



The relationship between air temperature and accumulation in Antarctica - more than Clausius-Clapeyron

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Between 1987 and 2010, numerous shallow firn cores were obtained in Dronning Maud Land, East Antarctica during several German, Norwegian, and Swedish expeditions. Most of these cores are 10-20m deep, covering a time period of 20-200yr; some longer cores date back to 1000-2000 yr ago. Measurements of stable oxygen isotope ratios yield information about accumulation rates and – with restrictions – temperature conditions. The presented data set (ca. 70 cores) is being comprehensively studied for the first time. The high number of cores improves the signal-to-noise ratio. The most recent cores give information until the present. Since three decades, meteorological measurements at Neumayer Station exist, which show that the stable isotope ratio here is not mainly determined by local temperature. Accumulation rates show different trends for different time periods, which do not agree with temperature/delta18O trends. Recent studies have shown that this is not only a “coastal” effect, as previously thought, but that also at inland deep drilling stations the relationship between accumulation and temperature is more complex than the simple dependence of saturation vapor pressure on temperature. The generally assumed positive correlation of accumulation rate and temperature used for dating of deep ice cores with flow models has to be reassessed.