CAMELS GB Supplementary Information

S1 Comparison of CAMELS-GB catchments with UK gauging network

To ensure that the catchments chosen for CAMELS-GB are representative of the diversity of catchments covered by the GB gauging network, the distributions of key catchment attributes calculated in CAMELS-GB were compared for the CAMELS-GB catchments (n=671) and all catchments in the GB gauging network (n=1507). Fig. S1 and S2 show that the CAMELS-GB catchments are representative of the wider GB gauging network and cover the diversity of landscape, geology, climate, hydrology and topography present across Great Britain.

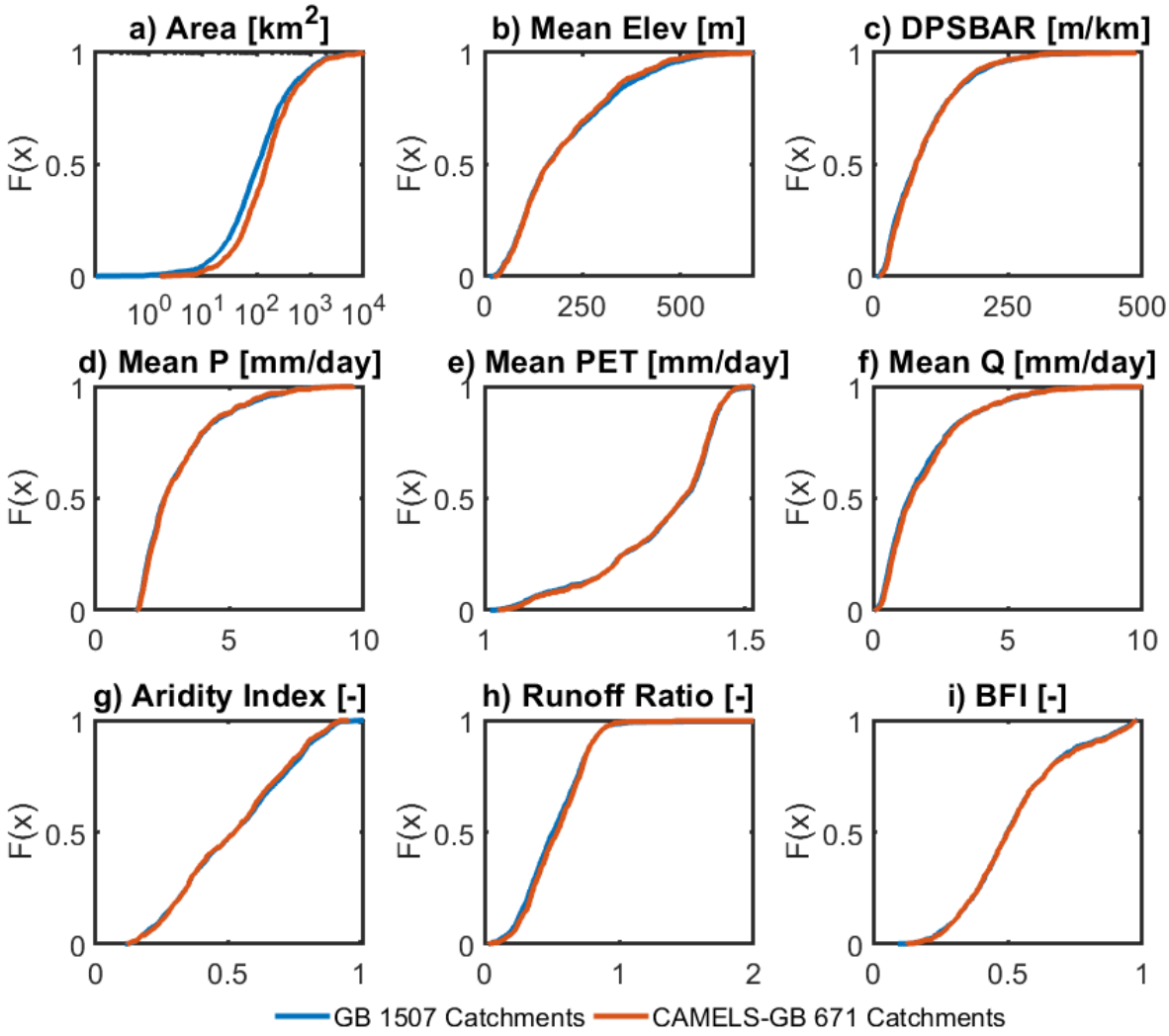


Figure S1. Cumulative distribution functions of key topographic, climatic and hydrologic catchment characteristics for all Great Britain catchments (n=1507) and CAMELS-GB catchments (n=671), a) catchment area (km^2), b) mean catchment elevation (m), c) mean drainage path slope (m/km), d) mean precipitation (mm/day), e) mean potential evapotranspiration (mm/day), f) mean discharge (mm/day), g) aridity index (mean precipitation divided by mean potential evapotranspiration) (-), h) runoff ratio (mean discharge divided by mean precipitation) (-), i) base flow index (-)

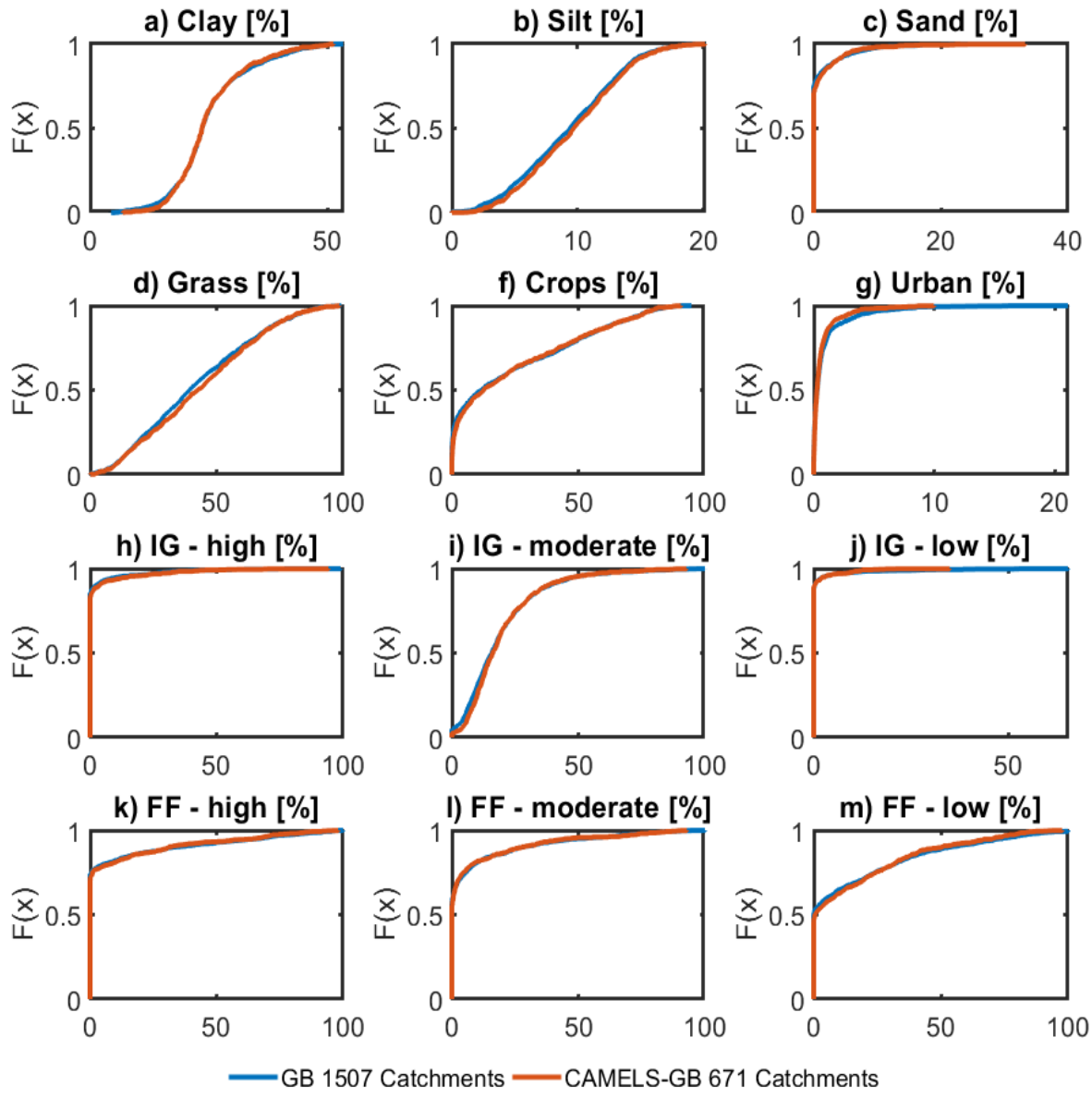


Figure S2. Cumulative distribution functions of key soil, land cover and hydrogeology catchment characteristics for all Great Britain catchments (n=1507) and CAMELS-GB catchments (n=671), a) percentage cover of clay (%), b) percentage cover of silt (%), c) percentage cover of sand (%), d) percentage land cover of grass (%), f) percentage land cover of crops (%), g) percentage cover of urban (%), h-j) significant intergranular flow – high, moderate and low productivity (%), k-m) flow predominantly through fractures – high, moderate and low productivity (%)

S2 CAMELS-GB Catchment Attributes

Maps are provided for the user to interrogate the spatial variability of each of the catchment attributes.

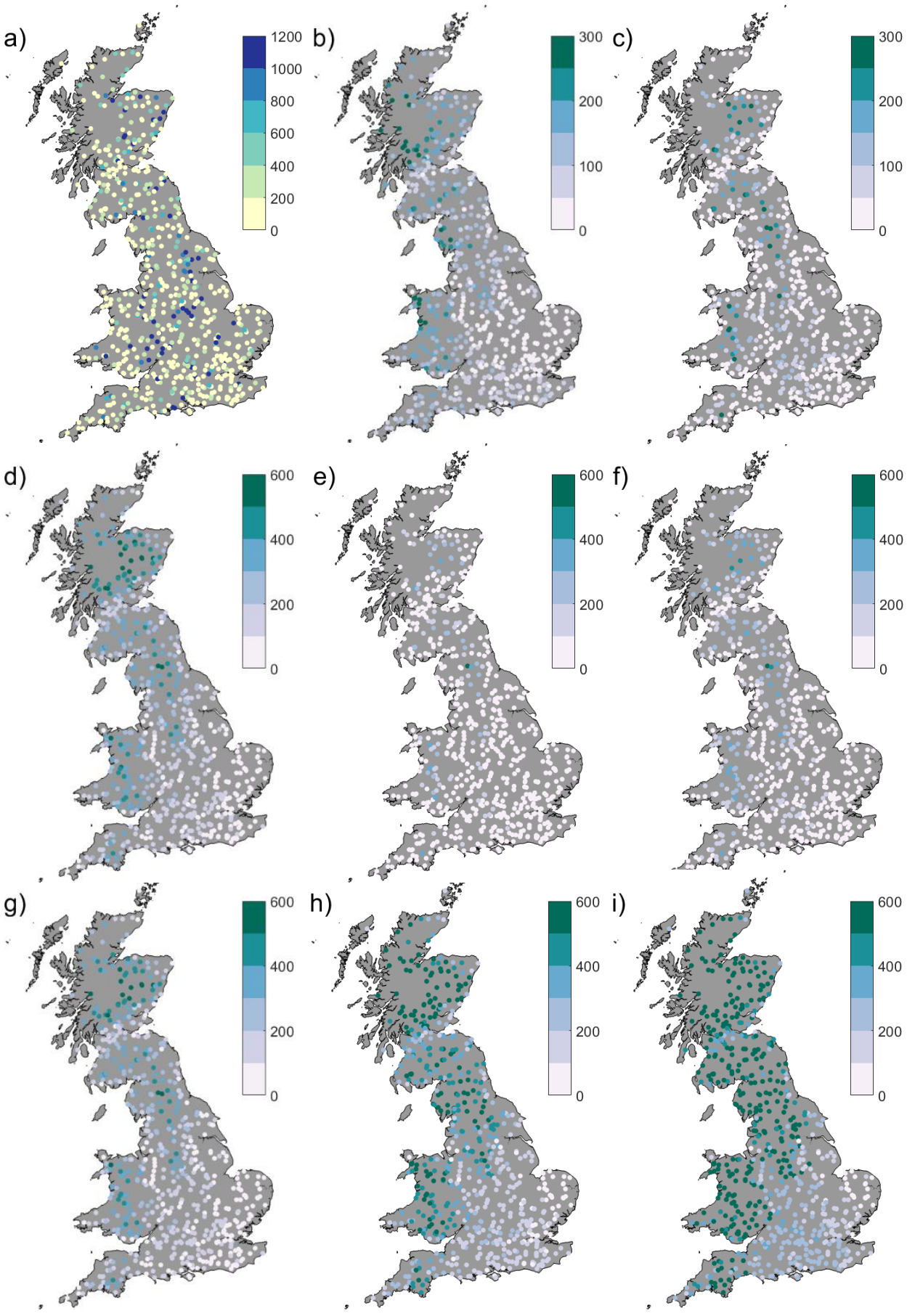
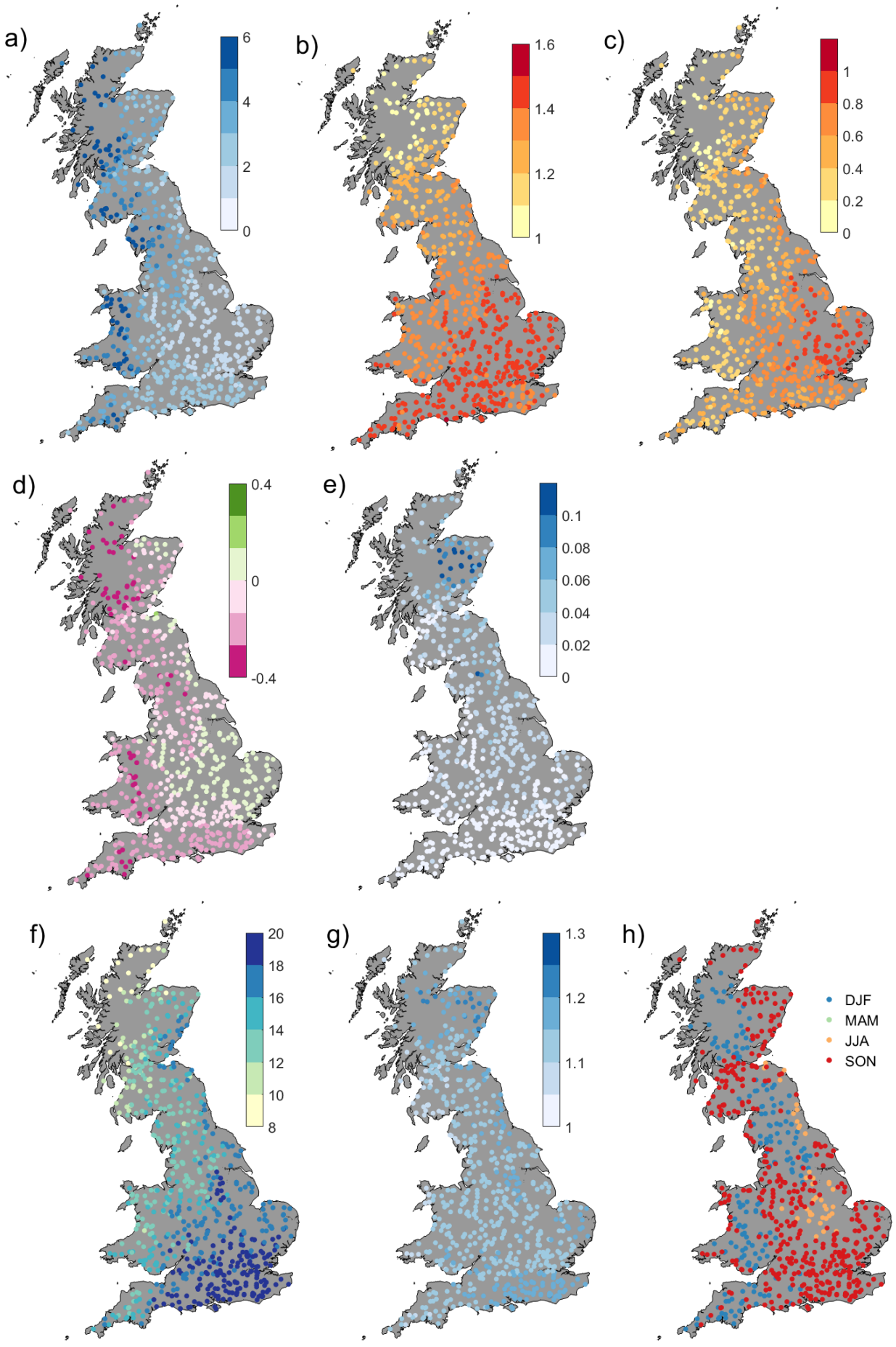


Figure S3. Maps of topographic attributes over GB, a) area (km^2), b) mean drainage path slope (m/km), c) gauge elevation (m), d) mean elevation (m), e) minimum elevation (m), f) 10^{th} percentile

elevation (m), g) 50^{th} percentile elevation (m), h) 90^{th} percentile elevation (m) and i) maximum elevation (m)


a)
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c)
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d)
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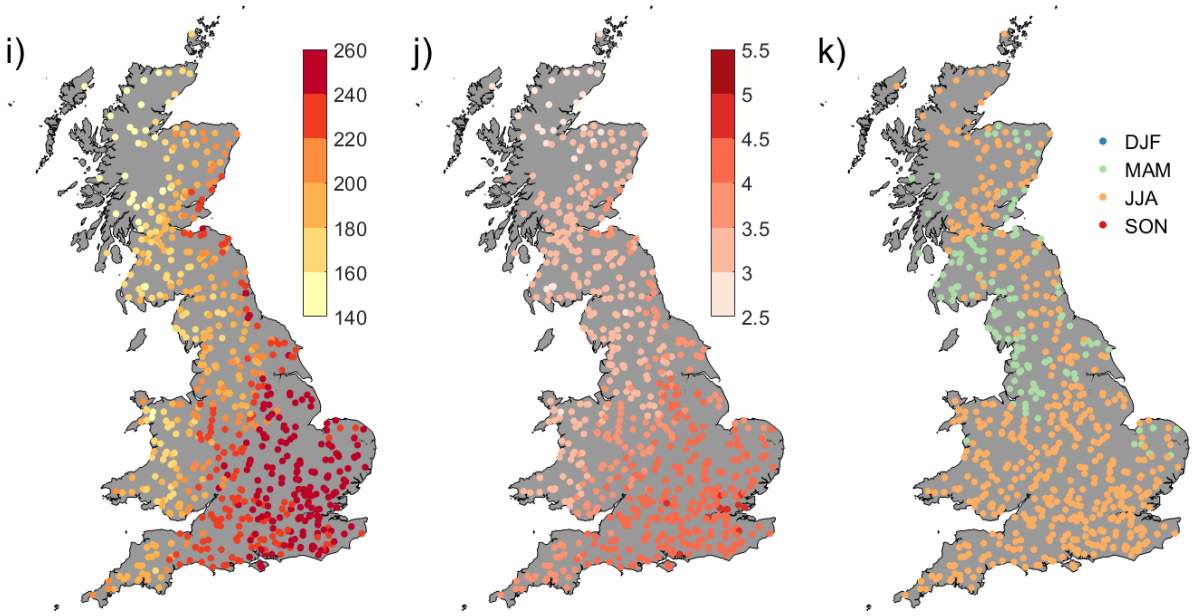
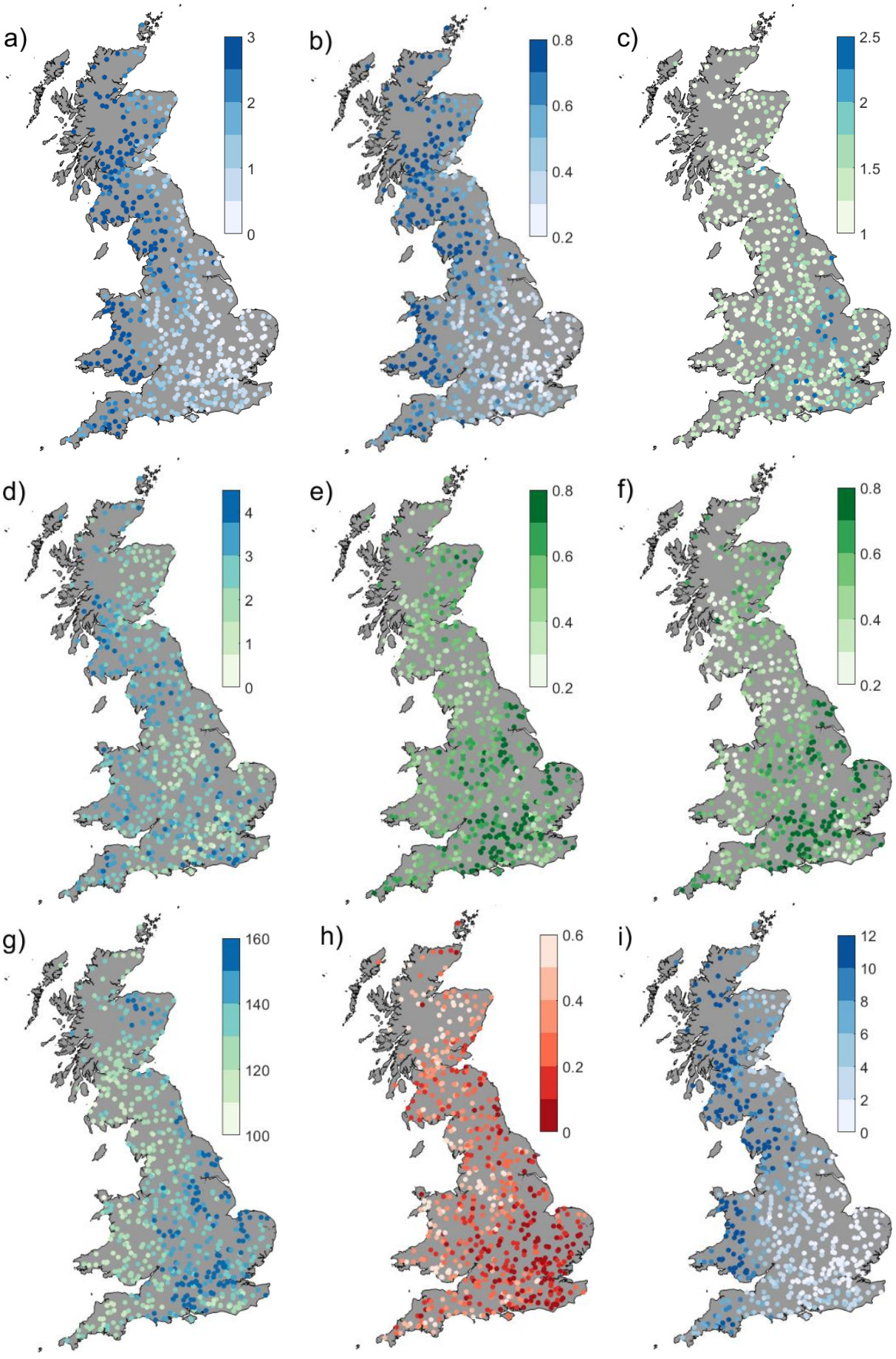


Figure S4. Maps of climatic indices across GB, a) mean precipitation (mm/day), b) mean potential evapotranspiration (mm/day), c) aridity (-), d) seasonality of precipitation (-), e) snow fraction (-), f) frequency of high precipitation days (days yr^{-1}), g) average duration of high precipitation events (days), h) season during which most high precipitation days occur (season), i) frequency of dry days (days yr^{-1}), j) average duration of dry periods (days), k) season during which most dry days occur (season)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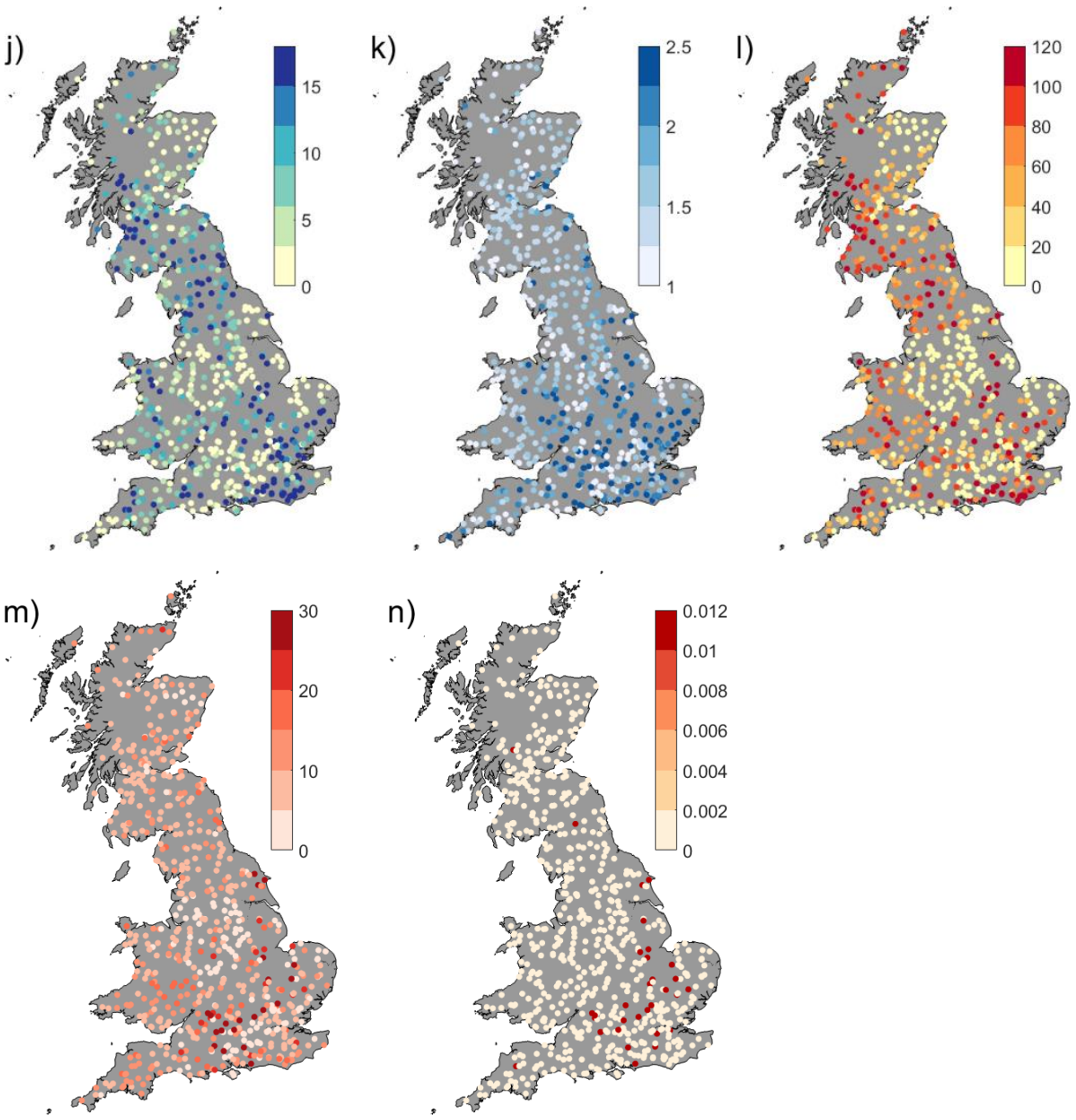


Figure S5. Maps of hydrologic signatures indices across GB, a) mean discharge (mm day^{-1}), b) runoff ratio (-), c) stream elasticity (-), d) slope of the flow duration curve (-), e) base flow index (-), f) base flow index CEH (-), g) mean half flow date (day of year), h) Q5 (mm day^{-1}), i) Q95 (mm day^{-1}), j) frequency of high flow days (days yr^{-1}), k) average duration of high flow events (days), l) frequency of low flow days (days yr^{-1}), m) average duration of low flow events (days), n) frequency of days where flow equals zero

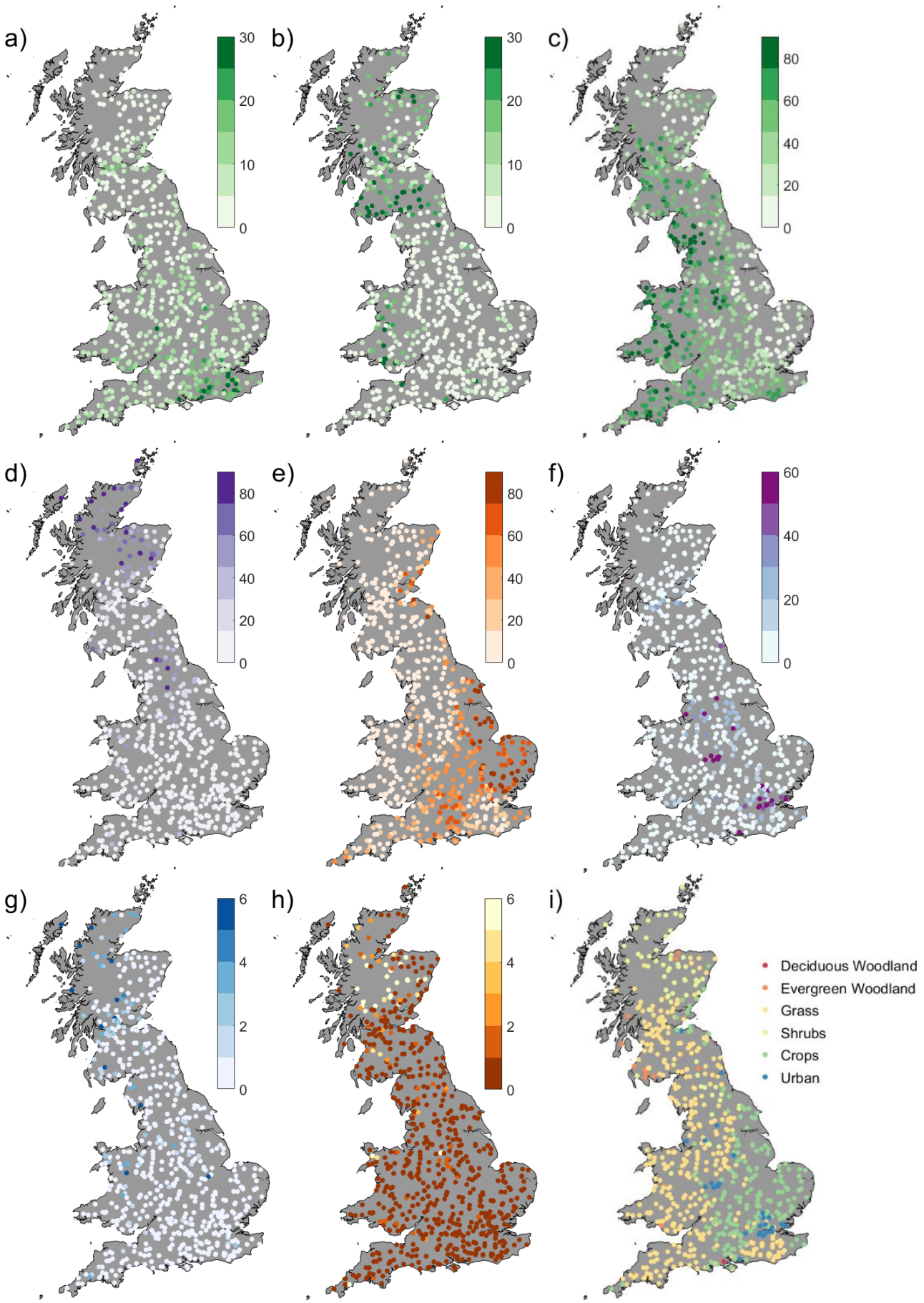
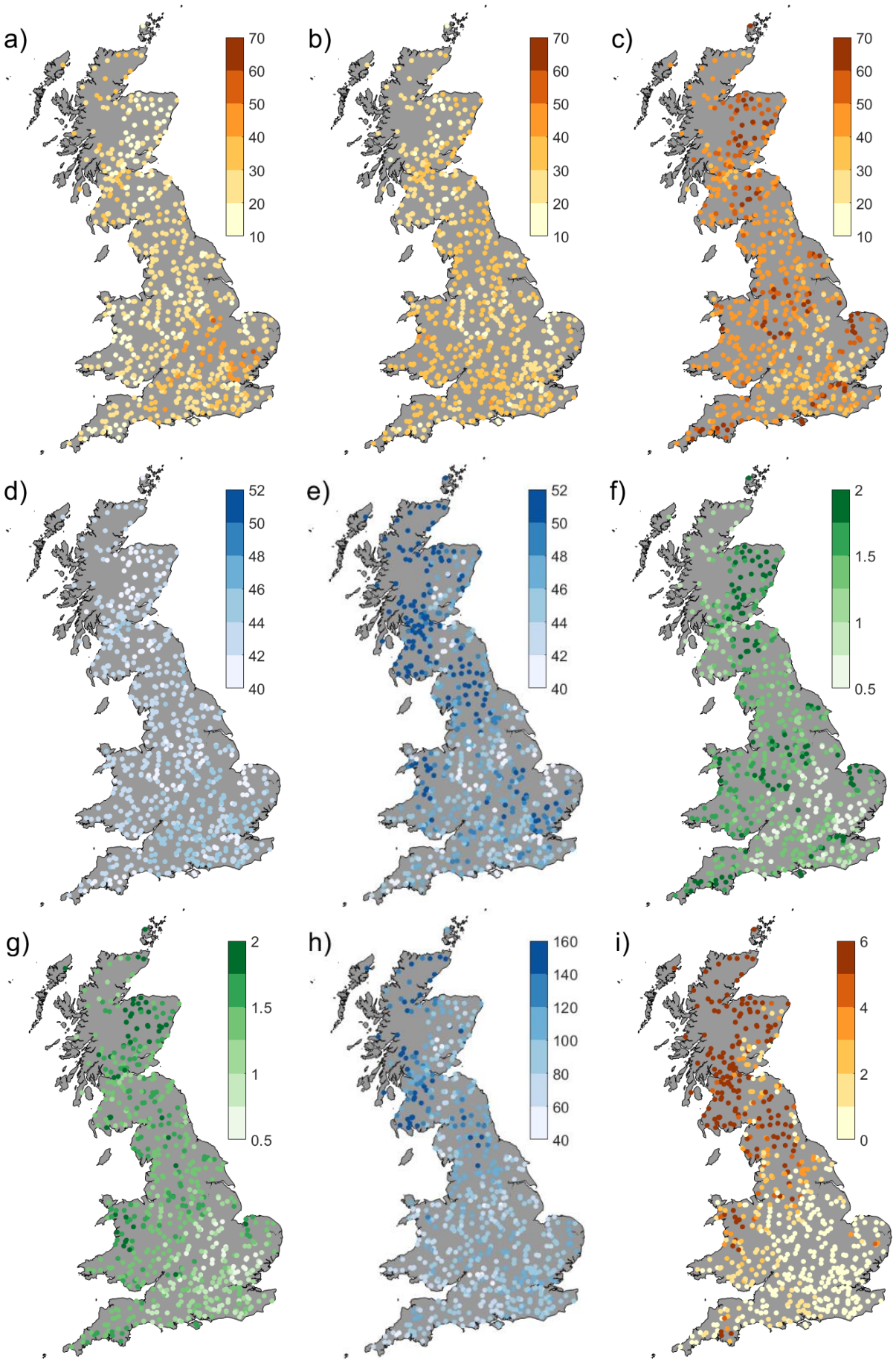


Figure S6. Maps of land cover attributes across GB, a) deciduous woodland (%), b) evergreen woodland (%), c) grass and pasture (%), d) shrubs (%), e) crops (%), f) urban and suburban (%), g) inland water (%), h) bare soil and rocks (%), i) dominant land cover (-)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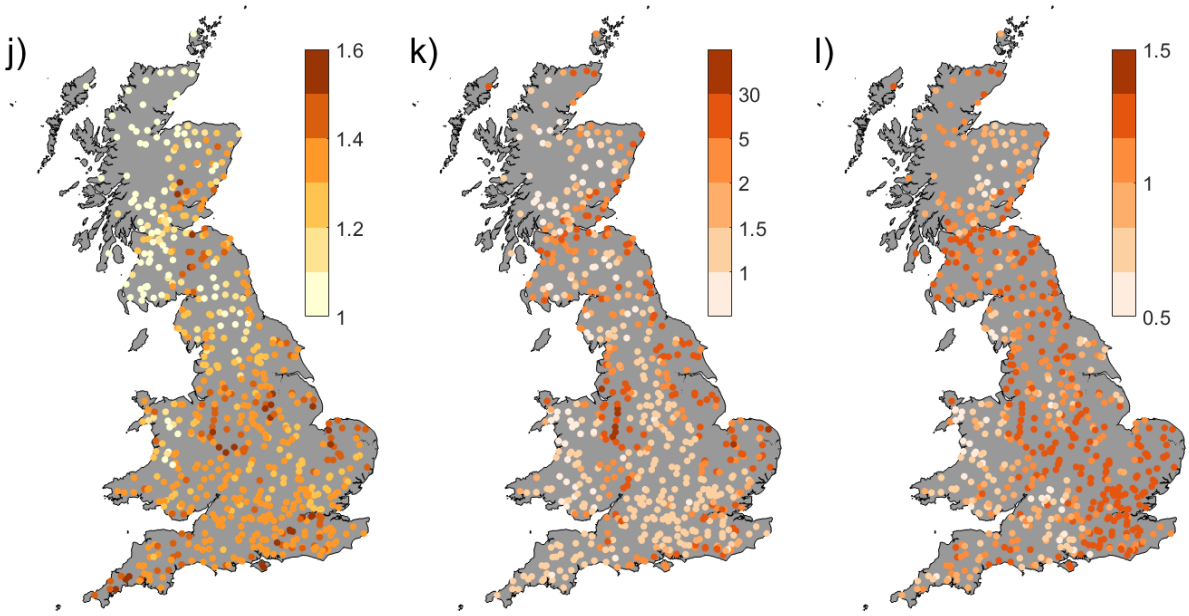

Figure S7. Maps of soil attributes across GB, a) percentage of clay (%), b) percentage of silt (%), c) percentage of sand (%), d) volumetric porosity – cosby (-), e) volumetric porosity – hypres (-), f) saturated hydraulic conductivity – cosby (cm h^{-1}), g) saturated hydraulic conductivity – hypres (cm h^{-1}), h) total available water content (mm), i) percentage of organic content (%), j) bulk density (g cm^{-3}), k) depth to weathered bedrock (m), i) depth available for roots (m)

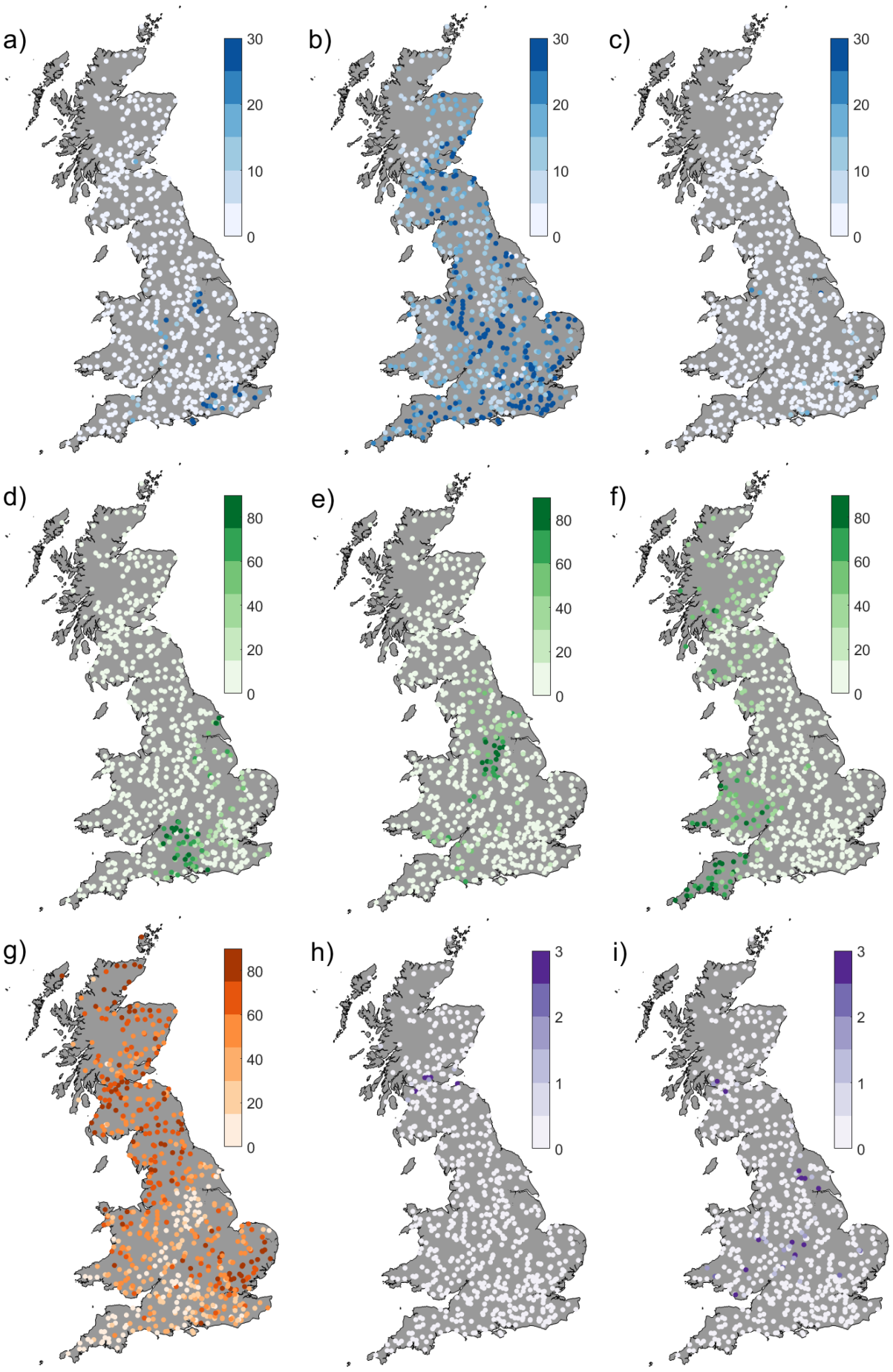

Figure S7. Maps of hydrogeology attributes across GB, a-c) significant intergranular flow – high, moderate and low productivity (%), d-f) flow through fractures – high, moderate and low productivity (%) g) rocks with essentially no groundwater (%), h) generally low productivity (intergranular flow)

but some not significant aquifer (%), i) generally not significant aquifer but some low productivity (intergranular flow) (%)

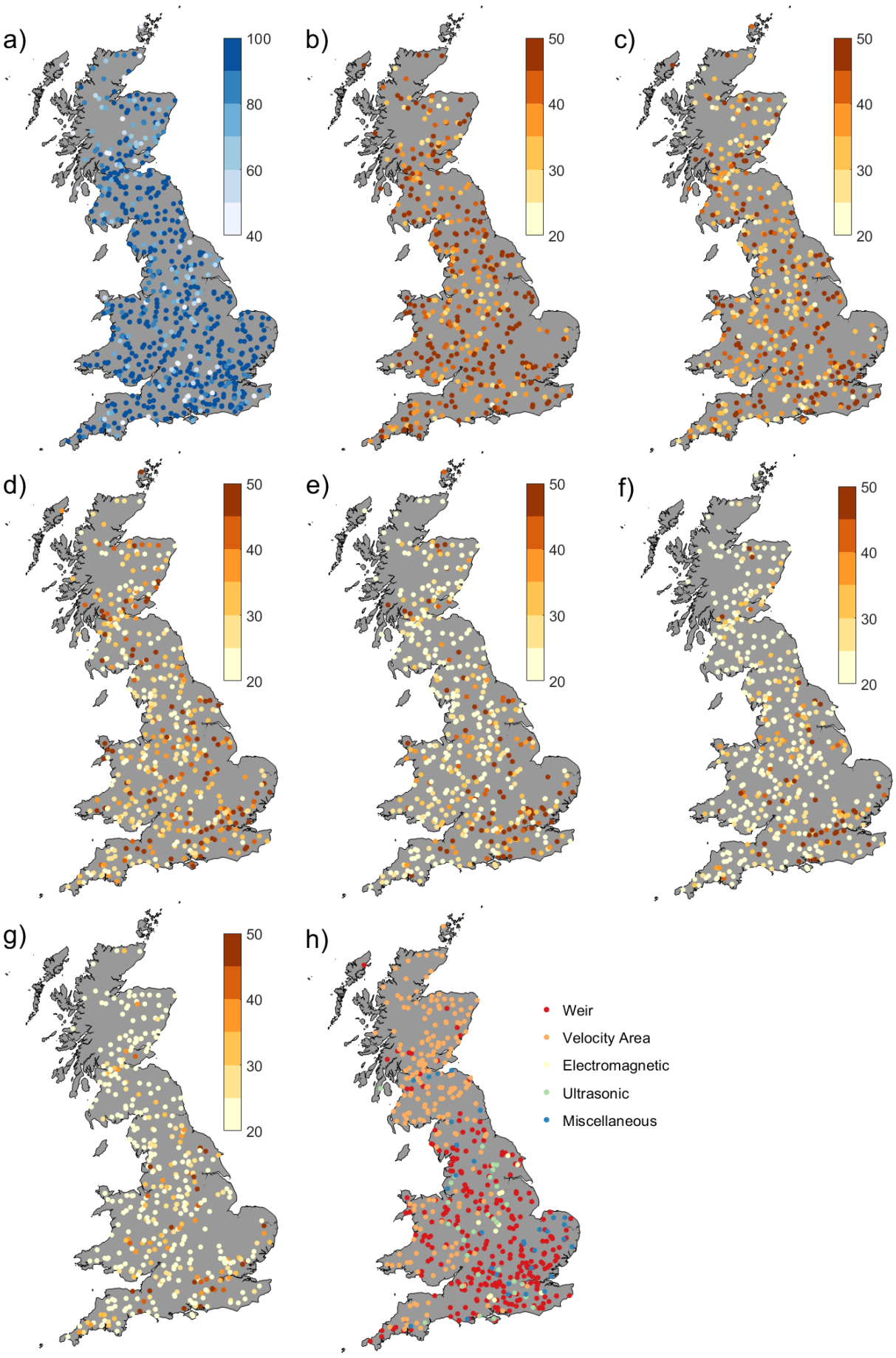

Figure S8. Maps of hydrometry attributes across GB, a) percentage of days with flow time series available from 1st October 1970 – 31st September 2015 (%), b-g) discharge uncertainty interval

(upper bound plus lower bound) for the XX percentile flow given as a percentage of the XX percentile flow (%) where XX equals b) 5, c) 25, d) 50, e) 75, f) 95, g) 99, h) station type

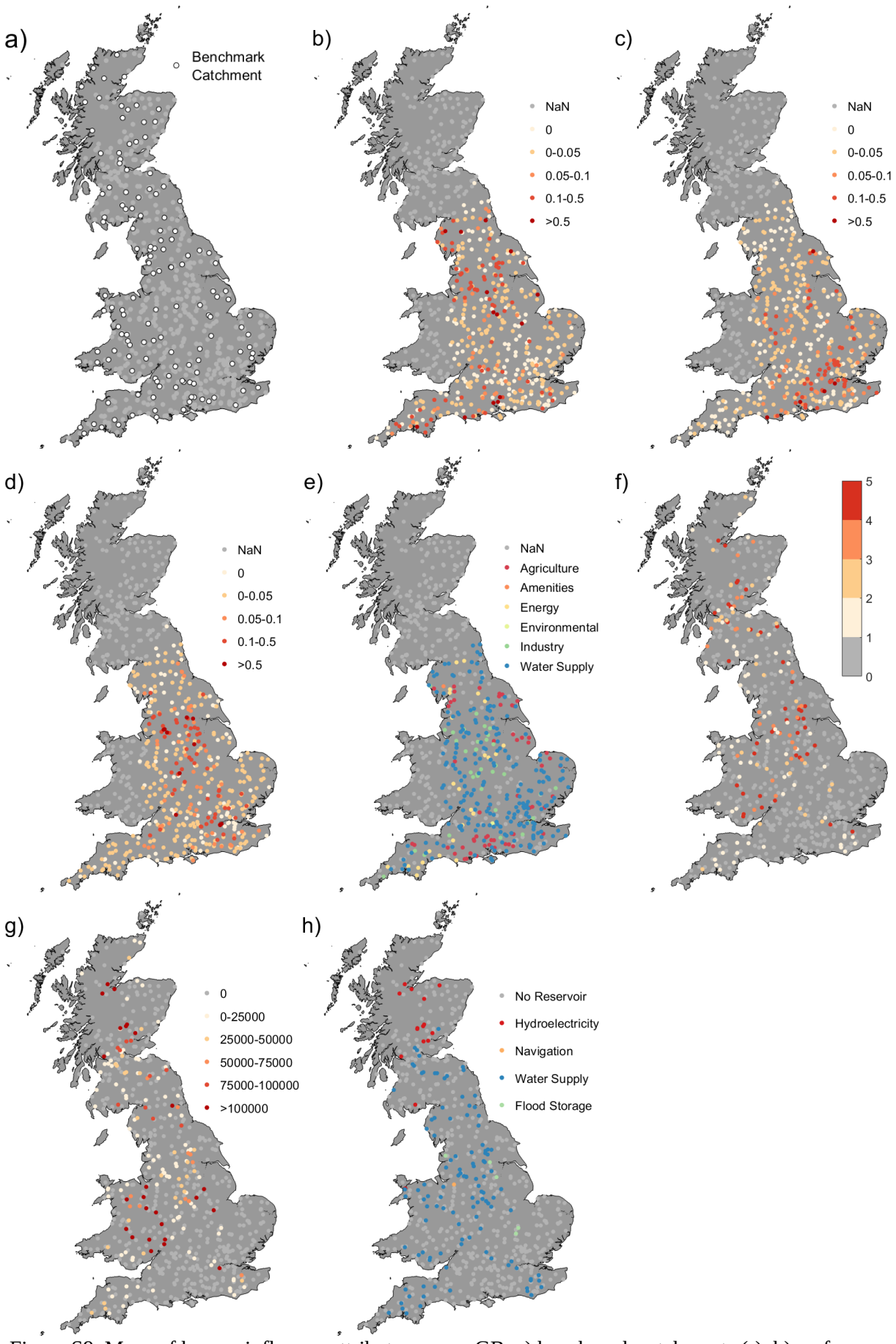

Figure S9. Maps of human influence attributes across GB, a) benchmark catchments (-), b) surface water abstraction (mm day^{-1}), c) groundwater abstraction (mm day^{-1}), d) discharges from water companies and other discharge permit holders (mm day^{-1}), e) dominant use for groundwater and

surface water abstraction (-), f) number of reservoirs (-), g) total reservoir capacity (ML), h) dominant reservoir use (-)

S3 CAMELS-GB Choice of Datasets

We provide examples of the differences between formulations in CAMELS-GB including two formulations for baseflow index, potential evapotranspiration and soil porosity and conductivity.

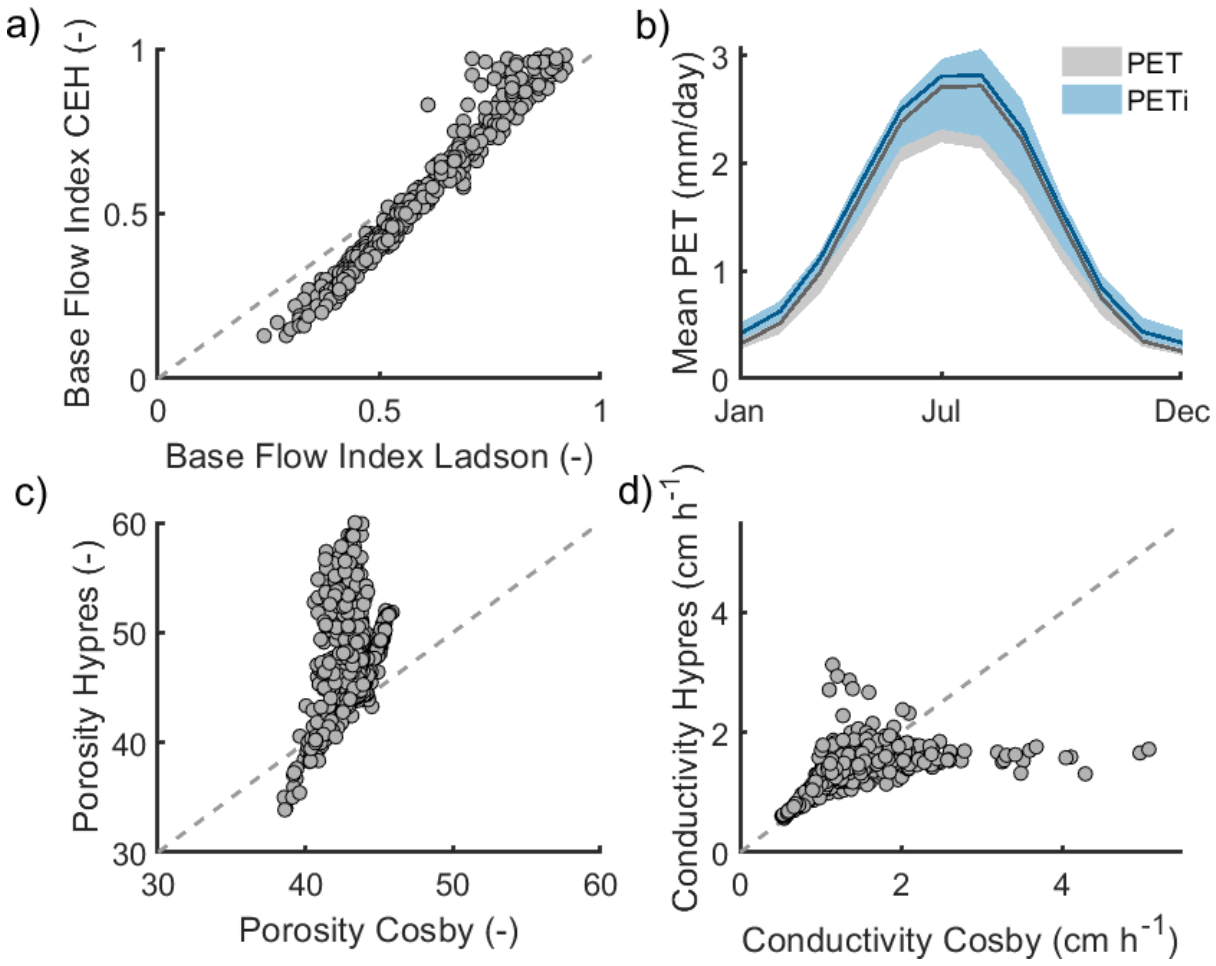

Figure S10. Differences in formulations, a) baseflow index (-), b) monthly variation in potential evapotranspiration with and without the interception correction, the shaded area shows the 5-95th percentile from all catchments while the line shows the mean (mm day^{-1}), c) soil porosity calculated using the Cosby and HYPRES pedotransfer function (-), d) soil hydraulic conductivity calculated using the Cosby and HYPRES pedotransfer function (cm h^{-1})