Global change observation missions

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In order to meet the requirements of Global Earth Observation System of Systems (GEOSS) as well as to continue the ADEOS and ADEOSŬ missions, JAXA is now planning the GCOM mission which is composed of a series of satellites. There are two series of satellites, and they are now tentatively called GCOM-W and GCOM-C satellites. Both series are composed of 3 satellites with 5 years lifetime. Hence, 13 years of continuous observation can be assured with 1 year overlaps. The first satellite of GCOM-W will be launched in 2010 while the first one of GCOM-C will be launched in 2011. GCOM-W will carry AMSR F/O. AMSR F/O will be very similar to AMSR on ADEOSŬ and AMSR-E on EOS-Aqua with some modifications. The frequencies are 6.9, 10.65, 18.7, 23.8, 36.5 and 89 GHz. All channels have vertical and horizontal polarizations and quantization is 12 bits for all channels. Unlike AMSR on ADEOSŬ, we have deleted 50 GHz channels which were used for temperature retrieval. The aperture of AMSR F/O will be 2m, and AMSR F/O will have more accurate hot load than AMSR. Two kinds of modification are considered. One is to use materials which have higher thermal conductivity. Another modification is to use an actively controlled thermal reflector. As for the X-band channel, we are discussing to divide it to several sub-channels in order to avoid the radio interference which have been observed in AMSR and AMSR-E observations. Another option is to modify the central frequency to a little higher frequency. 7 GHz looks a little better than 6.95 GHz in Japan, but we need more data in this frequency region covering all over the world. The incidence angle of AMSR F/O is 55 degree and the dynamic range is from 2.7 K to 340 K. Further, JAXA is asking NASA to provide SeaWinds F/O on GCOM-W. There are two options for SeaWinds F/O. One option is to use the almost same configuration with SeaWinds. Another option is an advanced system, i.e. larger aperture antenna, and addition of C-band scatterometer. GCOM-C will carry GLI F/O (tentatively called second generation GLI : SGLI). The SGLI will be rather different from GLI on ADEOSŬ. The main targets of SGLI are atmospheric aerosols, coastal zone and land. In order to measure aerosols over both ocean and land, it will have an ultra violet channel, as well as polarization and bi-directional observation capability. The instrument will be composed of several components. They are VNIR, polarization (POL), and short wave to long wave infrared (SWI & TMI). The VNIR and POL will adopt push broom scanners, while SWI & TMI will use a conventional whisk broom scanner. VNIR is an 11 channel scanner. The center wavelength of these channels are 380, 412, 443, 490, 530, 565, 670, 763, 865 nm. For 670 and 865 nm, there are

2 channels for each with different sensitivity. POL will have two spectral channels, i.e. 678nm and 865 nm, while each spectral channel is composed of 3 polarizations. Further, they have 3 different look angles, i.e. fore (+45˚), nadir (0˚) and aft (-45˚) to obtain forward scatterings. SWI will have 4 channels, i.e. 1.05, 1.38, 1.64 and 2.21 μm. TMI will have 2 split window channels, 10.8 and 12.0 μm. For, coastal zone and land observation, the IFOV of GLI F/O for these targets will be around 250m. Channels with 250 m IFOV are all channels of VNIR except 763 nm and 1.64 μm channel. TMI channels have 500 m IFOV and all the other channels have 1000 m IFOV. There are several options on the orbit. The baseline option is 700km afternoon orbit for GCOM-W and 800km morning orbit for GCOM-C to continue the AMSR-E observation and GLI observation. Both satellites are medium sized spacecraft, i.e. 2 to 2.5 tons. With GCOM mission, JAXA will contribute to GEOSS in the area of climate, weather and water cycle as well as ecosystems, agriculture, and several other societal benefit areas. The main scientific targets are to clarify radiative forcing of aerosols, to validate climate models and to achieve accurate NPP estimates. For operational use, areas like NWP input, fisheries, ship navigation, coastal managements, deforestation monitoring, and fire warnings are typical applications.