Title: Assimilation of the Microwave Limb Sounder Radiances

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Abstract

It has been shown that the assimilation of limb-sounder data can significantly improve the representation of ozone in NASA's GEOS Data Assimilation Systems (GEOS-DAS), particularly in the stratosphere. The studies conducted so far utilized retrieved data from the MIPAS, POAM, ILAS and EOS Microwave Limb Sounder (EOS MLS) instruments. Direct assimilation of the radiance data can be seen as the natural next step to those studies. The motivation behind working with radiances is twofold. First, retrieval algorithms use a priori data which are either climatological or are obtained from previous analyses. This introduces additional uncertainty and, in some cases, may lead to "self-contamination" when the a priori is taken from the same assimilation system in which subsequently ingests the retrieved observations. Second, radiances can be available in near real time thus providing an opportunity for operational assimilation, which could help improve the use of infrared radiance instruments from operational satellite instruments.

In this presentation we summarize our ongoing work on an implementation of the assimilation of EOS MLS radiances into the GEOS-5 DAS. This work focuses on assimilation of band 7 brightness temperatures which are sensitive to ozone. Our implementation uses the MLS Callable Forward Model developed by the MLS team at NASA JPL as the observation operator. We will describe our approach and recent results which are not yet final. In particular, we will demonstrate that this approach has a potential to improve the vertical structure of ozone in the lower tropical stratosphere as compared with the retrieved MLS product. We will discuss the computational efficiency of this implementation.