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## Hydro-climatic and anthropic determinants of spatio-temporal variability of crop water footprint

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Multidisciplinary analyses of the water-food nexus are often based on the water footprint indicator. The water footprint measures the volume of water necessary to produce a good, and its unit counterpart (water footprint per unit weight of good) can be interpreted as an indicator of efficiency in the use of water resources. Crop water footprint refers to the unit water footprint of crops and it is defined as the volume of water evapotranspired during crop growth divided by the agricultural yield.

This contribution focuses on the spatial variability (at global scale) and temporal evolution (in the period 1961-2004) of the crop water footprint of four crops: wheat, rice, maize and soybean. In particular, we investigate the role of hydro-climatic and anthropic factors in determining the spatial and temporal variability. First, a sensitivity analysis is used to quantify the influence of precipitation, reference evapotranspiration, and agricultural yield on crop water footprint, separating between green water (precipitation) and blue water (irrigation). Second, an analysis of agricultural yield is presented that separates the effects of hydro-climatic and anthropic determinants on yield, with a special focus on temporal trends.

Results highlight the important role played by hydro-climatic variables in the separation of green and blue water, despite the limited sensitivity of total water footprint to such variables. In the temporal analysis, hydro-climatic variables are found to contribute to the inter-annual fluctuations of yield (and thus of crop water footprint) but the temporal trends are dominated by anthropic determinants. In conclusion, both hydro-climatic and anthropic variables have a role in spatio-temporal variability of crop water footprint, although their influence is different if considering different aspects of such variability.