

ODISSEE, a promising tool for Lunar Laser Ranging. M. Aimar, H. Mariey, D. Albanese, E. Samain : Géoazur, Université de Nice Sophia-Antipolis, Observatoire de la Côte d'Azur (OCA), CNRS (UMR 7329), Caussols, France (mourad.aimar@oca.eu).

Today, laser ranging to the moon is very difficult. The signal to noise ratio is very low, and the link budget is extremely weak.

In partnership with Onera, we have developed an adaptive optics bench (ODISSEE) capable to correct the atmospheric turbulence. Used in association with the MeO station, it allows to significantly improve both the S/N and the link budget.

Laser ranging to the moon is closely linked to the phases of the moon. The more sunlight reflected by the moon, the larger the signal to noise ratio deteriorates. This is induced by two distinct phenomena : excess noise coming from the sunlight back scattered by the moon surface ; deterioration (reversible) of the corner cubes due to the excessive temperature. One could significantly improve the signal to noise ratio by decreasing the field of view of the telescope. Thus by correcting the wavefront on the return path of the laser, it will be possible to eliminate the solar flux from the interested zone with a field iris diaphragm. This will also have an impact on the center/periphery photodetectors effects, allowing to improve the accuracy of the distance measurement.

This opportunity to correct the wavefront allowed us to invest ourselves in other projects directly related to this problem : communication, satellite imagery ; and imagine others : space debris.

In the future, the wave front correction could be applied for the laser emission. It could dramatically reduce the size of the laser beam and improve the link budget.

In association with the MeO station, the adaptive optics bench will be an asset for the lunar laser ranging.

The poster will give a presentation of the bench, and a presentation of its performance on an internal source and on some stars.