How the atmospheres of Mars and Venus are affected by carbon monoxide

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Modelling of the Earth's atmosphere has acquired economic importance due to its use in the prediction of ozone depletion and in measuring the impact of global warming. Now, researchers, writing in the online open access journal *PMC Physics B* have found that the rate at which electrons lose energy to carbon monoxide is greater than that to carbon dioxide at higher levels in the atmospheres of both Mars and Venus.

This finding contributes to the body of knowledge required for modelling of the atmospheres of Mars and Venus, which in turn provides an opportunity to validate the techniques used in modelling of more complicated atmospheres such as that of Earth.

Solar energy is both absorbed in atmospheres and eventually emitted to space by processes at the atomic level. These complicated processes need to be parameterised so that huge numbers of individual interactions can be included in models. Modelling of the atmospheres of other planets is useful because the techniques can be developed and tested on different environments, which are not complicated by biological or human activity.

Researchers investigated the process in which free electrons in the atmospheres of Mars and Venus produce vibrational excitation of carbon monoxide. The electrons have a spread of energies and each energy has a different probability of producing excitation. They calculate this process in detail to produce a parameter called the electron energy transfer rate, which is rate at which energy is transferred from electrons to carbon

monoxide at a particular electron temperature. Applying this parameter they discovered that the rate at which electrons lose energy to carbon monoxide is greater than that to carbon dioxide at higher levels in the atmospheres of both Mars and Venus.

Author Laurence Campbell from Flinders University, Australia said "The process of validating models of the atmospheres of Mars and Venus would be expected to contribute to the modelling techniques used for the Earth's atmosphere" He went on to comment on the new journal "We're delighted to have our article published in PMC Physics B. Editor-in-Chief Professor Stephen Buckman has an outstanding reputation and we are truly excited to support the journal and the open access movement."

Speaking of this first article published in *PMC Physics B*, PhysMath Central's Chris Leonard said "We're very proud to have this high-quality research freely available to all via our open access journals. The broad scope of this journal will hopefully bring this work to the attention of researchers in adjacent fields and lead to a more complete picture of atomic processes in global warming."

Citation: Electron cooling by carbon monoxide in the atmospheres of Mars and Venus , Laurence Campbell and Michael J Brunger, *PMC Physics B* 2008, 1:3 www.physmathcentral.com/1754-0429/1/3/abstract

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