Scientific Requirements for AMSR-2 Follow On

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Background

- AMSR-2 was launched on May, 2012.
- AMSR-E and similar sensors(e.g. SeaWinds) stopped after 8 to 10 years operation because of the anomaly of antenna moving mechanism.
- In order to continue the observation as well as sufficient cross calibration with AMSR-2, AMSR F/O should be launched as soon as possible.

Main Requirements from PIs and users

- Improvements should be small in order to assure the earlier launch.
- Calibration system should be improved.
- Higher resolution, specially for low frequencies.
- Addition of microwave scatterometer.
- Addition of snow measurement capability.

Improvements should be small in order to assure the earlier launch.

- The highest requirement was the continuation of observations. The real lifetime of AMSR-2 is not known, but it may be around 10 years from the experiences of AMSR-E and SeaWinds on QuikScat.
- Both sensors used the same manufacturer for antenna moving mechanism and the both sensor operated around 10 years. As AMSR-2 was launched on 2012, it will be operated until around 2021.
- So, the fast development is the top priority.

Calibration system should be improved.

- AMSR-2 has the highest performances within the existing microwave radiometers. It has the highest spatial resolution and stability.
- However, it has positive biases compared to other microwave radiometers.
- The reason of this bias may be caused by the lack of absolute calibration of the system.
- Ground and on-board absolute calibration system is necessary.

Higher resolution, specially for low frequencies.

- One of the main characteristics of AMSR series is that they have C band, which can measure sea surface temperature and soil moisture.
- However, the spatial resolution of C band is around 50km. It is too coarse for many application areas. Higher resolution is also has high priority.

Addition of microwave scatterometer.

- From the experience of ADEOS-2, it was clarified that simultaneous observation by microwave radiometer and scatterometer is very effective for both sensors.
- JAXA has discussed with ISRO for the provision of microwave scatterometer.

Addition of snow measurement capability.

- One of the largest uncertainty of radiative forcings is the uncertainty of snow fall, especially over the ocean.
- Higher frequency channels will be effective to monitor the snow fall.
- From several simulations, 160 and 193 GHz will be most effective for snow fall monitoring.

Higher resolution, specially for low frequencies

- A new idea for higher resolution has been proposed.
- It utilizes super resolution technique.
- The low frequency bands of AMSR-2 have large overlaps.
- By adding horns to low frequency bands, overlaps become larger.
- Experimental trials using AMSR-2 C band has been conducted. 30km resolution has been achieved.
- Final goal is 20km for C bands.

Combination with GOSAT-3

- Combination with GOSAT-3 has been proposed by MEXT.
- GOSAT series are focused on the retrieval of greenhouse gases, i.e. CO2 and CH4.
- There will be several synergy effects.
- One of the expecting results is the monitoring of CH4 emission from permafrost soils using soil moisture and land surface temperature from AMSR F/O.
- Orbit selection will be a problem.