Spatial Structure in North American Regional CO$_2$ Fluxes Evaluated with a Simple Land Surface Model

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We evaluate spatial structure in Ameriflux CO$_2$ flux observations using a simple diagnostic land surface model. The Vegetation Photosynthesis Respiration Model (VPRM) calculates NEE using locally observed temperature and PAR, and satellite-derived phenology and moisture. We use observed NEE from a group of Fluxnet eddy covariance tower sites spanning North America to optimize VPRM parameters for these sites. We use the spatial structure of VPRM errors to investigate spatial coherence in regional CO$_2$ fluxes at several different time scales. We show that VPRM residual correlation degrades with increasing spatial scale. This conclusion should impact the size of regions used in atmospheric inversion calculations.

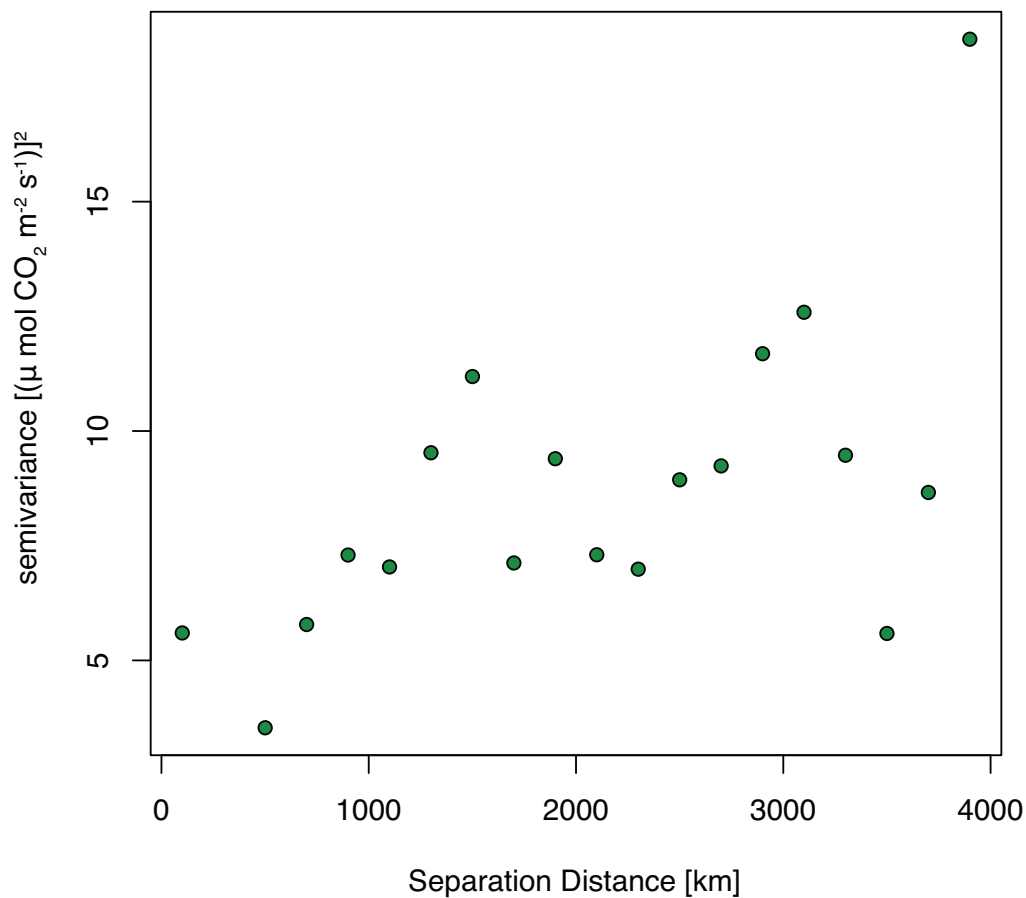**VPRM Residual Semivariogram – 1 June 2004, 13:00**

Figure 1. Semivariogram for VPRM residuals. Site pairs are grouped into bins by separation distance, with bin widths of 200 km. Bins containing at least 20 site pairs are shown. The increasing trend with distance shows that site-to-site residual correlation decays with increasing separation.