

Review of manuscript entitled “Atmospheric brown clouds reach the Tibetan Plateau by crossing the Himalayas” by Luthi et al.

In this paper, a pollution episode occurred over the TP was studied based on ground and satellite remote sensing data. A detail analysis of the back trajectories calculated from a numerical model with high spatial resolution was performed to figure out the source of the pollution and how it transported to the TP. It was pointed out that ABC reached the TP by crossing the Himalayas. The research looks interesting but the paper is not well written.

Major concerns:

1. Air pollution reaching the TP from its surrounding regions were widely studied, for example, Kuhlmann and Quaas (ACP, 2010, 10, 4673-4688) studied long-range transport of aerosols based on three consecutive pre-monsoon seasons from CALIOPSO data. They stated that “CALIPSO lidar satellite data, providing vertically resolved images of aerosols, shows aerosol concentrations to be highest in the lowest 5 km of the atmosphere with only little amounts reaching the TP altitude”. The major point of this ACPD manuscript is that aerosols can reach the TP altitude. So there seems some inconsistency between these two researches. Note that Kuhlmann and Quaas reached their conclusion based on measurements in three seasons, however, only a case study was performed by Luthi et al. My major point is that caution should be taken for the conclusion if it is derived from only a very extraordinary event.
2. The paper is not well organized. For example, section 2 concerns methods and data. I don't see any introduction to methods. The title of section 3.1, “Air quality measurements in the HTP region” is not suitable. First, air quality generally refers to PM2.5 or pollution trace gases. Here, the major data are derived from remote sensing of column-integrated aerosol optical properties. The title of section 3.1.1 “ABC determination” looks somewhat the methodology. Furthermore, I'm not sure what's the difference between section 3.1 and 3.1.1. In section 3.2, the authors used CALIOP and in situ data to describe this event. So the logic is not very clear and I have to say it is very hard to follow.
3. From Figure 2, it is very clear that there is an inconsistency between AERONET and in situ data, for example, BC concentration is high during Apr. 14-20, but AOD does not follow this pattern. Obviously, some words are required for this fact.
4. Uncertainty of SDA method should be discussed.

Minor concerns:

1. FMF generally refers to fine mode fraction, not fine mode AOD
2. P28112, L20, Two AAOD 500 nm datasets?
3. P28114, L14, what's meaning “15% to the yearly pollution occurrence”?
4. P28114, L21, the radiometer can work and does work on an overcast day.
5. P28115, L15-23, I'm not clear whether the radiometer can see the new particle formation since the new particles is too tiny.
6. P28117, L7-10, references required
7. P28118, L14-18, there is no any clues showing that aerosols reach the stratosphere.