



Use of Earth Observation data and Global Water Balance model to assess surface water resources and droughts at the Oum Er Rbia river basin and Moroccan country scales

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Morocco is an arid to semi-arid country that experiences erratic rainfall and recurring droughts. Water management in the country occurs primarily at the water basin level and is undertaken by Basin Agencies. Inter-basin water transfers sometimes take place, such as in the case of severe droughts when water is transferred from areas of surplus to areas of deficit. However, in-situ data is scarce and locally governed, which complicates such large-scale water management. In this study, newly developed Earth Observation (EO) products (surface soil moisture and evapotranspiration) were merged with a global water balance model (PCR-GLOBWB) to assess the Oum Er Rbia (OER) water basin's surface hydrology, and drought occurrences at the Moroccan country scale. At the OER basin level, PCR-GLOBWB model satisfactorily simulated surface runoff when compared with two river gauges. In addition, a spatial overlay of PCR-GLOBWB model quarter-annual surface runoff simulations with those of the highly detailed Soil and Water Assessment Tool (SWAT) showed a good modeling performance, with both models allocating the majority of surface water resources to the Middle Atlas Mountains. At the Morocco country scale, PCR-GLOBWB was used for a drought assessment using Standardized Precipitation Index (SPI), Standardized Runoff Index (SRI), and Standardized Soil Moisture Index (SSMI) drought indicators. The country-level study was performed for three historical drought events (spatial plots) and five selected basins (time-series plots). The results highlighted the local occurrence pattern of droughts in Morocco, which agrees with the literature and points to the importance and potential of large-scale inter-basin water management. Consistent and reliable EO products and global models can support hydrological assessments in data scarce areas and be used to enhance country-level drought mitigation strategies.