
71st Virtual UNISEC–Global Meeting

LignoSat

First Wooden Satellite in the World

LignoStella
project

Soi Otani, Kyoto University



Brief Introduction



LignoStella
project

Soi Otani

Undergraduate in Aerospace Engineering, Kyoto
University

Joined LignoSat in May 2024 as a member of the
structure team



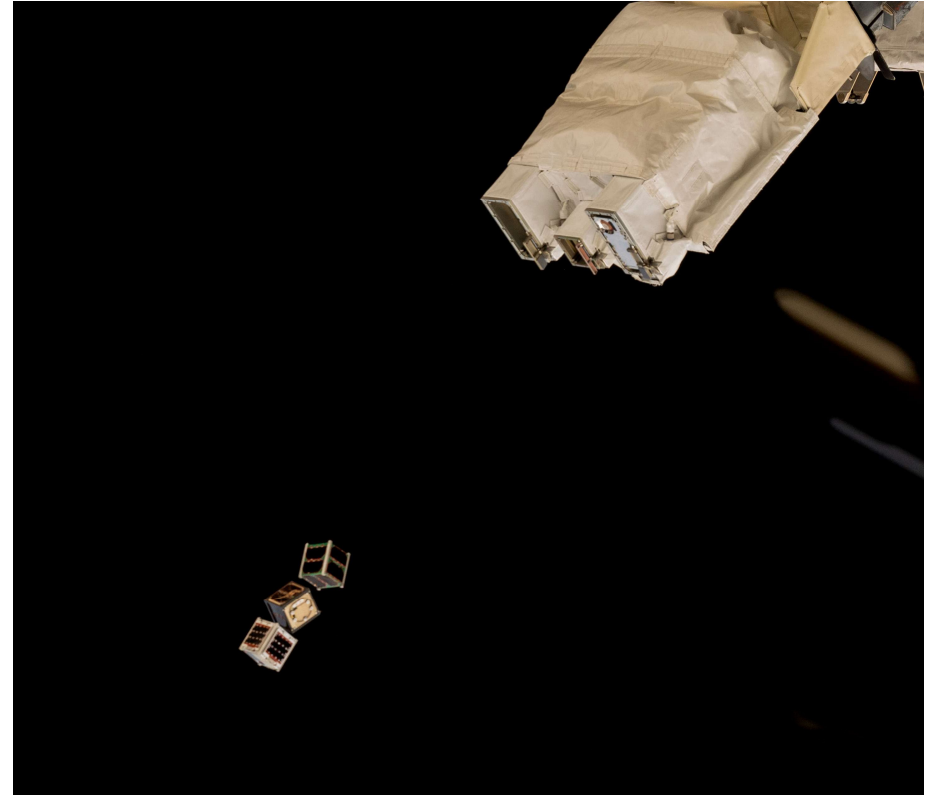


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About LignoSat

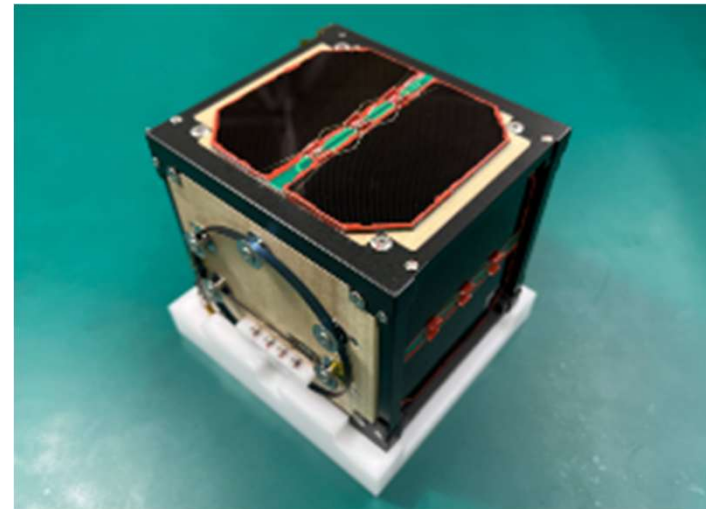


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Prof. Takao Doi was
appointed as visiting
professor at Ryukoku U
in 2025

LignoSat





About LignoSat



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What was the background of the world's first wooden satellite?

- Increase in satellites
- During atmospheric re-entry, alumina particles are generated
→ Potential for extreme weather, ozone layer depletion, and jet engine malfunction
- Sustainable satellite development
- Wood burns up during re-entry
- Japanese magnolia (Hoonoki, ホオノキ) was selected through vacuum exposure tests on the ISS



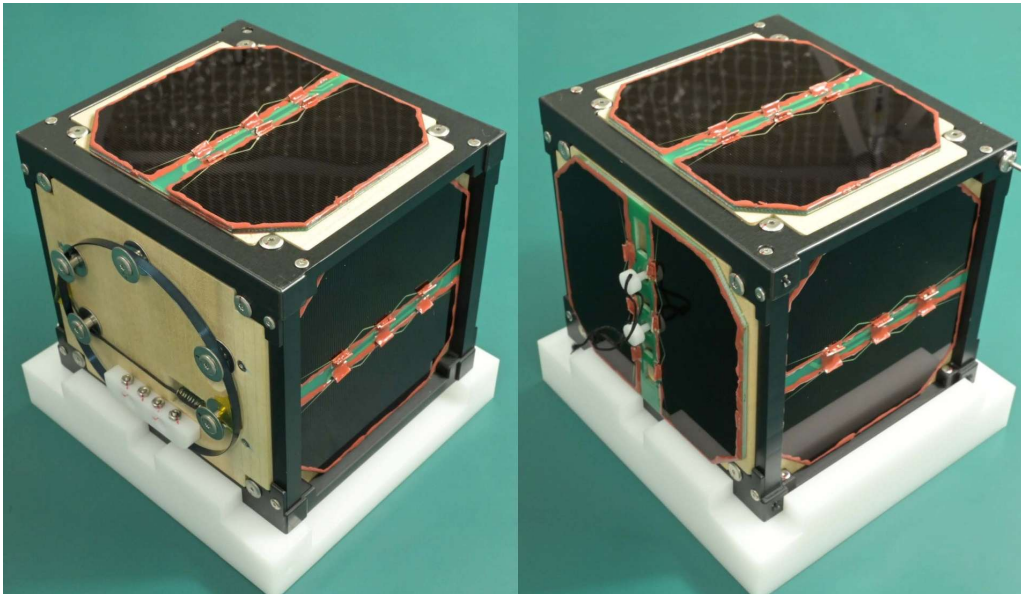
About LignoSat



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World's first wooden satellite

1. Measure strain in wooden panels
2. Measure internal temperature
3. Measure internal geomagnetism
4. Count SEU
5. Amateur radio mission



LignoSat Flight Model



About LignoSat



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8.15.2026

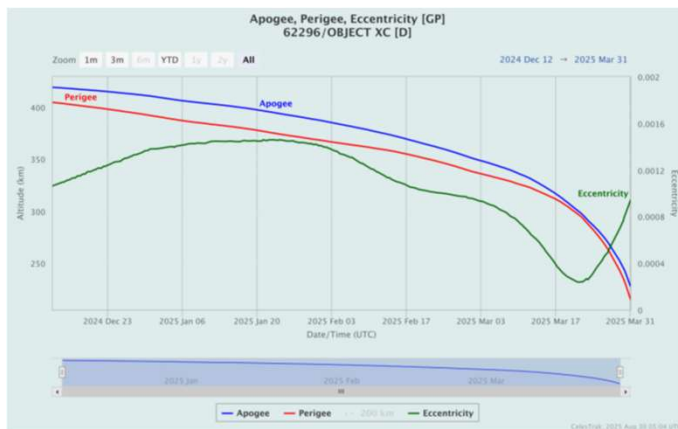
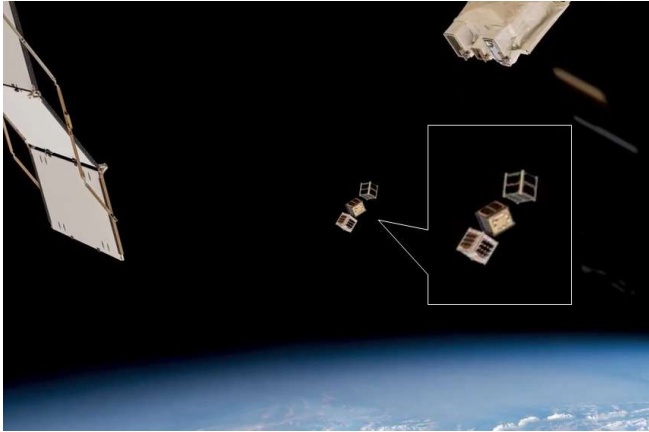
Soi Otani/Kyoto Univ.



About LignoSat



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December 9, 2024: Deployed from the ISS (J-SSOD #30)

April 4, 2025: Atmospheric re-entry

- Attempted to receive downlink signals over a total of 184 passes at the Kyoto University ground station
- No signals were received at any point prior to atmospheric re-entry



About LignoSat



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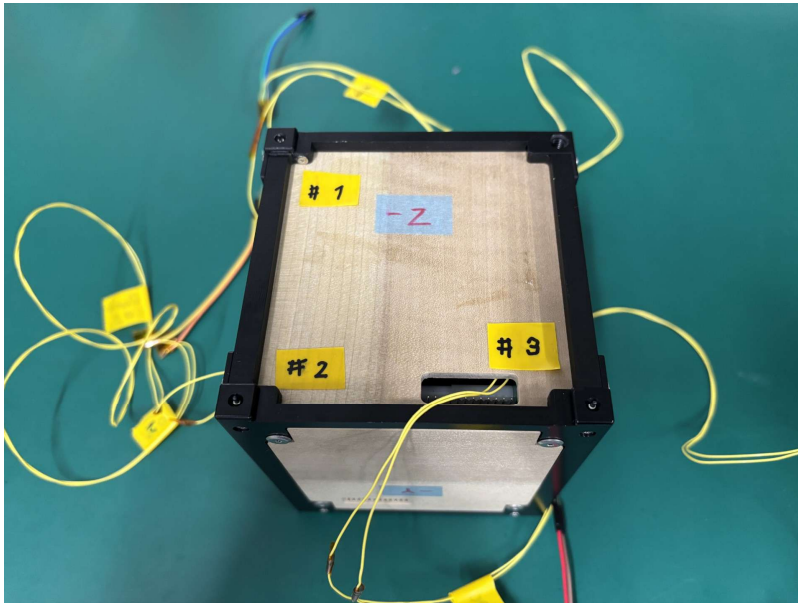


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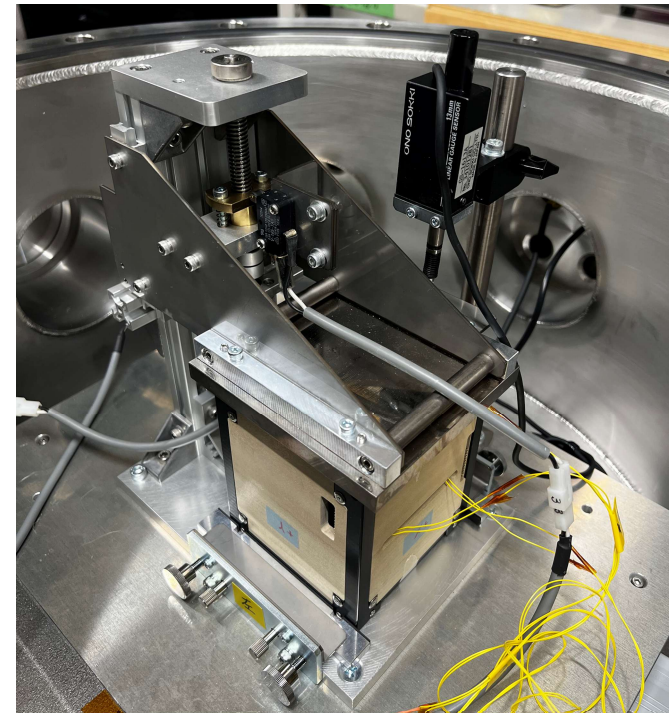




Deployment Switches



3 DepSw's. LED lights are connected to each switch.



The rig is placed inside a vacuum chamber. We monitored the displacement of each switch on release.

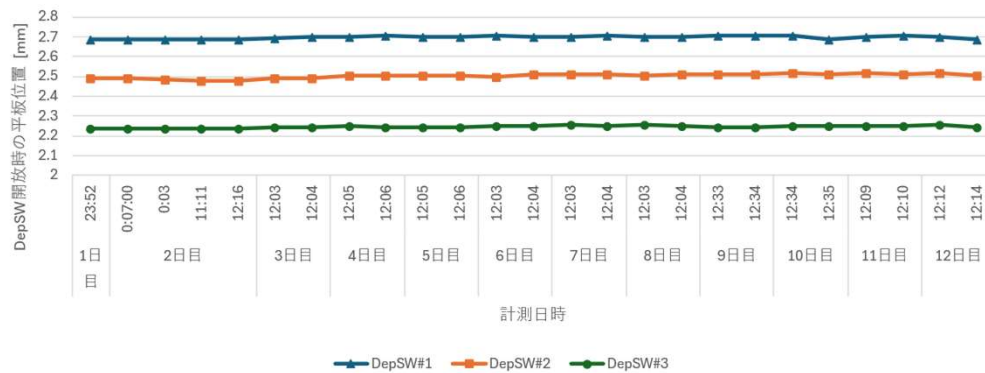


Deployment Switches



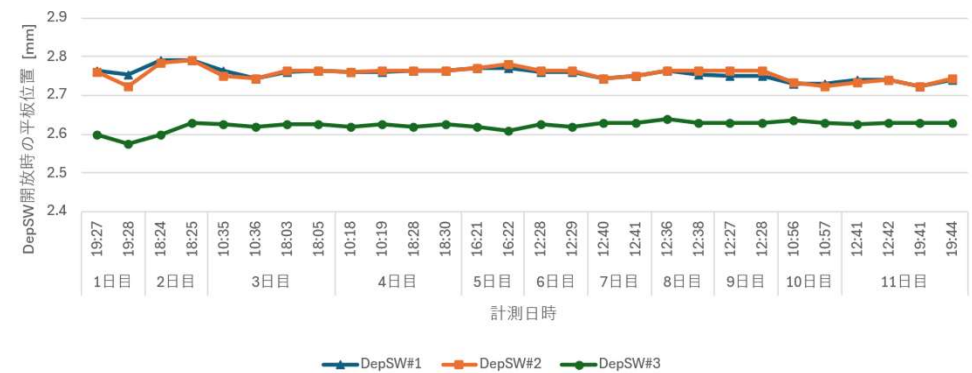
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DepSW試験（大気圧下）試験結果



12 days under atmospheric pressure

DepSW試験（真空中）試験結果



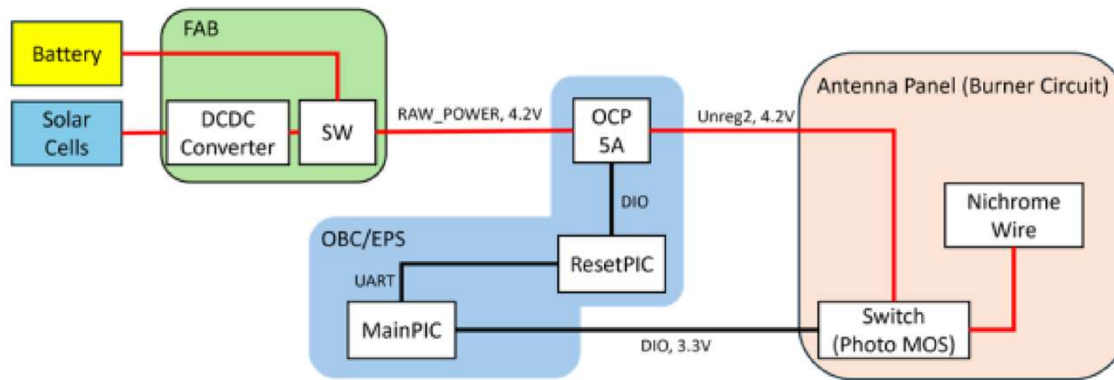
11 days under vacuum (0.00034 Pa)



Flight Software Upgrades



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Software flaws

1. Reset PIC freeze
2. Inter-PIC communication issues

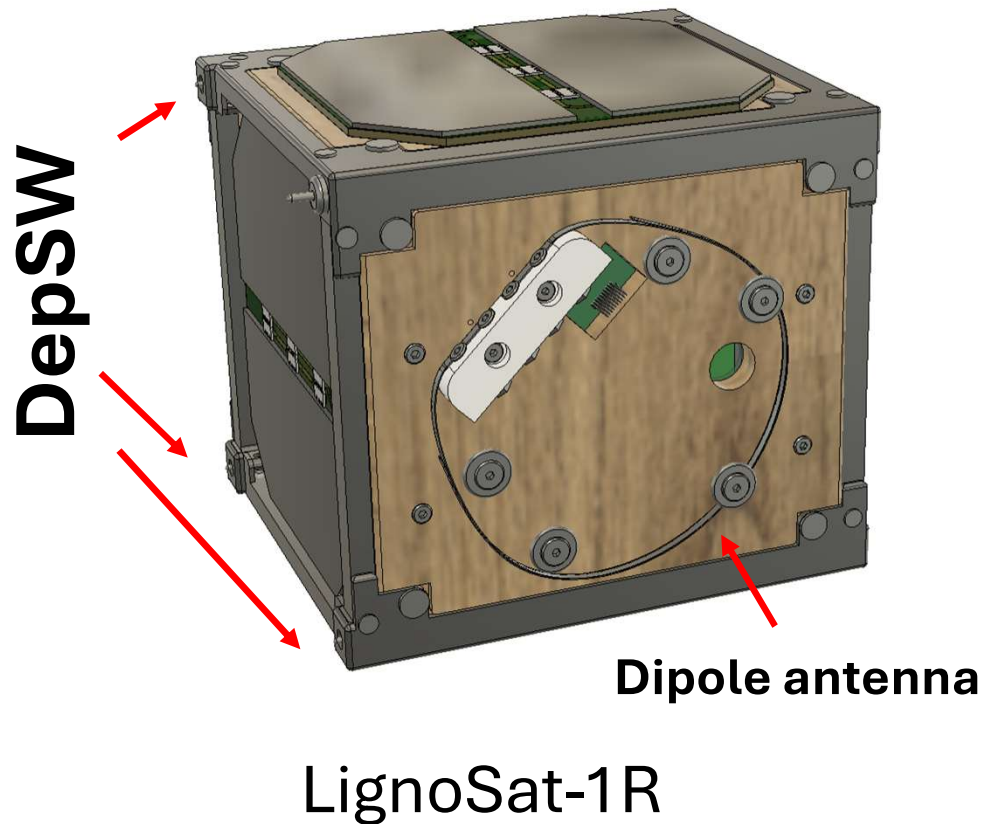
Antenna Deployment system



About Successor Models



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- Dipole antenna w/ 45° angle to prevent EM interference between antenna and frame
- We are planning to add a LED indicator for the power system that would be visible from the ISS after deployment



About Successor Models



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“LignoSat 2”

Possibilities with 2U

- Patch antennas
- Attitude control using magnets and hysteresis dampers



Conclusion



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otani.soi.86h@st.kyoto-u.ac.jp



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