



SOFIA UNIVERSITY ST. KLIMENT OHRIDSKI

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GRAPH BASED TRACKING OF THE MIXED LAYER HEIGHT IN THE RANGE CORRECTED SIGNAL OF CEILOMETER

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Motivation

- MLH:
 - Constrains the air pollution dispersion volume;
 - Quantify surface-atmosphere interaction intensity
- MLH retrieval:
 - Rawinsonde – coarse time resolution
 - **ALC** – ambiguity – layer attribution problem
 - Advanced instruments (e.g., DL, MWR) – too expensive



source: [Vaisala](#)

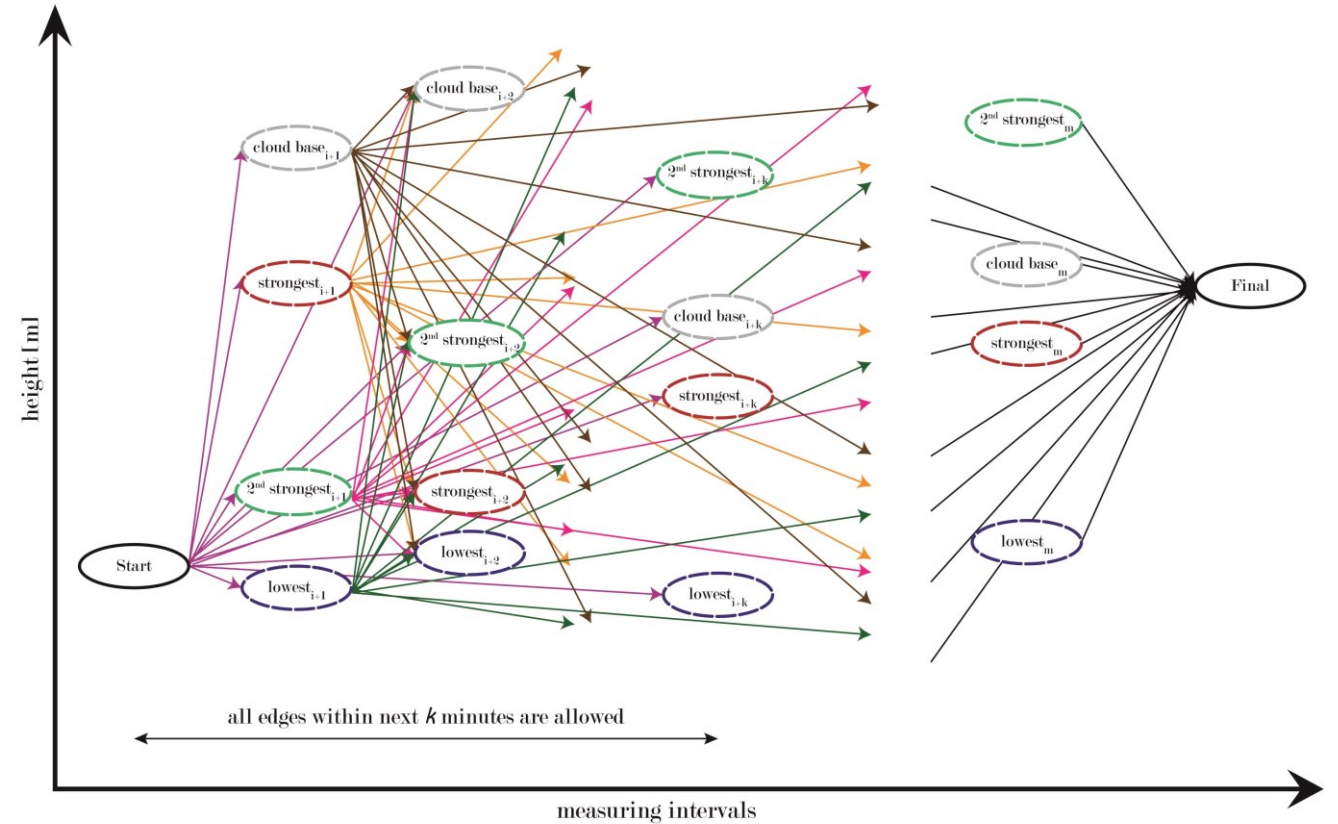
How to determine MLH from the ceilometer RCS?

- 1D algorithms (e.g. [Haeffelin et al. 2012](#) as a review) :
 - Gradient based algorithms
 - Variance based algorithms
 - Wavelet covariance algorithm
- “2D” edges detection algorithms (e.g. STRAT see [Morille et al. 2007](#))
- Graph-based tracking by shortest path in signal space (e.g. [Poltera et al. 2017](#))

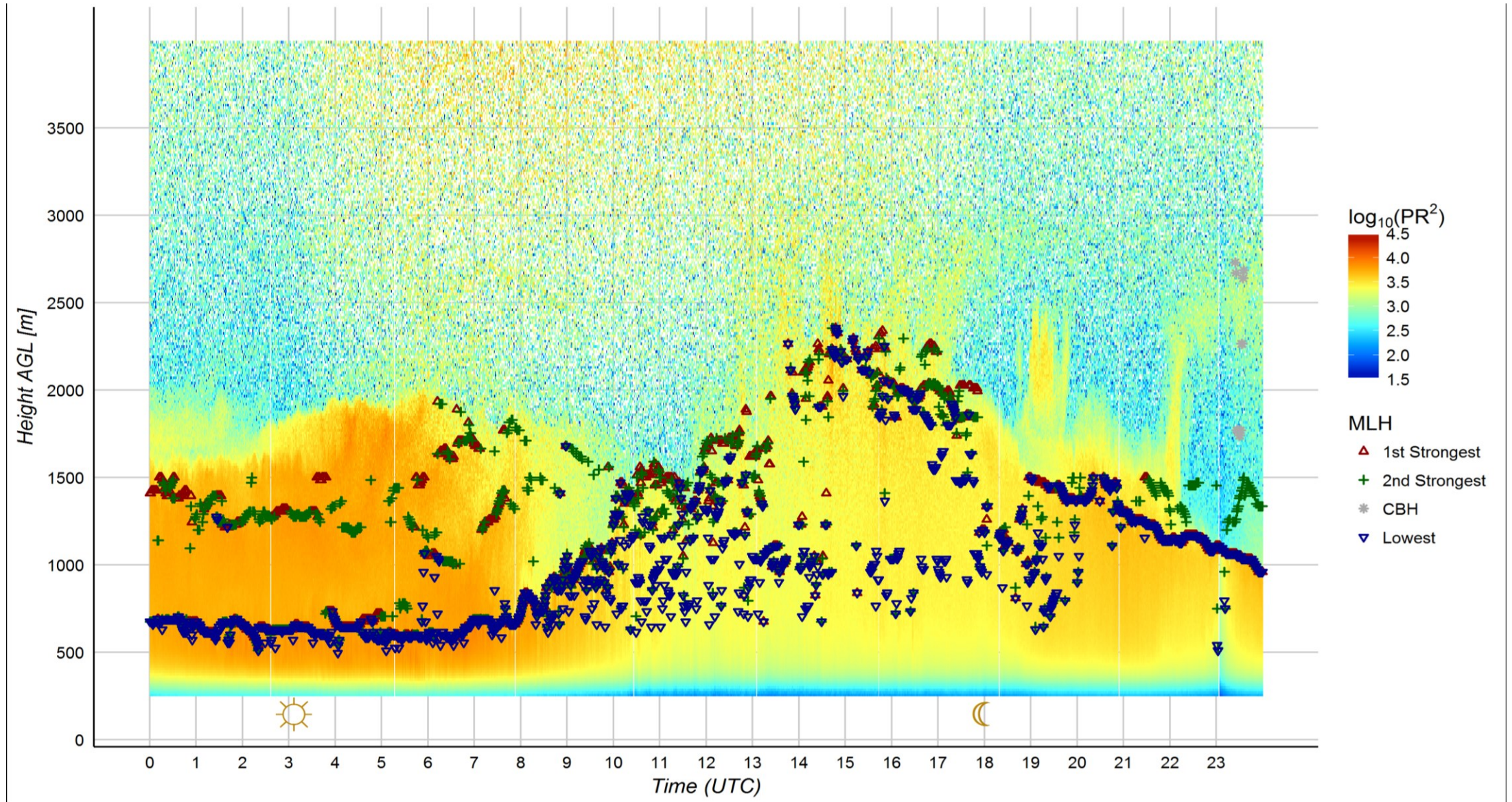
Aim - An improved MLH tracking through postprocessing of the retrieved by edge-detection algorithm MLH candidates

Methods

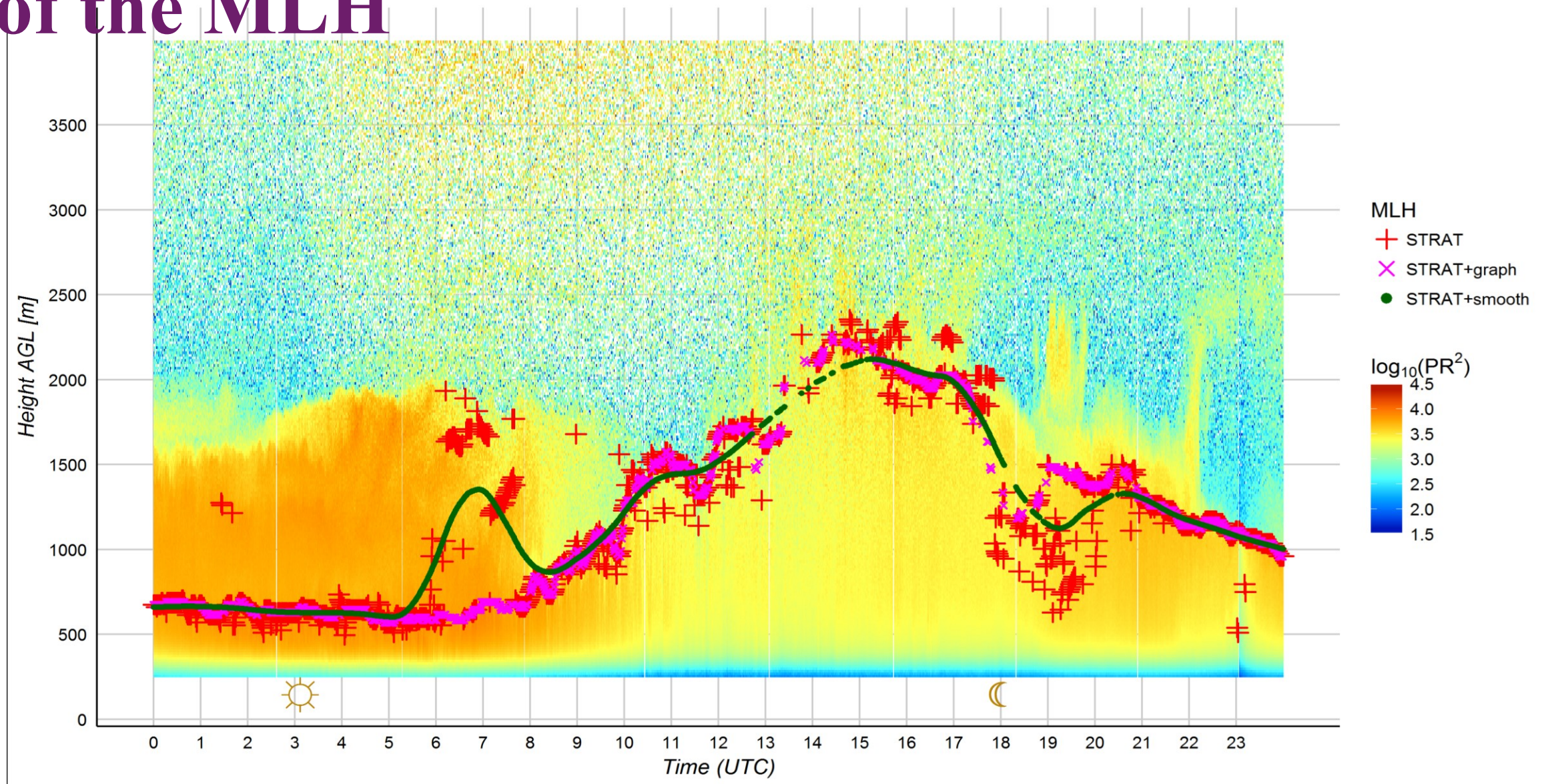
1. Run STRAT to get MLH candidates
2. Add CBH to MLH candidates and organize them in 3 different graphs (1-st from 0:00 to 8:00 UTC , 2-nd from 8:00 to 14:30 UTC and 3-rd from 14:30 to 24:00 UTC). All edges within 2, 1 and 2 hours are allowed in each graph with an extra weight of 5, 5 and 20m/min respectively
3. [Dijkstra](#)'s shortest path algorithm is applied in real space on every graph.



Raw data, STRAT candidates & CBHs



Results – graph-based and loess-based tracking of the MLH



Thank you!

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