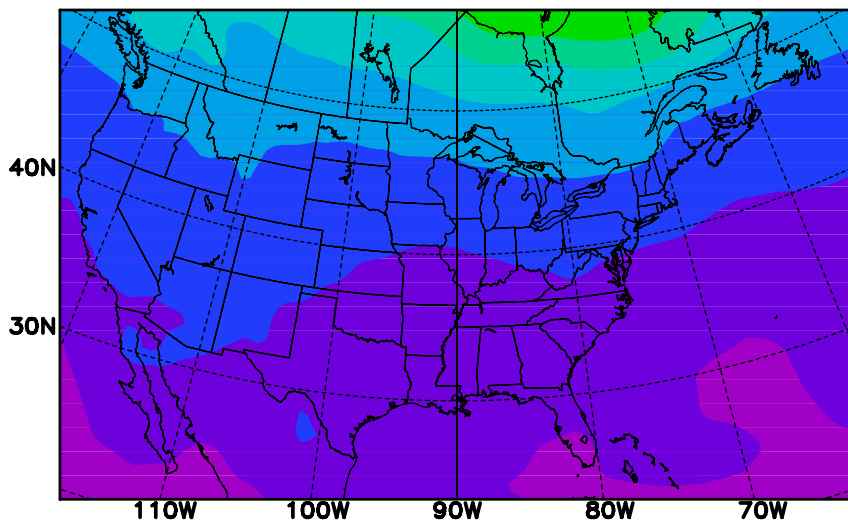
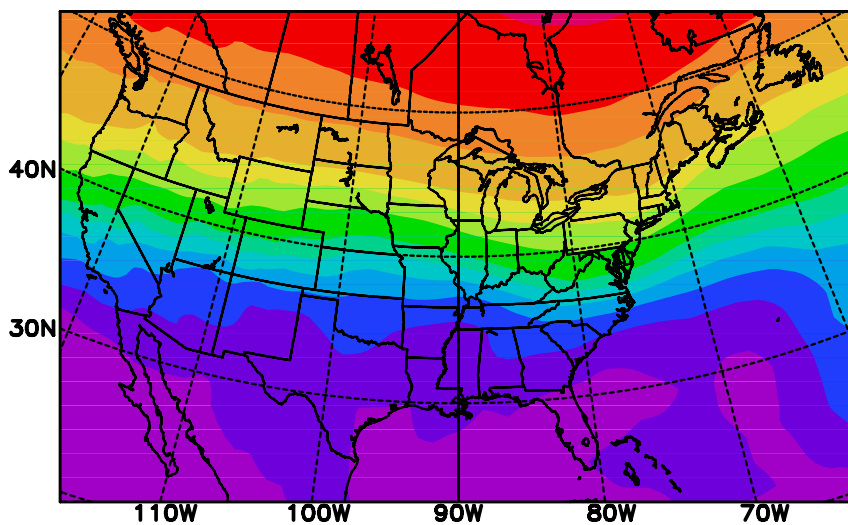


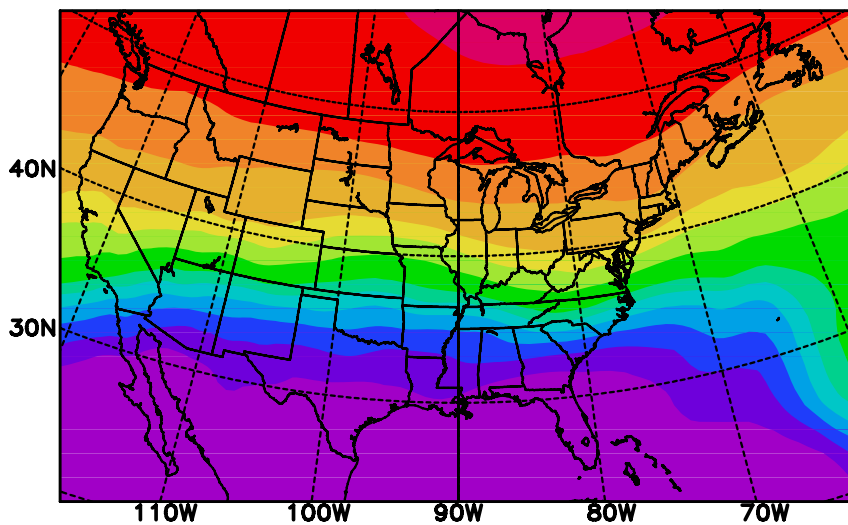
Figure 1. Comparison and Analysis Framework



**MOZART-NCAR**



**MOZART-GFDL**

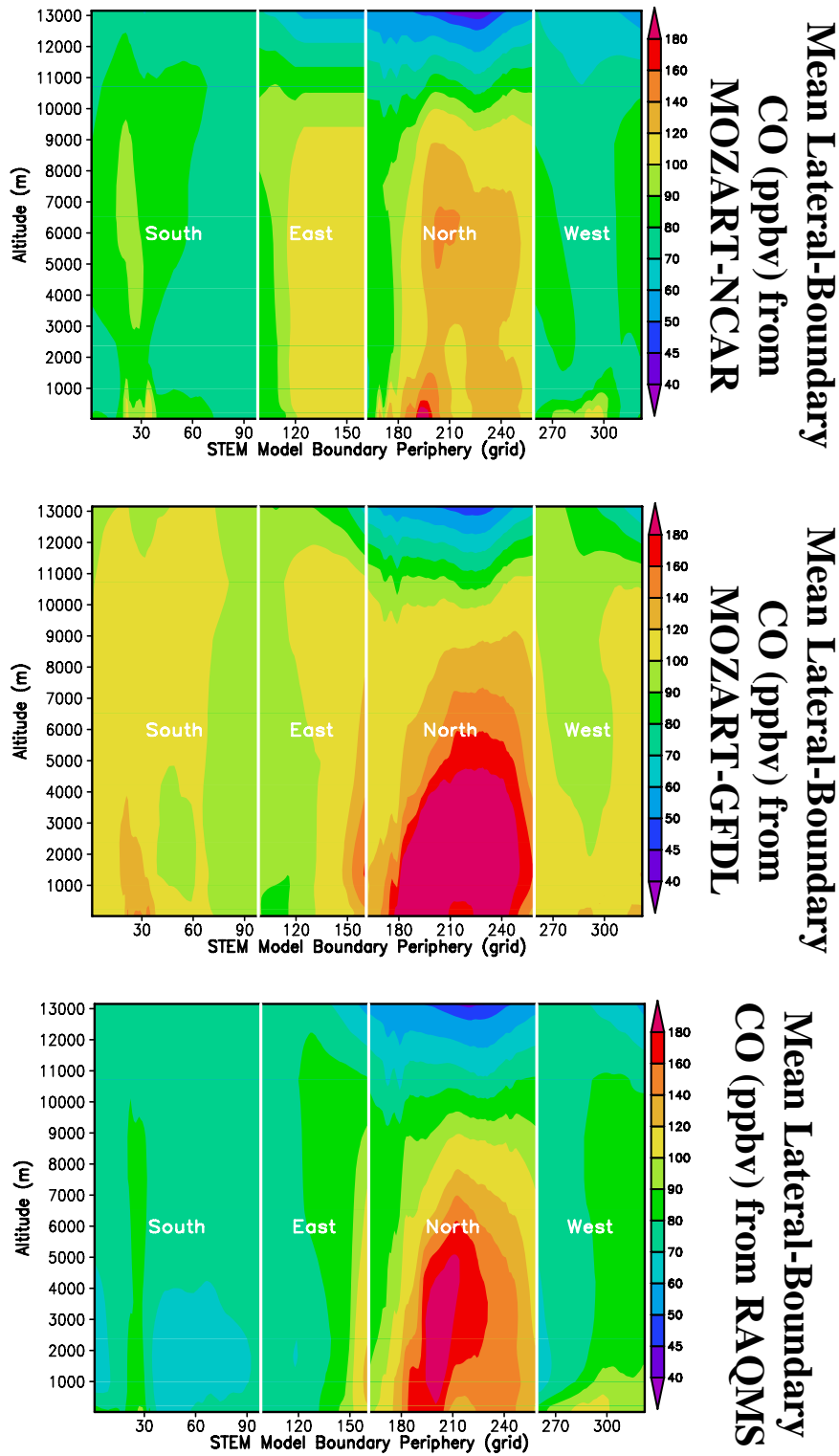


**RAQMS**

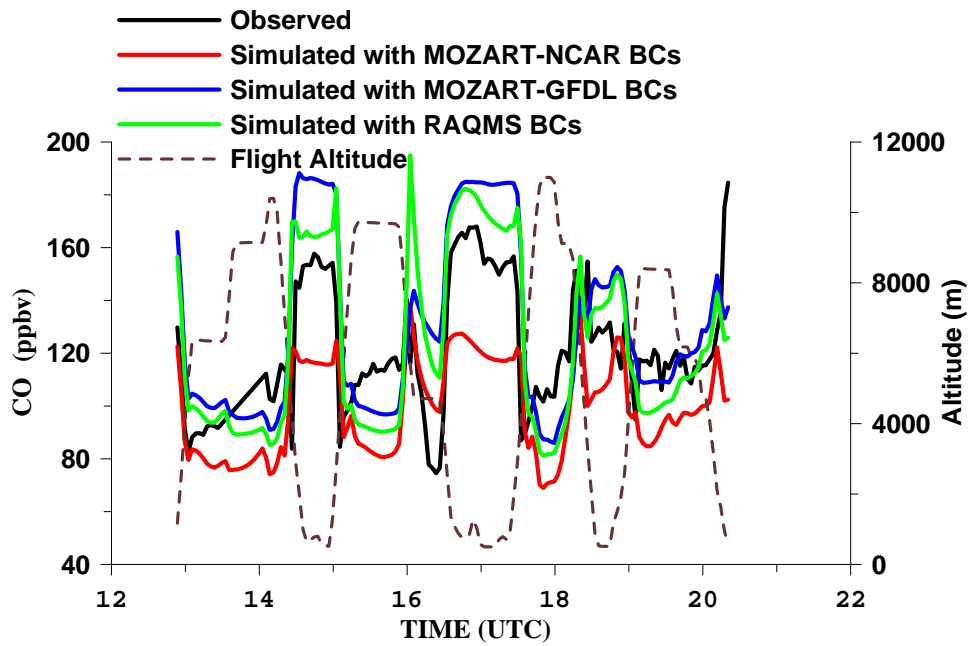
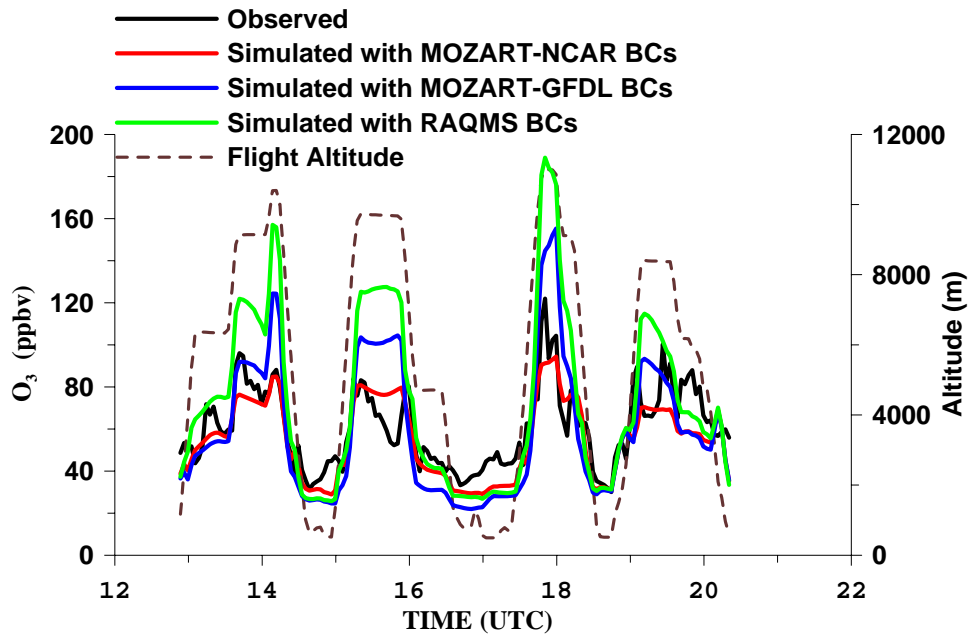


Mean O<sub>3</sub> top boundary conditions (ppbv) during the ICARTT period

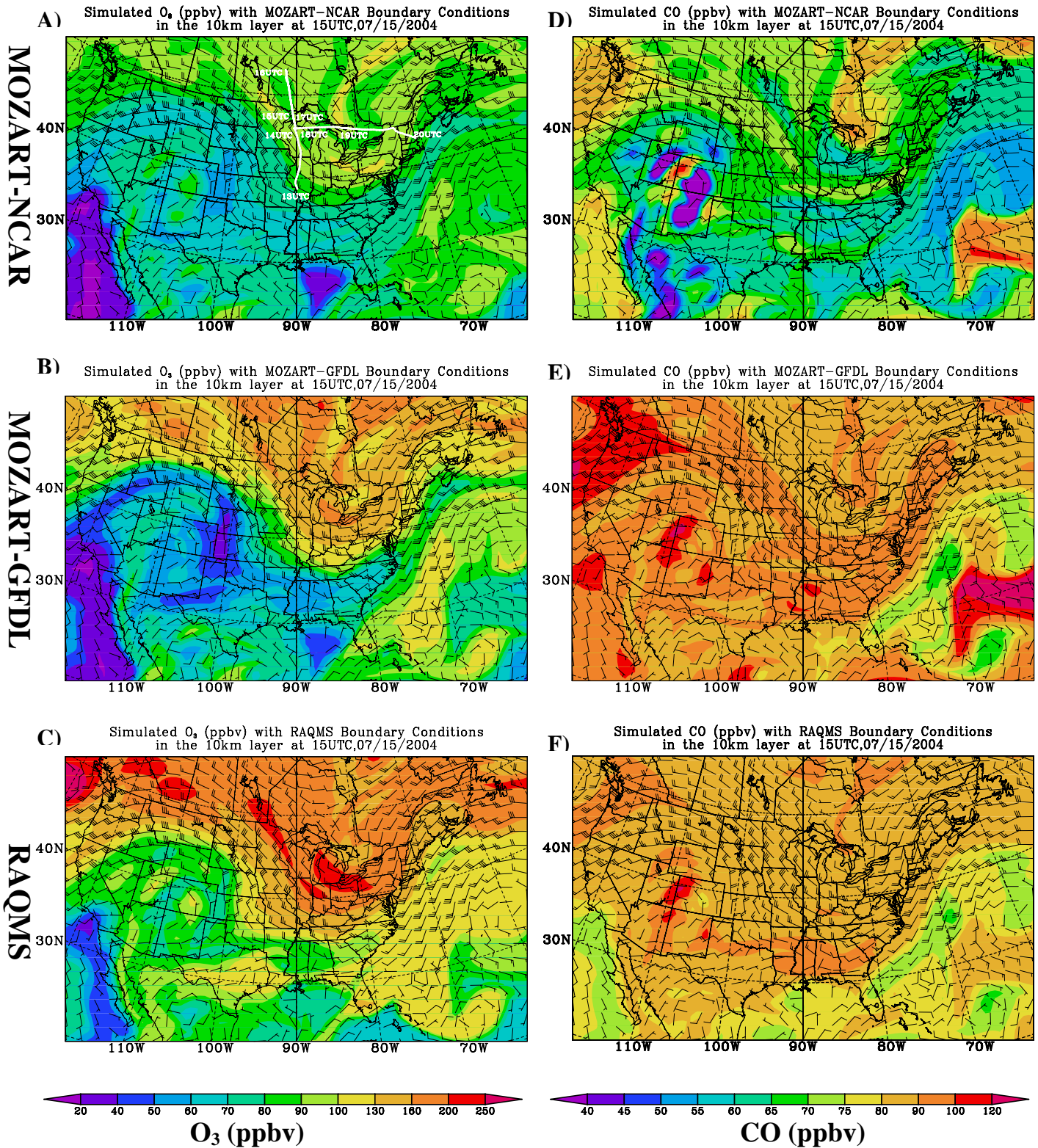
**Figure 2. Period-mean O<sub>3</sub> top boundary conditions from 3 global models.**



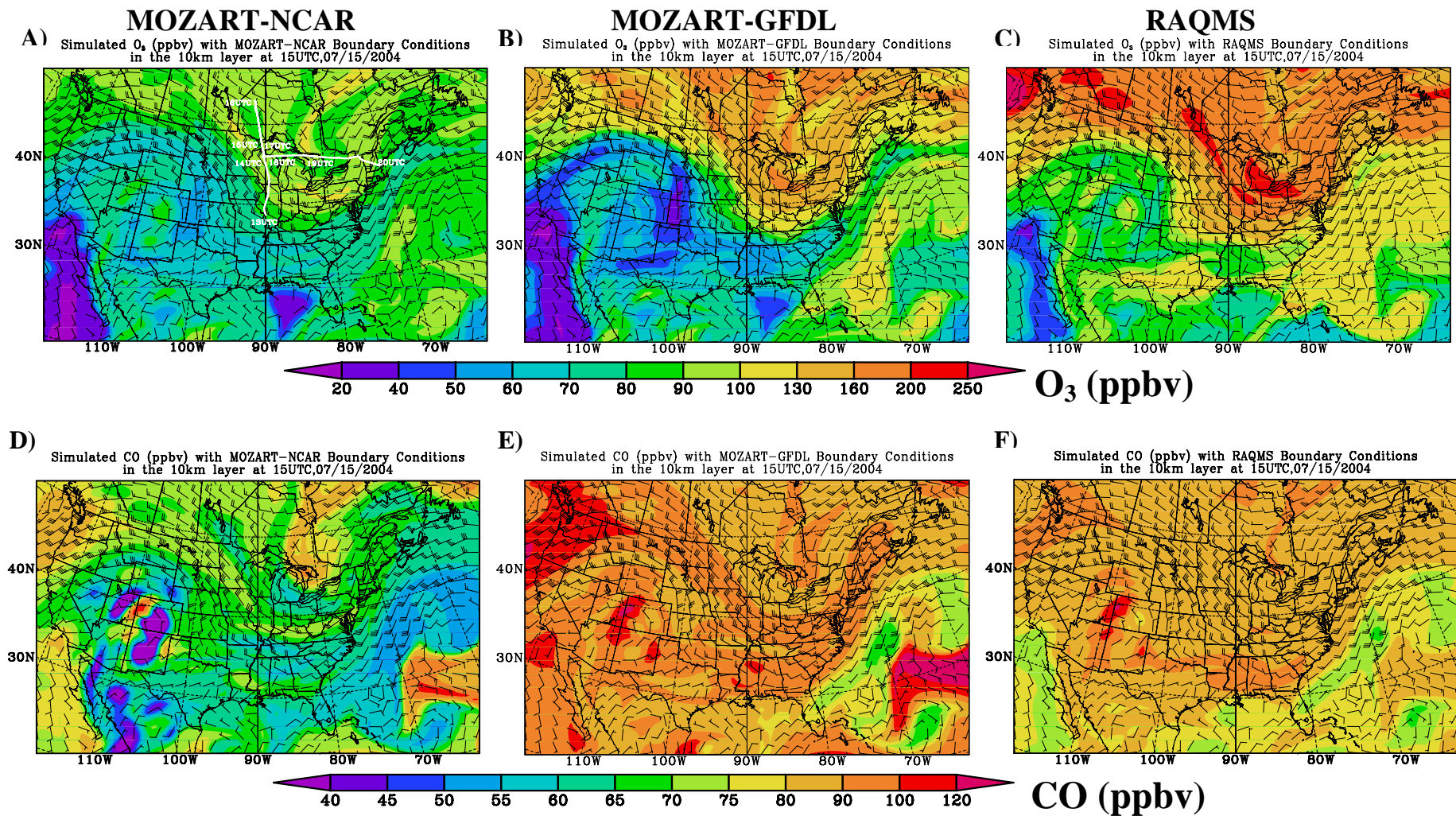
**Figure 3. Period-mean CO lateral boundary conditions from 3 global models, along the STEM's boundary periphery in grid (60km) starting from the southwest corner of the STEM 60km domain shown in Figure 1.**



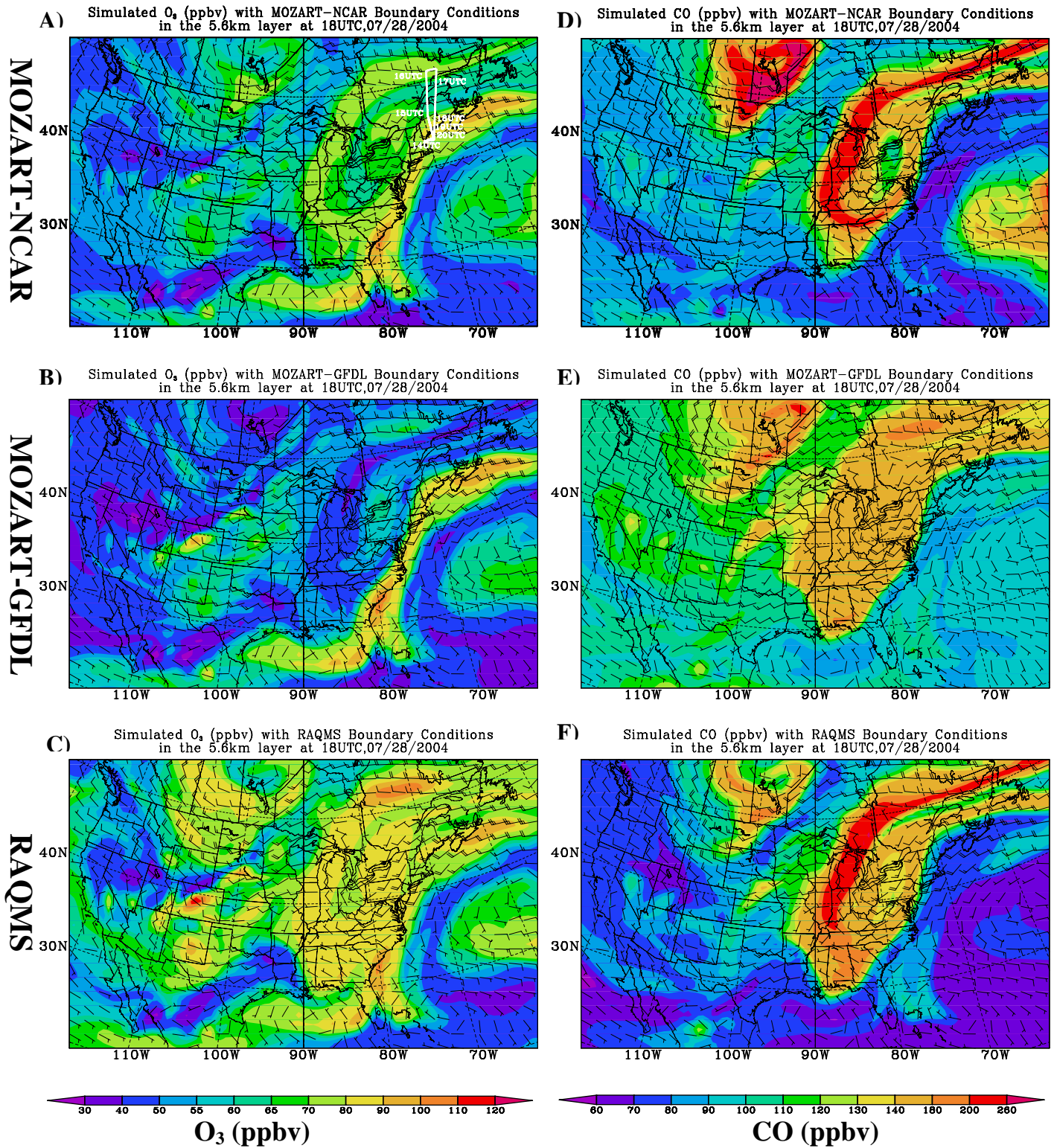
**Figure 4. Observed and Simulated O<sub>3</sub> and CO concentrations for the DC-8 flight 8 on 07/15/2004**



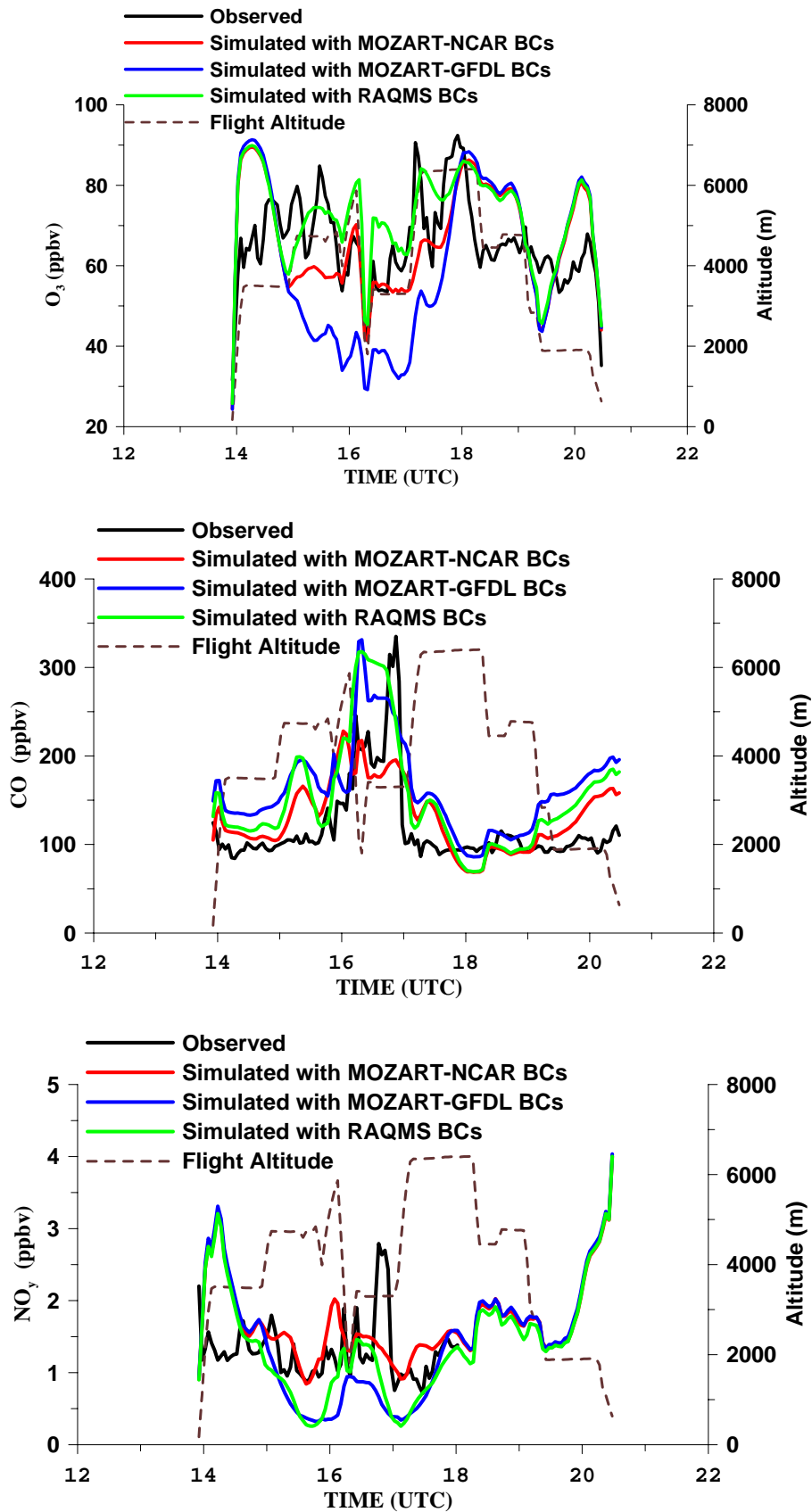
**Figure 5. STEM 60km simulated  $O_3$  and CO concentrations in the 10km layer with boundary conditions from the three global models for DC-8 flight 8 on July 15 (plot A shows the flight path).**



**Figure 5. STEM 60km simulated  $O_3$  and CO concentration in the 10km layer with boundary conditions in the 10km layer from the three global models for DC-8 flight 8 on July 15 (plot A shows the flight path).**

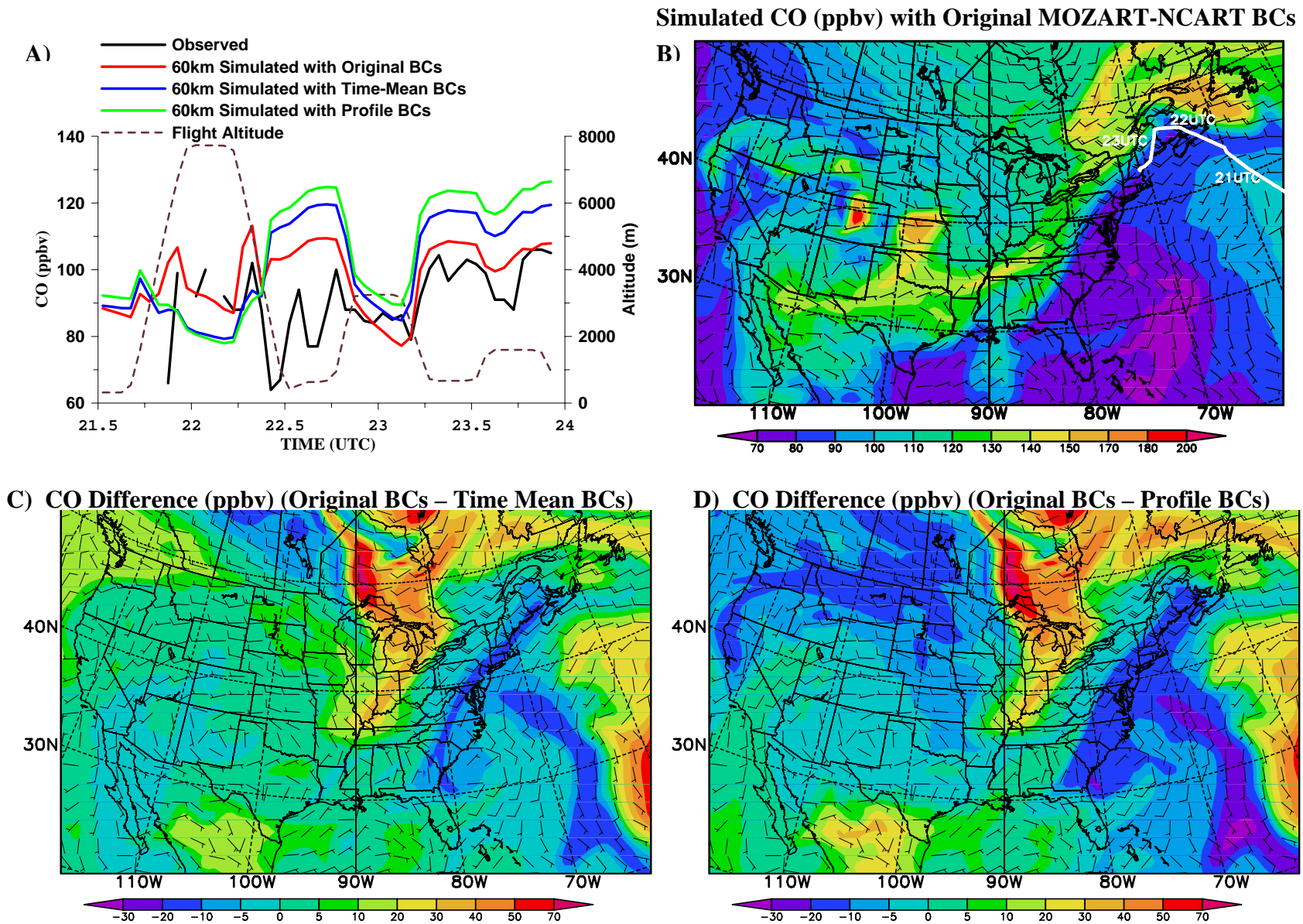


**Figure 6. STEM 60km simulated  $O_3$  and CO concentrations in the 5.6km layer with boundary conditions from the three global models for WP-3 flight 12 on July 28 (plot A shows the flight path).**

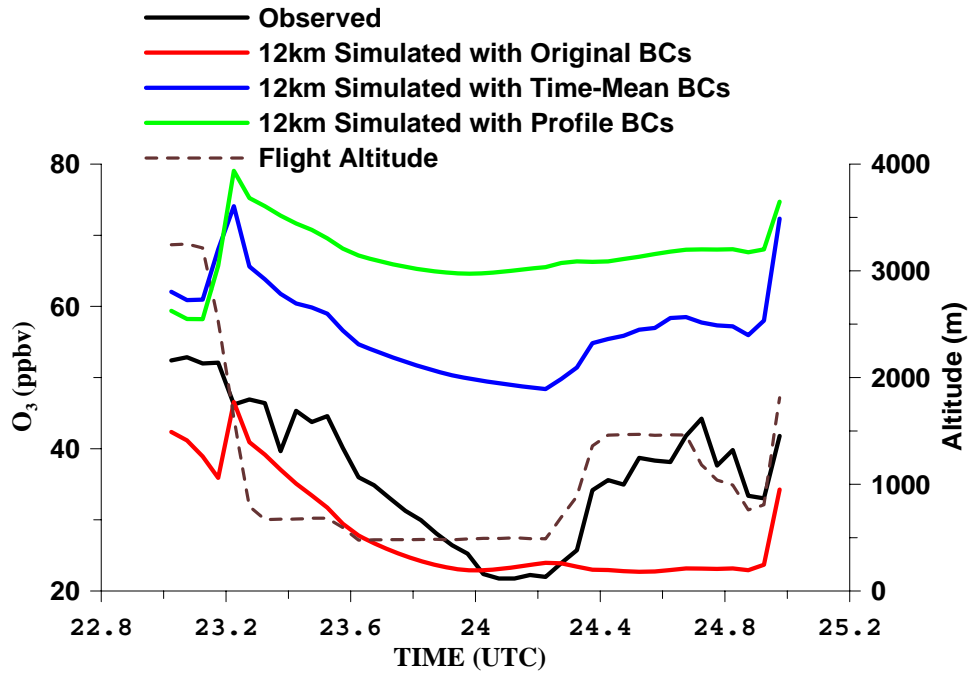
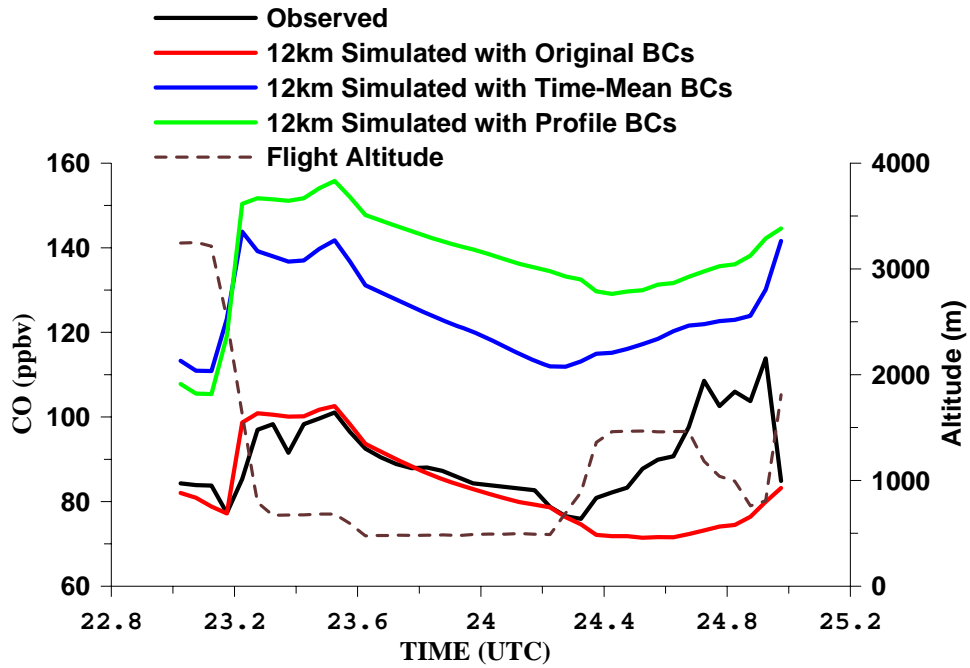


**Figure 7. Observed and simulated O<sub>3</sub>, CO, and NO<sub>y</sub> concentrations for the WP-3 flight 12 on 07/28/2004**

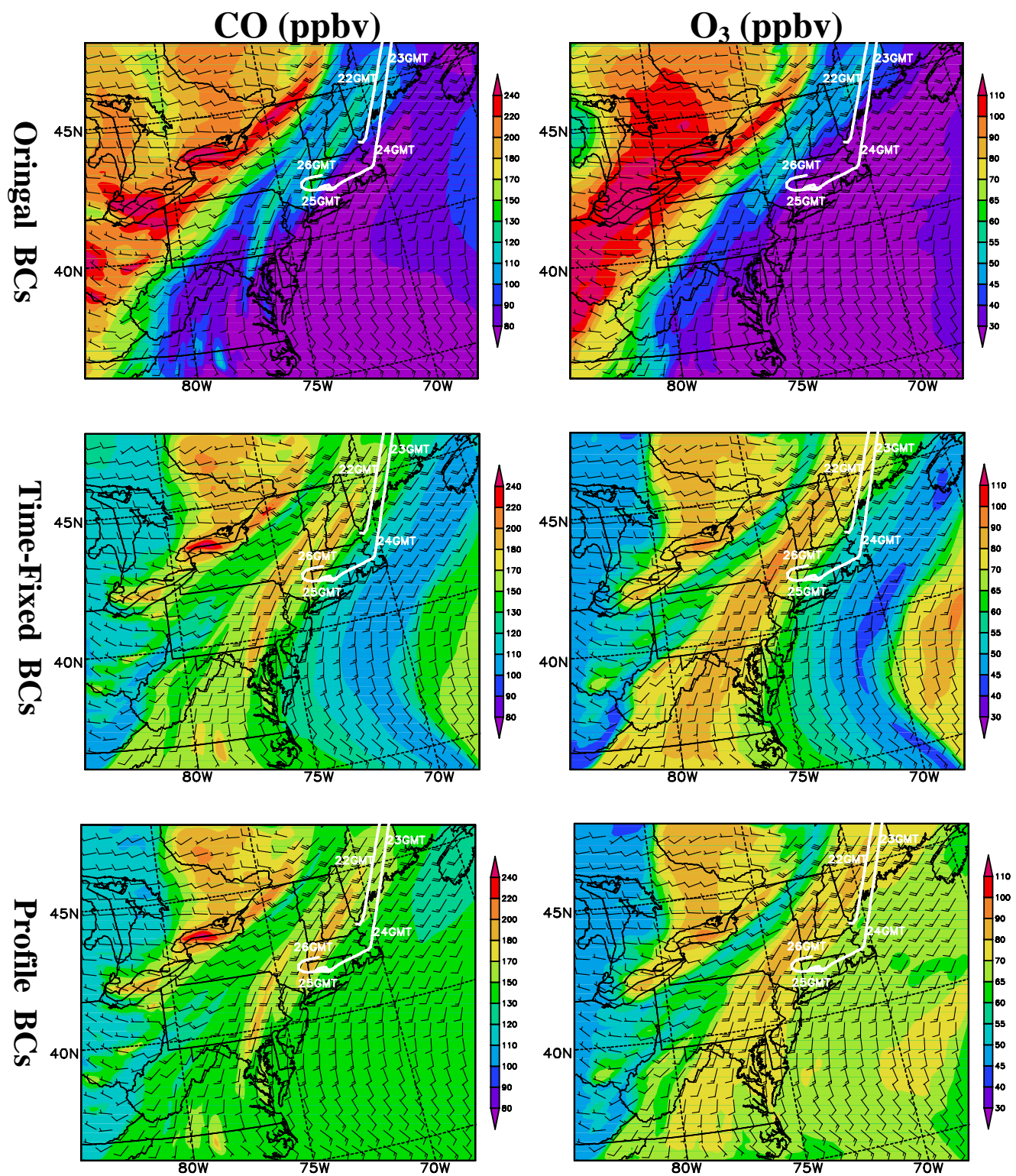




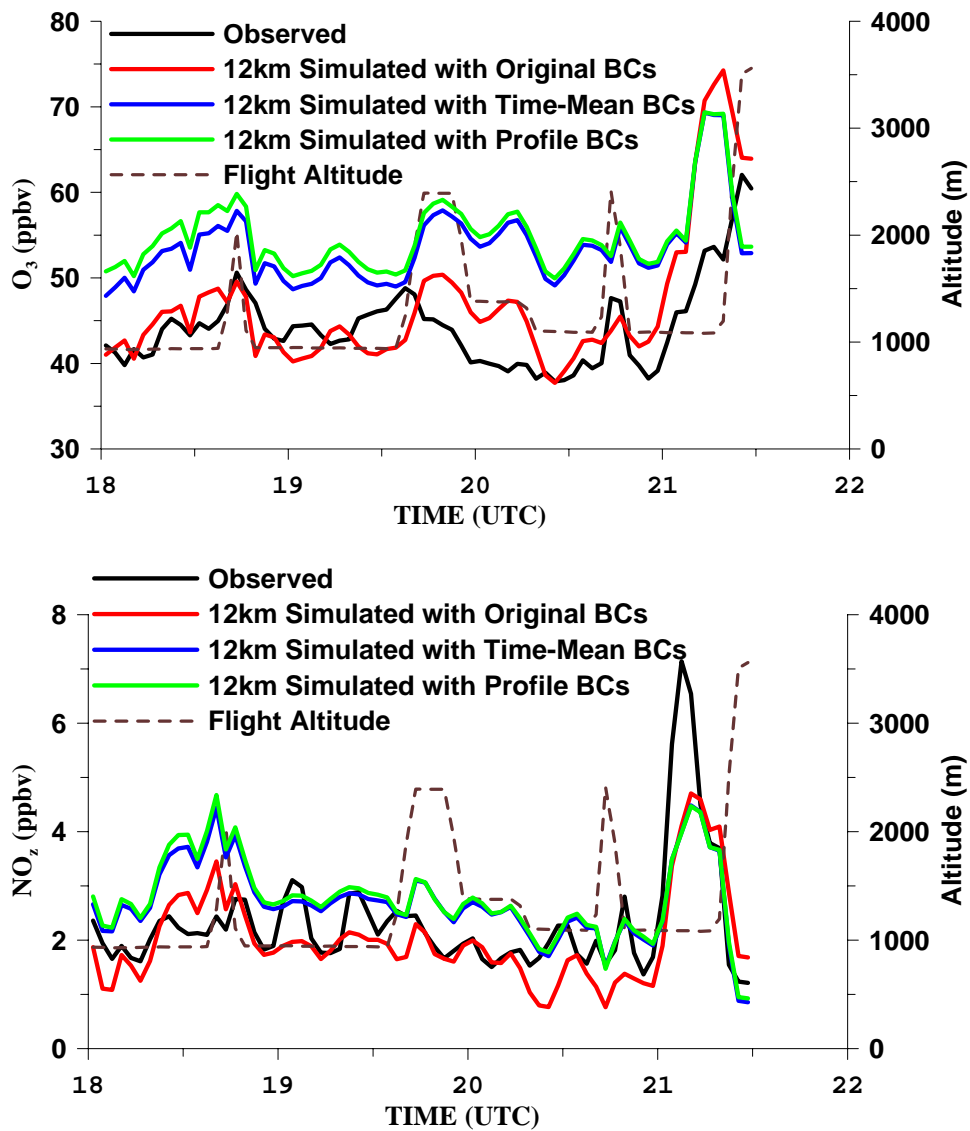
**Figure 8. 60km simulated CO compared to the DC-8 flight observation on 07/31/2004. Plot B shows the simulated CO with original MOZART-NCAR BCs in the 3km layer, 0UTC, 08/01/2004. Plots C, D show the corresponding CO differences among the three simulations.**



**Figure 9. Observed and simulated CO and O<sub>3</sub> concentrations for the WP-3 flight 13 on 07/31- 08/01, 2004**

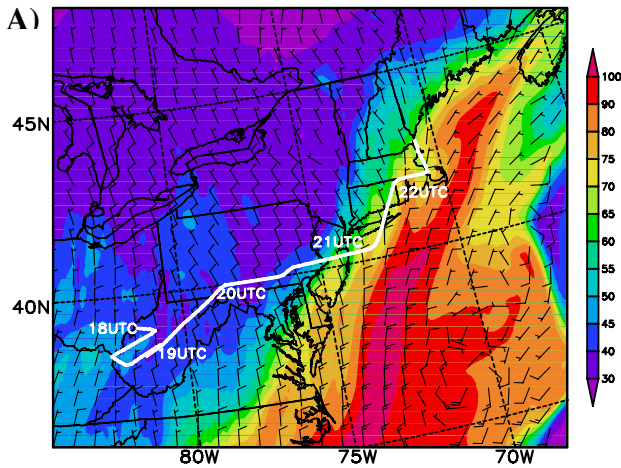


**Figure 10. 12km simulated CO (left column) and O<sub>3</sub> (right column) concentrations in the 1km layer, at 0 UTC, 08/01/2004, driven by 3 different boundary conditions. The WP-3 flight path is shown in each plot.**

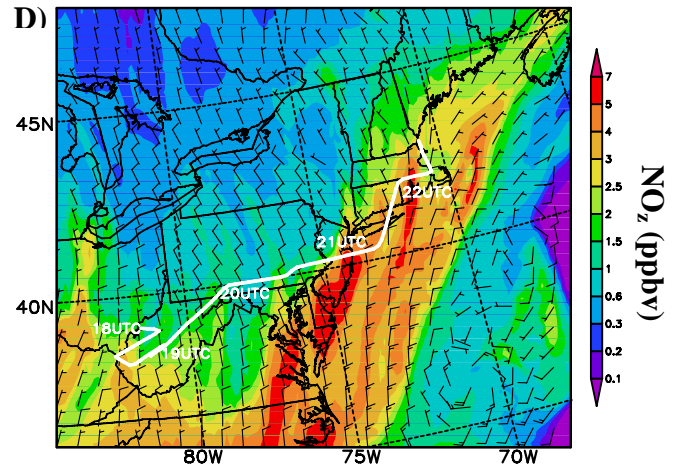


**Figure 11. Observed and simulated O<sub>3</sub> and NO<sub>z</sub> concentrations for the WP-3 flight 15 on 08/06/2004**

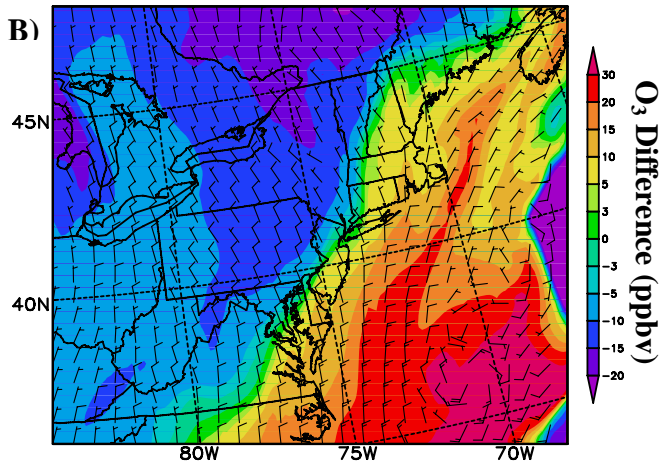
### Simulated O<sub>3</sub> with original BCs



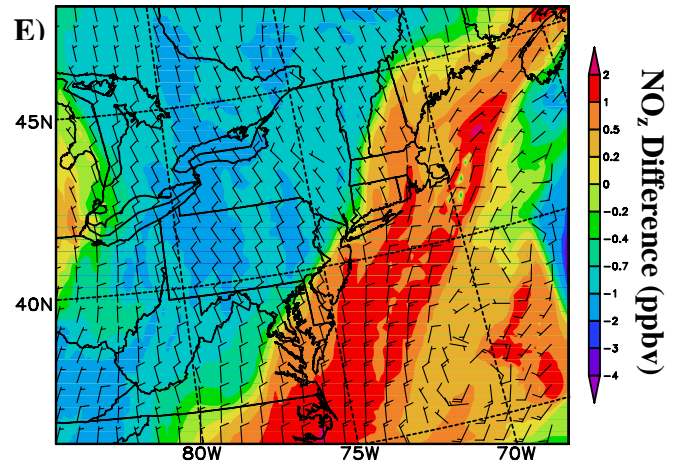
### Simulated NO<sub>z</sub> with original BCs



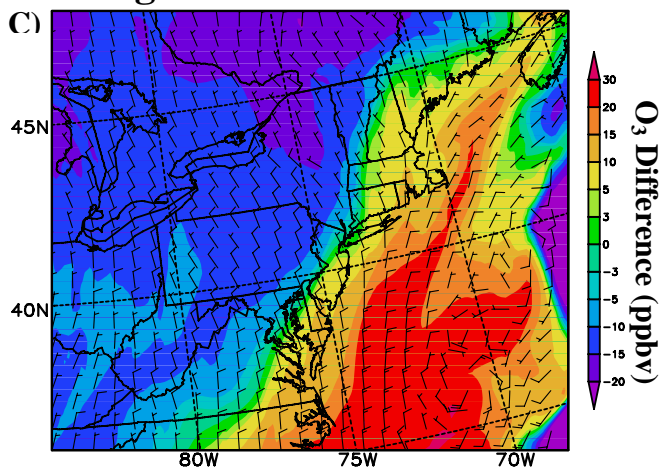
### Original BCs – Time Fixed BCs



### Original BCs – Time Fixed BCs



### Original BCs – Profile BCs



### Original BCs – Profile BCs

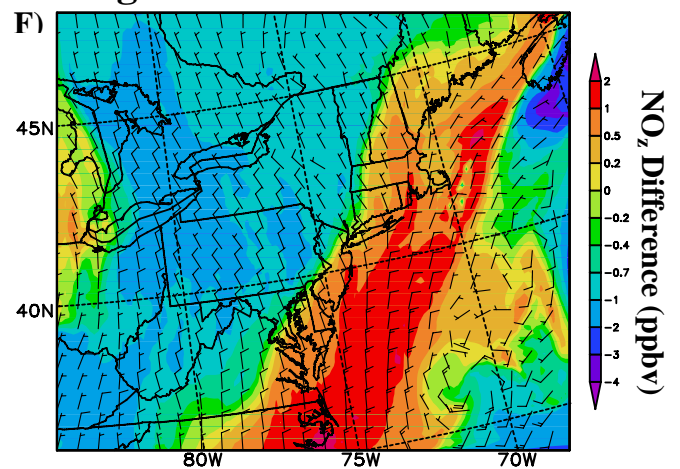
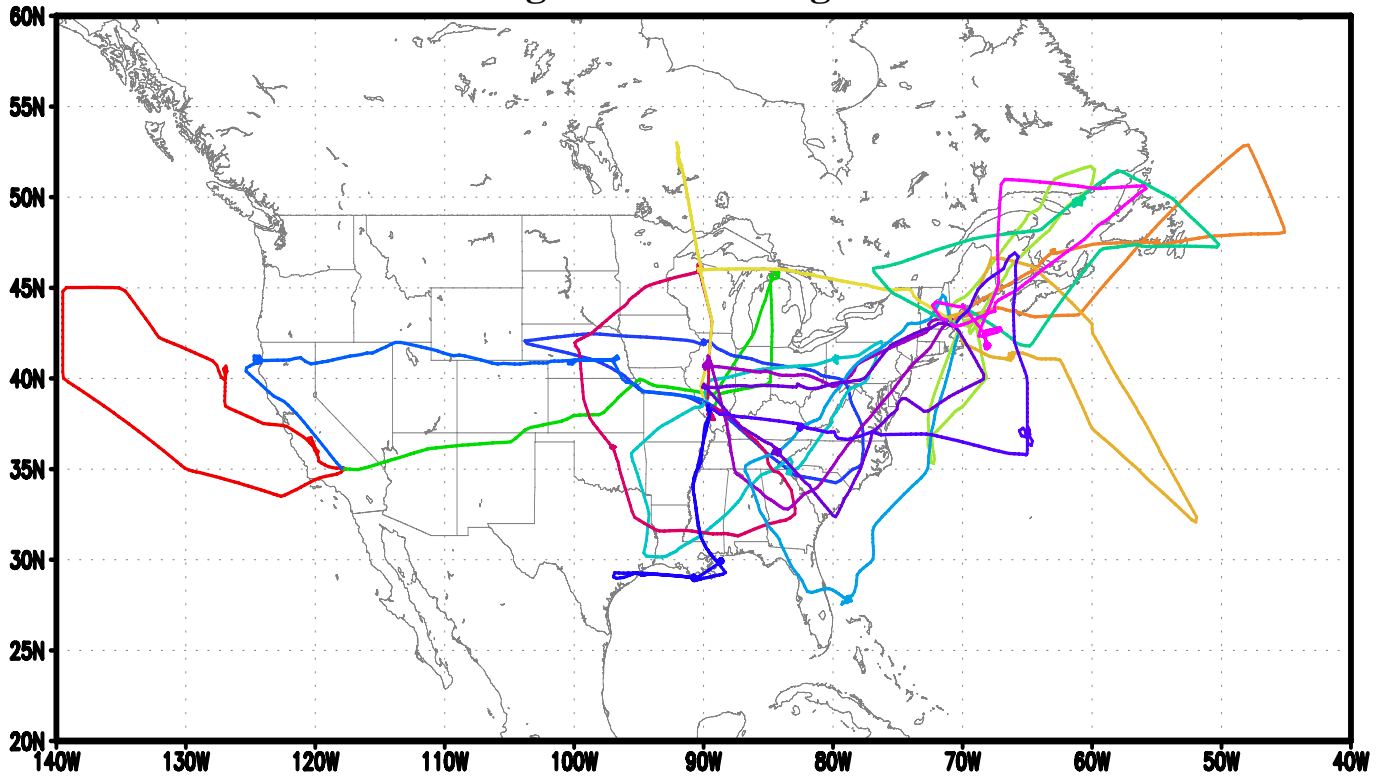


Figure 12. The 12km simulated O<sub>3</sub> and NO<sub>z</sub> concentrations and their differences among the three simulations in the 1km layer, 18UTC, 08/06/2004.

### NASA DC-8 Flight Paths during ICARTT Period



### NOAA WP-3 Flight Paths during ICARTT Period

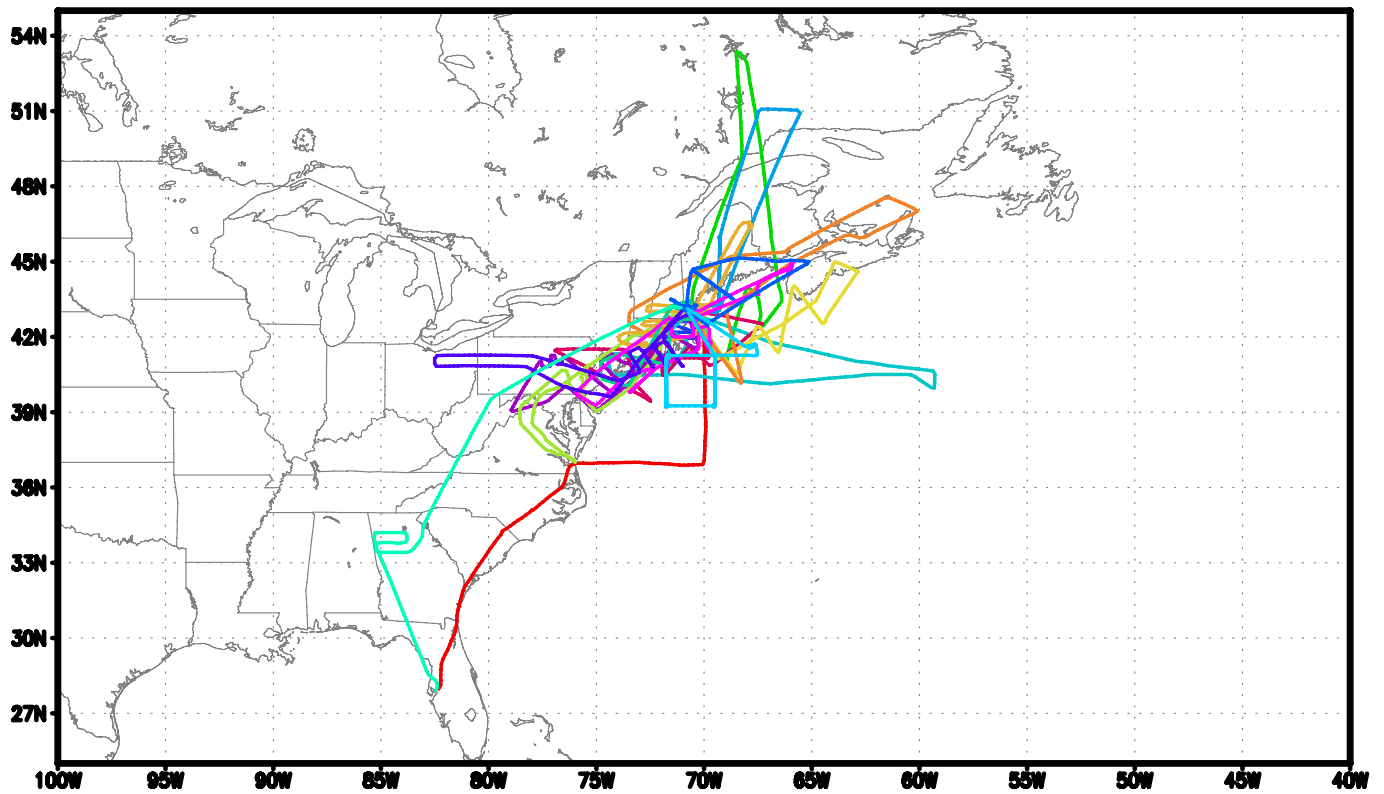
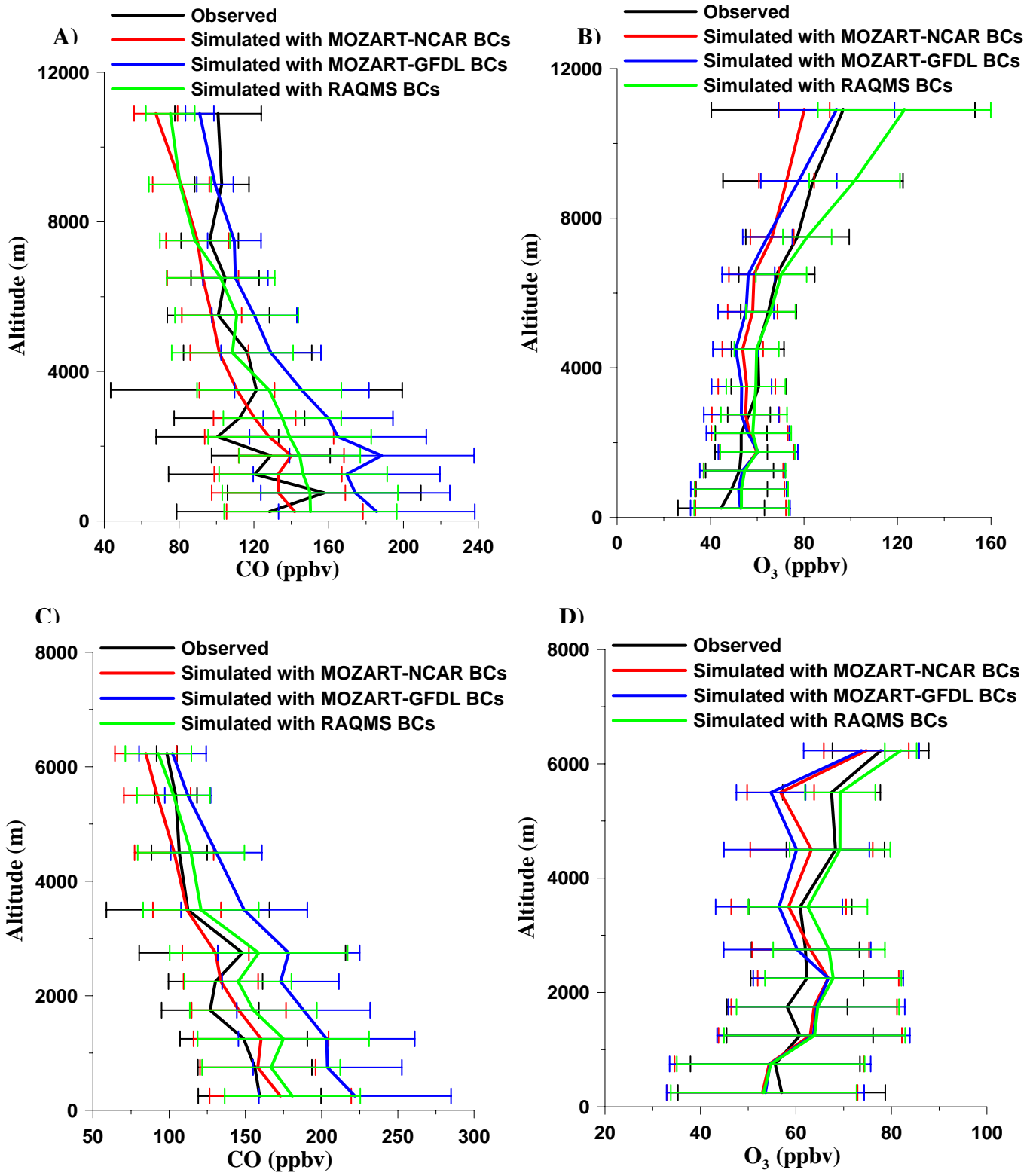
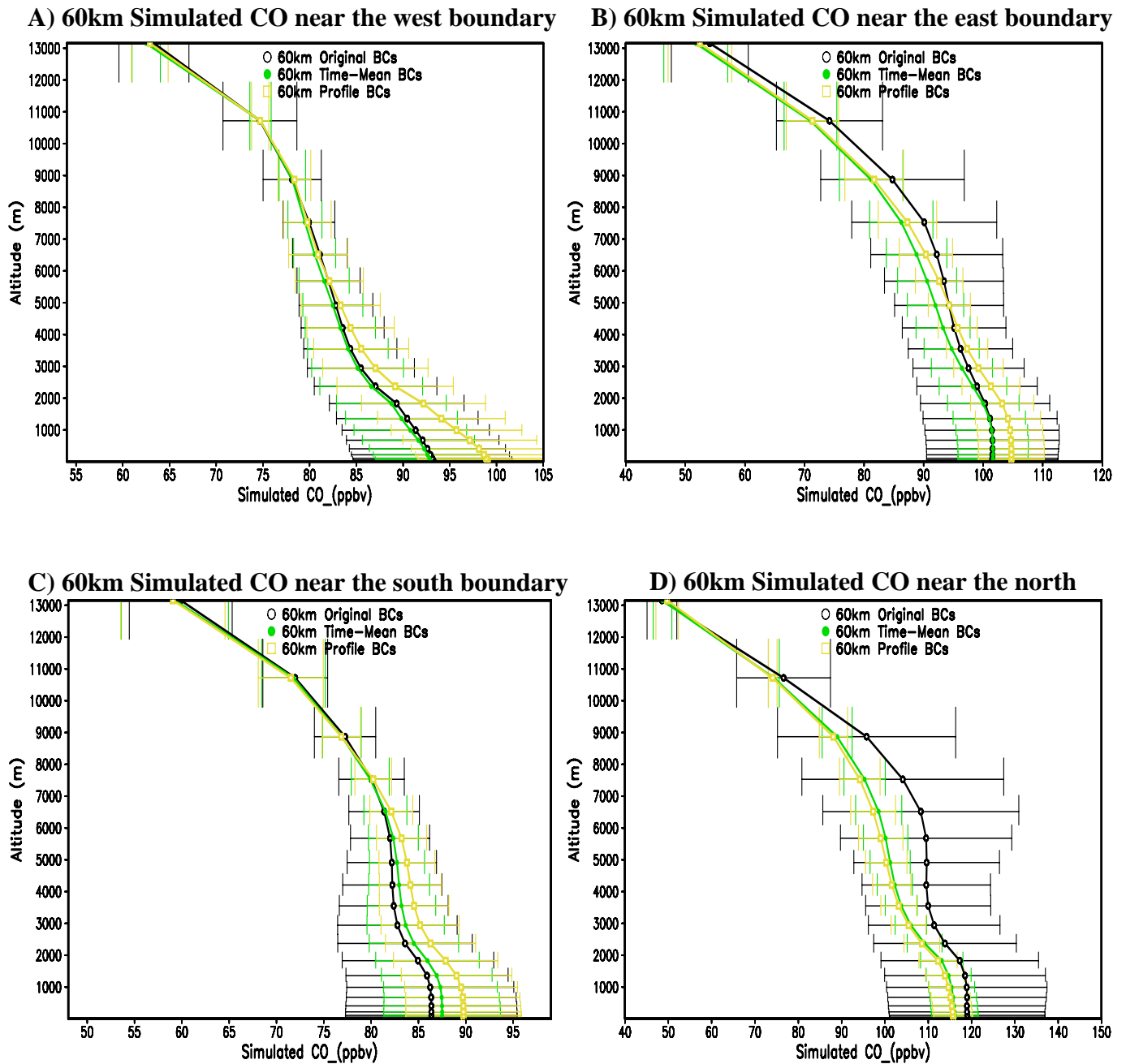


Figure 13. DC-8 and WP-3 flight paths during the ICARTT period

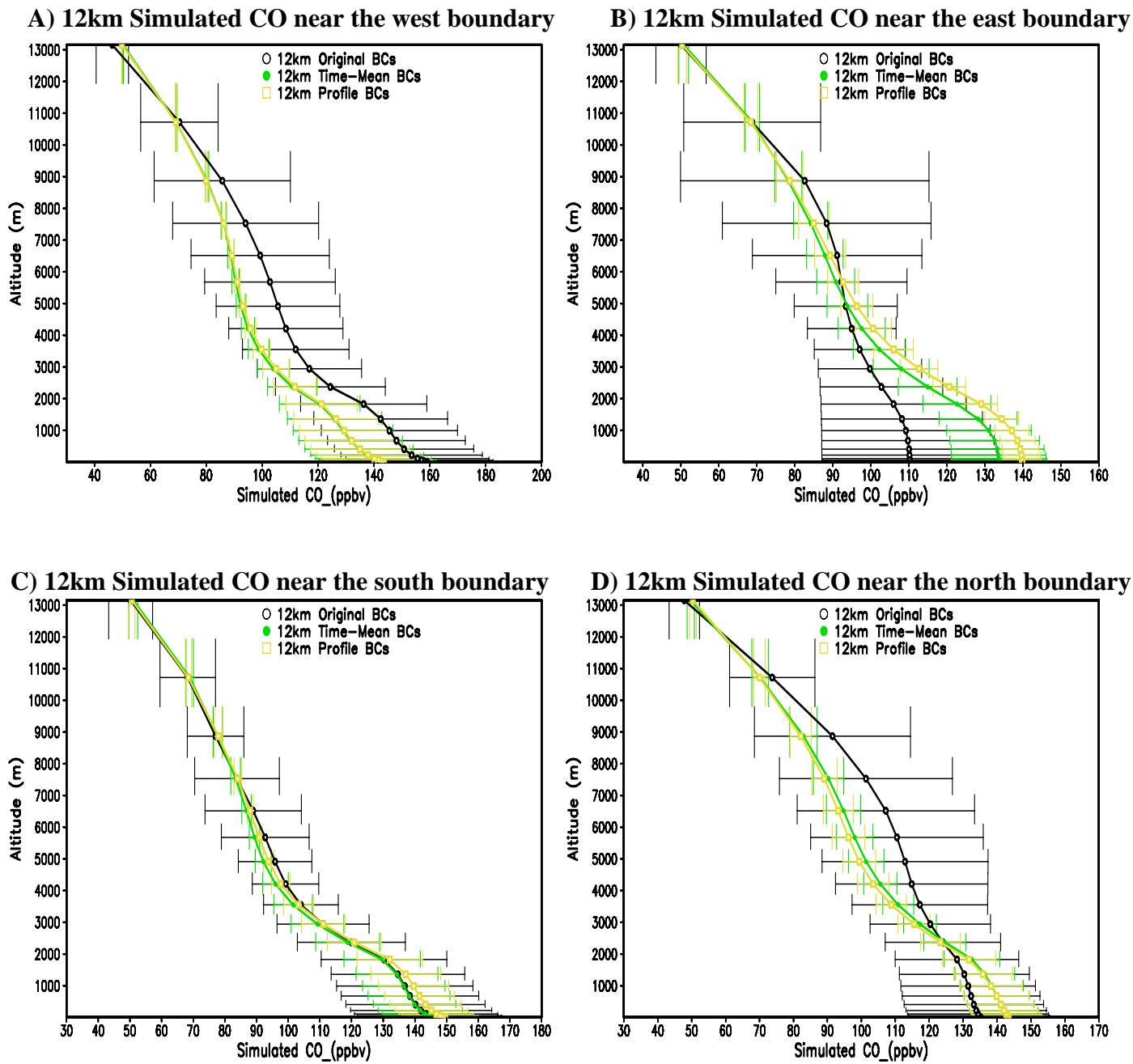


**Figure 14. Observed and 60km-simulated CO and O<sub>3</sub> mean profiles and standard deviations for all DC-8 flights (A, B) and WP-3 flights (C, D)**

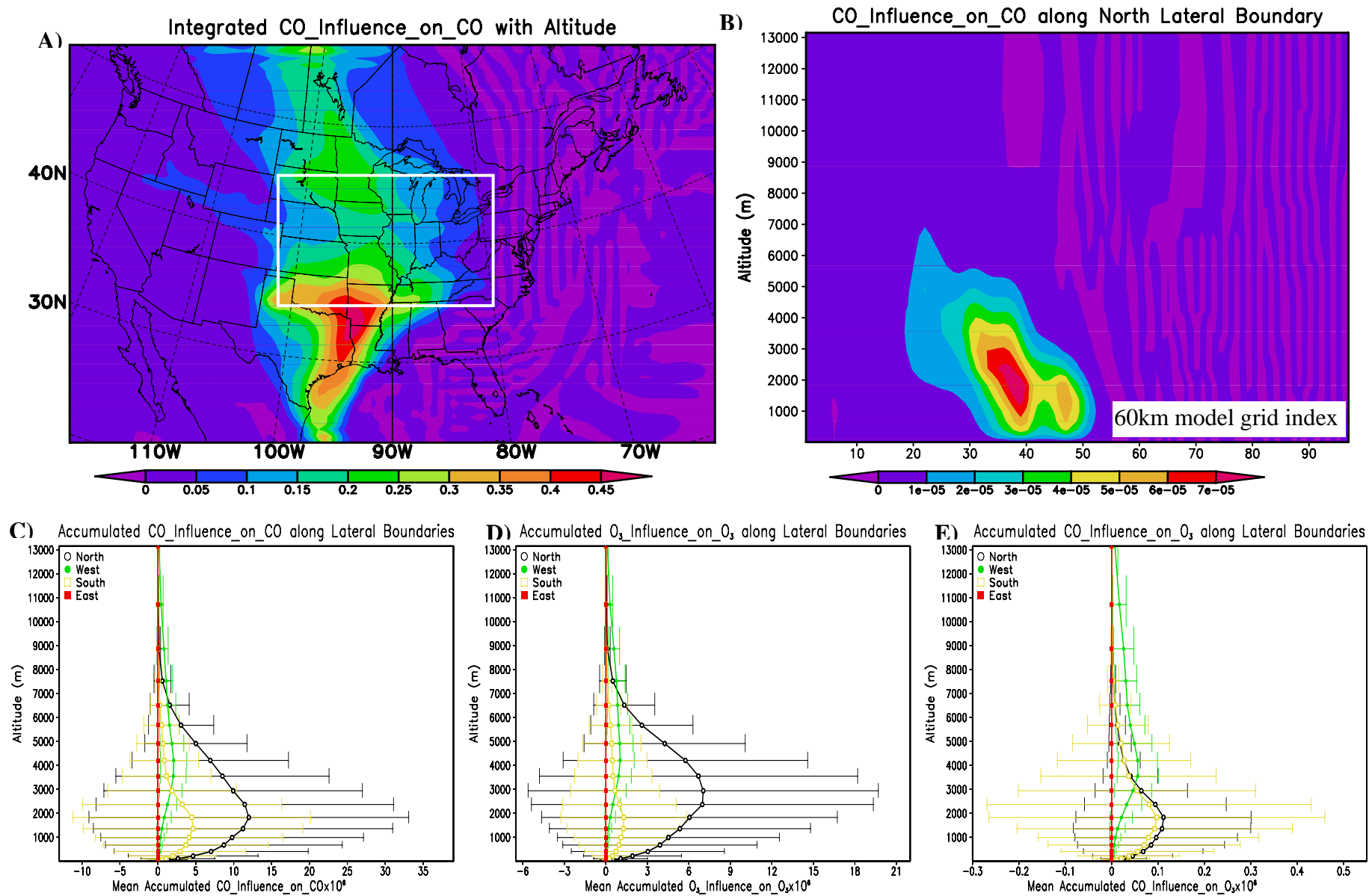


**Figure 15. Simulated CO mean concentrations and standard deviation with original MOZART-NCAR, time-mean and profile boundary conditions over the grid lines that are 5 grid cells from west (A), east (B), south (C) and north (D) boundaries, respectively in the 60km domain.**





**Figure 16. Simulated CO mean concentrations and standard deviation with original time-varied, time-mean and profile boundary conditions over the grid lines that are 5 grid cells from west (A), east (B), south (C) and north (D) boundaries, respectively in the 12km domain.**



**Figure 17. The influence function distributions: A) integrated with altitude B) north boundary and C), D), E) mean and standard deviations along the 4 lateral boundaries. The influence functions are integrated from July 19 to 24 for the target grid box with vertical elevation 1-4km shown in panel A.**