

Use of Green's function in spatial covariance analysis

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For numerical weather prediction, covariance plays a very important role in both ensemble and variational data assimilation. This research discusses possible applications of Green's function to covariance analysis. Since Green's function is an integral kernel that it can be used to solve partial differential equations for analysing the spatial statistical behaviour of forecasting error. By analysing error spectral statistics of Green's function, the linkage between the Green's function and covariance can be established. For example, from the Helmholtz differential equation for forecast error statistics, the covariance is the square of the Green's function after it performs the spectral transform. The possible use of Green's function for variational and ensemble data assimilation will also be discussed.