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Understanding groundwater recharge variability across Africa through comparative hydrology and data mining

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Groundwater use could be pivotal in supporting reliable water supply throughout Africa. However, we currently lack a clear understanding of how quickly aquifers are being recharged with just over 100 in-situ estimates of average annual groundwater recharge across the entire continent. In the absence of direct observations, large-scale hydrologic models can estimate the temporal and spatial variability of recharge in data sparse regions such as Africa.

However, such models are generally only evaluated against streamflow observations (if that) and it is unclear how realistically they reflect the variability of controlling processes on groundwater recharge. In our study we use data mining techniques to estimate the controlling factors on groundwater recharge estimates for two widely used large-scale hydrologic models, WaterGAP and PCR-GLOBWB. We subsequently compare these results to an a priori model derived purely from published studies on recharge controls in Africa and hydrologically similar regions. We finally compare all three models (2 hydrologic and 1 a priori) against 120 observations of groundwater recharge across Africa to understand how well actually recharge variability is represented.