

Exploring physical and biological connections using isoscapes

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Environmental chemistry data provide a wealth of information on Earth system processes, but perhaps one of the most general and widely useful applications of such data is in to identify within- and between-system connectivity. Chemical signatures have been used to establish hydrological connectivity, identify the provenance of geological materials, artefacts and forensic evidence, and trace the migration of humans and other animals. Particularly useful are spatial and temporal patterns of environmental isotope variation, which are often predictable based on large-scale databases and/or fundamental physio-chemical theory. I will review case studies demonstrating how the resulting quantitative data products, called isoscapes, have led to new advances and applications in fields as diverse as forensic science, water resources research, and aquatic ecology. I will also discuss how community data and computational infrastructure, including the Waterisotopes Database (wiDB; <http://waterisotopes.org>) and Isoscape Modeling, Analysis and Prediction tool (<http://isomap.org>) are facilitating and promoting the use of geochemical data in connectivity research and related outreach and education.

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