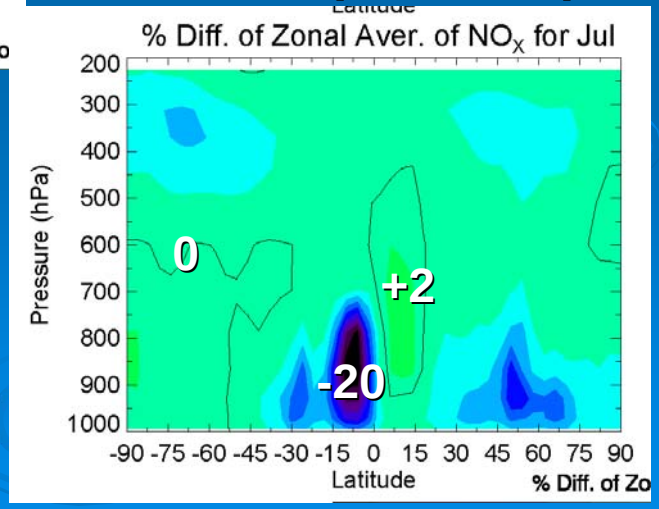
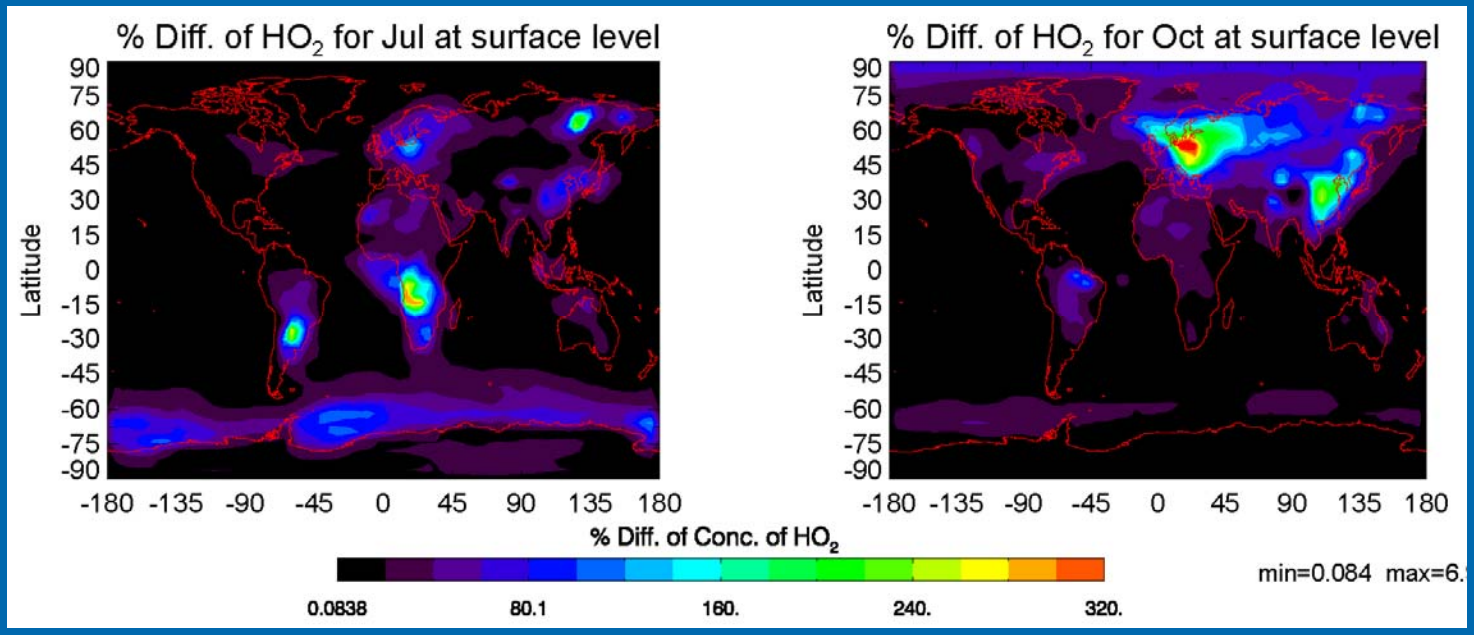
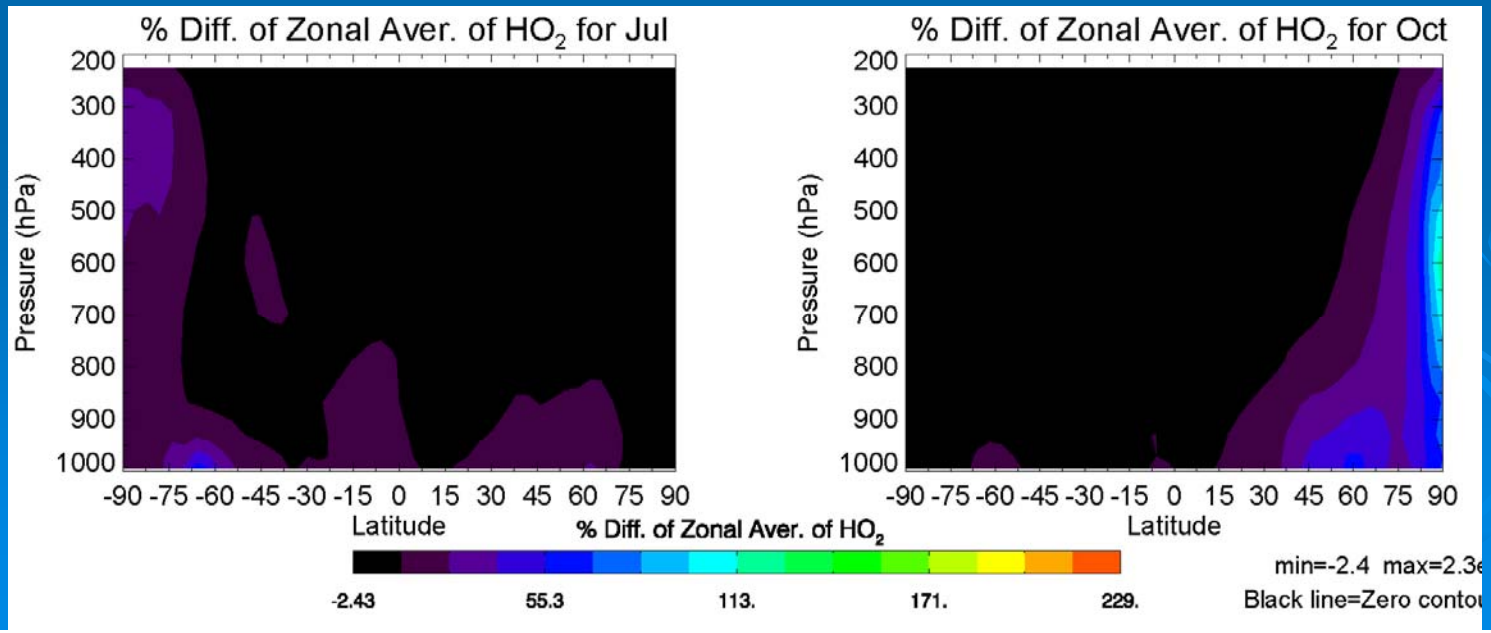


Tropospheric Results:

The combined effect of all the incremental changes is generally small (+/- a few percent). Most of the changes occurred because of the removal of a tropospheric heterogeneous chemical reaction for HO_x loss.

CO is an exception – several changes pushed it up or down. The net effect is the sum of several small effects.

No big changes resulting from JPL-06.

HO_x Changes: Test 3b-Test 3