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Deep Convective Event extraction procedure: first results

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The tropopause temperature is one of the rare non ambiguous threshold which can be applied to geostationary infra-red measurements. Therefore a straightforward procedure to delineate in space and time Deep Convective Event (DCE) is first to binarize according to this threshold and then to apply a 3D connectivity on successive 10.8 μm satellite images. This process circumnavigate the issue of splitting or merging systems as extracted DCE are only 3D volumes. A key point of this method is that it does not require any local tuning parameter and thus is well suited for building long term climatology. A specific algorithm has been developed to optimize long series data processing and then applied on 18 months database of MSG, MET7 and MTSAT.

This presentation will not address the issue of actual rainfall estimation but will focus on behavior of DCE seen as a proxy for intense precipitation event. Basic morphological parameters, such as duration or maximum area, are extracted and related with ground and upper air parameters. Some well known features appear clearly: continent/sea difference, diurnal cycle on land. A more innovative result is the relationship with elevation which appears strong but irregular. The relief triggering effect on DCE appears clearly. In strong contrast with orography, the vegetation cover does not show any clear dependence beyond DCE frequency.

Upper air data are supplied by NCEP and ECMWF. Although total precipitable water content is related both with DCE frequency and mean size, such a relationship does not appear for low level winds. This observation does not match with theoretical results which emphasize on wind shear in low troposphere. A possible explanation should rely in limits of deep convection representation in weather reanalysis models.

These first results suggest that DCE extraction procedure on one hand is stable enough to run on an operational basis and on another hand can bring significant information. As it relies on the 10.8 μm infrared channel, a full reanalysis since the beginning of geostationary weather satellite observation could be carried out.