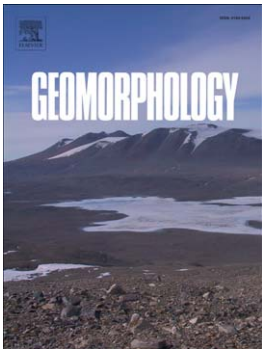

Hydrologic connectivity as a framework for understanding biogeochemical flux through watersheds and along fluvial networks

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Hydrologic connectivity as a framework for understanding biogeochemical flux through watersheds and along fluvial networks

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Hydrologic connections can link hillslopes to channel networks, streams to lakes, subsurface to surface, land to atmosphere, terrestrial to aquatic, and upstream to downstream. These connections can develop across vertical, lateral, and longitudinal dimensions and span spatial and temporal scales. Each of these dimensions and scales are interconnected, creating a mosaic of nested hydrologic connections and associated processes. In turn, these interacting and nested processes influence the transport, cycling, and transformation of organic material and inorganic nutrients through watersheds and along fluvial networks. Although hydrologic connections span dimensions and spatiotemporal scales, relationships between connectivity and carbon and nutrient dynamics are rarely evaluated within this framework. The purpose of this paper is to provide a cross-disciplinary view of hydrologic connectivity — highlighting the various forms of hydrologic connectivity that control fluxes of organic material and nutrients — and to help stimulate integration across scales and dimensions, and collaboration among disciplines.

Keywords: hydrologic connectivity; nutrient transport; hyporheic exchange; stream-groundwater interactions; river-floodplain interactions

1. Introduction

Hydrologic connectivity is a broad term that has been used in various contexts by numerous researchers, but its meaning often differs among disciplines (Bracken et al., 2013; Michaelides and Chappell, 2009). The different meanings are due in part to the varying influence that hydrologic