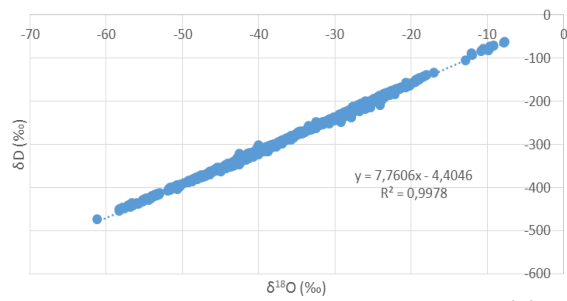
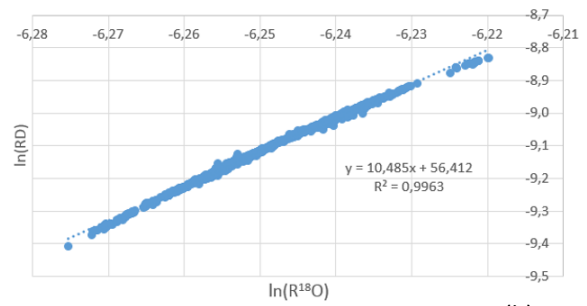


S1: Linear relationships between (a) δD (in ‰) and $\delta^{18}O$ (in ‰) using all (time-averaged) data points from our database, (b) $\ln(RD)$ and $\ln(R^{18}O)$ using all (time-averaged) data points from our database (excluding 9 outliers, thus making a total of 323 points).

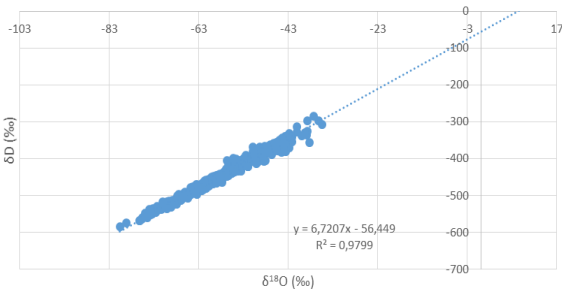


(a)

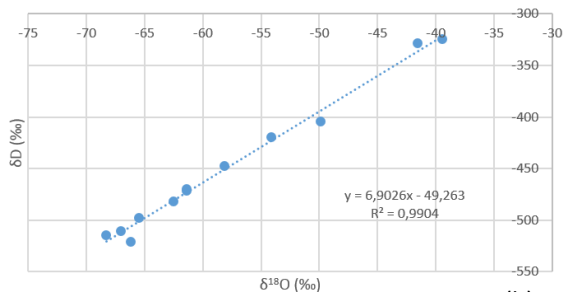


(b)

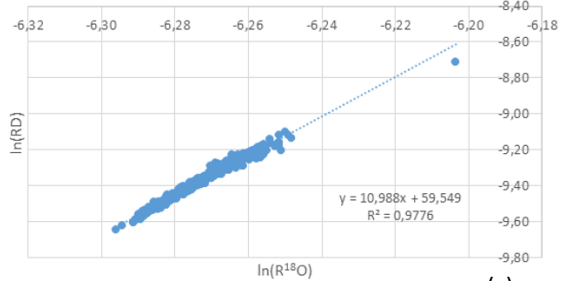
S2: Linear relationships between δD (in ‰) and $\delta^{18}O$ (in ‰) (a) using all data points (501 points), (b) data points of the mean seasonal cycle (12 points) of precipitation data measured at Dome C (Stenni et al., 2016), and used in our database, and linear relationships between $\ln(RD)$ and $\ln(R^{18}O)$ (c) using all data points, (d) data points of the mean seasonal cycle from the same measurements monitored.



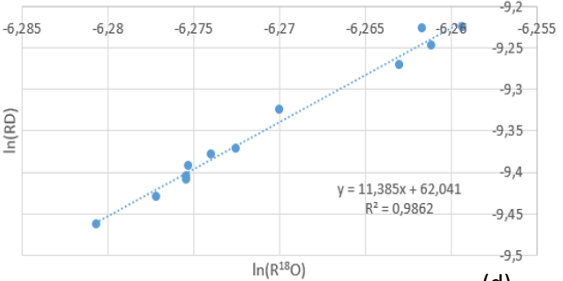
(a)



(b)

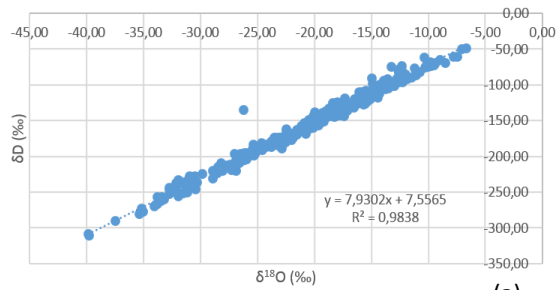


(c)

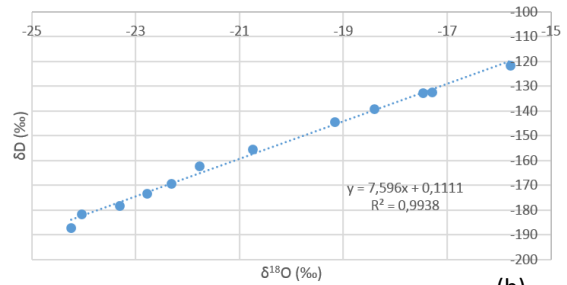


(d)

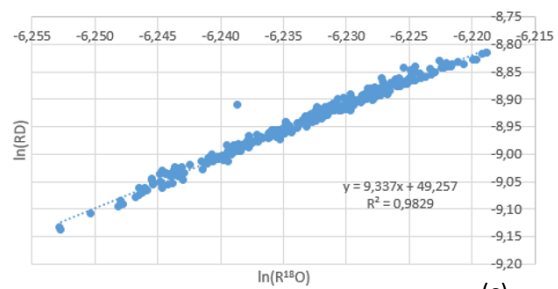
S3: Linear relationships between δD (in ‰) and $\delta^{18}O$ (in ‰) (a) using all data points (342 points), (b) data points of the mean seasonal cycle (12 points) of precipitation data measured at Neumayer (Schlosser et al., 2008), and linear relationships between $\ln(RD)$ and $\ln(R^{18}O)$ (c) using all data points, (d) data points of the mean seasonal cycle from the same measurements monitored.



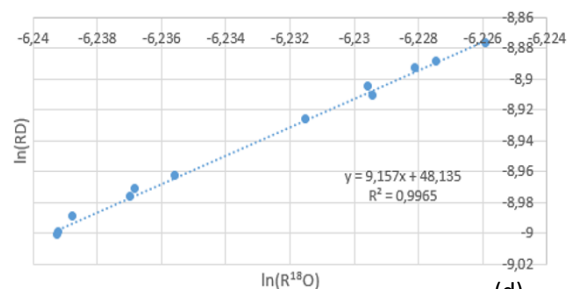
(a)



(b)

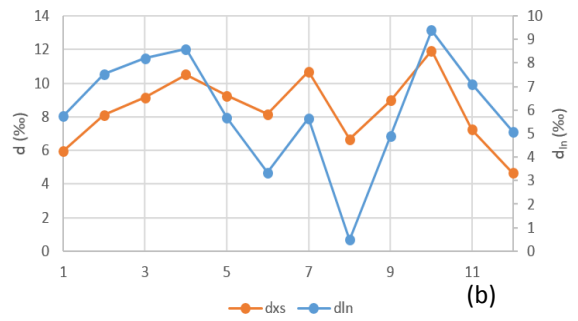
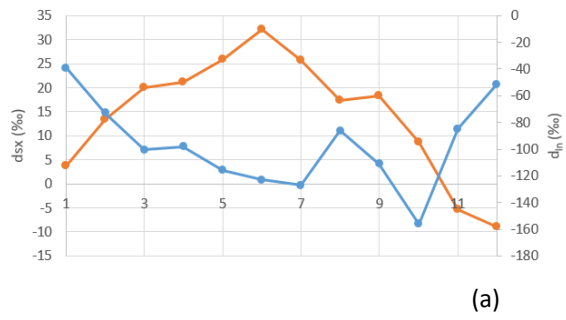


(c)



(d)

S4: Mean seasonal cycle using the classical deuterium excel definition (orange solid line), and the logarithmic deuterium defined by Uemura et al. (2012) as $dln = \ln(1 + \delta D) - ((-2.85 \times 10^{-2}) \times \ln(1 + \delta^{18}O))^2 + 8.47 \times \ln(1 + \delta^{18}O)$ (orange solid line) (a) using the precipitation data measured at Dome C (Stenni et al., 2016) and (b) precipitation data measured at Neumayer (Schlosser et al., 2008).



Schlosser, E., Oerter, H., Masson-Delmotte, V., and Reijmer, C.: Atmospheric influence on the deuterium excess signal in polar firn: implications for ice-core interpretation, *Journal of glaciology*, 54, 117-124, 2008.

Stenni, B., Scarchilli, C., Masson-Delmotte, V., Schlosser, E., Ciardini, V., Dreossi, G., Grigioni, P., Bonazza, M., Cagnati, A., and Karlicek, D.: Three-year monitoring of stable isotopes of precipitation at Concordia Station, East Antarctica, *The Cryosphere*, 10, 2415, 2016.

Uemura, R., Masson-Delmotte, V., Jouzel, J., Landais, A., Motoyama, H., and Stenni, B.: Ranges of moisture-source temperature estimated from Antarctic ice cores stable isotope records over glacial-interglacial cycles, *Climate of the Past*, 8, 1109-1125, 10.5194/cp-8-1109-2012, 2012.