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Convergence distribution within catchments, and its effect on the hydrological response

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Topographic convergence and divergence, as measured by e.g. planform curvature, is a first-order geomorphic parameter that affects the hydrological response of hillslopes and catchments. This is recognised in hillslope similarity parameters such as the hillslope Péclet number.

However, planform curvature is also among the least well understood hydro-geomorphic parameters. This poster discusses geomorphic controls on curvature, shows examples of how planform curvature is distributed within catchments, and how this distribution may affect the hydrological response.

We show that while catchments as a whole can be considered as being convergent in nature, the assembled hillslopes are overall divergent in nature, leading to a 'convergence paradox'. The hydrological significance of this is discussed.

We further show how the effect of DEM-derived topographic convergence/divergence (as measured by hillslope width functions) on the hydrological response (as measured by mean residence time and higher order moments) can be analysed within a Péclet number framework, both on the individual hillslope, and the catchment scale.