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ASSIMILATION OF MARTIAN OZONE

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Observations of atmospheric ozone [1,2] on Mars can be used to develop the representation of trace gas transport, sources and sinks within global circulation models and constrain middle atmosphere wind speeds which are not observed directly. Ozone is also readily destroyed by OH which recycles CO_2 to provide global stability of the atmosphere, a process still not fully understood.

To make optimal use of information, observations and model information are combined by the process of data assimilation. Although data assimilation is now commonplace on Earth [3], it is a fairly new concept for other planetary systems, with Mars the only other current candidate. The satellites currently orbiting Mars, combined with the future planned satellite missions, create a great opportunity for the development of trace gas data assimilation techniques for extraterrestrial planets.

For this project we use the LMD/UK Martian Global Circulation Model. The model uses a UK spectral dynamical core [4] and transport scheme [5] from a collaboration between the Open University and Oxford University along with physical parameterisations [6] primarily developed by the Laboratoire de Météorologie Dynamique and Instituto de Astrofísica de Andalucía. Combined with the LMD photochemical module [7] and the UK Analysis Correction scheme tuned for Mars [8] for assimilation of observations, we can investigate the evolution of ozone throughout a Martian year.

Preliminary results are discussed from investigation of the adjusted model ozone abundance while testing a method of assimilating artificial ozone data. Once refined, the technique will then be used for the assimilation of real observations from the SPICAM and MARCI instruments which provide total ozone column abundance.

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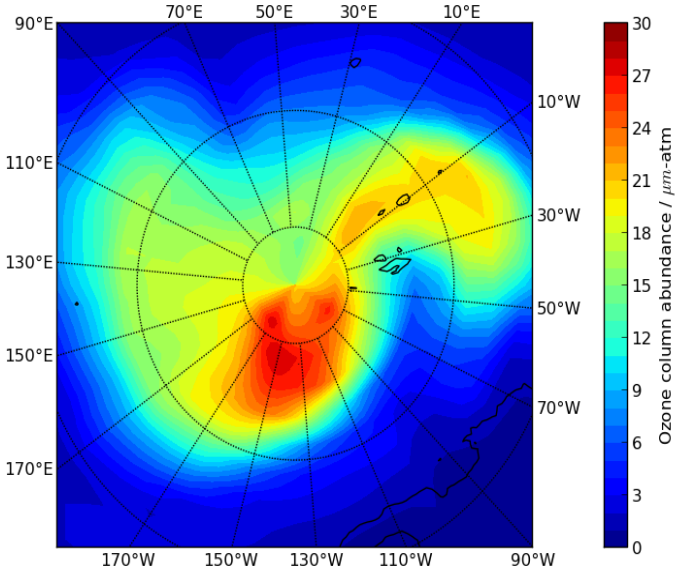

Figure 1 – Model output of ozone over the North Pole at the start of a Martian year