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Soil degradation control, remediation and reclamation

BOOK OF ABSTRACTS

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MONITORING OF GREENHOUSE GAS EMISSIONS BASED IN LIDAR TECHNOLOGY: LIFE CLIMAMED PROJECT

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Soil degradation in farming systems is a huge challenge. Many countries have serious problems due to the degradation and loss of soils associated to inadequate agricultural practices and soil management. The problem faces with the European Green Deal and the necessity of a sustainable management of soils to product enough food to satisfy the need for the growing population. The soil degradation is as well, associated to the negative effects of climate change. This process, basically warming due to the presence of greenhouse gases (GHG) in the atmosphere, is of major concern.

It is necessary to combat climate change and, at the same time, protect the soil, reduce the degradation and transform soils in a carbon sink. To achieve these objectives, it is necessary to change the farming managing of soils and reduce the GHG emissions from farms. However, it is necessary to demonstrate.

To measure the GHG emissions and determine if agricultural practices are reducing or increasing GHG emissions, the technology based on Laser Imaging Detection and Ranging (LIDAR) would be useful (Brannon et al., 2016). In this sense, a new device based in Differential Absorption LIDAR or DIAL (Liou, 2002) has been developed to detect CO_2, CH_4 and N_2O over the soil surface. After a prove period in the laboratory conditions, seven devices have been installed and they are recovering at real time the concentrations of these GHG in farming systems (between 2023-24) under different cultivation: olives, wheat, pistachio, grapes and a cow farm. They are installed in Italy and Greece. Additionally, meteorological stations have been installed to now the environmental conditions.

The previous results obtained indicated that the devices are providing good information about the GHG measured, and the predominant emissions is associated to CO_2. However, CH_4 is an important gas emitted in some places, for instance in cow farm area of Crete.

Although it is necessary to obtain more field data in the future year to model the behavior of the GHG, it has been demonstrated that this tool can be useful to support a decision-making system and help the administrations to prepare legislation that apply benefits to those farmers that achieve reduction of emissions and favored, in this sense, the increment of soil organic carbon by good agricultural practices.

References

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