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MCS longevity in the transition from land to sea

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Mesoscale convective systems (MCSs) are organized clusters of thunderstorms spanning more than 100 km horizontally, persisting often for multiple hours. They are known to be the dominant source of rainfall in the tropics, and the longest-lived MCSs are shown to be largely responsible for tropical extreme precipitation [Roca and Fiolleau, 2020]. Globally, the most extreme storms tend to be located over land, and the most intense storms over oceans tend to be adjacent to land, where motion is favored from land to ocean, e.g. tropical West Africa and the adjacent Eastern Atlantic Ocean [Zipser et al., 2006]. The mechanisms behind the intensification or dissipation of MCSs advected from land to sea are not well established yet, and hurricanes in the Western Atlantic can often be traced back to MCSs originating off the African coast.

We here investigate the evolution of MCSs emerging from satellite data over tropical Africa and the Eastern Atlantic Ocean. We use a 5-year database of tracked MCSs from infrared satellite data, TOOCAN [Fioellau and Roca, 2013]. We focus on the Atlantic hurricane season (June-November) and on all MCSs that are formed over land and cross over to sea. We look for relationships between MCS longevity, the time of crossing, and the surface temperature. We compare the results to CRM simulations of deep convection over a land surface (oscillating surface temperatures) progressing to sea surface (constant surface temperatures).

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