Continuous Sky clarity monitoring at Riga and Metsähovi: January 2018-June 2019

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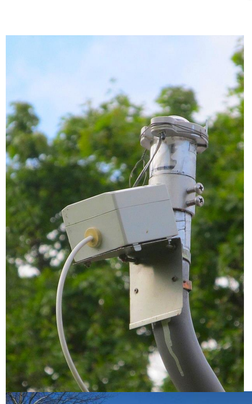
Introduction:

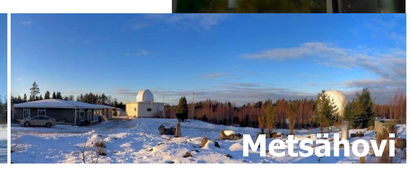
The description of the equipment, methodology and preliminary results used in this poster was presented as "Sky Clarity Comparison between Riga and Metsähovi SLR Stations" at the 2017 Riga ILRS technical workshop *(https://cddis.nasa.gov/2017_Technical_Workshop/docs/presentations/session3/ilrsTW2017_s3_delPino.pdf)*; the QR link to the presentation is at the poster's bottom.
In order to obtain reliable information on the yearly distribution of common available observation time, we decided to start the continuous sky clarity monitoring from January 1st 2018. Here we present a selection of the first 18 months of local and simultaneous cloudiness statistics for Riga and Metsähovi.

Sensors used

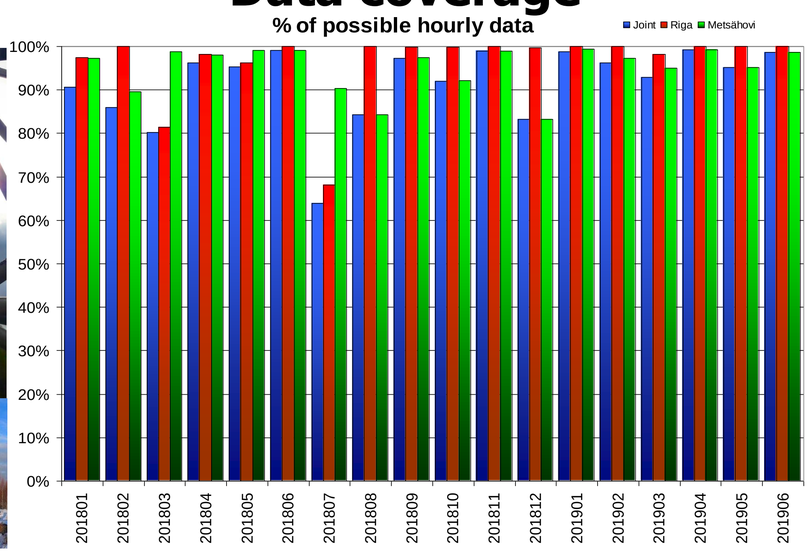


Sensors:
←
Riga: Aurora Cloud Sensor III

→
Metsähovi: Boltwood Cloud Sensor II



Data coverage



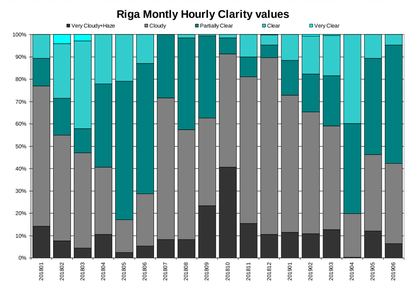
Distance

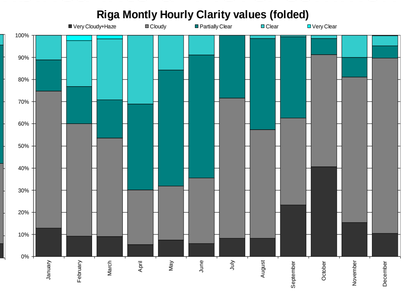
Riga

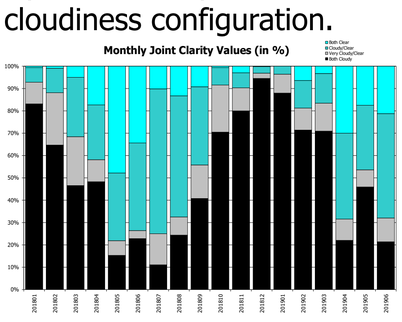
Simultaneous Riga-Metsähovi

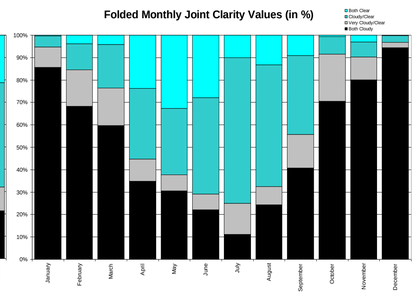
Metsähovi

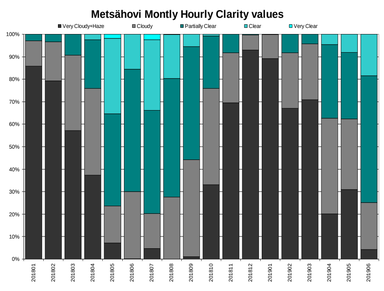
24h Monthly Clarity statistics: On each set the local hourly mean clarity value has been converted into 5-level cloudiness values. For the simultaneous statistics, the 5-level cloudiness sets have been combined into a 4-level common cloudiness configuration.

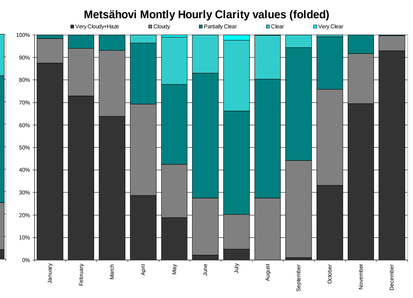




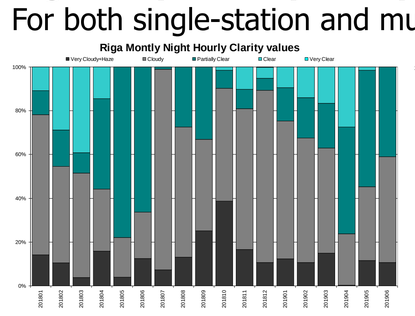


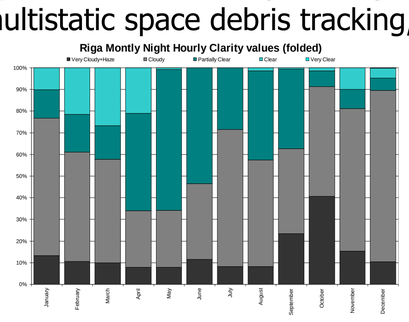


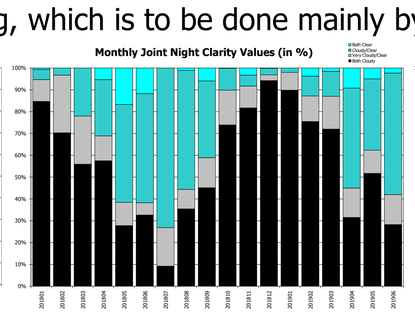


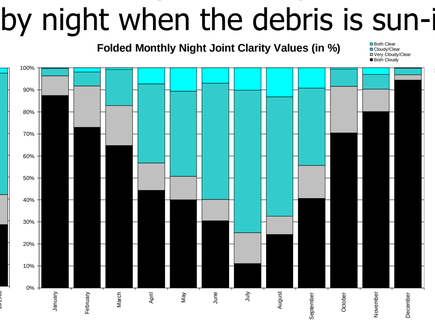


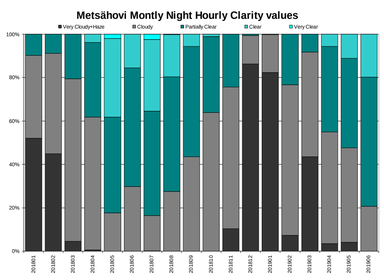
Night-only Monthly Clarity statistics: The night/twilight criteria used: Sun elevation below 0 degrees in Riga. The data processing uses the same levels as the 24h data. For both single-station and multistatic space debris tracking, which is to be done mainly by night when the debris is sun-illuminated, these statistics are particularly useful.

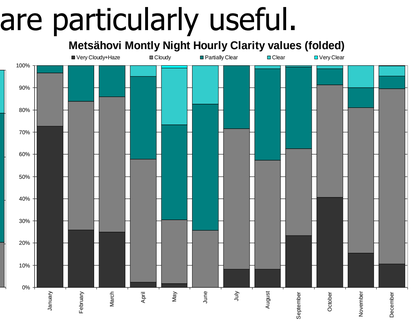




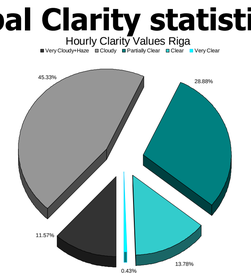


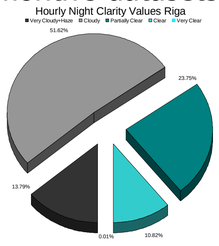


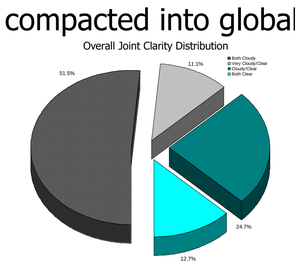


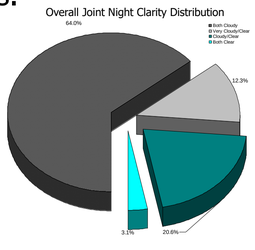


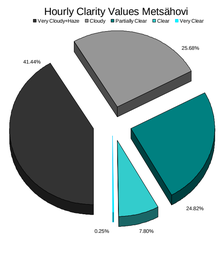
Global Clarity statistics: The 18 month's datasets has been compacted into global pie charts.

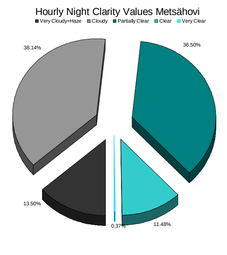




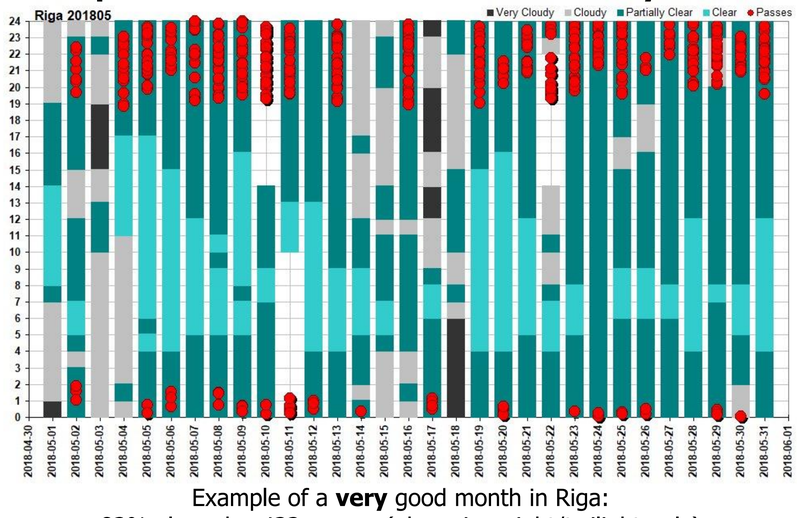




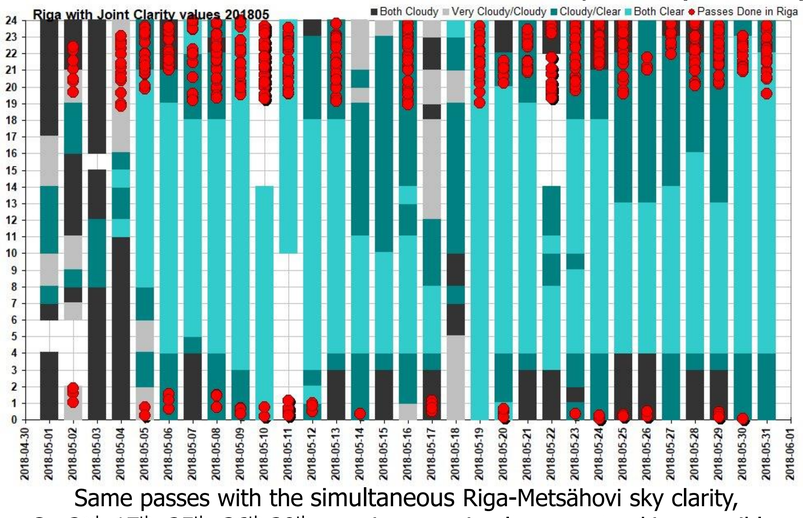




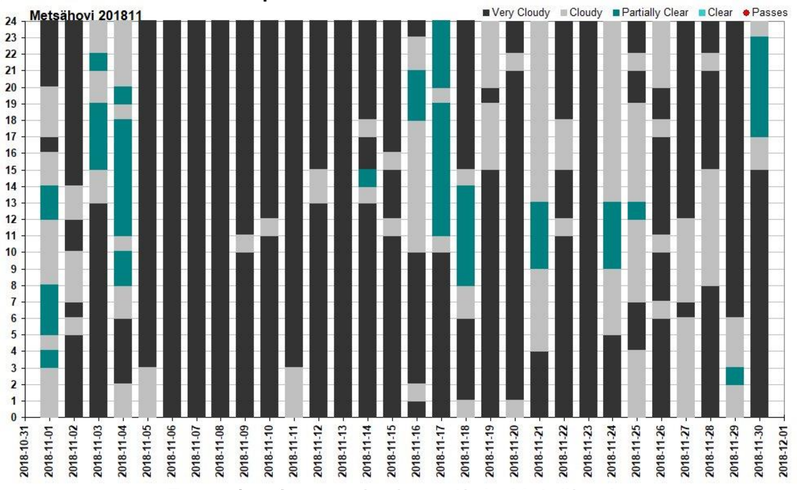
Examples of the 1 hour resolution monthly charts: When combined with the SLR observations epochs, (red dots) the cloud cover impact on the data can be evaluated.



Example of a **very** good month in Riga:
83% clear sky, 433 passes (observing night/twilight only)



Same passes with the simultaneous Riga-Metsähovi sky clarity,
On 2nd, 17th, 25th, 26th 29th mornings no simultaneous tracking possible.



Example of a very bad month in Metsähovi:
Only 8.18% partially clear sky

Conclusions:

- The long term multiyear clarity monitoring can be used to determine the typical cloud cover distribution monthly values, its variations and to detect any multiyear trends.
- The most favorable observing period for local and simultaneous SLR observations is from April to August/September.
- For minimum data impact the planned operational stops should be done on winter.
- We ***strongly*** recommend to all SLR stations operating a clarity sensor to start processing and monitoring their data following our methodology.
- Our team will be happy to support this effort.
- If this clarity information is available for a significant cluster of SLR stations, it will help on the time frame optimization of short-term observing campaigns.

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Link to the 2017 Riga ILRS workshop presentation:

NLS FINNISH GEOSPATIAL RESEARCH INSTITUTE FGI

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