

# **A fresh look on optical communications and its applications to planetary protection**

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In June 2005, the ESA project SILEX (started in 1989) culminated when the thousandth optical communication was performed successfully between the European Space Agency's geostationary technology satellite ARTEMIS and the remote sensing SPOT 4 CNES satellite. This important achievement demonstrates the maturity and reliability of optical communications in space, as well as their feasibility, since all communications were established successfully.

The main advantages of using optical communications instead of RF in space are, on the one hand, a much bigger bandwidth, which allows a higher transmission rate, and on the other hand, the use of simpler equipments and onboard systems (since huge antennas are not longer needed). Besides, from an economic point of view, this reduction in mass and volume to be boosted into orbit results in a cheaper launch of the space shuttle.

Moreover, nowadays, the amount of data collected by satellites is getting bigger and bigger, especially in the satellites related to the study of our planet (high resolution images), its weather and environment, as well as the ones dedicated to achieve information about planetary protection and other kind of data that can be used to prevent natural disasters, in which an immediate transmission of huge amounts of information is indispensable in order to be interpreted, jump to the opportune conclusions and take the correspondent decisions.

And it is here where the great application of optical communications systems in space is found: it is not necessary to store the information in the satellite and all the data, whatever its size is, can be sent in real time to a terrestrial receiver, which allows its immediate analysis and avoids a considerable waste of time, which can be especially useful in case this information reveals the necessity of an imminent intervention, like in the unlucky tragedy of the Tsunami of South Asia in December 2004.

This paper will study the use of optical communications in space, reviewing past projects until present and focusing on future perspectives and initiatives, especially those taken up by the European Space Agency in cooperation with other organizations, and their possible applications on relevant aspects of planetary protection.