

Future low flows and hydrological drought: how certain are these for Europe?

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Abstract Climate data from a re-analysis dataset (WFD, 1971–2000) and three GCMs (1971–2100) for two emissions scenarios were used to: (i) explore future low flows and hydrological drought characteristics, and (ii) estimate how uncertainty in forcing propagates into these characteristics. Runoff was obtained through a multi-model mean from large-scale models forced with WFD and GCMs. Low flow and drought characteristics in two transects across Europe were intercompared for 1971–2000 to estimate forcing uncertainty, and for two future time frames to quantify climate change impact and to compare impact with forcing uncertainty (signal-noise ratios). Annual flow was projected to decrease (maximum 30%), but forcing uncertainty is larger (minimum 35%). Drought duration was predicted to increase (50–180%) with low forcing uncertainty (<10%). Similar observations were made for future deficit volumes. This study shows that future droughts can be predicted with higher certainty than low flows and that multi-forcing is required.

Key words hydrological drought; low flow; runoff; future; uncertainty; forcing; Europe