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## The importance of a multi-temporal approach to assess climate change impacts in Northern Italian agriculture

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The territory of north-eastern Italy, crossed by the Po River, which flows eastward into the Adriatic Sea, is home to flourishing agricultural production. The area is among Europe's most important rural regions and is crucial for food production. However, the sector is facing the impact of climate change. Among the most worrying phenomena is an increase in the frequency of more severe and longer drought periods, leading to progressively arid climatic conditions. The summer of 2022 was one of the most critical times on record, with the combination of extreme temperatures and severe water shortages. The effects severely impacted agriculture, with crop loss, irrigation problems, and saltwater intrusion into the Po River delta. Emerging multi-temporal satellite remote sensing technologies and the application of big data-based algorithms allow in-depth knowledge of phenomena occurring on Earth and the subsequent research of mitigation solutions. Specifically, monitoring the impacts of extreme drought in the region can be useful in understanding which areas are most at risk in the short term, while the use of future climate models can guide more resilient agricultural management in the future. This research first proposes the application of multi-temporal MODIS satellite indices to assess the agricultural drought that affected north-eastern Italy in the summer months of 2022 and secondly analyses the possible traces of climatic aridification. In addition, we present a study on the relationship between agricultural lands and current & future climates, carried out using high-resolution climate zone maps (RCP8.5 scenario). The aim is to understand the potential future climate in the currently cultivated fields. Mapping present and future critical areas and knowing which farming systems are most at risk due to climate change can be valuable information for managing agricultural assets under the threat of climate change.

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