Spectropolarimetric Observation of Earthshine

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We present the results of our spectropolarimetric observations of Earthshine or ashen light of the Moon. These observations were conducted as a test of future search for habitable planets because polarimetry of extrasolar planets will provide their characteristics including astrobiologically important information. McCullough (2006) calculates the variation in polarization degree of reflected light against the phase angle and concludes that the light from a planet with a global surface ocean and a clear atmosphere will be polarized much larger than the light from a planet covered with land, desert or snow. Stam (2008) goes further into spectropolarimetric modeling of Earth-like extrasolar planets. In this model, increased degree of polarization at an oxygen absorption band around 760nm is expected. It is also noted that the polarization spectrum will be insensitive to the absorption that takes place between the planets and the observer. This point will bring a great advantage to ground-based observers.

Crescent Moon was observed in Nishi-Harima Astronomical Observatory in Hyogo, Japan in August, September, November and December in 2008, using a 60cm Cassegrain telescope mounted with simultaneous polarimetric imager/spectrometer developed by Nishida (2008, master thesis of Kobe University) and other predecessors. We report the results on the presentation.