

## ***Interactive comment on “Mesoscale fine structure of a tropopause fold over mountains” by Wolfgang Woiwode et al.***

**Anonymous Referee #1**

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The paper describes detailed observations of water vapor, ozone, and temperature at a tropopause fold in the vicinity of the polar frontal jet over Italy retrieved from measurements of GLORIA on HALOE . The data are compared to in situ measurements and high resolution model results. Observed fine structures and mixing between Stratosphere and Troposphere is discussed. The paper is well written and fits the scope of this journal well.

I have only some minor comments:

Page 3, line 25-26: actually already Weigel et al. (2012) (different to Ungermann et al. (2013), which is based on the same measurements) showed results of temperature and trace gas retrieval together at a tropopause fold?

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Page 6 or 7, Section 2.1: it should be mentioned, that the GLORIA data are cloud filtered and how they were filtered?

Page 16, line 29ff / Fig. 7d/f: do the "green" profiles really show dry stratospheric air or is there an issue with the measurement quality? They remain surprisingly close to the a priori values and a data gap is following in Fig. 7a? For Fig. 7c/d a logarithmic x-axis would probably be better?

Fig. 11a: I'm not sure if the 3d figure is really helpful here?The axis are difficult to read. Is it possible to improve it or, if not switch to a 2D Figure of H<sub>2</sub>O and O<sub>3</sub> versus potential temperature?

Probably beyond the scope of this study, but it would be interesting, if the retrieval of additional trace gases is possible and how their distribution looks like?

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