

## **Modeling non-stationary long memory with time varying spectra**

Nan-Jung Hsu<sup>1</sup> and Henghsiu Tsai<sup>2</sup>

<sup>1</sup> Institute of Statistics, National Tsing-Hua University, Taiwan

<sup>2</sup> Institute of Statistical Science, Academia Sinica, Taiwan

This study proposes a method of modeling long-memory phenomenon with time-varying long-memory characteristics. By adopting the ideas of Pintore and Holmes [1], a non-stationary covariance function is constructed by evolving the spectral representation over time in which the spectrum at each time follows a fractionally integrated process. The long-memory parameter may be time-varying but deterministic, and can be further specified via a parametric function or nonparametric splines. Maximum likelihood is used for parameter estimation which performs well as shown in the numerical examples. To illustrate the application, the methodology is applied to identify possible changes of dynamics in Nile River data and return data.

### **References**

- [1] Pintore A, Holmes C (2004) Spatially adaptive non-stationary covariance functions via spatially adaptive spectra. Manuscript. Available at [http://www.stats.ox.ac.uk/~cholmes/Reports/spectral\\_tempering.pdf](http://www.stats.ox.ac.uk/~cholmes/Reports/spectral_tempering.pdf).