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Hyper Cold Systems follow up

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The follow up of intense precipitation system is a key information for climate studies. Whereas some rainfall measurement series cover more than one century they cannot retrieve these phenomena in their spatial and temporal continuity. The geostationary satellite data offer a good trade-off between the length of data series and the retrieval accuracy. However a difficulty arise from ambiguous interpretation of the lone infrared signal in nephanalysis. Hence the tropopause temperature is used as a proxy to characterize extreme precipitation event. That does not mean that the more intense rain-rate will be always collocated with the coldest temperature but that most of these intense events is produced by systems whose a part is colder than tropopause.

Computations have been carried out on 38 months of MSG and Meteosat/IODC. System follow up is achieved by a simple 3D connexity algorithm, the time being considered as the third dimension. This algorithm produce three dimension clusters from where the main system parameters can be easily extracted. Thus the systems can be classified trajectory characteristic (duration, speed ans size variation). A drawback of this simple threshold method relies is some over-segmentation. In most of case the bias is minor as unconnected clusters are small and short-lived. However an aggregating algorithm have been developed to retrieve the most complex system trajectories.

To assess the efficiency of this method three regional studies are displayed: the North African Maghreb, the West African Sahel and the Indian Ocean. On Maghreb, the location of system initialization shows a dramatic difference between the eastern and western parts. Whereas in Tunisia a significant part of these systems are generated on sea and most have no clear relation with relief, the Morocco is mainly characterized with land initiated system with a strong orographic effect on system triggering. Another difference relies on the low level wind shear impact which appears as stronger in the eastern than in the western part. The Sahelian intense precipitation systems are obviously dominated by westward squall lines. Some triggering area appear clearly although their characterization is unclear as they are not associated with regular upper-air patterns or significant relief. The Indian Ocean area allows to check the algorithm efficiency in cyclone follow up. To properly match with the trajectories, it is necessary to run the post processing aggregating algorithm.