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Interactive comment on "A reconstruction of the past trend of atmospheric CO based on firn air samples from Berkner Island, Antarctica" *by* S. S. Assonov et al.

Anonymous Referee #2

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A reconstruction of the past trend of atmospheric CO based on firn air samples from Berkner Island, Antarctica, by S.S. Assonov et al.

General comments: The second sentence in the manuscript 'A reconstruction of the past trend of CO states that CO has been increasing rapidly over the past century'. This statement is not referenced and may or may not be accurate. This sets the tone for the manuscript which uses measurements of CO from Antarctic firn air to derive the trend of atmospheric CO from 1900 to the present. The sampling procedures are clearly described and the quality of the results discussed. The researchers clearly understand

the problems and difficulties inherent in both firn extractions and measuring CO. The firn measurements appear to be of high quality and add to the limited CO data available from this environment. Nonetheless, only 7 independent data points spanning 1968 to 1995 are used to determine a long-term trend in CO. The authors assume that the past trend of CO has been proportional to those of CH4 and CH3Cl. This is a serious flaw in the paper. The justifications given for this assumption are: 1) Oxidation of CH4 is an important source of SH CO, 2) The CH4 trend during the 20th is well known and 3) Atmospheric CH4 has increased due to anthropogenic activity. While justification 1 is certainly accurate, 2 and 3 cannot be supported with the available data. CO emissions have certainly increased since the 1900, but their impact on the atmospheric burden are still open to debate. Measurements of CO and CH4 made during the past 20-25 years show very different trends. CO measured at Cape Point South Africa since 1979 captures no significant trend (Brunke and Scheel), while CH4 has increased in the 1980s 1990s (Khalil and Rasmussen, Dlugokencky et al.). Rather than trying to model CO trends far beyond the scope of their data, I recommend the authors focus on the period of their measurements and attempt to reconcile their firn measurements and the atmospheric record.

General comments.

Introduction: The statement Because the oxidation of CH4 is the main source of CO in the southern hemisphere, it is expected that CO has also been increasing is simplistic and neglects the complicated chemistry of CO-CH4-NMHC-OH. It may, therefore, be inaccurate.

The page long discussion of 14 CO is off the topic of this paper and should be removed.

Section 4.1, Table 2: Of the 15 depths sampled only 8 are used in the analysis. The deepest samples at 58.88 m were corrected for contamination. The uncertainty in CO attributed this depth is not clear. The paper should provide the measured and corrected CO.

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Section 4.2 and 4.3: The paper derives trends of CO from those of CH4 and CH3Cl using a slight modification of the approach presented in Trudinger. However, Trudinger does not determine a trend beyond the period of measurements. As noted above, the results from this approach are not questionable.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 10259, 2005.