This paper discusses the use of rain water isotopologues for the investigation of moisture sources. This is an important topic of atmospheric and climate science and very well fits into the scope of Atmospheric Chemistry and Physics. The study is made for central Asia. The paper presents a new rain isotopologue data set for this region, performs a very detailed analyses on how the observed isotopologue ratios depend on location (latitude, longitude, altitude), season, and airmass flow patterns (HYSPLIT back trajectories). The main scientific result is, that the isotopologue data together with the back trajectories are used to determine the contribution of different moisture sources to the rain in central Asia.

Main comments:

In general, I find the paper very detailed. Maybe the authors can try to shorten some discussions/descriptions that are not mandatory for understanding Section 4 and 5. Besides the presentation of the new rain isotopologue data set, the main outcome of the paper is to fit the moisture sources from the measured isotopologue data with the help of back trajectory calculations. To my understanding, the objective is to invert the two Equations (2x Eq. 4 for δD and δ18, and Eq. 5), i.e. to determine the moisture sources (f_A, f_B, and f_C) from the measured δ_P (δD and δ18). However, the moisture sources are already known from the backward calculations, right? In fact, Table 2 and 3 show very similar results, e.g. the importance of all sources for UA, limited importance of the "Westerly" source for CKS, dominating importance of the "Local" source for AA and CHK. What do we gain from using in addition to the backward trajectory the isotopologue data? Or is the long-term/final objective to use the isotopologue data instead of the backward trajectory calculations (after having determined the fitting parameters by the combined availability of backward trajectories and isotopologue data)? I think a better explanation of the objective would be useful.

Minor comments:

I recommend revising all the Figure captions for completeness, e.g. Fig. 2: what is shown in the right panels? The mean values, i.e. the same as in the other panels or is this something else?

I am not a native speaker, but there seem to be several mistakes in grammar/spelling. Maybe revise together with the Copernicus copy editing service. A few examples are:

line 20: WAS derived

line 556: rations -> ratios

line 694: we applied mixing model -> we applied a mixing model

line 701: is the inner -> in the inner