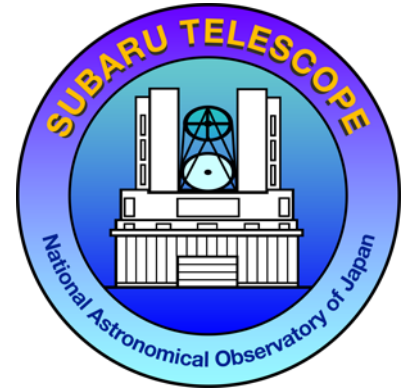


Subaru Users' Meeting FY 2017
NAOJ Mitaka Campus
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Telescope Status Report

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Summary

1. **Wind screen** incident was happened in April, 2017. We are studying about wind effect to the telescope.
2. **Mirror hatch**, which had troubles in 2016, was repaired in June and July in 2017. Our engineers are continuously working to reduce other potential risks.
3. **Primary mirror recoating** work was done from Oct. to Dec. The reflectivity is recovered up to 92 %.
4. The telescope is in a **“wear-out failure” phase** (故障摩耗期). Due to severe budgetary situation, we are already giving up some maintenance and update works. We are seeking to do self-manufacturing, however our man-power is also tight. We should look straight the severe reality.

1. Wind Screen Incident 2017





1. Wind Screen Incident 2017

- At around 12:40 am, April 10, 2017, wind screen became inoperable. It was discovered that the chain to drive the screen panels up and down and some of the panels of the windscreen fell.
- Observation at the night was cancelled immediately. Restoration work was done from April 10 to April 17. Removed and stabilized the fallen panels and chains. Observation resumed from April 17. After the incident, the windscreen is not operable. Therefore the telescope is operated without the windscreen for the time being.

1. Wind Screen Incident 2017



- Wind screen is a mechanism to prevent strong wind from directly hitting to the telescope.
- Activated the wind screen when wind speed outside is more than 7 m/s or wind speed at the top ring is more than 2 m/s.
- Telescope can be operated when wind speed is less than 14 m/s.
- We are now studying about wind effect to the telescope.

1. Wind Screen Incident 2017



1. Cut the chain



2. Remove the broken panels



3. Temporally fix



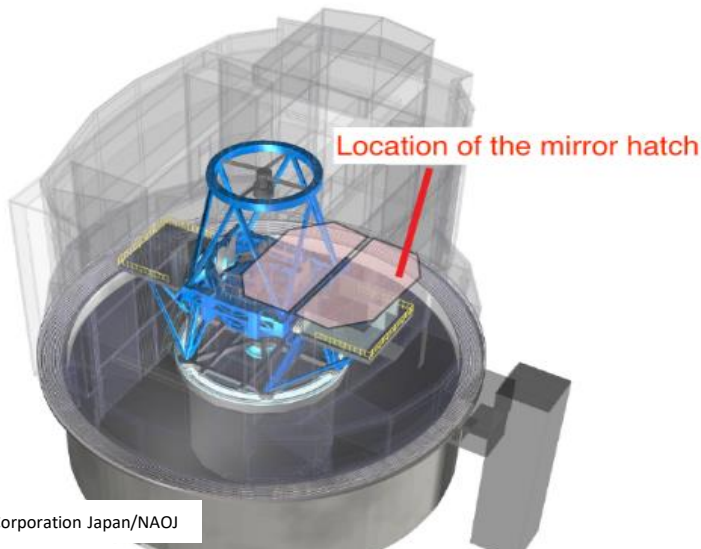
4. Dispose



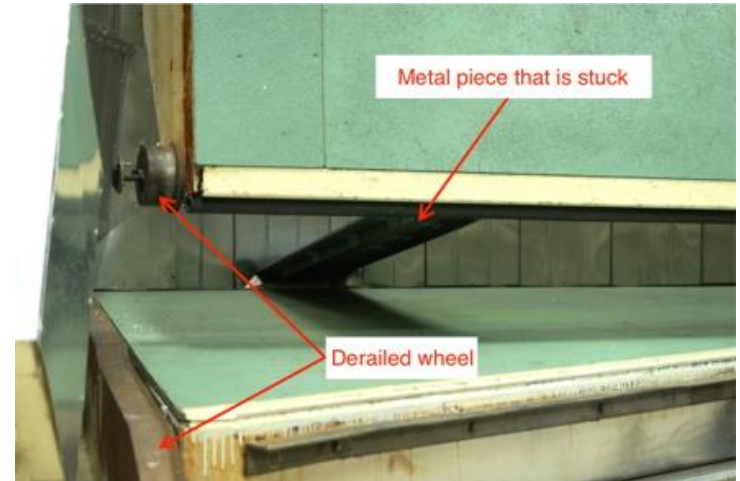
2. Mirror Hatch Incident 2016

- During the scheduled maintenance work of the telescope and the enclosure on Feb. 22, 2016, a mirror hatch stopped working when a metal piece was caught while being opened for testing. It was found that the wheel of the mirror hatch derailed and there are damages to the mirror hatch.

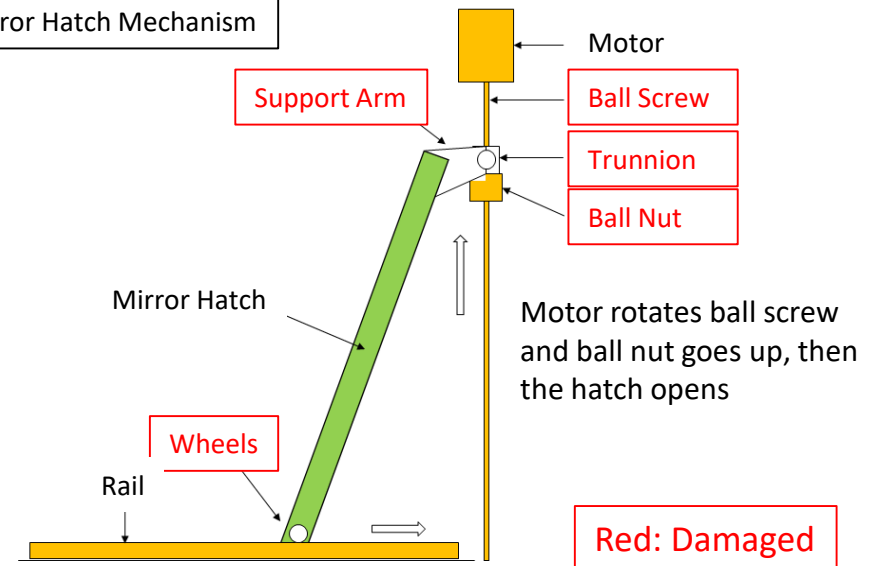
2. Mirror Hatch Incident 2016



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Mirror Hatch Mechanism



2. Mirror Hatch Repair Work

1. Cut the twisted arm



2. Weld a new arm



3. Cut a new hole



4. Install a new shaft



2. Mirror Hatch Repair Work



- Repeated various measurements and test movements to confirm reliability.
- Finally we confirmed the hatch was fully and safely operational in August 2017.



- We also found some potential risks both hardware and software on the mechanism during the repair work.
- We are continuously working to reduce those risks.



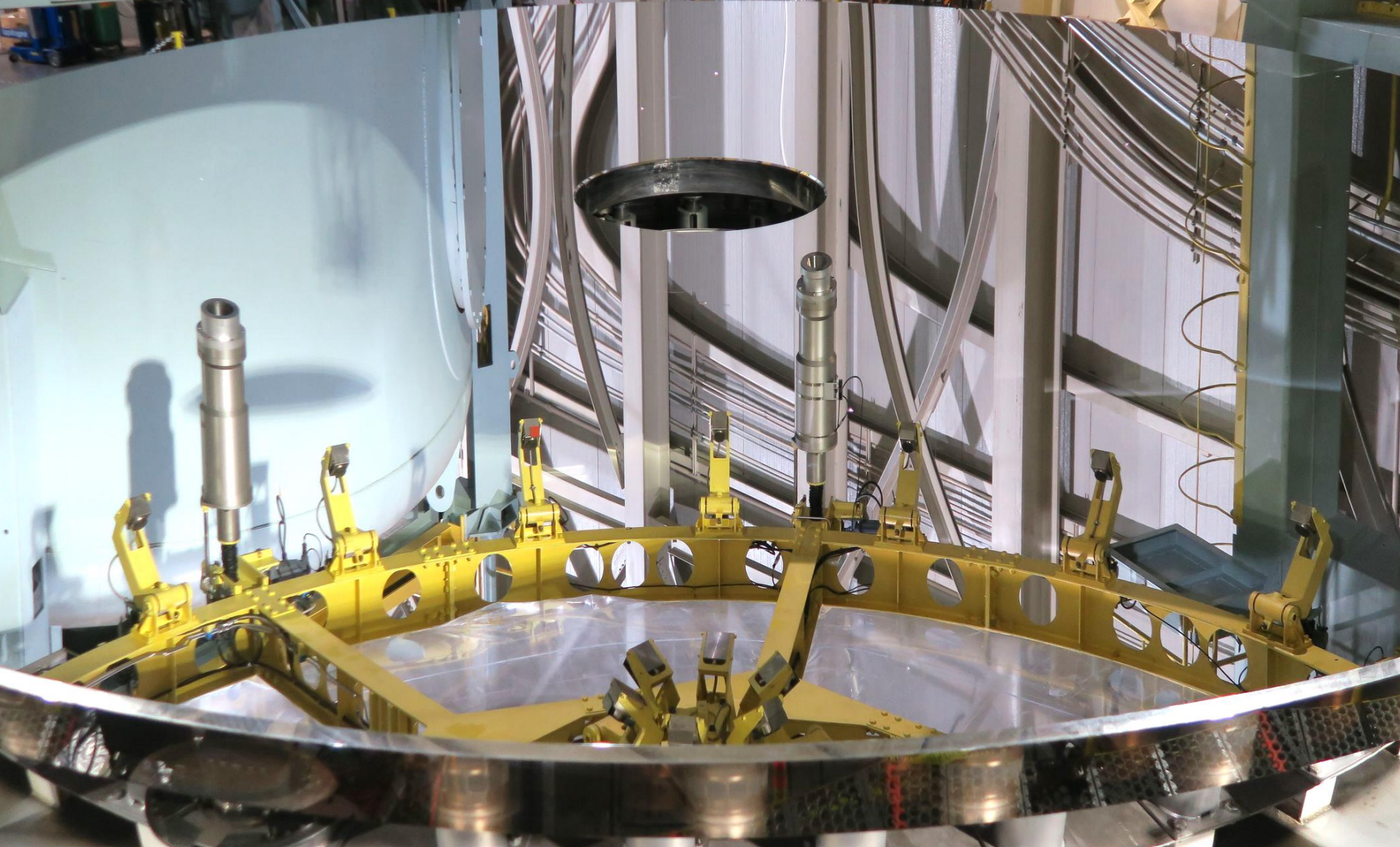
3. Primary Mirror Recoating

- The primary mirror recoating work was originally scheduled in summer in 2016, however, due to the mirror hatch incident, it was postponed.
- After mirror hatch repair work, we did the 8th primary mirror recoating work from October 2nd to December 14th.

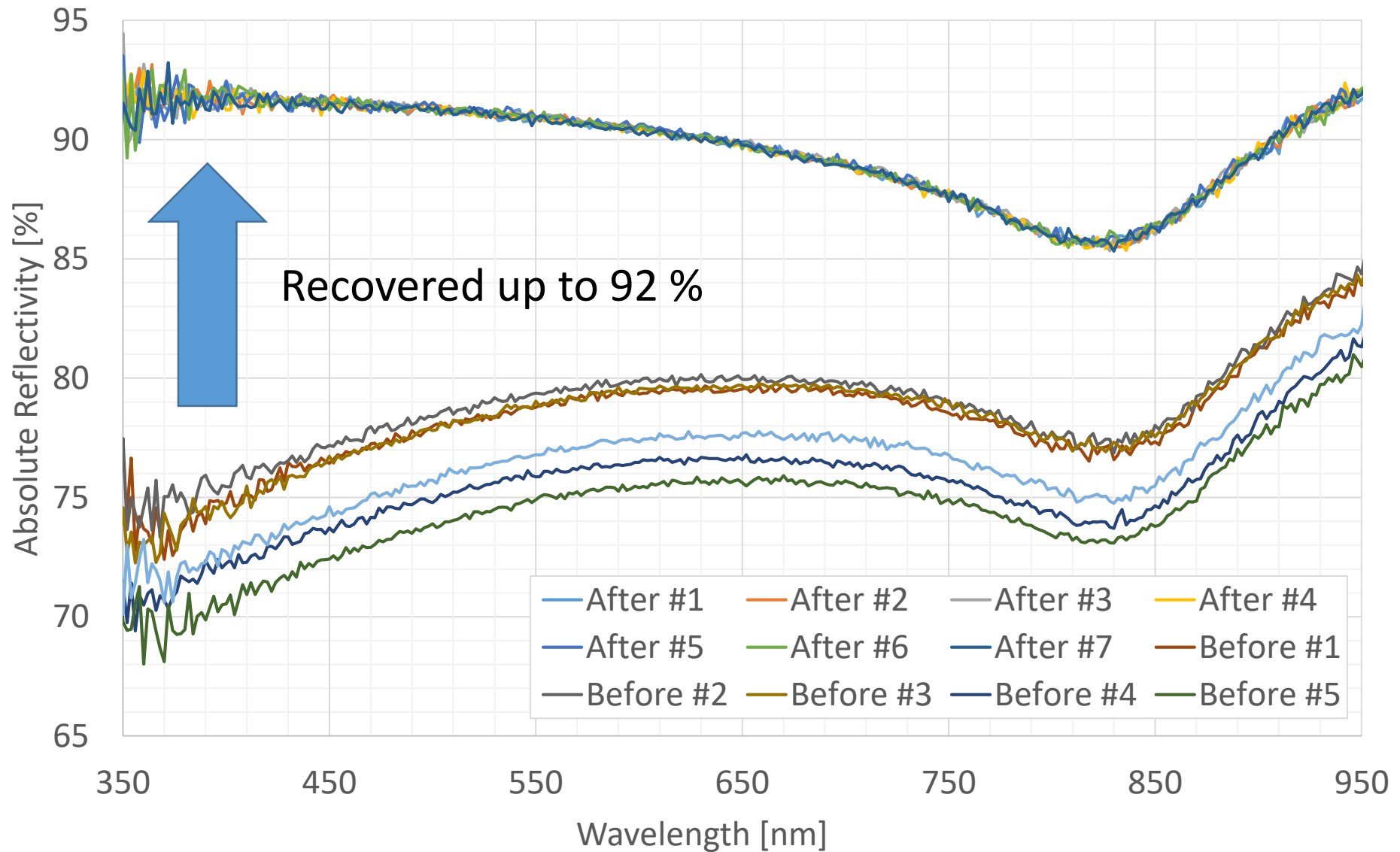
3. Before Cleaning

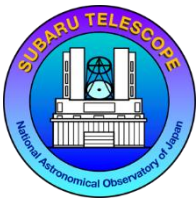


3. After Recoating



3. Primary Mirror Reflectivity





4. Telescope Troubles

- Single Event Upset (Unknown): 2 nights
- Wind Screen (Aging): 8 nights
- MLP1 Shutdown (Operational Error): 1 night
- Actuator ENC Alarm (Aging): 1 night
- Link Reset Issue (Unknown): 1 night

Cancel nights due to Telescope Troubles are only listed. Instrument/Software/Other troubles are not included.

Total 13 nights lost by the telescope trouble

* We have total 3.5 months downtime so this 13 nights are effectively 18 nights downtime for a normal year.

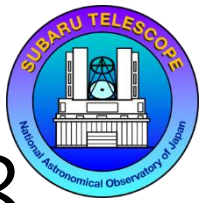
The telescope is in a “wear-out failure” phase (故障摩耗期). Troubles due to aging will be increased continuously.



4. Scheduled Works in 2018

- Feb: Annual Mechanical Maintenance
 - No downtime
- Apr: CIAX Maintenance
 - No downtime
- Aug and after: TUE hardware update
 - Special arrangement (or 1-week downtime?)
- Aug and after: Actuator CPU card replacement
 - 30-50 cards are replaced for test in the next year
 - (No downtime expected?)

Budgetary situation is really severe. Some maintenance and update works are already gave up or postponed.



4. Other internal projects in 2018

- Study of Programmable Logic Controller (PLC)
- Preparation for the telescope fully remote control
- Preventive maintenance using LOCOMOCO system
- Dome-rail flatness measurement
- Coolant water bottleneck resolve
- Study of mirror reflectivity degradation

We are seeking for self-manufacturing (内製化) to reduce any cost, however, our man-power is also tight to do these studies and for these new ideas.



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