



- *Breakout session introduction* -
Constellation mission suitable
for UNISEC-Global community

Shinichi Nakasuka
University of Tokyo

Let us Start Joint Project towards Future

Global Space Projects by Member Universities



Store & Forward CubeSat
“IoT” network



BIRDS project

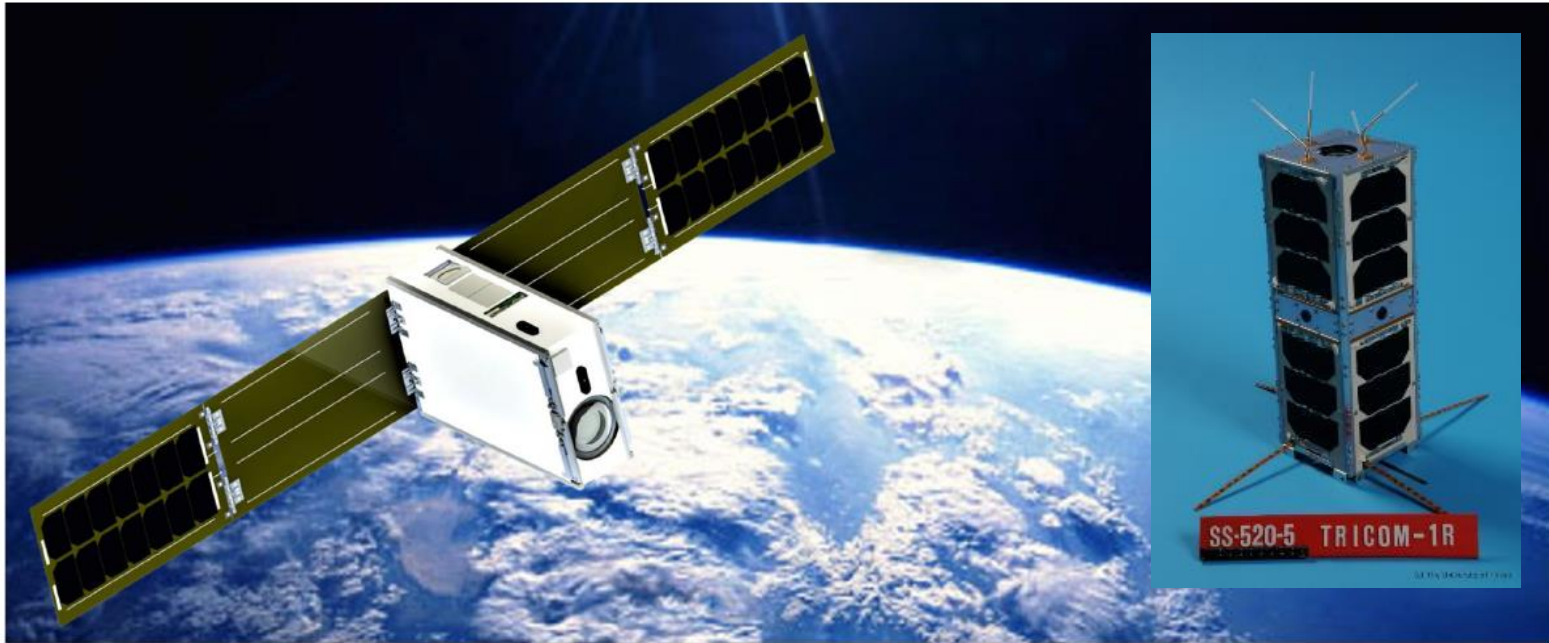


Standardization of
CubeSat interface



Global University Space Debris
Observation Network(GUSDON)

How about developing one satellite by each country to construct constellation?



Assumptions:

- Jointly design satellite bus (6U) with online guidance (education)
- Each satellite will be developed by each country with its own funding or if difficult, we will jointly search for international funds.
- All the satellites have the same mission payloads to contribute to solving global problems etc., as a constellation.
- Each country can have one mission payload for its own interest

Merits of Constellation

- **Earth Observation**

- Higher time resolution: from once per 20-40 days to once/twice per day
- Robust to one satellite failure

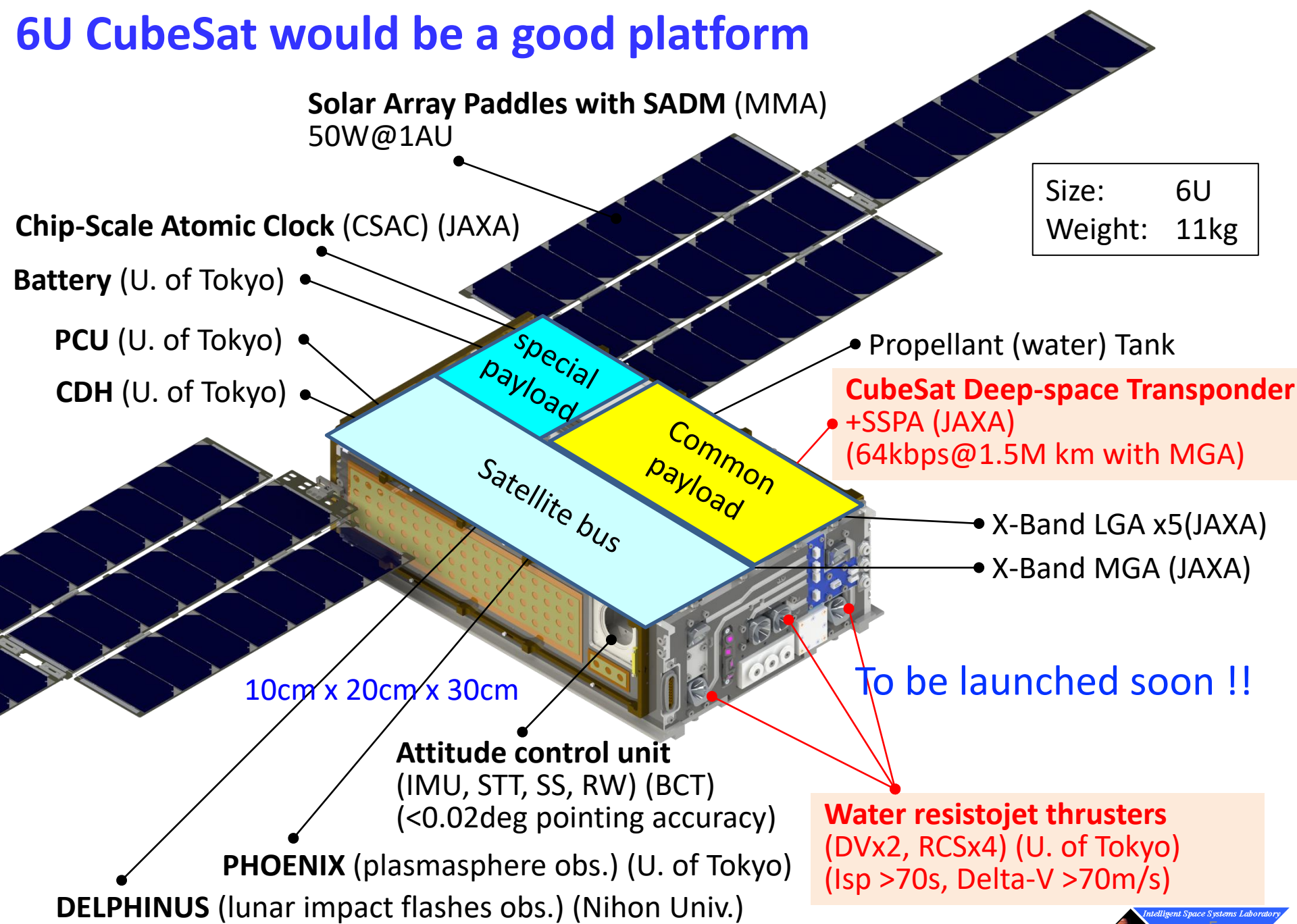
- **Communication**

- 24 hours' service with many satellites
- Cross link between satellites can improve the service in future

- **In-situ Monitoring or Sensing in/from Space**

- Multi-site, simultaneous monitoring in/from space
- Aims at scientific or environmental observations

6U CubeSat would be a good platform



Solar Array Paddles with SADM (MMA)
50W@1AU

Size: 6U
Weight: 11kg

Chip-Scale Atomic Clock (CSAC) (JAXA)

Battery (U. of Tokyo)

PCU (U. of Tokyo)

CDH (U. of Tokyo)

Propellant (water) Tank

**CubeSat Deep-space Transponder
+SSPA (JAXA)
(64kbps@1.5M km with MGA)**

special payload

Common payload

Satellite bus

X-Band LGA x5(JAXA)

X-Band MGA (JAXA)

To be launched soon !!

10cm x 20cm x 30cm

Attitude control unit
(IMU, STT, SS, RW) (BCT)
(<0.02deg pointing accuracy)

**Water resistojet thrusters
(DVx2, RCSx4) (U. of Tokyo)
(Isp >70s, Delta-V >70m/s)**

PHOENIX (plasmasphere obs.) (U. of Tokyo)

DELPHINUS (lunar impact flashes obs.) (Nihon Univ.)

Discussion Items

- Common mission payloads which our community can utilize in constellation for a common objective
 - merit of constellation should be exploited
 - requirements to satellite bus should not be so severe
- Specific mission payload by each country for their own interest
 - Each country should pick up one mission
- Rough image of the specifications of the satellite bus system
 - Requirement on power, communication, attitude control, information processing, etc.
- The overall missions and bus should be implemented in 6U size

