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The Outline of GOSAT-2 mission:requirements and specifications of mission instruments

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GOSAT which was launched on 23rd of January, 2009 has been operated over four years and an area for improvements such as the observation specifications and hardware methods as well as the measurement accuracy. Therefore we have studied the mission of the GOSAT follow-on, that is GOSAT-2 to leverage greenhouse gases observation from space for the science as well as the practical use such as the effort against global warming by the improvements of the observation performances.
At first, we defined the requirements for the concentration measurement accuracies, the estimation error of the net flux and so on which should be accomplished in the next generation based on the GOSAT observation results. Secondly, the specifications of the mission instruments have been studied to satisfy the mission requirements and were defined. To confirm the possibilities of the defined specifications, we have carried out trial manufacture and considerations and redefined the specifications of the mission instruments.
The principal improvement point is the increase of the number of the useful data. A large part of GOSAT data have been contaminated with the clouds and only a few percent of the measured data are used. To increase the useful data, we considered the following some kinds of methods.
1. Reduction of the IFOV size; It is possible to reduce the influence of the clouds if the IFOV size becomes small. But it is hard to compensate the reduction of the SNR, so we will give up the reduction of the IFOV size.
2. Adoption of multi FOV;GOSAT has only one FOV and we have considered to increase the number of the FOV to increase the number of the data by the adoption of the multi photo diodes detector. But the optical cross talk which is generated by the multipath reflection between cover glass and photo diodes is too large and exceeded our requirement. So we gave up the adoption of the multi FOVs.
3. Adoption of an intelligent pointing; We are considering to detect the clouds in the FOV of the FTS on orbit and to drive the line of sight to the area where there is no clouds. We are now studying the method to detect the clouds and drive the pointing mirror.
4. Increase of the SNR; In the high-latitude region, the luminance of the solar ray reflection is low, so the SNR is low and it's difficult to observe the high-latitude region of the northern hemisphere in winter. It is possible to extend the observation area to the high-latitude region if the SNR is increased.
The increase of the SNR will be realized by the expansion of the aperture size and the adoption of the over sampling. We are now conducting the trial manufacture of the large size corner cube which is used in the Fourier Transform Spectrometer mechanism.
In the presentation, I will introduce the mission requirement to GOSAT-2 and the results of the trial manufacture as well as the specifications of the mission instruments which are redefined.