UMD Uptime Analysis

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Motivations and goals

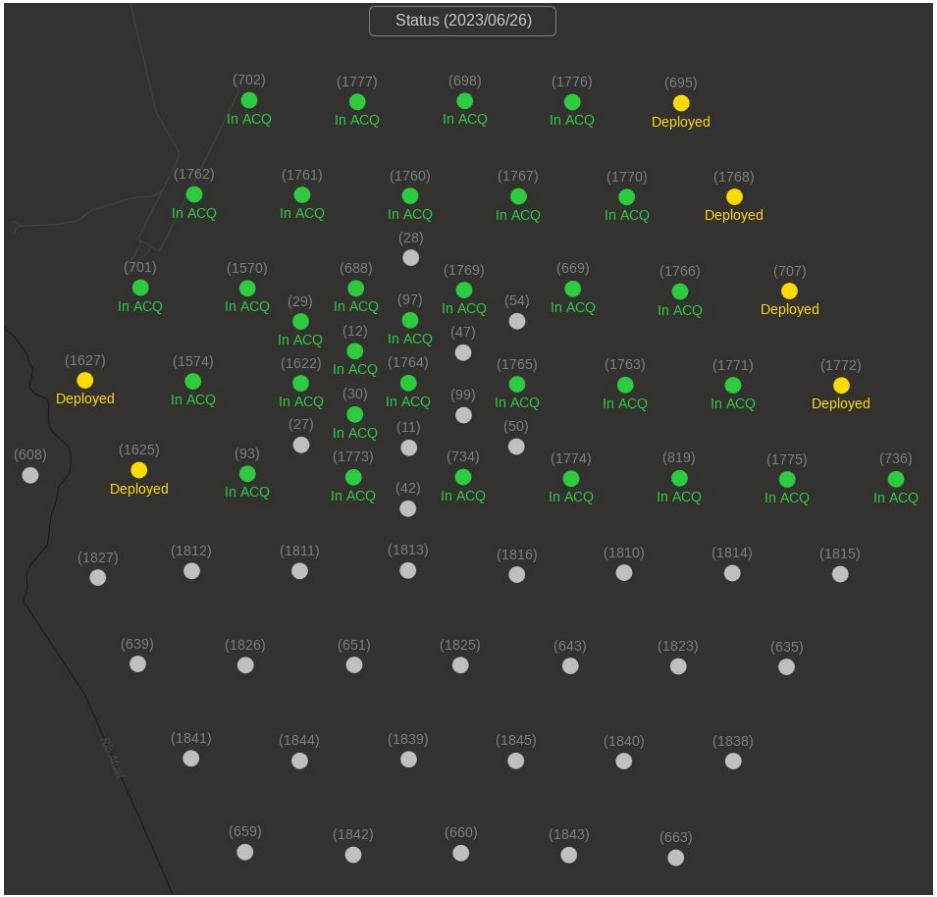
Motivations

- Currently 32 positions (106 modules) in Acquisition
  - 38 deployed
- Need for data monitoring
  - online
  - long term

Goals

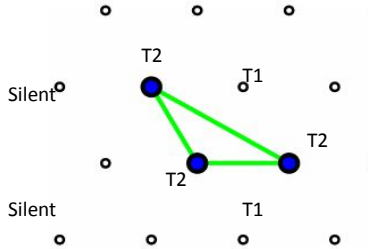
Develop a LTP tool

- Uptime fraction per module
- Uptime fraction of UMD array



Definiton of UMD *uptime*

Possible T3 configuration



CDAS request after T3 event to SD:

- **Window 0** tolerance for stations with T2
- **Window 30** tolerance for every other station

T3 request from CDAS

WCD status	Module status
'Candidate'	'Candidate'
'Rejected'	'Rejected'
'Silent'	'Silent'
	'Inactive'

$$uptime = \frac{\#events(\text{Module candidate \& WCD candidate})}{\#events(\text{WCD candidate})}$$

If a WCD has a T1, each module of the associated counter should have a T1

Candidate: T1 was successfully found and event successfully sent to CDAS

OFFLINE Application

Analysis using

- Merged files from: Prod/v2r0/XAuger/yyyy/mm/xad*.root
- OFFLINE icrc23-pre3 tag

```
<sequenceFile xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
              xsi:noNamespaceSchemaLocation='@SCHEMALOCATION@/ModuleSequence.xsd'>

  <enableTiming/>

  <moduleControl>

    <loop numTimes="unbounded" pushEventToStack="yes">

      <module> EventFileReaderOG            </module>
      <module> EventCheckerOG               </module>

      <try>
        <module> MdModuleRejectorAG         </module>
      </try>

      <module> EventSqueezer    </module>

    </loop>

  </moduleControl>

</sequenceFile>
```

MdModuleRejector ⟶ removes “bad data” periods
EventSqueezer ⟶ own module

Retrieved info from our module:

Event ID

WCD:

- ID
- Status (rejected, silent, candidate)
- trigger error code
- (trigger window)

Module:

- ID
- is or not in the event*
    - Status (rejected, silent, candidate)

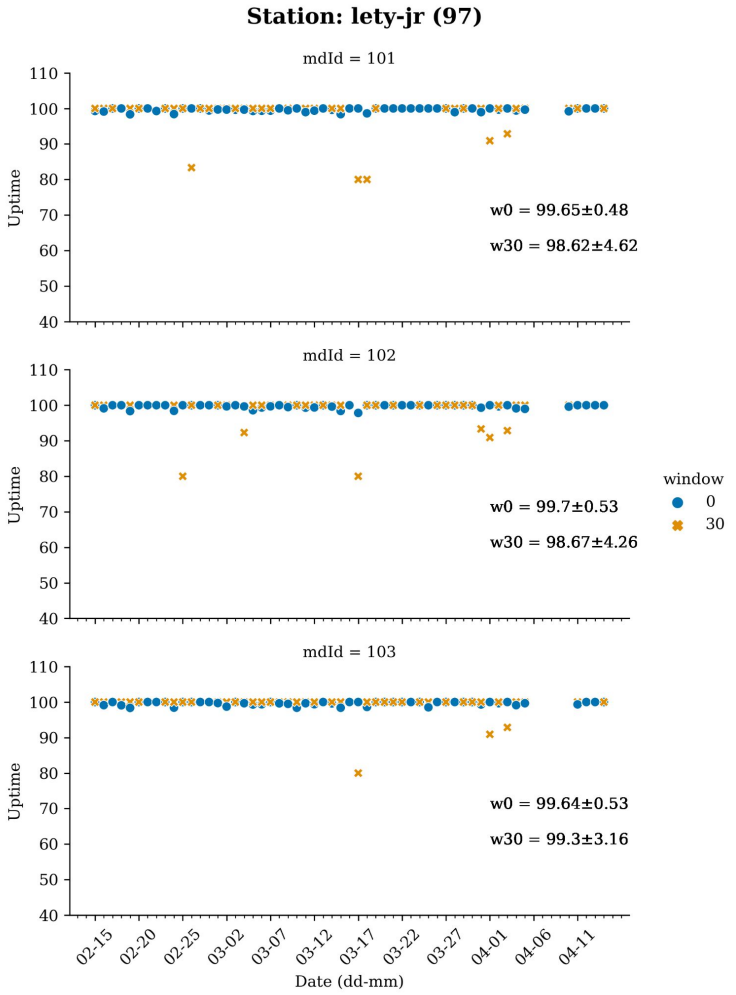
* Mainly, it helps us remove stations that are not yet deployed but are still present in the Offline configurations. Otherwise, it serves an error flag.

Uptime per module

Output info from OFFLINE run ⟶ python dataframe

Uptime calculation per **day** and **module**, **discriminated by window**

Example position: Lety jr (97)

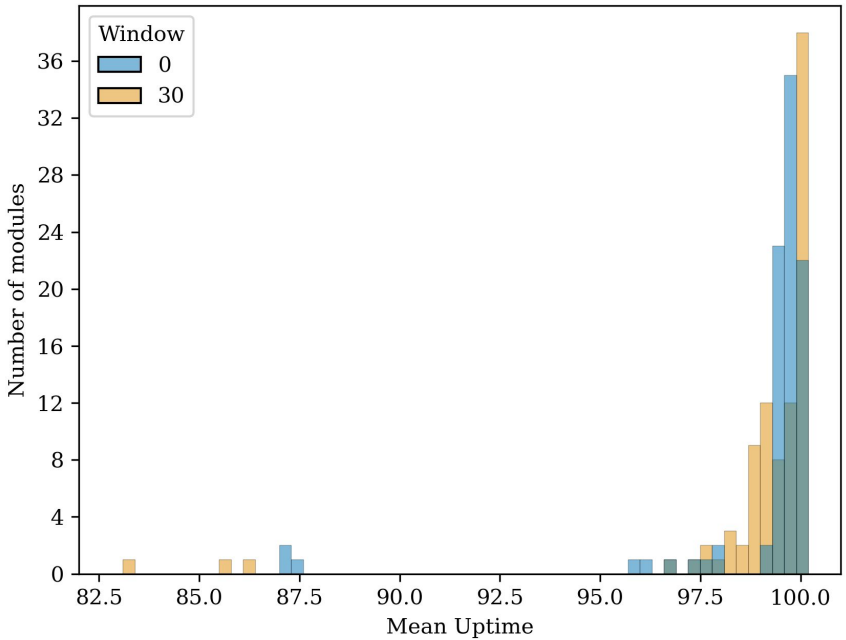


Uptime per module

Output info from OFFLINE run ⟶ python dataframe

Uptime calculation per **day** and **module**, **discriminated by window**

Distribution for all modules in the period Mar-Apr 2023

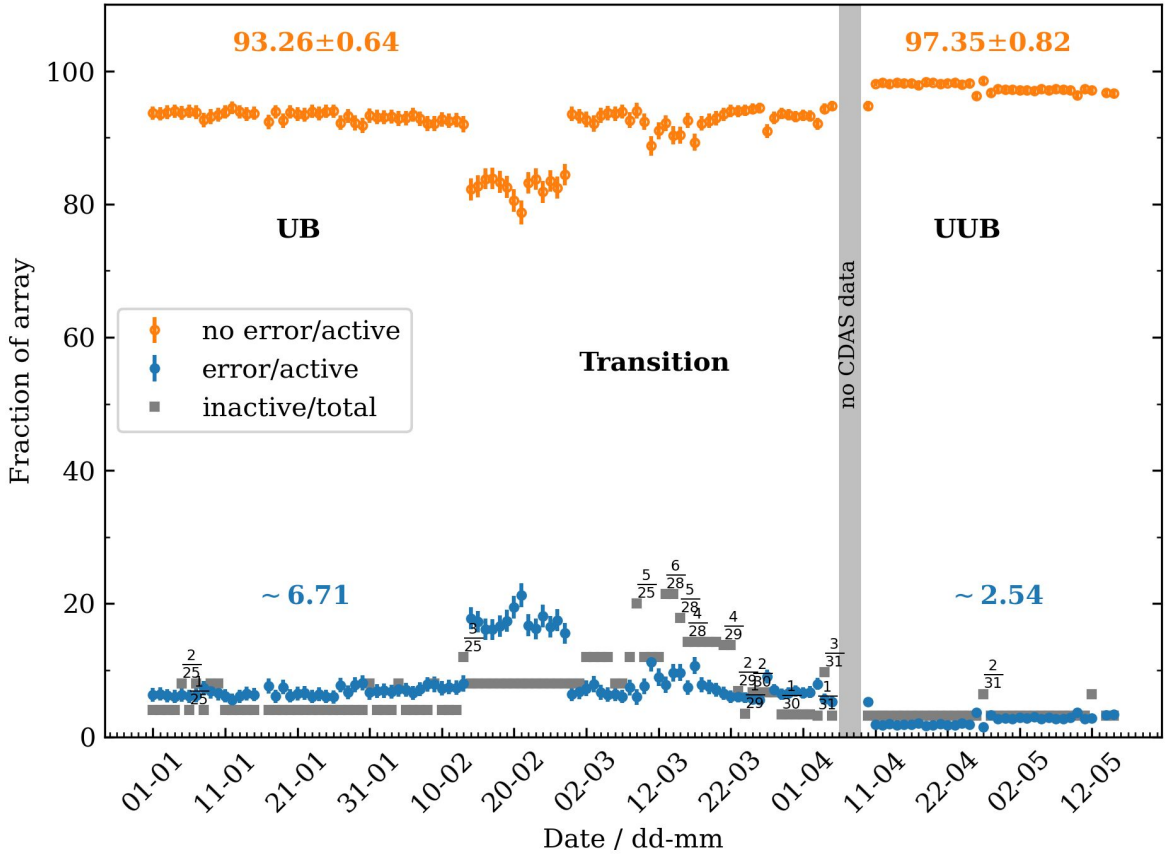


Time evolution of UMD *uptime*/error rate

Time evolution of total *uptime* for the **whole array**

For each day:

- calculate the mean *uptime* over counters and determine the error of the mean
  - consider both windows
  - exclude inactive counters or modules
- keep track of the number of active, inactive and total counters
  - total = active + inactive
- error rate = 1 - *uptime*



Summary

- Lay the foundations of UMD long-term monitoring
- UMD *uptime* is improved after the installation of UUB (error rate reduced)
- Stable overall performance over time

Outlook

- Extend the method to higher level analysis
- Develop monitoring tool for UMD shift
- Develop tool for LTP analyses

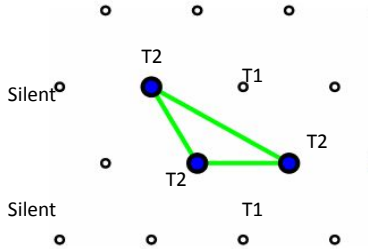
Thanks for your attention!

Questions? Comments? Suggestions?

Backup

T1 request from CDAS

Possible T3 configuration



CDAS request after T3 event to SD

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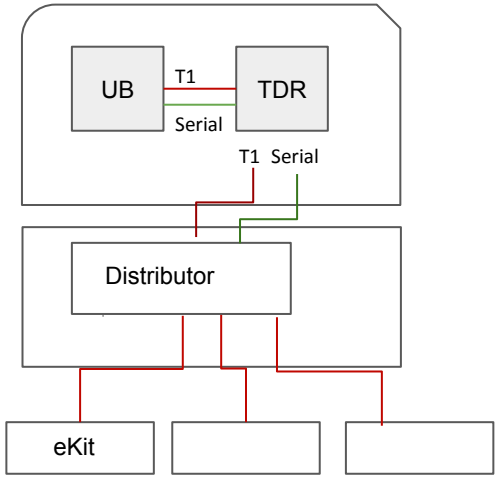
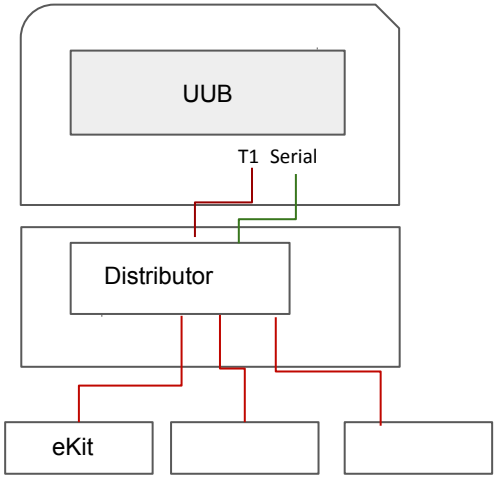
UB/UUB connections with UMD

SD ⟶ UMD



UB: two places to search for T1



UUB: one place to search for T1

Impact of the UB ⟶ UUB change?

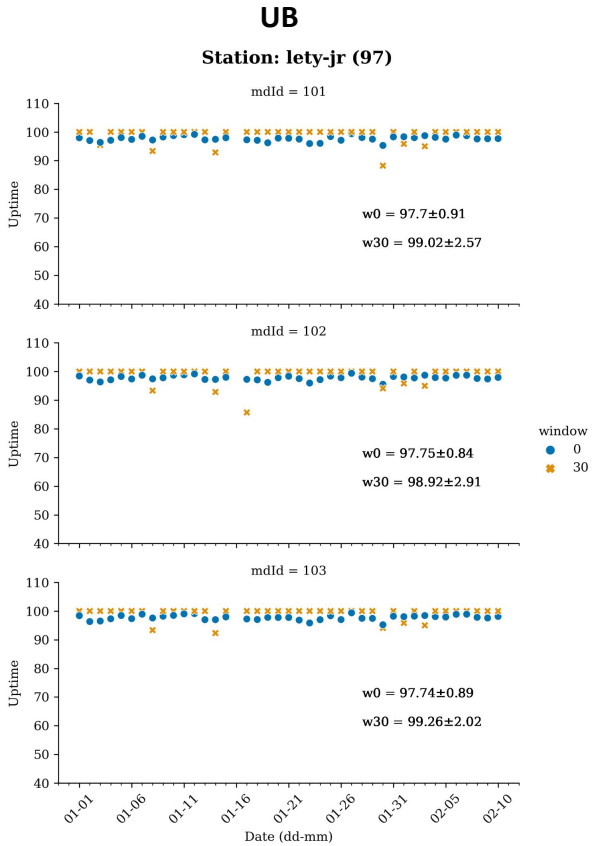
UB to UUB

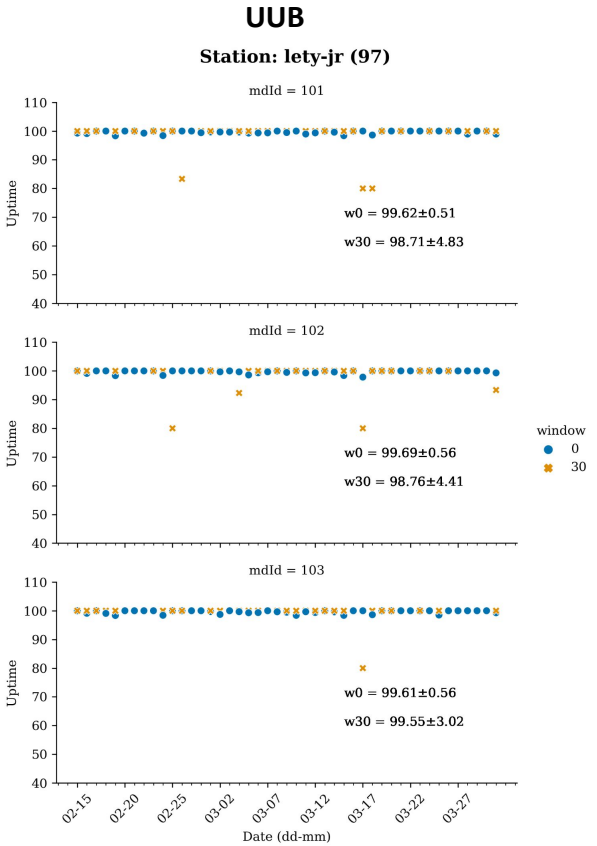
Example:

- Position: Lety jr (97)
- UB ⟶ UUB: 13/02/2023
- **Uptime per module, discriminated by window**

UB ⟶ UUB

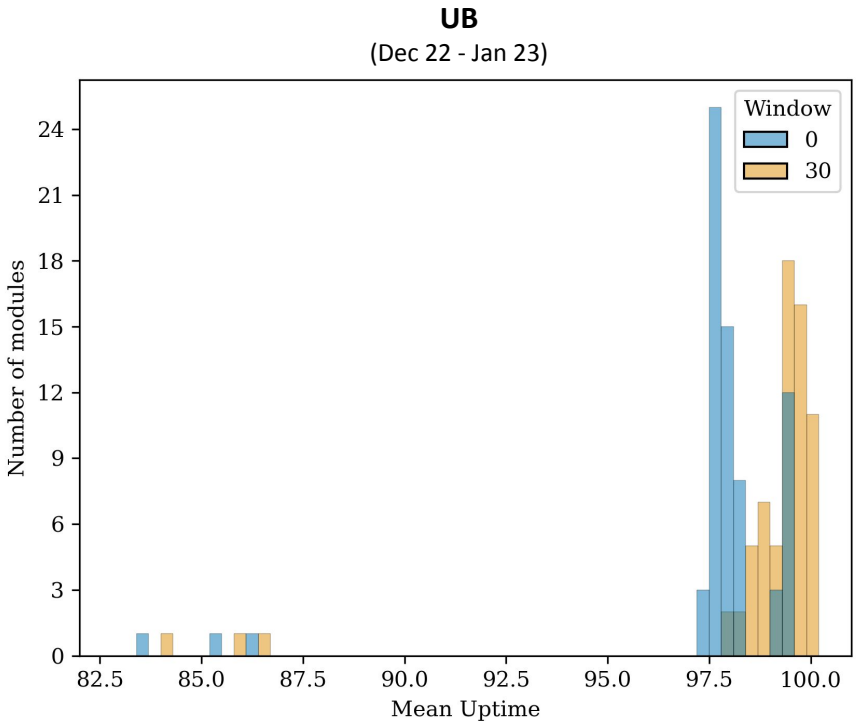
Uptime increase and dispersion decrease for window 0

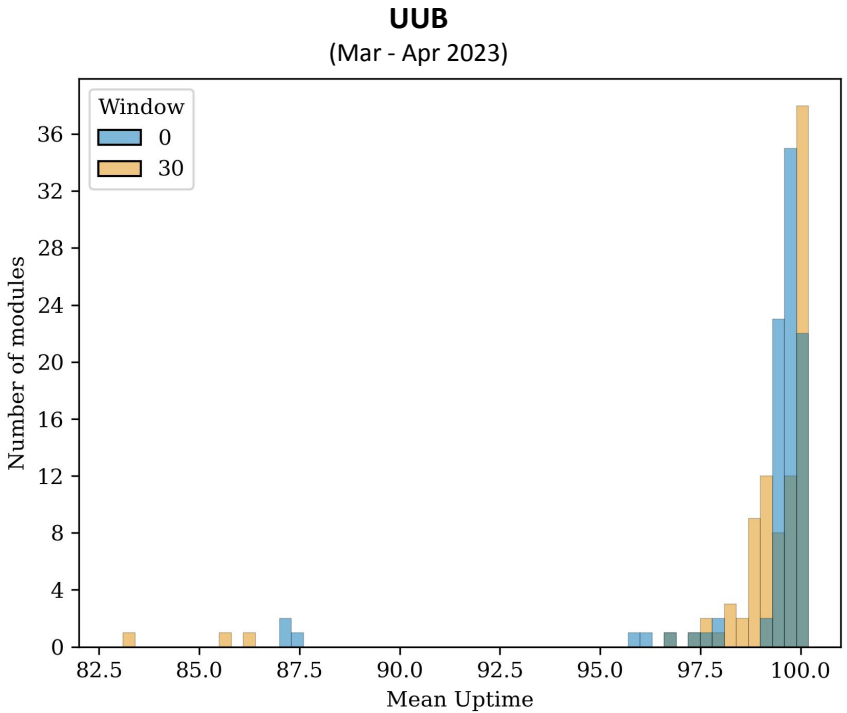




UB to UUB

Distribution of mean uptime per modules, discriminated by window





General improvement of UMD uptime equipped with UUB

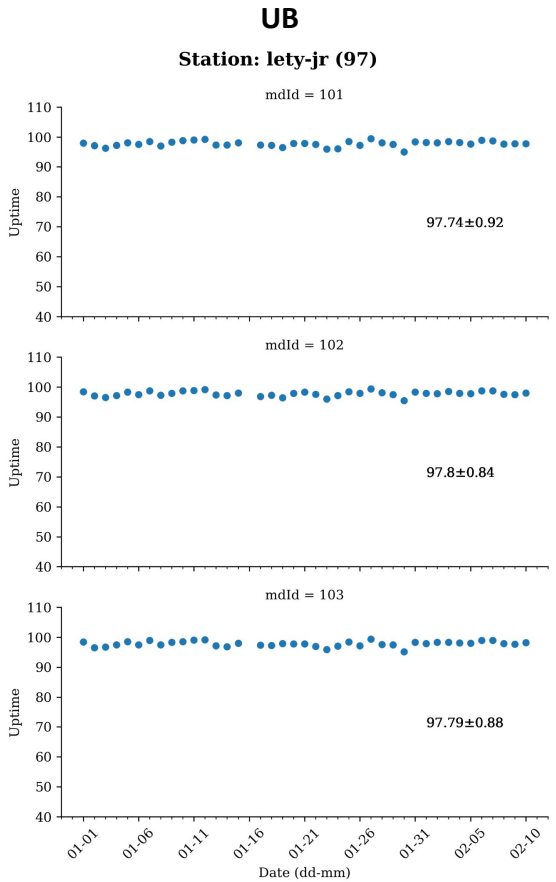
Total UMD uptime per module

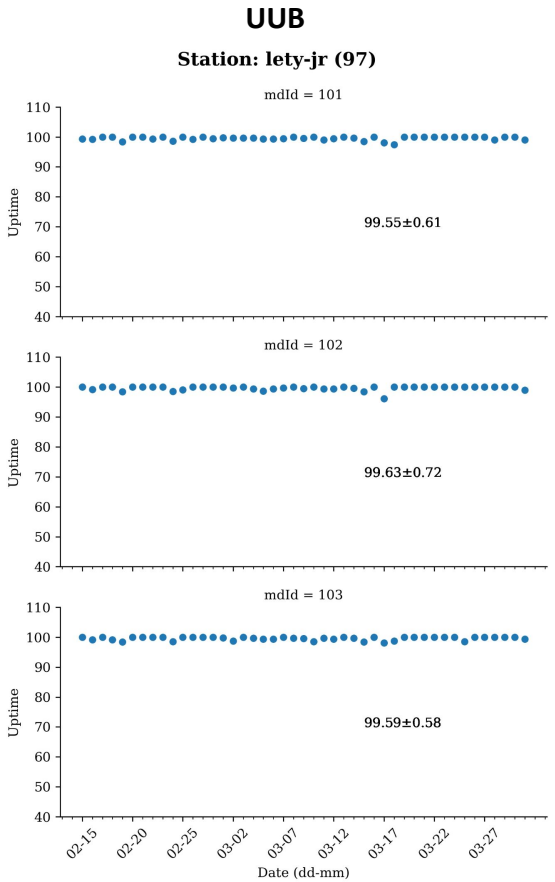
Example:

- Position: Lety jr (97)
- UB ⟶ UUB: 13/02/2023
- **Total uptime per module**

UB ⟶ UUB

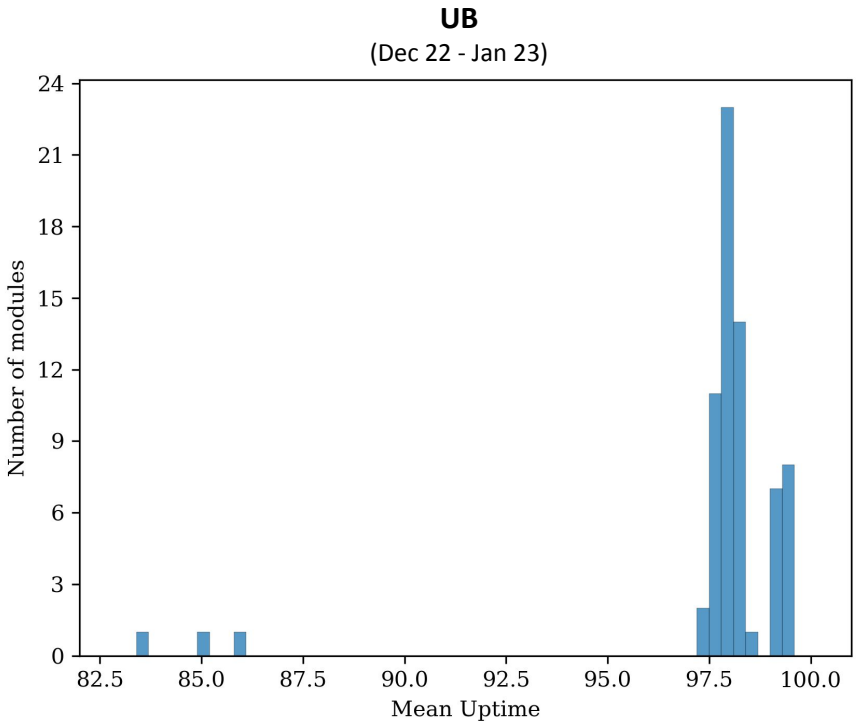
higher mean value and
lower dispersion
for total uptime

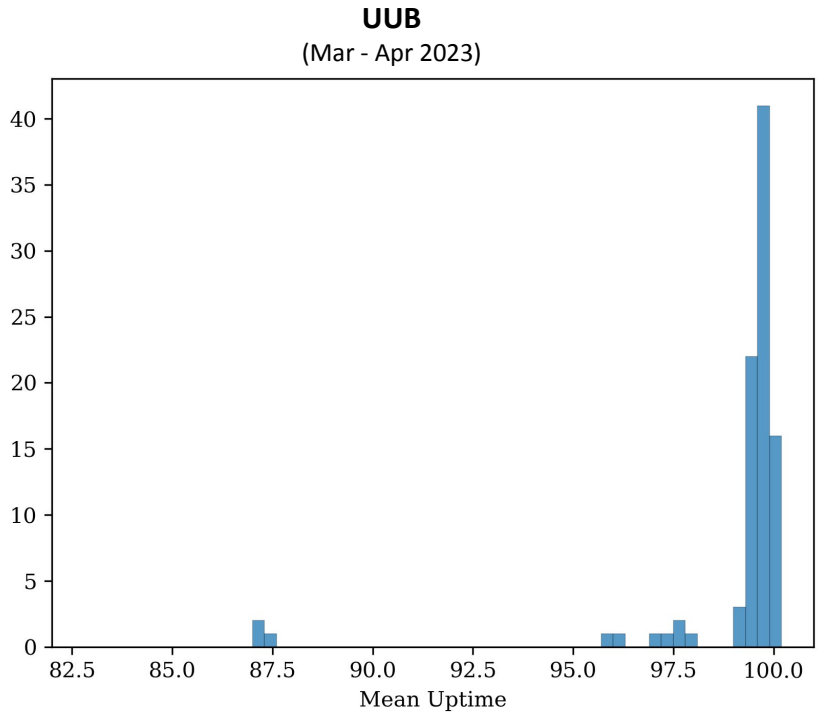




Total UMD uptime per module

Distribution of mean total uptime per module





General improvement of UMD uptime with UUB installed

Time evolution of UMD *uptime*

Time evolution of total *uptime* for the **whole array**

For each day:

- calculate the mean *uptime* over counters and determine the error of the mean
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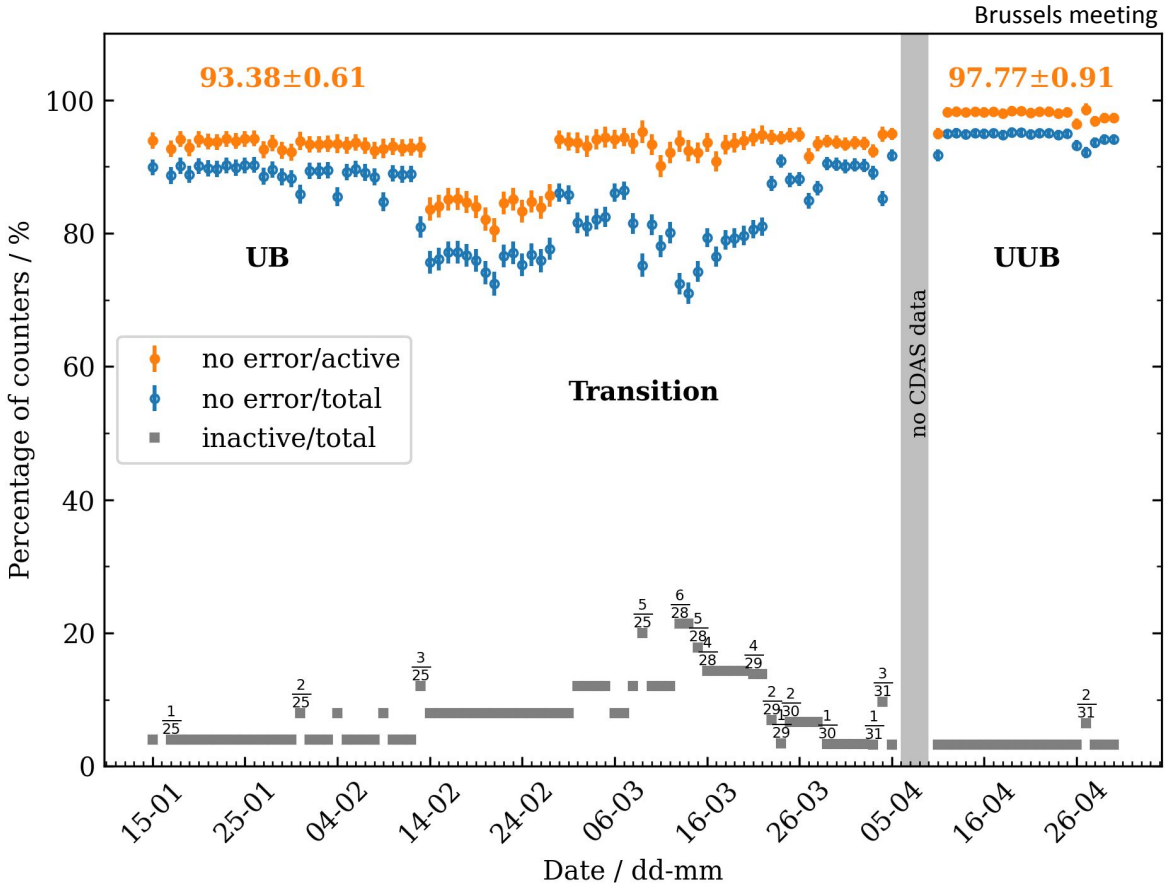
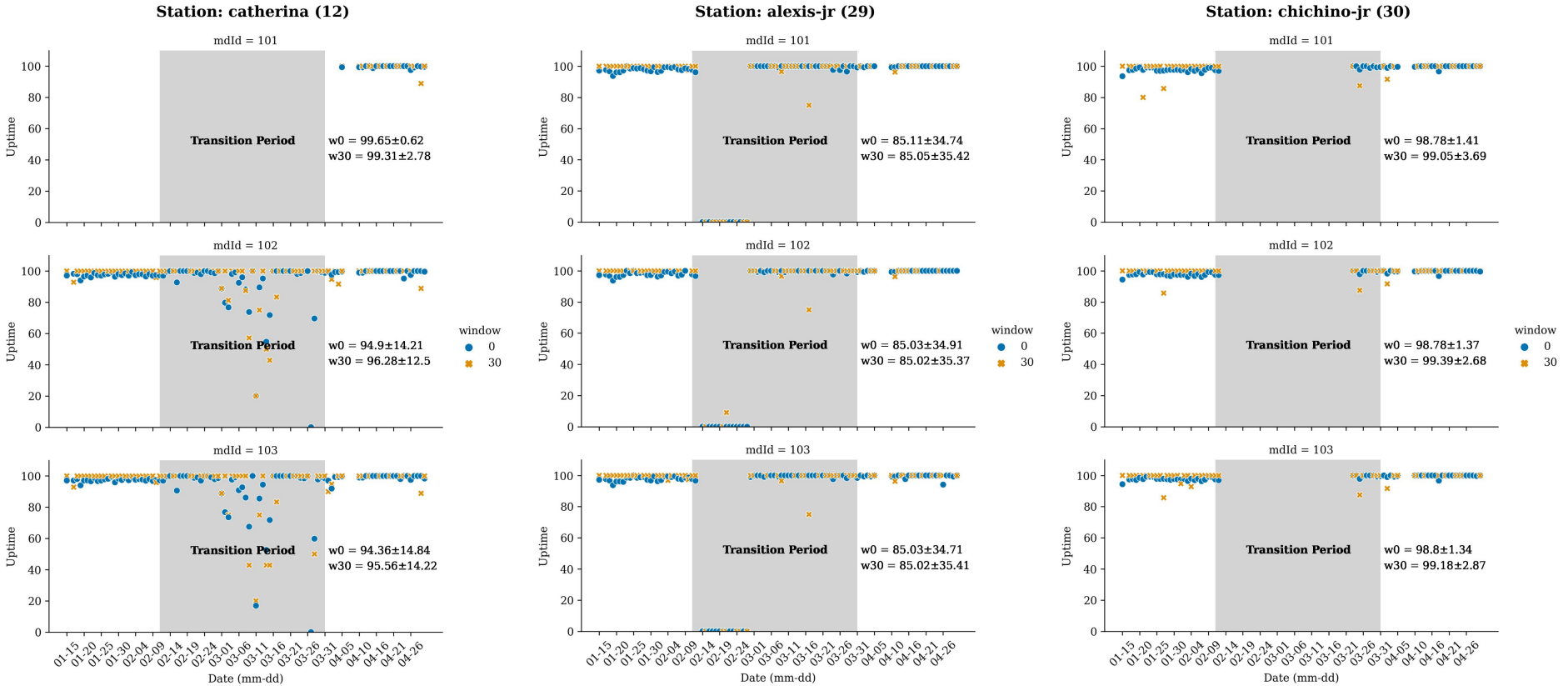
Stable performance over time



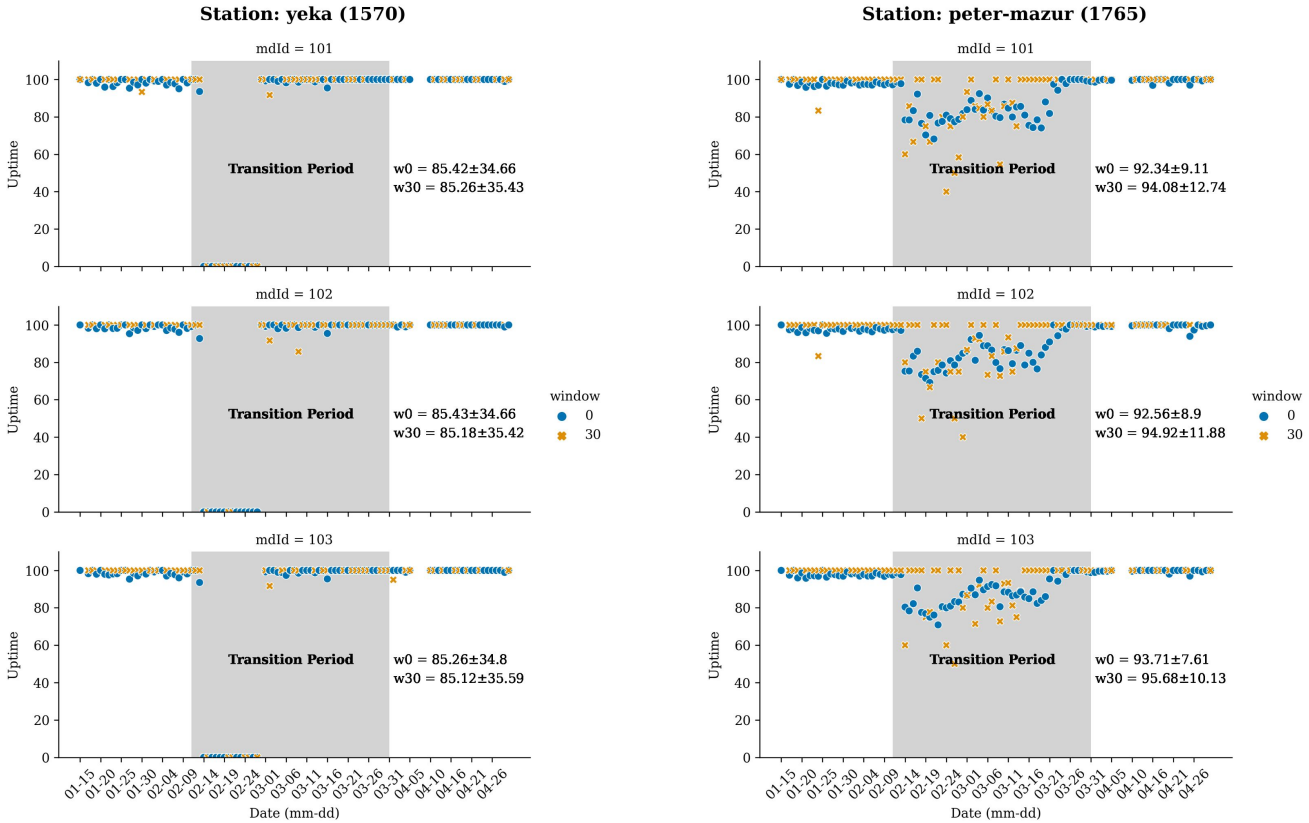
Stations with issues during the transition period

UUB installed 13-02



Stations with issues during the transition period

UUB installed 14-02



Stations with issues during the transition period

UUB installed 06, 09-02