Baseflow Routing and Evaluation in Global River Reaches

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2023
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This honours thesis aimed to create a high-resolution map of river reach baseflow indices (BFI) and review graphical baseflow separation methods. Results revealed that BFI is a useful metric for low-flow stability, but caution is needed in equating BFI with groundwater discharge. River reach BFI values are presented in a 15 arc-seconds resolution gridded dataset, developed using flow routing of a course-resolution global BFI from Beck et al. (2015). Validation against gauging stations showed strong agreement (adjusted R2 values of 0.64 and 0.658 for BFI2 and BFI3, respectively) despite uncertainties from source data and baseflow separation. The created BFI maps can be used for global hydrological models, such as temperature or stream chemistry for which baseflow is an important factor; assessing climate change impacts; and sustainability of anthropogenic withdrawals. These presented downscaled and flow-routed maps represent the first estimate of BFI in global river reaches, especially large rivers where graphical baseflow separation methods are not applicable.
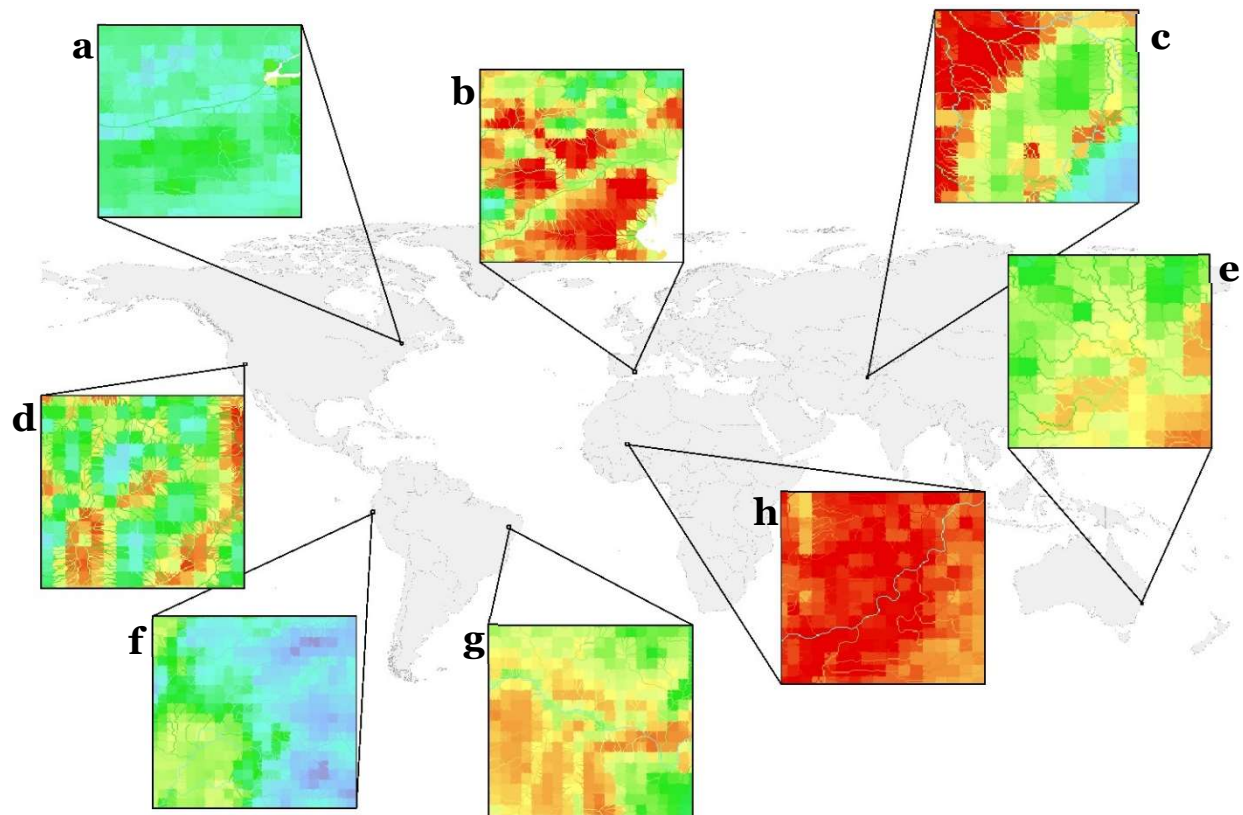
Map of Selected Insets of Downscaled BFI2 at High-Resolution.