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Preliminary results of relative radiometer to measure the Earth's outgoing radiation on FY-3F satellite

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A space based relative radiometer has been developed and applied to the PICARD mission. It has successfully measured 37 months solar radiation, terrestrial outgoing radiation, and a comparable interannual variation in Earth Radiation Budget (ERB) is inferred from those measurements [1]. However, since the BOS (Bolometric Oscillation Sensor [2]) relative radiometer is originally designed to measure the solar irradiance with 10 seconds high cadence comparing to the absolute radiometer. The high dynamic range of BOS limits its performance to track the Earth's outgoing radiation in terms of instantaneous field-of-view (iFOV) and the absolute radiation level. Two relative radiometers (RR) will be developed for JTSIM/FY-3F. One is the solar channel relative radiometer aimed to measure the solar irradiance side by side with the cavity solar irradiance absolute radiometer (SIAR). The second RR is acting as a non-scanner instrument to measure the Earth's outgoing radiation. Comparing to the design of PICRD-BOS. Each RR has included an aperture, for the solar channel it limits its Unobstructed Field of View (UFOV) to about 1.5 degree and for the Earth channel to about 110 degrees, respectively. We also test the possibility to use the Carbon Nanotube coating on the main detector. In this presentation, the design of the earth channel relative radiometer (ERR) will be introduced, including the aperture design, dynamic range and the active temperature control system. The preliminary laboratory test result of the ERR will be discussed in the end.

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