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The Impact of Meteorological Drought on Vegetation Health in the Middle Euphrates River Basin (Syria)

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Syria is now witnessing the dramatic effects of a multiyear drought that has been afflicting the country since 2006. The drought has impacted several regions, but the north-eastern Al Jazira region, corresponding to the Middle Euphrates River basin and considered the Syrian “breadbasket”, has been hammered particularly severely.

With this paper we aim at contributing to the knowledge on the consequences of multiyear meteorological drought on food security in the basin of the middle range of the Euphrates River in Syria.

Annual precipitation data were collected from 11 ground meteorological stations for the period 1983–2020 covering an area of 96800km^2. Data were provided by the Syrian Ministry of Agriculture. In addition, the series of two satellite-based indices, namely Vegetation Condition Index (VCI) and Vegetation Health Index (VHI) were collected to analyse the vegetation responses to the meteorological drivers. These indices were downloaded at a resolution of 4-km for the time range 1983-2020, from the Centre for Satellite Applications and Research (STAR) of the National Oceanic and Atmospheric Administration (NOAA). The crop production data, including yields of cotton, wheat, and maize, were collected at provincial level over the period of 1983–2020 from Syria Statistical Yearbook.

Recent changes in meteorological drought features (e.g., frequency and intensity) throughout Syria for the years 1983–2020 were assessed by means of the Standard Precipitation Index (SPI), to characterize the meteorological draughtiness for the Al-Jazira region.

SPI was computed on a 12-month timeline to account for the delayed effect of rainfall deficiency on crop output. Commonly, agricultural droughts are evaluated using drought indices at these long timeframes (e.g., 18 and 24 months) because these longer timescales reflect the accumulated influence of meteorological drought that might alter soil water content and stream flow. The correlation matrices of the series of SPI, averaged at different time scales to focus on the effect of multiyear drought events, with the series of VCI and VHI, will be presented.

This work is preliminary to the GIS application of simplified Benfratello's water balance method (Barontini et al., 2021) to assess the proneness to water scarcity and the irrigation deficit of different areas of the basin.

References

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