



Gap filling in incomplete geophysical data sets

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Data sets in the geosciences are often full of gaps. This is usually the case for geological and paleoclimatological proxy data from the remote past, as well as for historical records from the more recent past. In modern times, data points may be missing because of the way the measurements are obtained. For example, remote sensing instrumentation can be hampered by clouds, aerosols, or heavy precipitation. The presence of gaps in data sets presents various problems, for example in spectral estimation, specifying boundary conditions in numerical models, and so on.

We demonstrate here how freeware from the SSA-MTM Toolkit (<http://www.atmos.ucla.edu/tcd/ssa/>), based on Singular Spectrum Analysis (SSA) and multi-channel SSA, can be applied to fill the missing data with smooth information from an iteratively inferred “signal” that represents coherent spatio-temporal structures, while the “noise” variance is discarded or reduced (Kondrashov and Ghil, 2006). Doing so can be quite valuable in a wide variety of applications, ranging from reconstruction of paleoclimatic and instrumental climate data to oceanographic and space physics data.