The Bolometric Oscillation Sensors for Micro- and Nano- satellite missions

Ping Zhu, Michel van Ruymbeke, Ozgur Karatekin
Royal Observatory of Belgium

The numbers of the sound scientific results coming out from the micro- even nano- satellite missions are increasing . The PICARD spacecraft is belonging to such a category. It is the third satellite integrated on the MYRIDE microsatellite platform. The mass of the spacecraft is about 120Kg. The PICARD micro satellite was successfully launched on 15 June 2010. It is orbiting the Earth with a heliocentric orbit at an altitude of 725 km. The objectives of the mission are to monitor the total solar irradiance (TSI), to measure the solar diameters, to study the connection between the solar activities and the earth's climate. The 11 years solar cycle was firstly established based on the Sunspot number counting. It is then confirmed by the solar irradiance and other photometric measurements. The positive correlation of frequency shifts of the solar acoustic p modes and the negative correlation of solar diameter with the solar cycles are under discussions.

There are also other demands from the PICARD mission, which are filling the gap of high frequency signals detection because the short term (~4mHz) solar radiation variation is containing the solar p-modes signal. How these eighenfrequencies of solar p-mode changes correlate with other activity indices ones, which can give clues to the understanding of the build-up of activity in the Sun (Tripathy et. al. 2000, Jimenez et. al, 1998). The objective is to bring additional information about the terrestrial radiation. The measurement of the terrestrial radiation could help studying the energy budget of the Earth and provide more information about the interannual variation of terrestrial radiation at the top of the atmosphere . The Bolometric Oscillation Sensor is originally designed to meet the aforementioned requirements.

Actually, there are several instruments, which are flying on the space to monitor the Total Solar Irradiance (TSI). The SOHO/VIRGO, ACRIMSAT/ACRIM3, SORCE/TIM and the PICARD missions, the first three ones are quiet at the end of the missionary duty. The PICARD is the most recent one. The Bolometric Oscillation Senor (BOS) is flying with the PICARD satellite. Another miniaturized BOS will be payload on the PICASSO nanosatellite mission.