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Application of Isoscapes to Global Wildlife Studies - A Decade of Progress and the Road Ahead

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Critical to understanding the ecology of migratory species is the ability to quantitatively link geographical regions used by individuals or populations during their life cycle. Traditional approaches to determine migratory connectivity over large geospatial scales have relied on extrinsic mark & recovery methods – which are largely unsuccessful for most animals. The use of intrinsic markers like stable isotopes in animal tissues offers a new and alternative approach.

The isotope approach relies on the fact that food web stable isotopic values are reflected in the tissues of organisms, and that organisms migrating between isotopically distinct biomes carry with them spatial information on the location of previous feeding. Knowing a priori the global or regional spatial patterns of various stable isotopes in the landscape (Isoscapes) allows us to infer geographical region of origin of migrating animals.

This presentation provides an overview of a decade of research and ongoing improvement in stable-isotope assays and approaches (primarily dD, d18O, d13C, d15N) aimed at unraveling migration linkages in migratory animals (e.g. examples of birds, insects will be illustrated). The isoscape approach has been most successful using hydrogen isotopes owing to predictable global spatial isotopic patterns, but other isotopic tracers are increasingly being used. Combined with GIS and advanced geostatisitical tools, “Isoscapes” represents an increasingly powerful tool in wildlife migration and forensics research.