Automatic scheduling of satellite passages at the SOS-W

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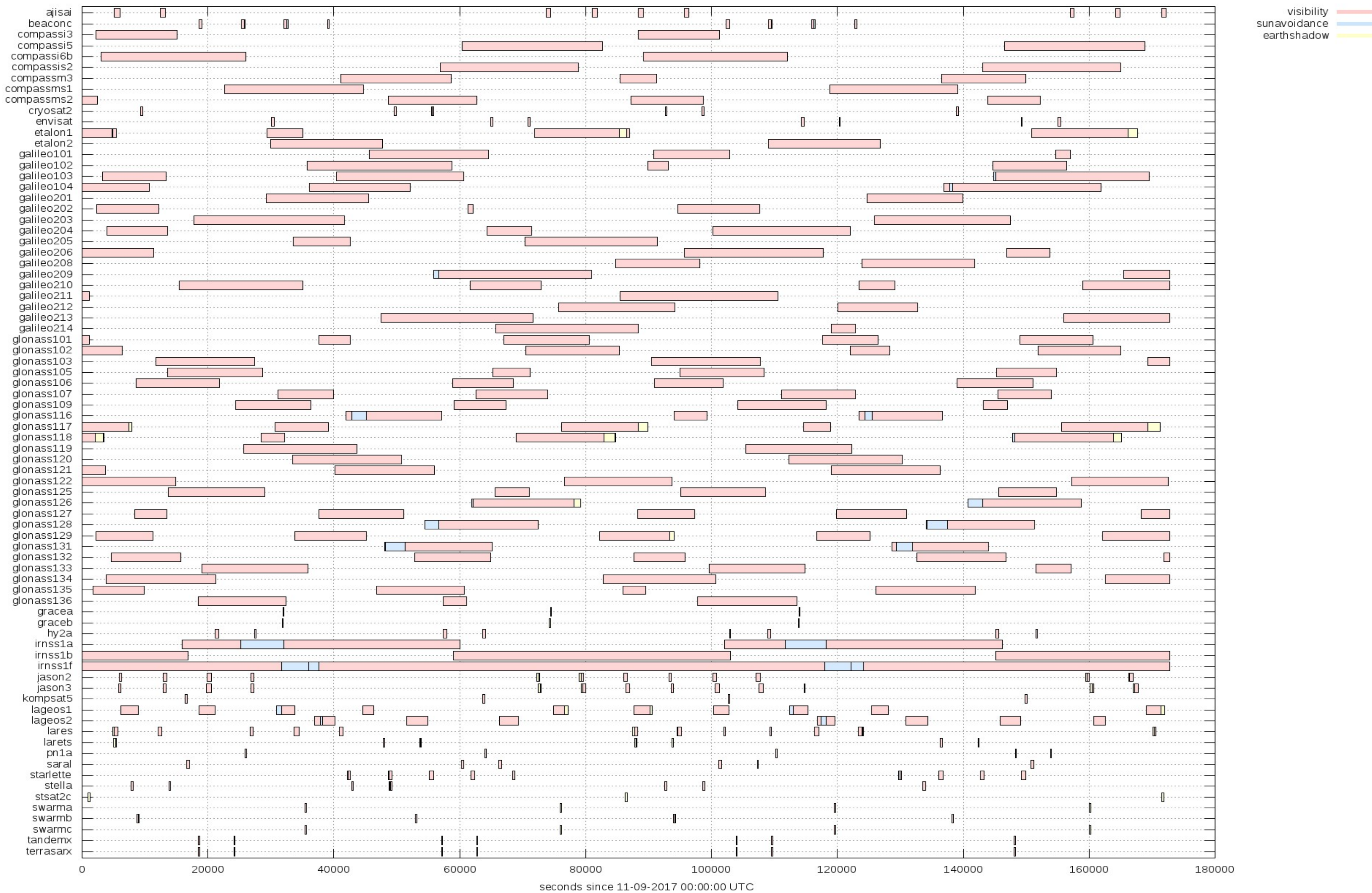
Why automated pass scheduling ?



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

Benefits of automated scheduling

- Doesn't forget calibration runs at predefined intervals
- Optimizes observing geometry
  - observing sessions allocated around RAA,TCA,SAA
- Objective target selection
- Keeps track of intented/successfull observations
- Is on time for rapid LEO passages
- Makes the most out of observing time

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 2 normal point windows are allocated
  - LEO targets have highest priority to avoid shadowing of passages
- System performance is governed by minimum observation time

Pass scheduling algorithm

- If calibration is expired, schedule calibration run.
- Sort visible and not observed passes by speed in azimuth and elevation, allocate specific observation time for target with maximum speed.
- Check if observation session “shadows” LEO passages, reduce target observation time or select first shadowed LEO passage if remaining observation time too short.
- Add target to list with expiration time of 1/3 of length of passage. Targets in this “expiration” list are not scheduled again until expiration time vanishes or no other target is available.
- Carry out observation.
- Select new target with advanced time.

Tasks to be done within minimum observation time

- Setup telescope, eventtimer and transmit receive unit with target parameters
- Determine actual noise level, if low enough continue
- Start pointing spiral search
- Stop spiral search if signal in one histogram bin has reached triggerlevel
- Perform 4-step pointing optimization and attenuate if required
- Observe at least for the minimum observation time or specific normal point window then switch to next target
- Starlette acquisition video

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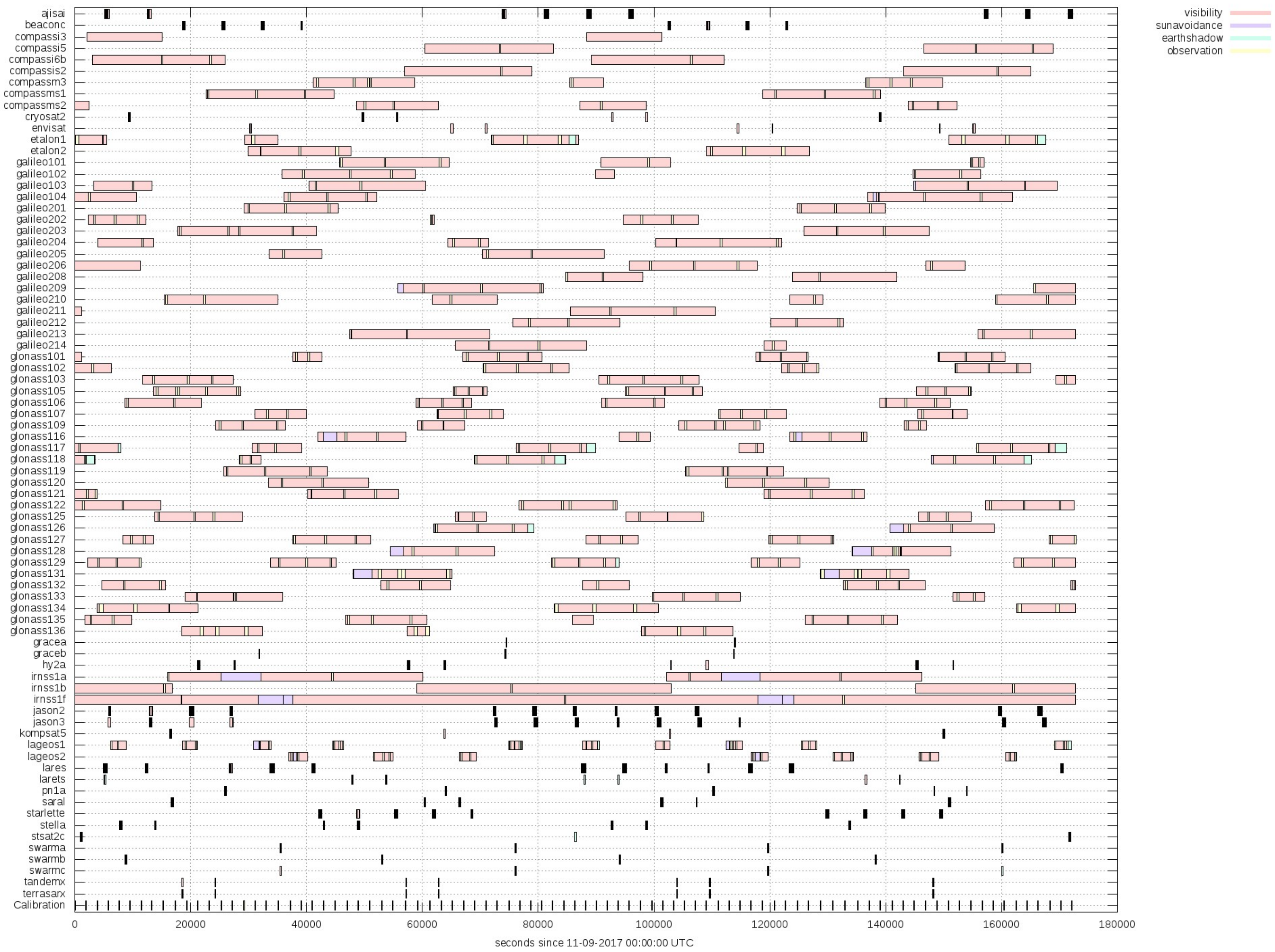
Schedule Gantt Graph



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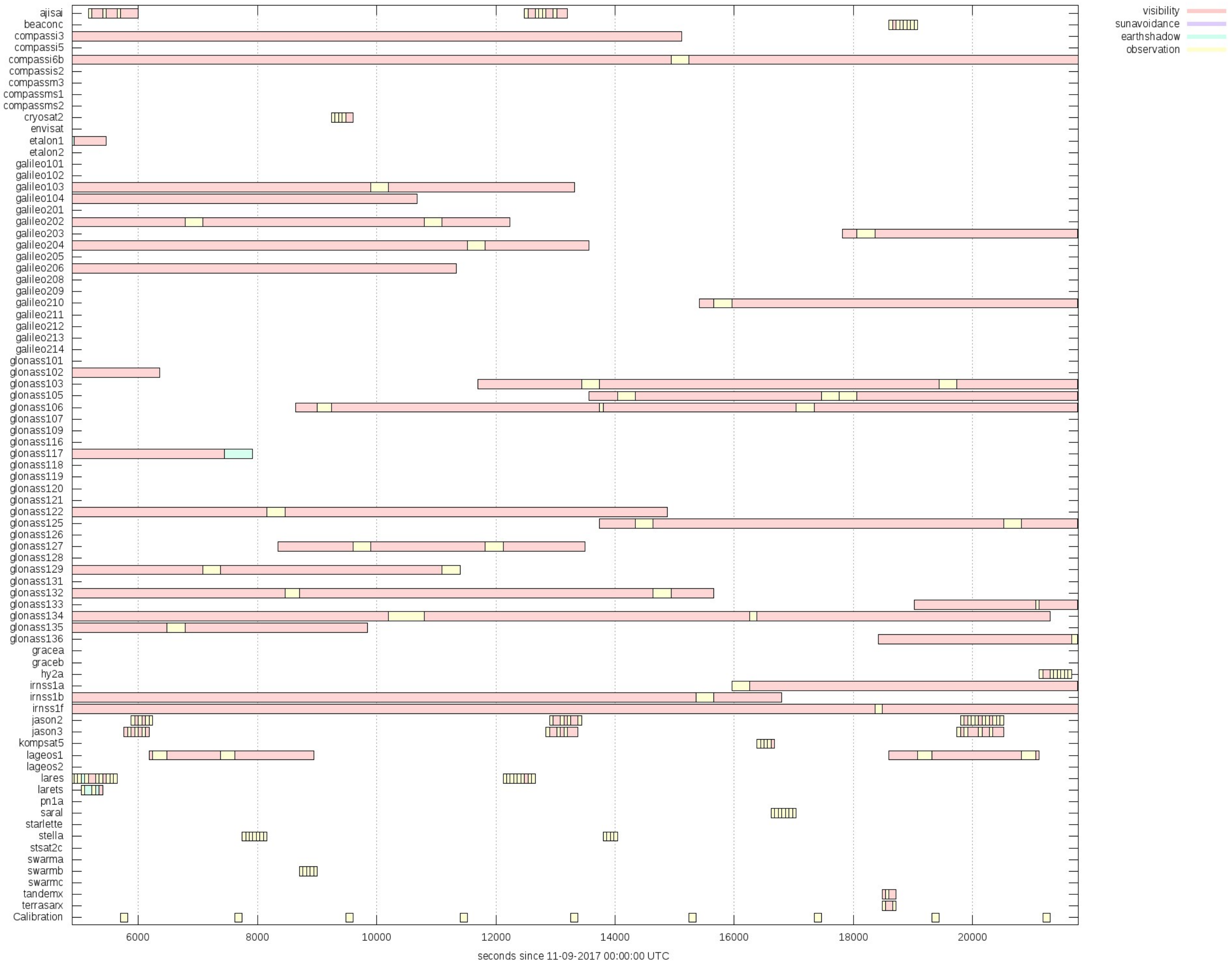
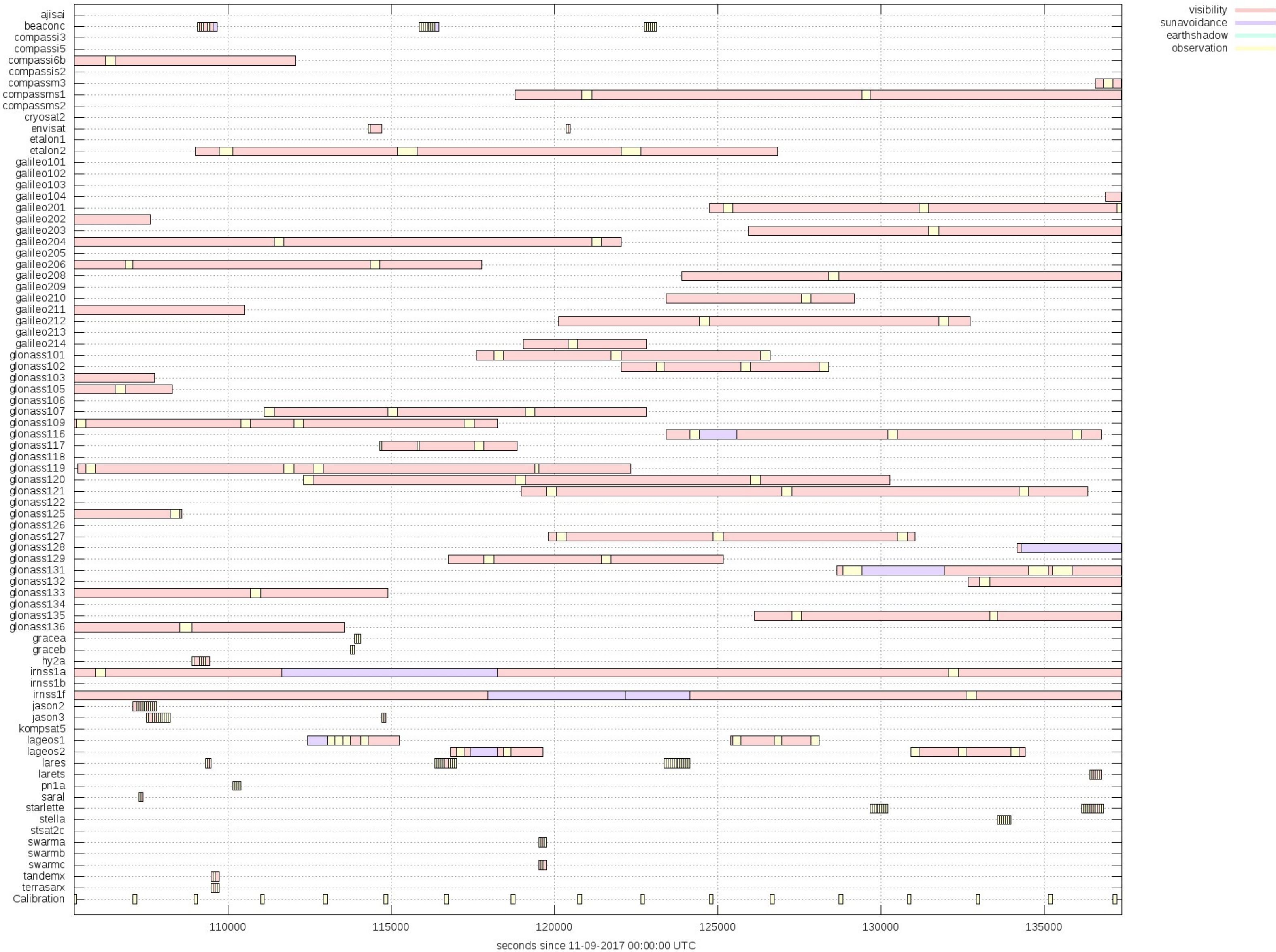
Interleaving features



Interleaving features (2)



How many missions can we support ?

- Currently 78 missions plus calibration (every 30 min. for 2 min.)
- 7 geodetic missions with at least 6 normal point windows or 3 times minimum observation time per pass
- 3 Glonass satellites in special campaign (6 normal point windows per pass)
- This workload requires 1743 minutes observation time per day

  → the system is allready overloaded

  → good to have two SLR systems on site
- Cloudy sky conditions and air craft safety shut offs are the main factors corrupting the schedule and mission support

  → dynamic scheduling taking these factors into account is the way to go to optimize performance

  → this makes it hard to quantify mission support in practice