

Special Topic

Second Workshop on Wind Measurements in the Middle Atmosphere 13–16 May 1996

The Upper Atmosphere Research Satellite (UARS) was launched by NASA on 12 September 1991. It carries ten instruments dedicated to the study of the atmosphere in the altitude range 10–110 km. The measurements were divided into three main areas: energy input, species concentrations and temperatures, and dynamics. The concept was ambitious, and the mission was developed at a time before budget and resource restrictions, with which we are now familiar, were an issue. Thus it was an opportunity for highly advanced instruments to make measurements of the atmosphere that had not been made before, or had not been made with the same accuracy or coverage. The spacecraft itself was large, extremely stable, and offered 24 h daily coverage for the duration of the mission which was planned to last for 18 months with an optional extension to 30 months. Now, at the time of writing, nearly 6 years after launch, the coverage has been reduced, but the spacecraft and the dynamics instruments continue to operate.

The two dynamics instruments are the High Resolution Doppler Imager (HRDI), a triple-etalon Fabry-Perot spectrometer that measures winds from airglow emission from ca. 60 to 110 km, and stratospheric winds from absorption lines below 40 km. This instrument is operated by the University of Michigan, Ann Arbor and is supported by NASA. The second dynamics instrument is the WIND Imaging Interferometer (WINDII), which is an imaging phase-stepping field-widened Michelson interferometer. It measures winds from airglow emission over an altitude range of 80–300 km. WINDII is operated by York University, and is supported by the Canadian Space Agency (CSA) and the Centre National d'Etudes Spatiales of France (CNES) with a team comprising both French and Canadian scientists.

WINDII and HRDI have produced extremely comprehensive data on winds in the measured altitude range, far exceeding the scope of previous measurements. In addition, early work on validation of the two satellite

instruments showed that their wind values above ca. 90 km were larger than those obtained by some ground-based radars, which had provided most of the previous results. However, HRDI and WINDII agreed with each other. Since these earlier results had provided most of the input to models, it appeared that the UARS dynamic results were challenging prior knowledge. This realization was, in part, responsible for the initiation of the First Workshop on “Wind Observations in the Middle Atmosphere”, organized by CNES, and held in Paris 15–18 November 1994. Here the problems arising from these differing results were discussed and recognized, but a clear resolution of the basis of these problems was not reached.

Therefore a Second Workshop, on “Wind Measurements in the Middle Atmosphere” was organized by York University and the CSA, and held at the University of Toronto, 13–16 May 1996. This special issue contains some of the papers presented there. Forty-six oral presentations were made at the meeting, and twelve poster papers presented. More specific issues were addressed concerning the differences between the satellite and ground-based results than at the previous workshop, and further insights into the nature of the dynamics of the upper atmosphere were gained, but a full understanding of the remaining differences has yet to be achieved.

The 12 papers in this special issue touch upon all of the issues mentioned above. These include comparisons between various techniques; models and observations; tidal, season and longitudinal variations; as well as vertical winds. There was also a session on future wind measurements, but no manuscripts related to this issue are included here.

The workshop program committee is grateful to Kim Rago of the Institute for Space and Terrestrial Science for her dedicated work in making all the arrangements for the workshop and for preparing the program book. In the preparation of this issue, we express our thanks

for the effort made by all the referees who carefully and quickly reported on these papers. The Topical Editor in charge of this special issue would also like to warmly thank Ms Sylviane Perret in the Editorial Office for the efficient help she gave in preparing this special issue.

Without the efforts of all of these individuals, this issue would not have been published in due time.

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