Bundesamt für
Kartographie und Geodäsie

Improvements of the SOS-W automatic scheduler for special campaign support

S.Riepl, A. Böer, C.Schade, T.Schüler

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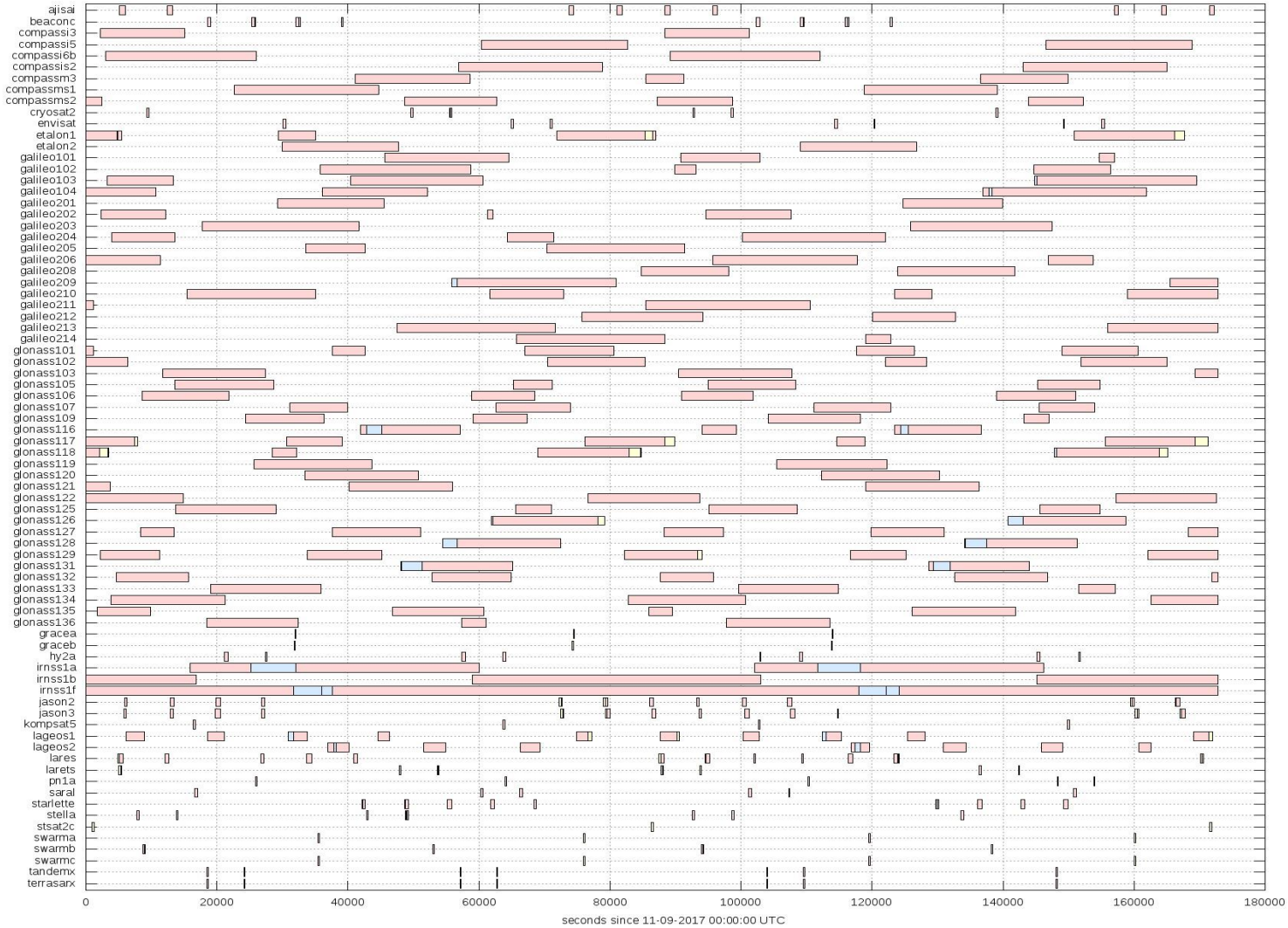
Geodätisches Observatorium Wettzell

Why automated pass scheduling ?

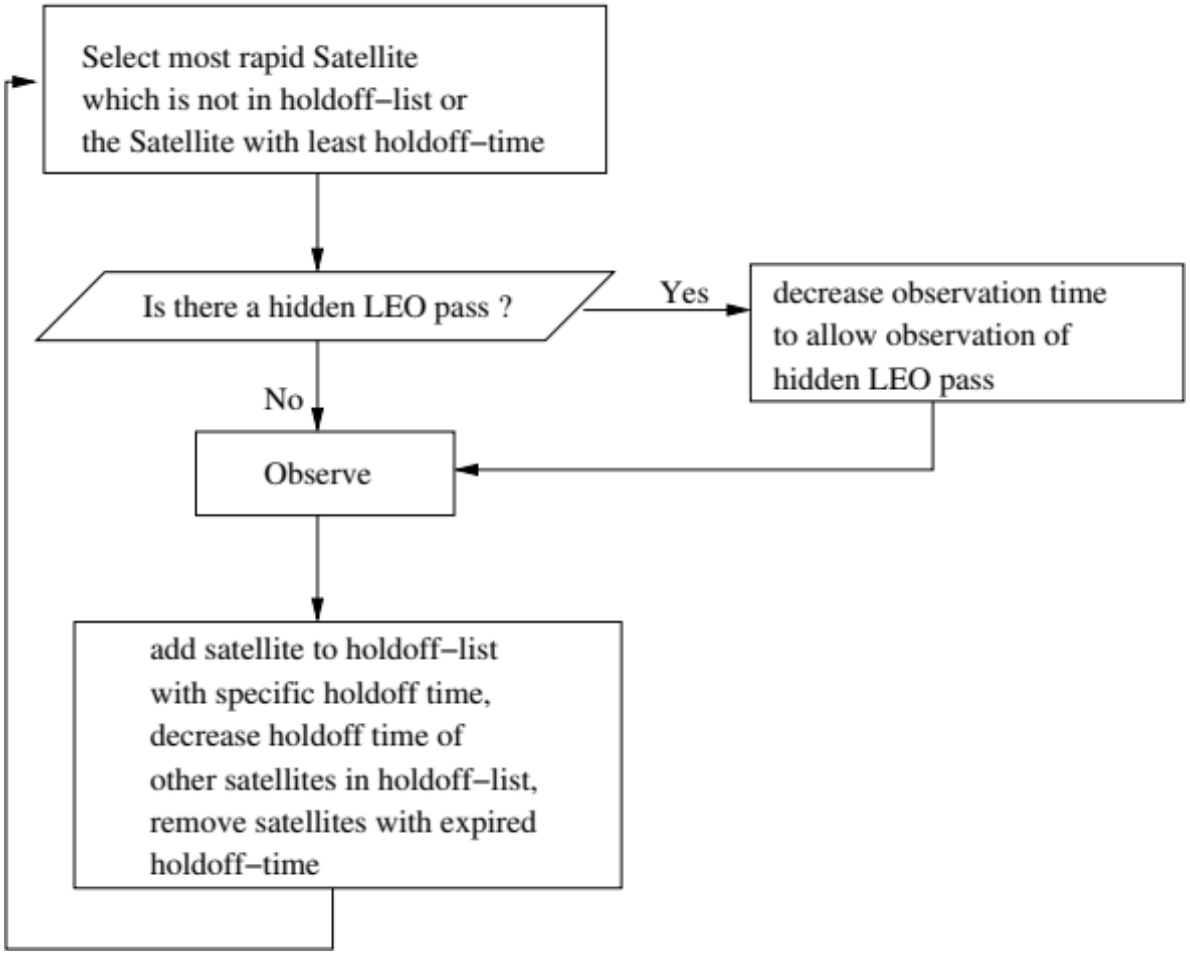


- Besides satellite acquisition, pass scheduling is the most tedious job

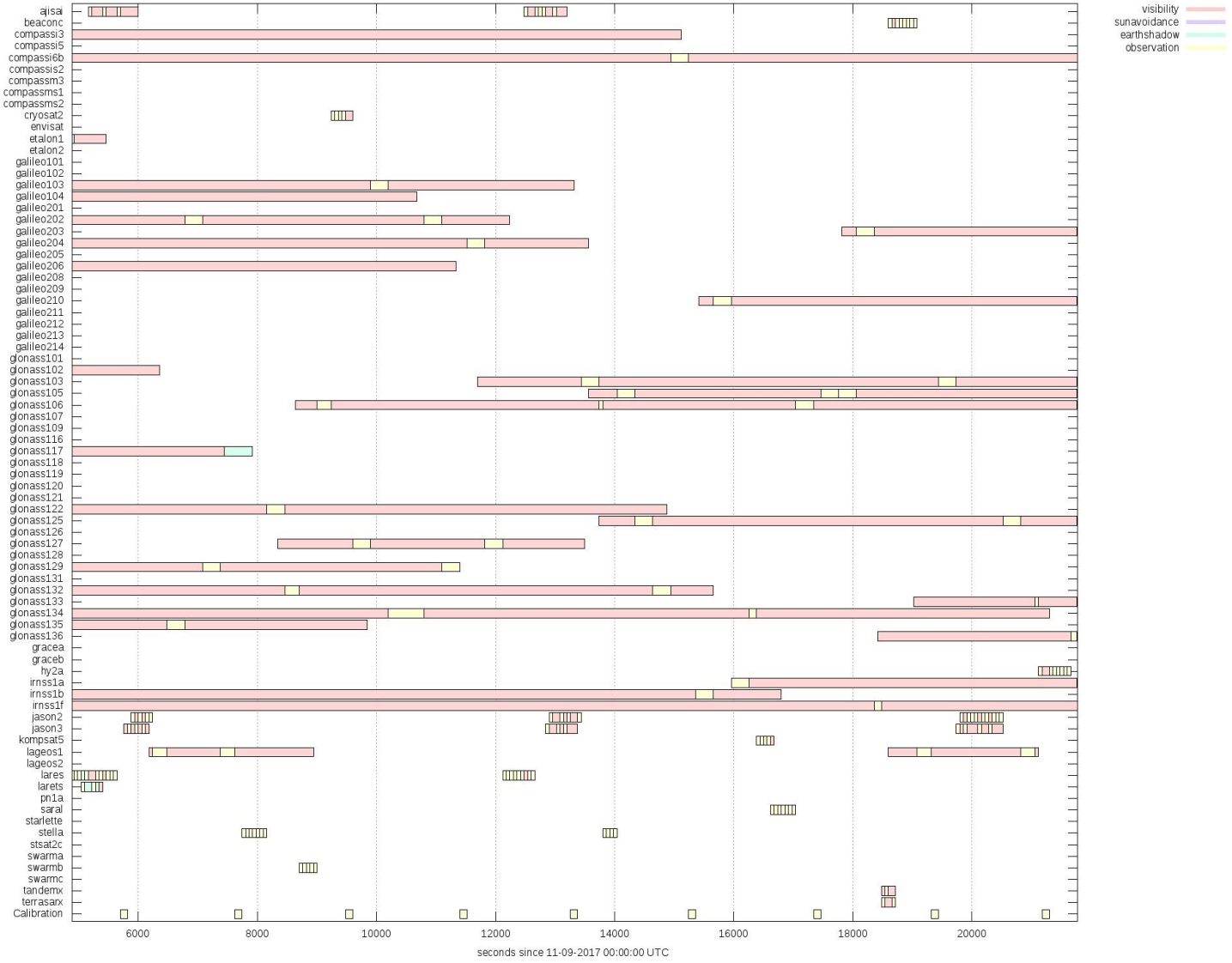
Pass scheduling parameters

- Minimum observation time (for SOS-W 60 seconds, including pass switch time)
- Minimum elevation angle (20 degree)
- Sun avoidance and earth shadow encounters (for scheduling of light curve measurements)
- Target specific observation time (normal point window)
- - for geodetic targets 6 normal point windows per pass are allocated,
- observing session is terminated if maximum number of observations
- is reached
- - LEO targets have highest priority to avoid hidden passages
- System performance is governed by minimum observation time

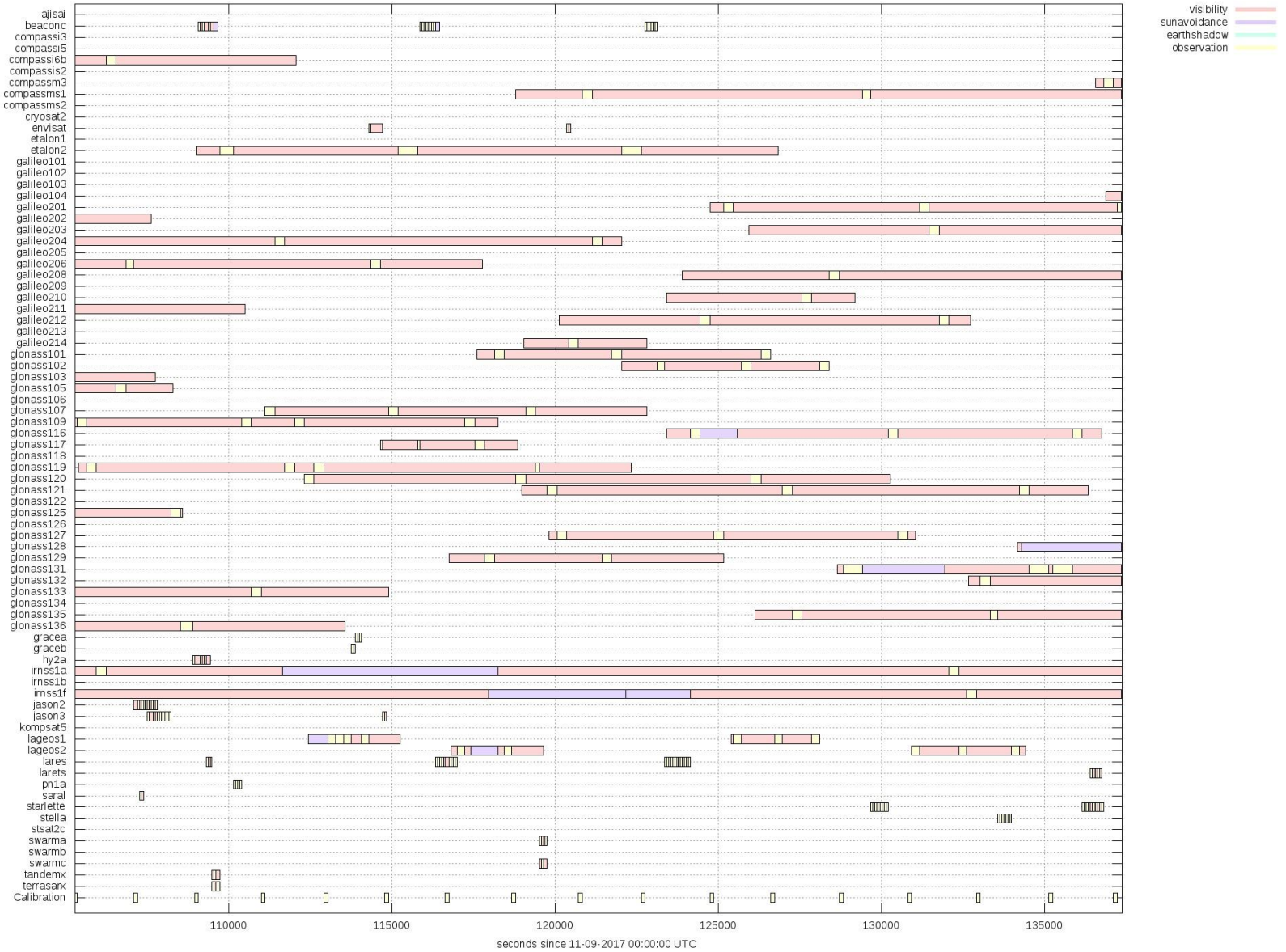
Pass scheduling algorithm



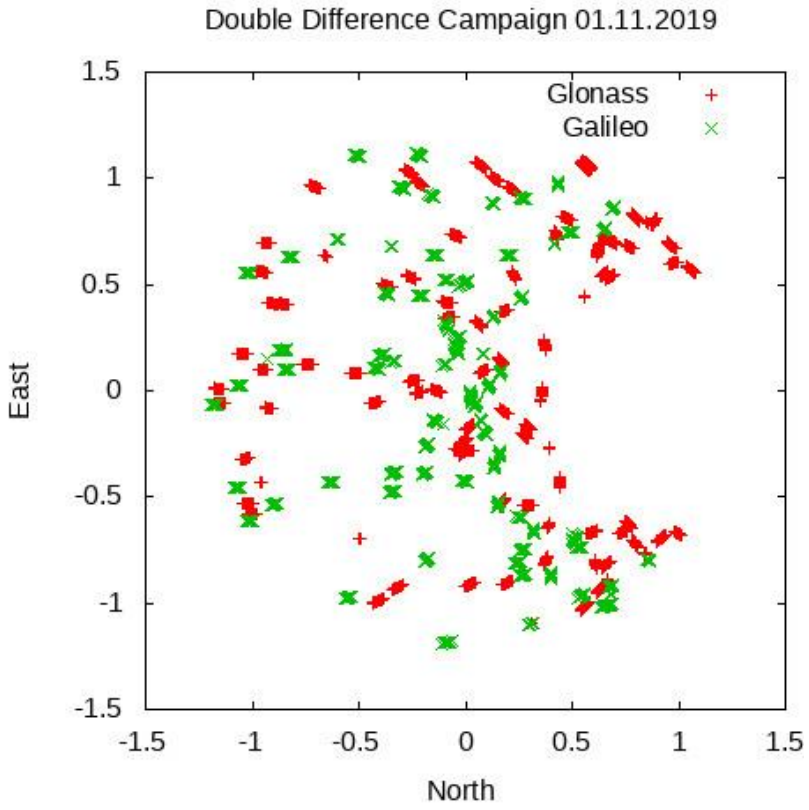
Interleaving features

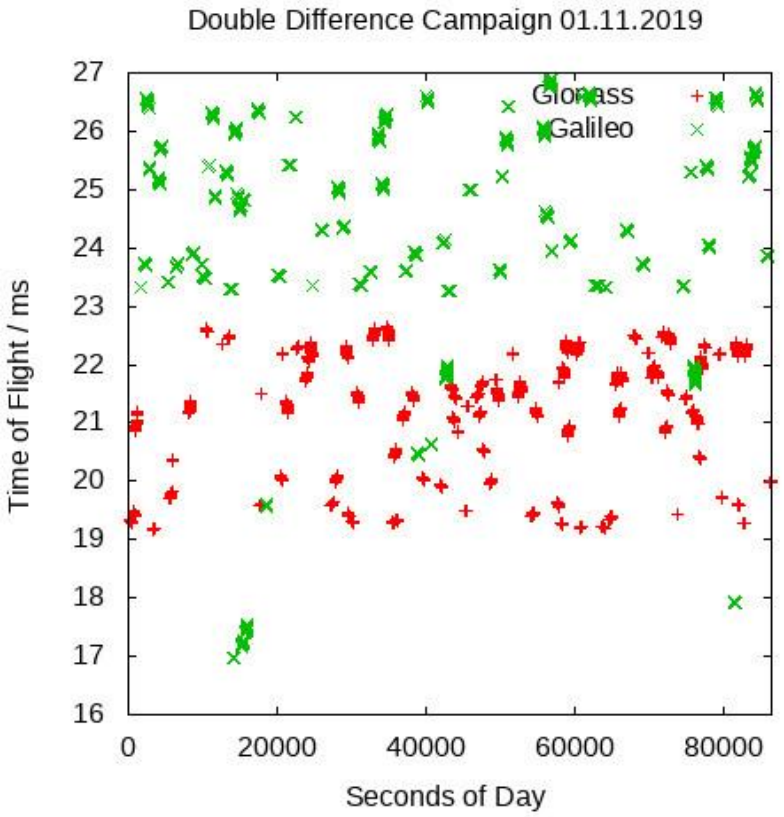


Interleaving features (2)



Pass scheduling algorithm – typical distribution of GNSS observations

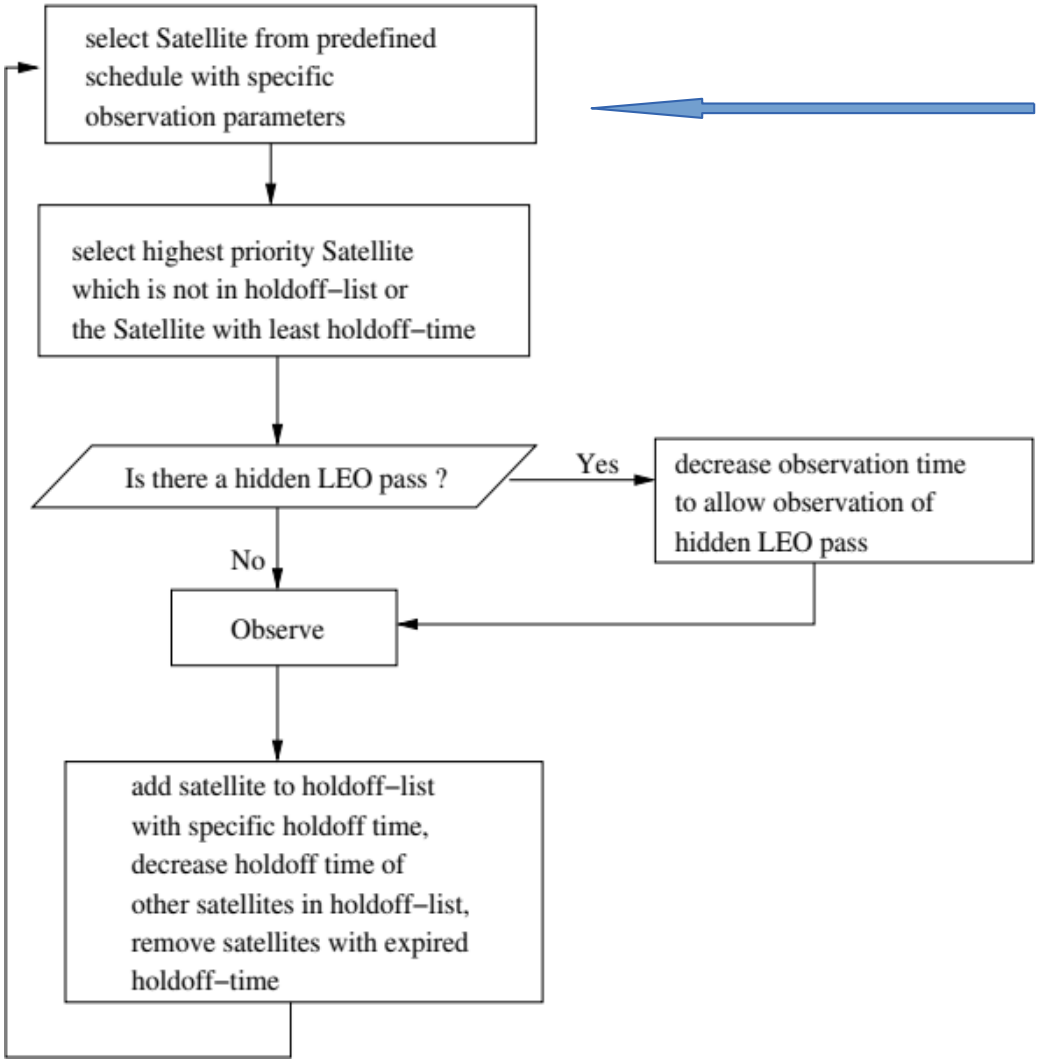




SUCCESS Campaign Requirements

Campaign duration: 2019/05/12-2019/06/02
Main Tasks:
- Eclipsing satellite passes: Observations of Galileo 102 and 220 satellites during eclipse. Continuous observation during eclipse phases is encouraged (collection of NPTs with low sample rate is also possible). Furthermore it is suggested to start ranging at least 5-10 minutes before the eclipse. If possible, collect a long pass segment of the pass during which the eclipse is taking place (description see below, selected eclipse passes are 5 -7 hours long).
- Long pass segments: Collect one normal point of the above Galileo satellites every 15 minutes, for the whole pass (as long as possible).
- Simultaneous observations: Two or more stations observe the same Galileo satellite simultaneously for e.g. 15-30 minutes continuously.

Pass scheduling algorithm with predefined schedule

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2019-05-12 17:20:00 2019-05-12 23:04:09 galileo102 10 300 900 600
2019-05-12 23:04:09 2019-05-12 23:07:00 galileo102
2019-05-13 16:14:00 2019-05-13 21:52:00 galileo220 10 300 900 600
2019-05-15 14:19:00 2019-05-15 14:28:00 galileo102 10 300 900 600
2019-05-15 15:45:00 2019-05-15 21:15:00 galileo102 10 300 900 600
2019-05-17 19:12:00 2019-05-18 00:27:18 galileo220 10 300 900 600
2019-05-18 00:27:18 2019-05-18 00:29:00 galileo220
2019-05-19 18:35:00 2019-05-19 23:57:15 galileo102 10 300 900 600
2019-05-19 23:57:15 2019-05-20 00:02:00 galileo102
2019-05-20 17:30:00 2019-05-20 22:51:52 galileo220 10 300 900 600
2019-05-20 22:51:52 2019-05-20 22:59:00 galileo220
2019-05-22 17:01:00 2019-05-22 22:22:34 galileo102 10 300 900 600
2019-05-22 22:22:34 2019-05-22 22:27:00 galileo102
2019-05-23 14:21:00 2019-05-23 14:27:00 galileo220 10 300 900 600
2019-05-23 15:53:00 2019-05-23 21:12:00 galileo220 10 300 900 600
2019-05-25 13:39:00 2019-05-25 13:58:00 galileo102 10 300 900 600
2019-05-25 15:24:00 2019-05-25 20:35:00 galileo102 10 300 900 600
2019-05-27 18:41:00 2019-05-27 23:49:00 galileo220 10 300 900 600
2019-05-29 18:12:00 2019-05-29 23:21:00 galileo102 10 300 900 600
2019-05-30 17:05:00 2019-05-30 22:18:00 galileo220 10 300 900 600
2019-06-01 16:36:00 2019-06-01 21:46:00 galileo102 10 300 900 600
2019-06-02 13:41:00 2019-06-02 14:01:00 galileo220 10 300 900 600
2019-06-02 15:27:00 2019-06-02 20:31:00 galileo220 10 300 900 600
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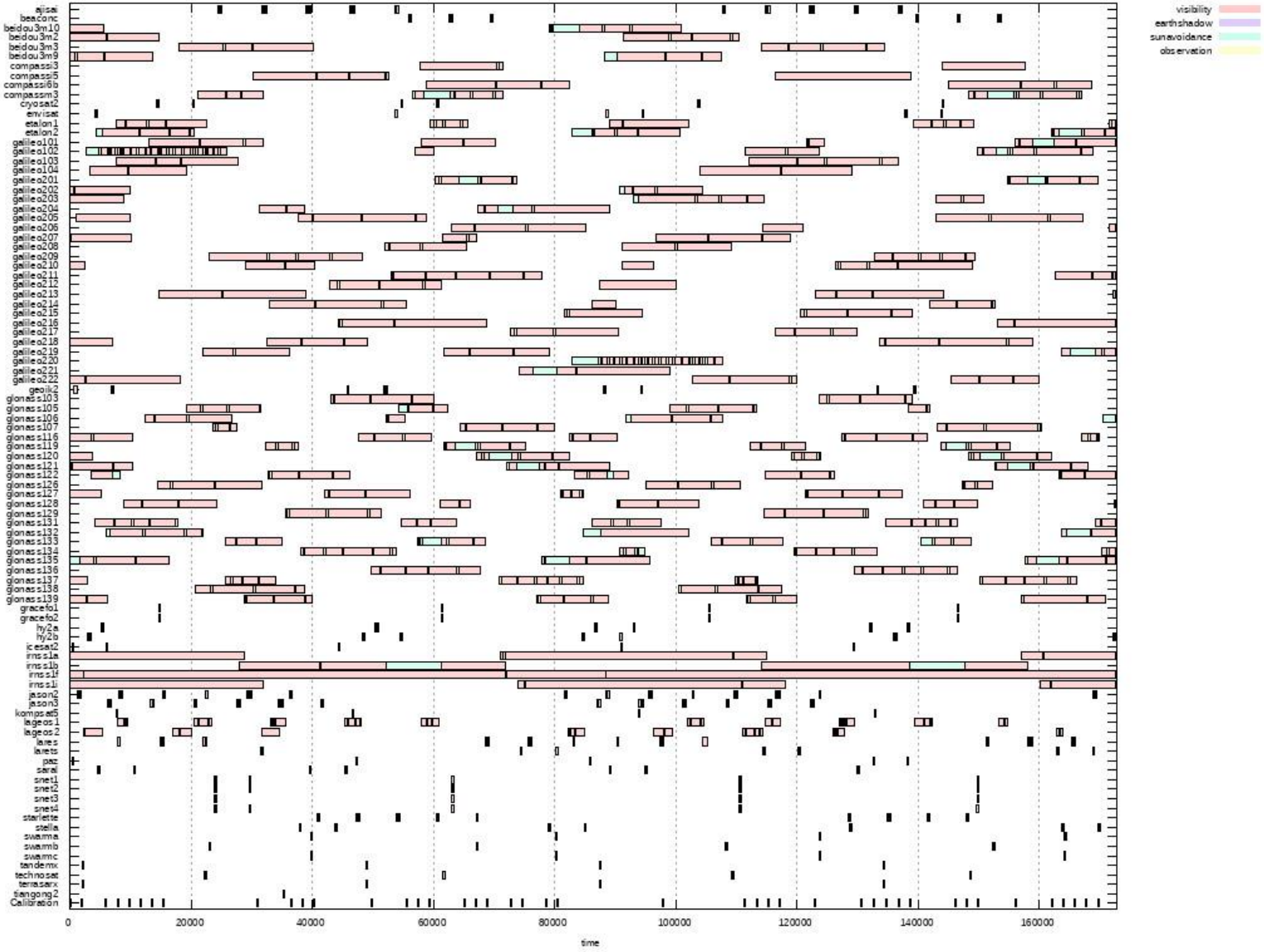
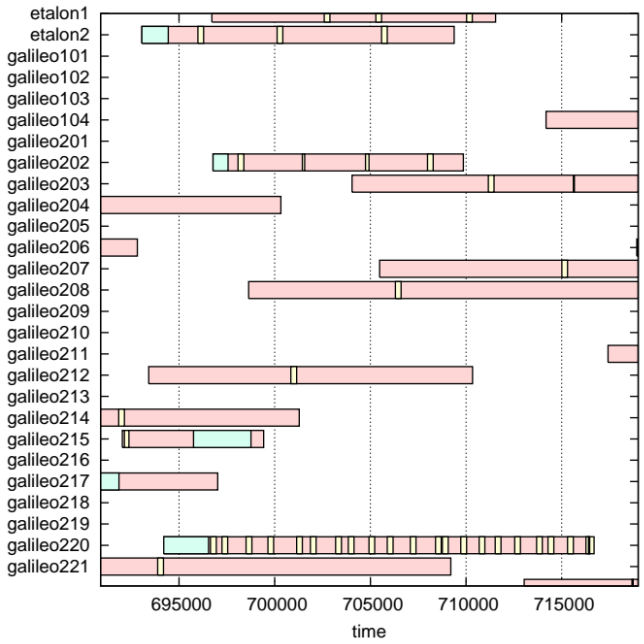
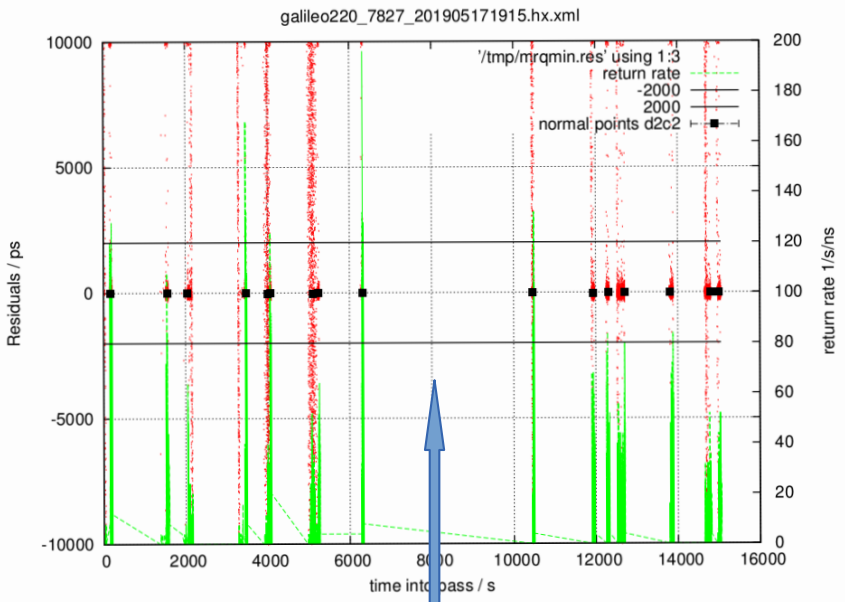
Partial Schedule Gantt Graph for SUCCESS Campaign



SUCCESS Campaign Observations





overcasted sky

Conclusion

- Automatic Scheduling optimizes observing geometry
- Automatic Scheduling provides objective target selection
- Automatic Scheduling does very nice pass interleaving
- Implementation of predefined schedule permits realisation of arbitrary tracking scenarios
- Special observation campaigns can be programmed in advance
- Predefined Scheduling will be used intensively in upcoming double difference campaigns