



Department of Decision Sciences  
Statistics Seminars

## Multiscale CUSUM tests for time-dependent spherical random fields

**Alessia Caponera**

Luiss

Thursday, 4<sup>th</sup> April 2024

12:00 pm **Room 3-E4-SR03** Via Roentgen 1 Milano

### Abstract

The analysis of time-dependent spherical random fields is a natural setting for, among others, Climate and Atmospheric Sciences. In these areas, it is often a valid question to probe whether structural breaks have occurred over time; the most immediate example of such changes is obviously represented by shifts in the global (averaged over space) mean corresponding to global increments of the Earth temperature. Such shifts can be investigated by means of a number of traditional statistical tools, such as the celebrated CUSUM test. However, spatial fluctuations at different scales could potentially be of interest when studying atmospheric phenomena. We then propose a CUSUM-type test procedure to test for a possibly non-stationary mean, allowing modifications which may go beyond a simple global mean shift. In particular, we derive the asymptotic distribution of the test statistic under the null hypothesis of stationarity, and we prove consistency of the corresponding test. Our approach, which intrinsically integrates the spatial and temporal dimensions, could give multiscale insights into both the global and local behaviour of changes. This will be motivated by a real dataset of global surface temperature anomalies.