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Spatial and temporal variations in the occurrence of low flow events in the UK

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Abstract. Information on the magnitude and variability of low river flows at the river reach scale is central to most aspects of water resource and water quality management. Within the UK, river stretches with permanent gauging stations represent less than one percent of the total number of river stretches mapped at a scale of 1:50,000 and fewer than 20% of gauged catchments can be regarded as having natural flow regimes. This has led to the development of simple, multivariate models for predicting average annual natural flow duration statistics through relationships with catchment characteristics. One assumption within these models is that low flows occur at the same time at all points within a catchment, irrespective of the hydrogeological nature and climatic condition of the catchment. This paper discusses the implications of spatial variations in the timing of low flow events for this type of model. Differences in the timing of the mean day of occurrence of the annual Q95 flow in UK catchments can be identified with low flows occurring earlier in the year within impermeable dry catchments and later in the year for wet permeable catchments. However, any differences in the mean day of occurrence between different catchments are generally masked by the magnitude of the inter-year variability in the day of occurrence.

From analysis of linear combinations of flow statistics from nearest-neighbour gauged catchments, the paper demonstrates that the assumption of temporal coherence of low flows will generally result in an under-estimate of Q95; these underestimates are more significant for pairs of impermeable catchments than for combinations of permeable catchments and impermeable-permeable catchments.

[Final Revised Paper](#) (PDF, 1403 KB)

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