



A 10 ppmv systematic offset in the EDC CO₂ record of the deep part of the ice core

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The EPICA Dome C (EDC) ice core contains the longest continuous ice core time series to date and has allowed reconstructions of atmospheric CO₂ concentrations back to 800,000 year BP. Gas measurements from the oldest part of the record between 650,000 and 750,000 years BP revealed significant lower CO₂ concentrations on average of about 15 ppmv compared to the expectations from the CO₂-temperature relation after 650,000 years BP. We have revisited the EDC CO₂ record, in particular for the part older than 650,000 years BP, with CO₂ measurements on EDC ice from the ice archive in Antarctica and with measurements using a new sublimation extraction technique. The new measurements show a consistent offset to the original data of up to 10 ppmv in the part before 650,000 years BP calling into question - at least partly - the lower CO₂ concentrations found during the 650,000 to 750,000 year BP time window. The new data from different extraction techniques and different parts of the EDC ice core suggest that the ice core part used for the original data, which had been stored in Europe, has changed in such a way that measurements with our standard dry extraction principle result in a systematic offset. The processes responsible for this offset are not known; however, this might be related to fractionation processes between different gases during clathrate formation and relaxation.