



Drought impacts are climate-driven for green while always strong and fast for blue water

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Drought comprehensively affects different interlinked aspects of the terrestrial water cycle, which have so far been mostly investigated separately and without direct comparison. In particular, resolving the partitioning of the drought water deficit into blue-water runoff and green-water evapotranspiration is critical, as anomalies in these water components threaten different associated societal sectors and ecosystems – yet drought effects on blue and green water have been mostly investigated separately and without direct comparison. We here analyze the propagation of drought-inducing precipitation deficits through soil moisture reductions to blue and green water changes by use of comprehensive multi-decadal data from >400 near-natural catchments along a steep climate gradient across Europe. We show that soil-moisture droughts reduce runoff stronger and faster than ET across the entire continent. While runoff responds within weeks, ET can be unaffected for months in dry climate and entirely in wet climate. Understanding these drought-impact pathways on blue and green water resources and across geospheres is not only essential for our ability to ensure food and water security, but also to paleo-hydrological reconstructions as the revealed climate-dependent pathways are likely valid across time.