Supplement 3

Further characterisation of cloud base features

In this supplement, the number of cloud base grid points identified as *dry-warm* (see text in the paper for the definition) in the domain 54.5-61° W, 11-16 ° N from the $\text{COSMO}_{\text{iso,1km}}$ data is provided (Fig. S3.1). Furthermore, the distribution of the anomalies (as shown in the paper, but here including minimum and maximum values; Fig. S3.2) and absolute values (Fig. S3.3) of specific humidity and isotope parameters of the different cloud base features *dry-warm*, *clear*, *cloud*, and *cloud-rain* (see text in the paper for the definition) are shown.

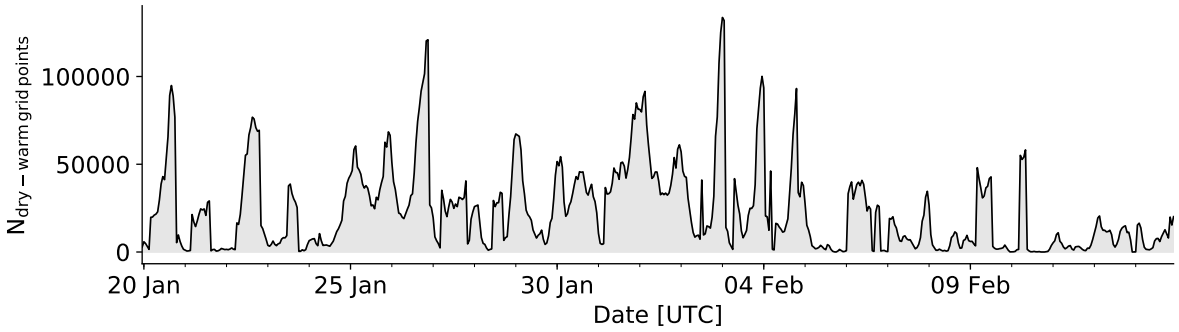

Figure S3.1: Time series of the number of cloud base grid points identified as dry-warm in the domain 54.5-61° W, 11-16 ° N (316028 grid points available) from the $\text{COSMO}_{\text{iso,1km}}$ data.

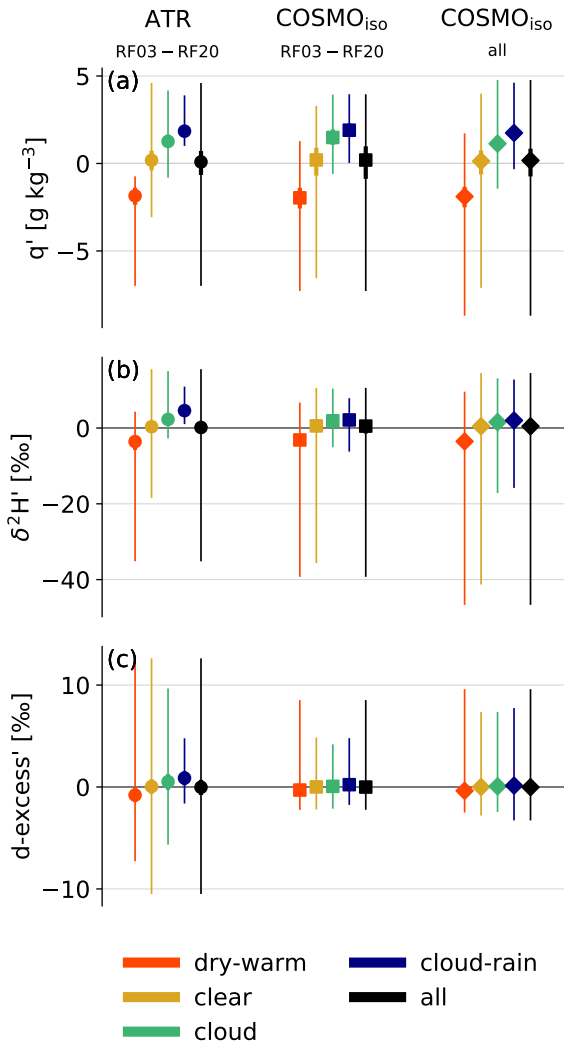

Figure S3.2: Distributions of the cloud base anomalies in (a) specific humidity, (b) δ^2H in vapour, and (c) d-excess in vapour for the data points identified as *dry-warm*, *clear*, *cloud*, *cloud-rain* (see paper for the definition) and all of them together (black) from the ATR and $\text{COSMO}_{\text{iso,1km}}$. For the ATR data, anomalies are defined relative to each flight's mean cloud base conditions. For $\text{COSMO}_{\text{iso,1km}}$, anomalies are defined relative to each time steps mean cloud base conditions in the domain 54.5-61° W, 11-16° N. Shown are median (markers) and the minimum-maximum range (lines) of the cloud base data points collected by the ATR (RF03-RF20), the $\text{COSMO}_{\text{iso,1km}}$ cloud base grid points at the hourly time steps that are closest to the ATR flights ($\text{COSMO}_{\text{iso,RF03-RF20}}$), and over the whole simulated period (20 January to 13 February 2020; $\text{COSMO}_{\text{iso,all}}$).

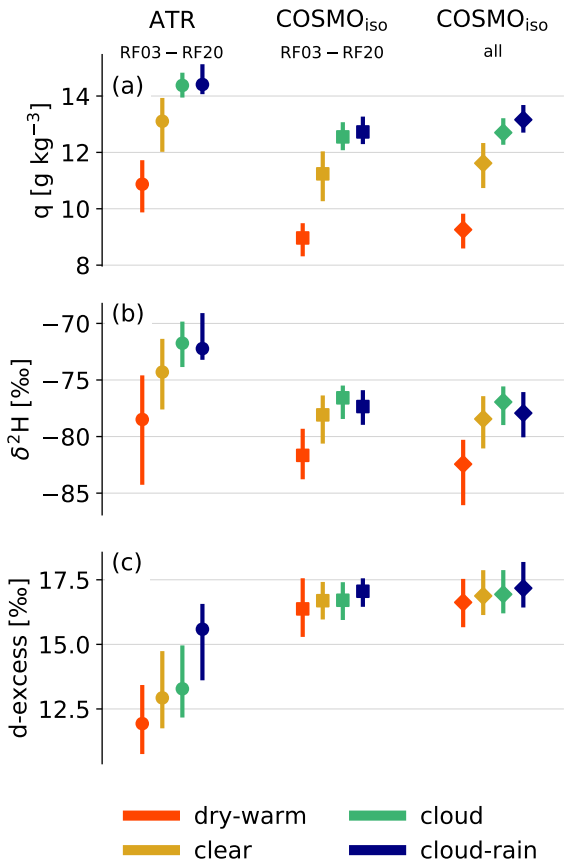

Figure S3.3: Distributions of the cloud base values of (a) specific humidity, (b) δ^2H in vapour, and (c) d-excess in vapour for the data points identified as *dry-warm*, *clear*, *cloud*, and *cloud-rain* (see text in the paper for the definition) from the ATR and COSMO$_{iso,1km}$. Shown are the median (markers) and the 25-75-percentile range (lines) over the cloud base time steps of the ATR (RF03-RF20), the COSMO$_{iso,1km}$ cloud base grid points at the hourly time steps that are closest to the ATR flights (COSMO$_{iso,RF03\text{-}RF20}$), and over the whole simulated period (20 January to 13 February 2020; COSMO$_{iso,all}$). For the COSMO$_{iso,1km}$ simulation, only the data in the domain 54.5-61° W, 11-16° N are taken into account.