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Offsets among ice core derived CO2 reconstructions covering the Holocene and Last Interglacial

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There is a general consensus in the scientific community that Greenlandic ice cores do not allow for reconstruction of past atmospheric carbon dioxide (CO_2) concentrations due to artifacts likely caused by *in-situ* production of excess CO_2 from both organic and inorganic carbon compounds within the ice archive. In the case of Antarctic ice cores such processes are thought to be insignificant, making Antarctic ice cores the only direct archive of past atmospheric CO_2 concentrations beyond modern observations. However, with increasing numbers of high-precision CO_2 reconstructions from multiple Antarctic ice cores – mostly covering specific time intervals during the last 130 ka – it has become evident that offsets in CO_2 are not unique to Greenland ice cores. Over the last decade evidence is mounting that small systematic offsets of typically 2-10 ppm exist among different Antarctic CO_2 records covering the same time period. Because CO_2 is well-mixed within the atmosphere different ice cores should agree with each other within their measurement uncertainty, independent of the ice core drilling site. The unambiguous detection of such offsets between different ice cores is only possible in the absence of strong atmospheric trends, such as during interglacial periods. Here, we take a closer look at CO_2 offsets among records available for the Holocene and the Last Interglacial and investigate their long-term evolution. We present unpublished CO_2 data from multiple ice cores, including Talos Dome and EPICA Dome C, and discuss possible offset producing mechanisms. We speculate that Antarctic ice cores are also subject to slowly progressing *in-situ* production of CO_2 over many millennia, similar to Greenlandic ice cores, however to a much smaller extent and limited to about 10 ppm. We further note a tendency for higher offsets in the case of high accumulation sites. Despite all possible mechanisms that have the potential to alter CO_2 concentrations within the ice archive, we highlight that the overall integrity of the ice core-based CO_2 reconstruction is not in question, as all records generally share the same common signal. However, the absolute CO_2 levels should be interpreted with care and in light of such potential offsets.