1056-86-1546 **Frederik J Simons*** (fjsimons@gmail.com), Department of Geosciences, Guyot Hall 321B, Princeton, NJ 08544. *Slepian Functions for Signal Estimation and Spectral Analysis.*

It is well-known that mathematical functions that are timelimited (or spacelimited) cannot be simultaneously bandlimited (in frequency). Yet the finite precision of measurement and computation unavoidably bandlimits our observation and modeling scientific data, and we often only have access to, or are only interested in, a study area that is temporally or spatially bounded. In the geosciences we may be interested in spectrally modeling a time series defined only on a certain interval, or we may want to characterize a specific geographical area observed using an effectively bandlimited measurement device. Analyzing and representing scientific data of this kind will be facilitated in a basis of functions that is "spatiospectrally" concentrated, i.e. "localized" in both domains at the same time. One particular approach to this "concentration" problem was originally proposed for time series by Slepian and coworkers, in the 1960s. We show how this framework leads to practical algorithms and statistically performant methods for the analysis of signals and their power spectra in one and two dimensions, and on the surface of a sphere. We highlight the connections to sparsity by showing that many geophysical processes are sparse in the Slepian basis. (Received September 22, 2009)