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Extracting light, temperature and time dependencies from eddy covariance CO_2 flux observations using 3D cubic spline estimation

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Light, temperature and time are considered to be dominant factors in driving variations in the net ecosystem CO_2 flux of terrestrial vegetation. Characterising the nature of these dependencies is important when interpreting patterns of behaviour in EC data and ultimately predicting future responses. However, we are unable to exert sufficient control over natural canopies to identify these dependencies separately, whilst the covariation of light, temperature and time often confounds attempts to identify the independent effects of these three factors from EC data. Here, we apply an objective 3D interpolation scheme based on cubic splines to estimate the simultaneous dependence of net ecosystem CO_2 flux on light, temperature and time in annual EC data sets. This methodology is applied to various CARBOEUROPE and AMERIFLUX sites to elucidate these relationships for the biomes in question.