ROBEX DEMOMISSION OVERVIEW: LIVE FROM THE LUNAR ANALOGUE

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This presentation presents an inside view of the analogue mission campaign which will be performed between 12 June and 7. July 2017, on the Mount Etna in Europe, Italy.

The presentation is planned as a live view chat on the active field tests, which will be performed simultaneous to the ASTRA 2017 Conference.

The aim of the ROBEX demonstration mission is to test and validate a complex robotic mission scenario including highly autonomous tasks mixed with scientist and operational interrupts to conduct scientifically relevant measurements.

For the Demonstration Mission Space a dedicated scenario was chosen by the ROBEX lunar scientists. The scenario describes the installation of an active seismic network (ASN) on the Moon's surface. Main focus here is the measurement of the internal structure and the composition of the upper layer, the lunar regolith. In addition, the natural seismic activity shall be monitored, including meteorite impacts, which can serve as semi-controlled sources if impact flashed are observed from Earth. The seismometers are planned to be transported by a rover and put down on the surface by means of a robotic arm.

Further experiments will allow long term autonomous navigation, exploration of craters as well as robotic cooperation tasks with the aim of geological analyses and sample selection.

During this one month analogue campaign, a realistic mission scenario will be built up, including a control station some 30 km from the remote site. The key components have already been validated on Mt. Etna in a test campaign in September 2016.

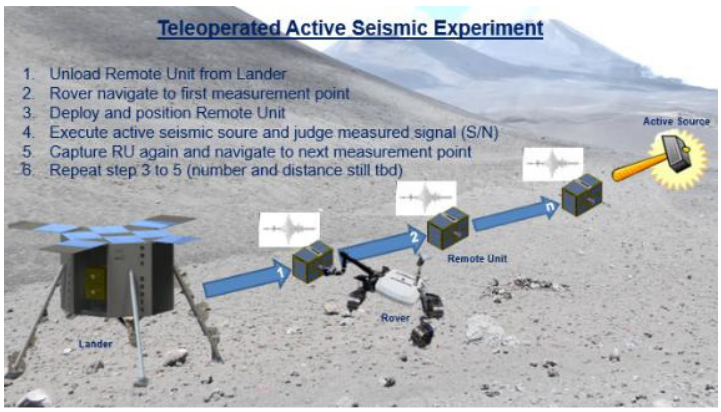

Fig. 1: Teleoperated active seismic experiment placing the sensorboxes along a line

The analogue mission on the Mt. Etna consists of two individual experiments. First, the rover will traverse the lander in site, deploy the seismic instrument, wait until one measurement is taken, lift the instrument again and repeat the measurement on several points on this traverse (see Fig. 1). In a second scenario, located close to the lander site, the rover will deploy a seismic network consisting of four instruments that will be arranged at three corner points of an equilateral triangle of ca. 100 m side length and one seismometer in the center of this triangle (see Fig. 2). Both scenarios require heavy load transportation capabilities and autonomous driving performance as well as dexterous manipulator and gripper devices to place and align the instruments precisely onto the ground. Additional technological challenges arise from the telecontroled and highly autonomous operation of the system.

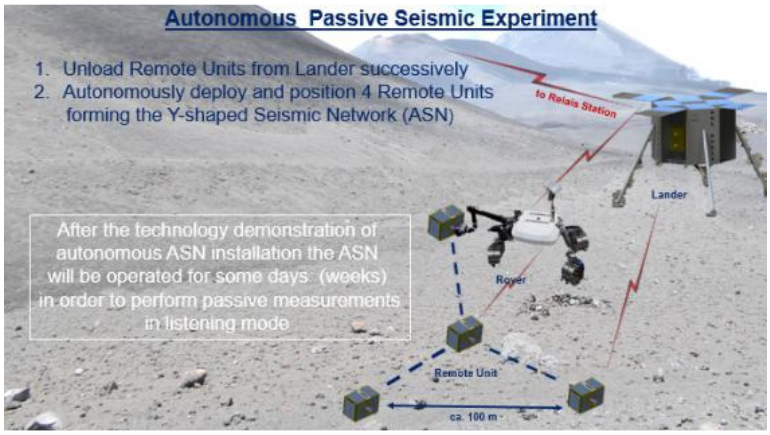

Fig. 2: Autonomous passive seismic experiment using 4 remote units in a y shaped configuration

The site Mt. Etna has mainly been chosen due to the similarity of the natural seismic activity in this region, which has a focal depth of up to 600 km, similar to lunar deep quakes (700 to 1100 km). Since the Etna is an active volcano, several seismic events per day can be expected, allowing to obtain a record of natural seismicity in a short time frame.

Furthermore, the site shows the important criteria for analog mission such as:
- Volcanic terrain and soil environment
- Natural seismicity of volcanic origin
- Moon-analog in geologic context and shape
- Topography and morphology representative lunar surfaces
- Basis for constructing the necessary logistic and operational infrastructure

[1] http://www.robex-allianz.de/

Words: 529 (required: 300 to 800)