Geophysical Research Abstracts, Vol. 8, 10581, 2006
SRef-ID: 1607-7962/gra/EGU06-A-10581

A reconstruction of the past trend of atmospheric CO based on firn air samples from Berkner Island, Antarctica

Assonov, S.S.(1); Brenninkmeijer, C.A.M.(1); Chappellaz, J.(2)

(1) Max Planck Institute for Chemistry, Mainz, Germany; (2) Laboratoire de Glaciologie et Géophysique de l'Environnement, Grenoble, France; e-mail: carlb@mpch-mainz.mpg.de

Although for several atmospheric trace gases trends over the past 100 year -and beyond- have been reconstructed using firn air and ice core analyses, little is known about one of the chemically most significant trace gases, namely CO. We present here results from 3 Antarctic firn drilling expeditions (Firetrac and Cryostat). One of these has given results of sufficient analytical quality to warrant modelling. The measurements clearly show lower CO values at depth, implying lower CO concentrations in the past.

Given the limited number of measurements, past trends for CO has been reconstructed using the simplest possible approach, namely using a firn air model in the forward mode to constrain age distributions, and assuming the CO increase to be proportional to the known increase in CH4. With CH4 being a significant source of SH CO this is fair assumption. We derive that CO has been increasing from about ˜38 ppb to 52.5 ppb over a period of roughly 100 years and this appears to be beyond what is expected on the basis of the CH4 growth, and propose that biomass burning is the most likely candidate for this. Furthermore, we carry out the same modelling using CH3Cl as a proxy for CO. The two reconstructions basically agree each other and, when used as a model input, produce depth profiles in well agreement with observations.

Finally we discuss the problems related to CO and in particular isotope measurements, and review current knowledge as to try to attempt to foresee what we can expect from ice core analysis. We have indications that in situ produced 14CO contaminates the atmospheric 14CO record in firn, and maybe we can derive from firn air CO measurements information as to whether in situ produced CO corrupts the CO record. In such

a case, it would be hopeless to expect to reconstruct past CO from ice cores. But lets remain hopeful. More about that at the conference.