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# ***Interactive comment on “Assessment of adequate quality and collocation of reference measurements with space borne hyperspectral infrared instruments to validate retrievals of temperature and water vapour” by X. Calbet***

## **Anonymous Referee #1**

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Overall, this paper makes a significant contribution to the area of satellite retrieval validation. In particular, it provides an empirical method of computing the uncertainties associated with space/time mismatches between validation measurements and satellite retrievals. To date, these mismatches have been largely estimated through model-based techniques, or minimized through optimization techniques. So it is significant to have a data-based approach to quantifying the impact of these mismatches.

The overall approach seems well-founded. There are a few areas where the paper will

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benefit from additional clarity in the presentation.

p. 5593 lines 11-13: It could be argued that best estimate methods might "obscure" co-location errors rather than "ignore" them, since these methods are designed to minimize co-location uncertainty, but do not provide an independent estimate of the uncertainty.

p. 5593 lines 24-27: A small point, but to help provide context early for the multi-sensor approach for humidity measurement taken in section 2.1, a clarification that RH errors are <3% only for lower and mid-troposphere, or that an important bias is the dry bias of some sonde types in the upper troposphere, would be useful.

p. 5594, line 1: Maybe "ensemble of parcels in the atmosphere" rather than "parcel" singular to help underscore the difference between the atmospheric column and the drifting in situ measurement location (for the case of sondes).

Section 2.1, line 19. By reading Calbet et al. (2011), I learned that the interpolation referred to here is temporal interpolation. I agree with not reiterating too much detail from previous work. However I think the current work could be improved by briefly specifying the interpolation applied to the CFH and bias-corrected RS92 data. It could be as simple as changing "Interpolated" in line 9 to "Time-interpolated," although a brief description of the interpolation of the sonde measurements from their actual measurement time to the satellite overpass time would be ideal.

p. 5599, line 18: "upper deviation" might be clearer as "positive deviation in the upper troposphere", and "above" later in this sentence is confusing.

p. 5602, line 11: Is the inequality here between the diagonal of matrix  $S_x$  and the state-space deviations, consistent with Fig. 8?

p. 5603, line 9-10: "as few retrieved parameters from the hyperspectral radiances as possible" might be better than "as little retrieved parameters"

p. 5604, line 13: The phrase "quality assessment" here is a bit vague, would something

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like "validation process" be more consistent with the prior text?

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Interactive comment on Atmos. Meas. Tech. Discuss., 8, 5591, 2015.

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