EDITORIAL

This special issue of the *Journal of the Atmospheric Sciences* (*JAS*) contains 21 papers that present observations and scientific results from NASA's *Upper Atmosphere Research Satellite* (*UARS*). The *UARS* satellite is the largest single atmospheric science space mission ever launched and contains 10 instruments measuring constituents, winds, temperature, energetic particles, and solar irradiance. Measurements extend from the upper troposphere to the thermosphere. *UARS* was launched into space on the Space Shuttle *Discovery* on 12 September 1991 and was deployed on the 15th; the first geophysical data from the Microwave Limb Sounder was available five days later. Data from other instruments became available in the following weeks and months, and a collection of early results was published in a special issue of *Geophysical Research Letters* (GRL) in June 1993. Descriptions of the instruments appeared in a special section of the *Journal of Geophysical Research* also in June 1993. *UARS* observations were profoundly affected by aerosols from the Mt. Pinatubo eruption. In the time since the GRL special issue there has been tremendous quantification of the aerosol effects and many other improvements of the instrument algorithms. In fact, in the process of accounting for the aerosol effects, new capabilities were developed, and *UARS* has provided the first daily mapping of stratospheric aerosols.

The purpose of this special issue is manifold. The papers present a landscape of what the instruments have seen as well as scientific interpretation of the observations. Also, the *UARS* data is now becoming public, so this issue serves as an introduction for those who wish to use these data in their own research. The data are available through the Goddard Distributed Active Archive Center (DAAC, Goddard DAAC User Services Office, Telephone: 301-286-3209; E-mail: daacuso@daac.gsfc.nasa.gov). The data collection can be examined by TELNETing to daac.gsfc.nasa.gov (LOGIN:daacims, PASSWORD:gsfcdaac). Furthermore, the papers in this special issue are much more centered on atmospheric chemistry than has been usual for the *Journal of Atmospheric Sciences* in recent years. The editors hope that this will signal to investigators in atmospheric chemistry that such papers are very welcome in *JAS*, given that this field is a very important part of modern day atmospheric science. Finally, more color illustrations are used in this issue than is usually the case for *JAS*. Color presentations have proven to be very useful in displaying results from satellite data, and we hope to motivate more use of color and a concomitant reduction in the publication setup fees.

In addition to the information derived directly from the *UARS* instruments, there is the prominent use of assimilated datasets provided by the U.K. Meteorological Office. This is the first time that a NASA mission has been directly supported by a meteorological data assimilation. The widespread use of the assimilated data shows the value of assimilated data products as recognized by the science team. It also highlights the intimate link between constituent and dynamical fields. Quantitative evaluation of the constituent chemistry often requires explicit removal of the dynamical variability. On the other hand, the results presented here reveal the power of constituent observations to isolate and quantify dynamical processes. In the past decade, new knowledge in stratospheric dynamics has been driven by constituent observations, and the papers presented here help to extend this constituent paradigm to more general atmospheric applications.

The 21 papers in the special issue cover a wide variety of subjects; a review of the titles of the papers reveals the general topics that are covered. There are, however, themes that connect subsets of the papers. There is a summary of the first winter of *UARS* observations from both a meteorological and a long-lived tracer point of view. These papers include the analysis of the extraordinary tropospheric blocking event in late January 1992 that profoundly influenced stratospheric dynamics. There are overviews of ozone and water vapor measurements, as well as discussions of dynamical

features, from the Microwave Limb Sounder. This instrument has provided a dataset unique in its spatial coverage and longevity. There are a series of papers that investigate the controversy associated with the deep descent of mesospheric air into the lower stratosphere and possible related flow of air from the wintertime polar vortex to middle latitudes. There are two papers discussing dynamics of the mesosphere and thermosphere. There are two papers analyzing the detailed information on stratospheric aerosols that was obtained by the infrared instruments. Other papers discuss mixing processes, a global view of important reservoir species, and summertime stratospheric chemistry.

We, as editors of this issue, would like to thank the other *JAS* editors and the AMS editorial staff for being most helpful in the face of some extraordinary production procedures for this issue. This includes facing many manuscripts that did not meet the AMS formatting requirements and therefore needed special diligence. We also want to give special thanks to the reviewers who complied with stringent reviewing schedules. Finally, we want to acknowledge the authors of these papers for their thoughtful, complete, and timely responses to the reviewers. All of these efforts were crucial in allowing this special issue of the *Journal of the Atmospheric Sciences* to appear so soon after its conception.

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