Introduction

Air pollutants, such as aerosols and various trace gases, are transported on a hemispheric or global scale. The Task Force on Hemispheric Transport of Air Pollution (HTAP) is studying the intercontinental transport of air pollution in the Northern Hemisphere by conducting a series of multi-model evaluations and inter-comparison experiments to: produce estimates of intercontinental source-receptor relationships; improve the understanding of the variability and uncertainty in current model estimates; assess potential future changes in source receptor relationships; and guide future model developments to decrease uncertainties in source-receptor relationships.

The HTAP Prototype GUI provides the flexibility to display multiple experiments, models, diagnostics, and variables simultaneously on an array of visualizations. Image choices include: latitude-longitude maps (time-averaged), latitude-longitude maps of time-averaged differences, animations, vertical profiles, and time-series, scatter and zonal mean plots. Users have the ability to choose the upper and lower limits of the vertical layer to display along with the start and end time (for 2001 monthly data). The data is downloaded from the HTAP server, stored locally, and then pre-processed to convert the different vertical levels for each model to uniform pressure levels. This tool is web-based, so all of the visualization, analysis, and data extraction can be done online using a regular web browser. Without the need to remotely log on to HTAP servers or download data and software to a local machine. Recently, Giovanni has implemented a demonstration site in which HTAP model data are received from the Juelich HTAP WCS server (i.e., not locally stored). Currently, the Giovanni HTAP WCS demo presents two models for viewing: CAMCHEM3311m13 (SR1 and SR2) and ECHAM5-HAMMOZ (SR1 and SR6EU). Ozone, sulfur oxides, and nitrogen oxide variables are available for those models and experiments. A large majority of HTAP data residing on the Juelich server are available on sigma levels. The data are not pre-processed to uniform pressure levels, making it difficult for model inter-comparison on specific vertical layers. The CAMCHEM3311m13 model data are on pressure levels. ECHAM5_HAMMOZ model data are on sigma levels. Thus, the experiments for one model may be compared (CAMCHEM3311m13 SR1 versus SR2 and ECHAM5_HAMMOZ SR1 versus SR6EU), but the models themselves cannot.

GIOVANNI HTAP Prototype (data preprocessed at Goddard)

GIOVANNI HTAP (direct access to the archive at Juelich via WCS)

LIMITATIONS OF RETRIEVING THE DATA VIA WCS

- The data are not pre-processed to uniform pressure levels making it difficult for model inter-comparison.
- Retrieval time is on the order of 2 minutes (for a year request) as opposed to a few seconds, when stored locally.
- Models define time as “days since Y”, where X varies between models. Additionally, time is valid for day Y of the month, where Y also may vary by model.
- Quality control is needed for models which have fields that are populated with zeroes or that do not specify a missing value.

Vertical Layer Discrepancies Between Models

The above spreadsheets highlight both the time and vertical level discrepancies that exist between the various models participating in the HTAP project. They have been shared with the modeling community on the ESIP wiki page (http://wiki.esipfed.org/index.php/WCS_Access_to_ESIP契 Files). Resolving the differences between all models, in order to potentially create a uniform dataset both in vertical space and with time definition, is ideal for users. This would greatly enhance the capabilities of the Juelich HTAP WCS service. In conjunction with Giovanni, multiple-model and multiple-experiment data may then be visualized and compared almost instantaneously.

Sample Output Options

- 2D lat-lon images
- Time-series plots
- Vertical profiles
- Scatter plots
- Animations

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