Applying Quantitative Ecoregionalization to Network Analysis: Quantifying Representativeness and Determining Importance Values for AmeriFlux Sites

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New Approaches to Ecological Regionalization Symposium Abstract

We apply a multivariate statistical cluster analysis to determine how well the current distribution of sites in a sampling network is representative of the dominant combinations of vegetation, soils, and climate present in the conterminous US. Statistical indices based on multivariate representativeness and site importance indicate how well the current network of eddy flux towers "samples" the population of carbon flux environments within the nation. The same empirical approach provides a repeatable rationale for the selection of additional flux tower sites by determining any number of additional locations such that the representation of the overall network is maximized by their addition. A representativeness importance value for each existing eddy covariance tower in the AmeriFlux network can be calculated.

We have statistically created a series of nine sets of flux-relevant ecoregions which divide the conterminous U.S. into a set of areas within which the carbon flux from terrestrial ecosystems is expected to be relatively uniform and homogeneous. Starting with digital GIS layers of factors deemed important in regulating carbon fixation and loss from terrestrial ecosystems, we assembled a set of maps of multivariate factors which describe and characterize the flux environment in each map cell. Then, we used a k-means clustering procedure to classify each map cell into a particular group whose cells have sufficiently similar environments. Because there were as many as 30 environmental descriptors, each with nearly 8 million cells, it was necessary to perform the clustering process on a parallel supercomputer.

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