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## **Prominent discords in climate data through matrix profile techniques: detecting emerging long term pattern changes and anomalous events**

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Outliers detection generally aims at identifying extreme events and insightful changes in climate behavior. One important type of outlier is pattern outlier also called discord, where the outlier pattern detected covers a time interval instead of a single point in the time series. Machine learning contributes many algorithms and methods in this field especially unsupervised algorithms for different types of data time series. In a first submitted paper, we have investigated discord detection applied to climate-related impact observations. We have introduced the prominent discord notion, a contextual concept that derives a set of insightful discords by identifying dependencies among variable length discords, and which is ordered based on the number of discords they subsume.

Following this study, here we propose a ranking function based on the length of the first subsumed discord and the total length of the prominent discord, and make use of the powerful matrix profile technique. Preliminary results show that our approach, applied to monthly runoff timeseries between 1902 and 2005 over West Africa, detects both the emergence of long term change with the associated former climate regime, and the regional driest decade (1982-1992) of the 20th century (i.e. climate extreme event). In order to demonstrate the genericity and multiple insights gained by our method, we go further by evaluating the approach on other impact (e.g. crop data, fires, water storage) and climate (precipitation and temperature) observations, to provide similar results on different variables, extract relationships among them and identify what constitutes a prominent discord in such cases. A further step will consist in evaluating our methodology on climate and impact historical simulations, to determine if prominent discords highlighted in observations can be captured in climate and impact models.