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Abstract

Towards sustainable agricultural management using high-resolution X-band radar precipitation estimates

(X-RadAG)

Real-time estimates of precipitation at high spatial and temporal resolution can significantly improve the efficiency of agricultural management by optimizing agronomic practices from an economical and environmental standpoint. However, due to the inherent high spatial and temporal variability of precipitation amount and rate, these data are not accessible from standard monitoring systems. In this project we evaluate the possibility to utilize new low-cost and green nature X-band radar technologies for producing high space-time resolution precipitation estimates over agricultural areas in Italy and Israel. The precipitation estimates will significantly improve agronomic practices and optimize crop yield and environmental quality.

The research objectives are: 1) develop a prototype of high space-time resolution precipitation estimates and observation system based on locally installed X-band radar and rain gauges; 2) develop a nowcasting procedure using the high resolution precipitation data to allow a short term (tens of minutes) precipitation prediction; 3) integrate the observed and nowcast precipitation data in short-term agricultural decision making process on fertilizer, herbicides and fungicides application using the real-time knowledge on the spatial variation of precipitation; 4) integrate precipitation observation data in mid-term agricultural decision making procedures on yield quantity and quality; and, 5) combine the high resolution precipitation data with remote sensing imagery to study spatial dependency of crop growth and yield on precipitation amounts.

The innovation in this research is in the synergistic collaboration between expert scientists in radar meteorology and precipitation estimation and in precision agricultural management and decision support systems. There are no present installations of small X-band radar opportunely planned and optimized for agro-meteorological purposes. We will establish a sound dissemination strategy for transfer of knowledge towards the end users, with a participatory approach to facilitate an adequate involvement of farmers and local stakeholders.