

**Review of
The Meteorology-Chemistry Interface Processor (MCIP) for the CMAQ modeling
system**

**Submitted for publication in
Geoscientific Model Development Discussions**

The paper offers an updated overview of the Meteorology-Chemistry Interface Processor (MCIP). MCIP is a crucial component of the Community Multiscale Air Quality (CMAQ) modeling system which is widely used in the air quality community. The fundamental function of MCIP is to act as a buffer between the meteorological model and other components of CMAQ modeling system (such as emissions processing system, EPS, and the chemical transport model, CTM). Currently, CMAQ is being used as an offline CTM. This means that there is no feed-back from CTM to the meteorological model, and as such the CTM expects the emissions and the required meteorological fields to be provided externally. Digesting the meteorological information, checking for consistency and comprehensiveness of the input data, and performing coordinate transformation and interpolation when necessary are not trivial tasks. These tasks will add substantial overhead to the CTM if done internally in the CTM. MCIP allows reducing the overhead in the other model components by performing the interface functionality as a stand-alone model. Thus an overview of MCIP and its complex functionalities is of significant importance to the air quality community and warrants the publication of this paper.

Since MCIP development has to be in conjunction with the CTM developments, it is essential to know about the new science that is being introduced in the CTM and the role of MCIP in satisfying the implementation of the new science. The paper meets the expectations in this regard and covers the new developments. The authors even go further and comment on the suitability and compatibility of options to be used. They also offer recommendations as to what options are preferable. This is important for the user community as it delineates the limitations in the use of the model which even an advanced user of this modeling system may overlook. However, the manuscript is too long and at some points explains details that are more suited for a user's guide than a paper. Perhaps shortening the paper will add to its value and make the paper more focused on the overall structure of MCIP.

My specific comments are:

- 1) Page 1454: The discussion about windowing option can be summarized.
- 2) Page 1455: Layer collapsing uses interpolation and not averaging. There is no discussion to justify this.
- 3) Page 1466: The justification for calculating some of the necessary cloud-related fields in MCIP is the lack of this information in the routine outputs from meteorological models. However, it is not clear whether or not MCIP is able to use such information if it was available from the meteorological model.

- 4) Page 1467: The discussion about dry deposition is concentrated on the engineering aspect of the connections to the met. Model. There is a need to discuss the scientific aspect of the connection. I.e., what information is needed from the meteorological model for the dry deposition calculations and which land surface model can potentially provide such information.
- 5) Page 1468: Since the use of GOES data is explained in section 5.4, it would be useful to also list the website for GOES data (i.e., <http://satdas.nsstc.nasa.gov>).