



## Error estimation for localized signal properties: application to atmospheric mixing height retrievals

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The height of the atmospheric mixing layer is a key parameter for many applications where emissions from the surface are transported through the atmosphere.

The mixing height can be estimated with various methods and algorithms applied to radiosonde or lidar data. However, while all these methods provide a value for the mixing height, typically none of them provides a measure of uncertainty.

That is because the methods that retrieve mixing height commonly look for thresholds in vertical profiles of some measured or estimated quantity.

Classical error propagation typically fails on such estimates.

Therefore we propose an a posteriori method to estimate mixing height with uncertainty.

The method relies on the knowledge of the measurement errors and on the concept of statistical confidence, derived from the Welch's t-test. It is based on a solid theoretical base. The errors obtained are comparable with those that one could obtain through a Monte Carlo approach.

It can be applied to all the problems involving the localization of a property in a sequence of data like time series, profiles, or generic signals.