PROJECT FACTSHEET

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TUDOR

Optimizing irrigation and saving water using thermal infrared remote sensing

INSPIRATION

Irrigation - which is the process of applying controlled amounts of water to plants at needed intervals - is the largest user of fresh water either from natural water bodies or from stored ground water resources. A large proportion of water is nonetheless lost due to an irrigation that is not as efficient as it is should be. In the light of water scarcity in many areas of the world, and the increased competition for fresh water, there is an urge need for an improved irrigation management.

However, farmers often don't know exactly how much irrigation water should be applied at what time to maximize irrigation efficiency and for maximizing the water use efficiency of plants. In this context, thermal infrared images, which detect differences in the evaporative cooling effect, can be of high interest in order to depict the distribution of soil water within a field.

INNOVATION

TUDOR is a collaborative project funded by the European Space Agency under the Luxembourg National Space Programme (LuxIMPULSE) on water stress detection, evapotranspiration and crop water requirement analysis to support irrigation scheduling.

Throughout this project led by Hydrosat, LIST will make benefit of its algorithm expertise in water stress detection, evapotranspiration modelling, and thermal infrared and visible near infrared image analysis. LIST will use a novel version of the crop water stress index and an improved evapotranspiration model developed by the Institute that overcomes the problem of model parameterisation. LIST researchers will indeed integrate their algorithms with thermal imaging technology to provide critical data on crop water stress and water use.

Algorithms will be first jointly analysed by Hydrosat and LIST for their performance in irrigation management on a dataset collected over a controlled experiment in Northern Germany with prevailing sandy soils and notorious shortage of irrigation water. In the experiment run by LWK and Thünen Institute, three different irrigation intensities were applied on different crop types and measurement of soil moisture, crop yield, and meteorological variables were taken. On several days with pronounced water stress during the growing period, drone images were flown by Geocoptix.

IMPACT

These findings obtained from the controlled experiment will be applied to irrigated agricultural fields in Portugal in cooperation with the University of Lisbon's Instituto Superior de Agronomia to test the algorithm performance on real fields. At a later stage of the collaboration, a satellite data and analytics platform will be developed based on CubeSats where large fleets of satellites can provide daily overpasses and cover large areas for irrigation advice. By providing farmers with high-accuracy data on aerial crop water stress and water use, TUDOR will not only enable optimizing irrigation and saving water, but also reduce costs while increasing yield.

Partners

Geocoptix (DE) , Agricultural Chamber of Lower Saxony (DE) , Federal Research Institute for Rural Areas, Forestry and Fisheries (DE) , Hydrosat S.a.r.l (LU)

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Contact

5, avenue des Hauts-Fourneaux
L-4362 Esch-sur-Alzette
phone: +352 275 888 - 1 | LIST.lu

Martin SCHLERF (martin.schlerf@list.lu)

LUXEMBOURG INSTITUTE OF SCIENCE AND TECHNOLOGY | LIST