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PREVIOUS MODEL COMPARISONS

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First Annual High-Speed Research Workshop  
Williamsburg, Virginia  
May 14-16, 1991

## 1987 AND 1988 MODEL COMPARISON WORKSHOPS

The first model comparison was held at Ft. Myers Beach, Florida in January 1987. This meeting was attended by 26 participants from 5 nations representing 14 models. Issues discussed included 1) transport methodologies; 2) transport of nuclear test debris; 3) transport algorithms; 4) source gases; 5)  $\text{NO}_y$ ,  $\text{Cl}_x$ ,  $\text{HO}_x$ , and  $\text{O}_3$ ; 6) photolysis rates; 7) diurnal averaging; and 8) rainout. The Upper Atmosphere Data Base at the NASA/Langley Research Center was first used at this meeting. The good interaction among the various modeling groups was the prime result of this comparison.

The second model comparison meeting was held at Virginia Beach, Virginia in September 1988. This meeting was attended by 35 participants from 7 nations representing 16 models. More real model-model intercomparisons were undertaken at the 1988 meeting and several topics were addressed including 1) photochemistry and radiation; 2) transport; 3) current atmosphere 1980; and 4) assessment runs: 1980 to 20xx. The Upper Atmosphere Data Base was used at the meeting for real-time intercomparisons.

Specific subjects discussed and intercompared in 1988 included 1) photolysis rates; 2) heating and cooling rates; 3) model circulations; 4) transport of an idealized tropospheric source gas, labeled X; 5) transport of an idealized time-dependent inert tracer, labeled Y; 6) transport of an idealized time-dependent stratospheric source gas (like ozone), labeled Z; 7) an informal comparison of model results versus observations; 8) an assessment of the "40 km ozone problem;" 9) column  $\text{O}_3$ ,  $\text{HNO}_3$ ,  $\text{HCl}$ ,  $\text{HF}$ , and  $\text{NO}_2$ ; 10)  $\text{NO}_y$  and  $\text{Cl}_x$  levels; 11) ratios  $\text{NO}/\text{NO}_2$ ,  $\text{NO}_2/\text{HNO}_3$ ,  $\text{NO}_x/\text{NO}_y$ ; 12) ratios  $\text{Cl}/\text{ClO}$ ,  $\text{ClO}/\text{Cl}_x$ ,  $\text{ClO}/\text{HCl}$ ,  $\text{ClONO}_2/\text{HCl}$ ; 13) ratios  $\text{O}/\text{O}_3$  and  $\text{OH}/\text{HO}_2$  and species  $\text{H}_2\text{O}_2$  and  $\text{H}_2\text{CO}$ ; 14) distributions and lifetimes of  $\text{N}_2\text{O}$ ,  $\text{CH}_4$ ,  $\text{CFCl}_3$ ,  $\text{CF}_2\text{Cl}_2$ ,  $\text{CCl}_4$ , and  $\text{CH}_3\text{CCl}_3$ ; 15) assessment runs of ozone perturbations from changing source gases; and 16) assessment runs of perturbed circulations and temperatures from changing source gases.

Model differences were documented and discussed at the 1988 meeting and several model errors were corrected as a result of the meeting. The NASA Conference Publication 3042, "Two-dimensional Intercomparison of Stratospheric Models," edited by C. H. Jackman, R. K. Seals, Jr., and M. J. Prather was published in 1989 as a result of the meeting. This document serves as a good reference for 1) model computations of photolysis rates, heating and cooling rates, and constituent distributions; 2) a post meeting analysis of a detailed intercomparison of thermal infrared cooling rates; and 3) model descriptions.

A couple of lessons were learned from this 1988 meeting: 1) not enough lead time for pre-meeting analysis of model results was allowed with too many comparisons being completed in real-time; and 2) too many comparisons were attempted which resulted in a document that was fairly comprehensive but not very conclusive. The models computed different values for photolysis rates even when  $\text{O}_3$  and  $\text{O}_2$  were fixed, thus more time should be spent at future model comparison meetings on radiation codes. Many model differences were determined at the 1988 meeting, however, there was little discussion on the validation of models. Criteria should be established in the future which can be used to validate models.