Geophysical Research Abstracts
Vol. 14, EGU2012-12224-3, 2012
EGU General Assembly 2012

The Earth as a benchmark: spectro-polarimetry unveils strong bio-signatures

S. Bagnulo (1), M.F. Sterzik (2), and E. Palle (3)

(1) Armagh Observatory, Armagh, Northern Ireland, United Kingdom (sba@arm.ac.uk), (2) European Southern Observatory, Alonso de Cordova 3107, Vitacura, Santiago, Chile, (3) Instituto de Astrofisica de Canarias, Via Lactea, s/n E38205 La Laguna (Tenerife) Spain

One of the next most important goals of astronomy is the characterization of exo-solar planets and the search for extra terrestrial life.

Traditional spectroscopic measurements cannot be easily applied to the study of the atmospheres of the exo-solar planets, because the light reflected by the planet is overwhelmed by the radiation of the hosting star. Polarimetric techniques offer an attractive solution to this problem. Since the light reflected by the planet is highly polarised, it can be distinguished from the nearly unpolarised stellar radiation, provided that the observations are obtained with sufficiently high signal-to-noise ratio. Theoretical models have been developed to predict what the polarised spectrum of an Earth-like planet would look like if observed in linear polarization from space [1]. Model predictions appear to be very sensitive to the percentage of ocean, vegetation, and clouds that cover the visible area of the planet.

Here we present polarised spectra of the Earthshine, which simulate the observations of the planet Earth as seen from space. Interpreted with theoretical models, our observations clearly reveal bio-markers, and practically demonstrate that spectro-polarimetry may be a key diagnostic tool not only for the study of the exoplanets, but also for the search of extra-terrestrial life.

[1] Stam, D.M., 2008, Astronomy and Astrophysics, 484, 989.