

General:

The paper analyzes simultaneous observations of a volcanic ash plume with ground based radar and space borne passive millimeter wave sensors. The study is a significant contribution to the ongoing discussion on the development of volcanic ash monitoring systems in order to meet needs in various fields ranging from climate research to air traffic management.

Specific:

In the introduction "... the role of the radar polarimetry for quantitative estimation of ash plume" is mentioned as "One of the original elements of this work...". After this announcement some more elaboration of this aspect is expected. This lack is particularly striking in the comparison between the DPX- and SPC-based estimates of ash-TCC. Differences between these estimates were attributed to various effects, but the availability (resp. not-availability) of polarimetric variables is surprisingly not mentioned in this discussion. This provokes for example the question how the SSMIS-DPX regression would be related to a SSMIS-SPX regression. "SPX" means using only the x-band reflectivity, and ignoring the polarimetric variables. At any rate, a substantiation, to which extent this study revealed the added value of polarimetry, should be provided in a final version.

Technical:

1. The language should be checked by a native English speaker.
2. p6218, l 6: "...provide information to..." should probably read "...provide information on..."
3. p6218, l11,12: I suggest to replace

"... thus limiting impractical or even dangerous conditions to perform in situ sampling."

by

"... thus avoiding impractical or even dangerous conditions of in situ sampling."

4. p6219, l8: thogu → though
  5. p6220, l10: "sections" → "subsections"
  6. p6221, eq.1, l.16:  $K_p$  is the dielectric factor of spherical water drops. The actual properties of the scattering particles is included in  $S_{XX}^{(b)}$ .
- p 6223, l2: "...radar volumes are processed..." → "...radar signals are processed..."
- p 6224, l14: "thought" → "through"
- p 6226, l 8: "Plank's" → "Planck's"
- p 6231, l 17: "thought" → "though"
- p 6232, l 12: "from the North" may be omitted

Table 1: Equations 1 to 4 are defining expectation values. Therefore, I suggest adding in table 1 the averaging time used for retrieving the variables on the left hand side of eq. 1—4. Particularly  $\rho_{HV}$  is meaningful only as a time average.