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A satellite view on the extratropical transition of a hurricane

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Previous studies have shown, that about 50 percent of Atlantic tropical cyclones undergo the transition to an extratropical phase. This transition is a gradual process triggered by several changes in the environment of the cyclone such as increased baroclinicity, meridional gradients in humidity and SST, and the increased coriolis parameter. Substantial changes in the structure of the cyclones can be observed. The core loses its typical symmetric appearance, deep convection is decreasing, comma shaped cloud patterns and frontal structures evolve. During and after extratropical transition cyclones are known to generate large amounts of precipitation, strong winds, and large waves, posing a threat to land and maritime environments. About half of these cyclones re-intensify after extratropical transition with the potential of reaching gale to hurricane force winds.

This presentation will show a case study of a tropical cyclone that underwent re-intensification after extratropical transition using high resolution satellite based remote sensing data. The “Hamburg Ocean Atmosphere Parameters and Fluxes from Satellite Data” (HOAPS) provides twice daily global fields of precipitation, wind, evaporation, and related atmospheric parameters derived from the passive microwave radiometer SSM/I. Data is available in several resolutions and from pixel-level to globally gridded fields. HOAPS wind fields are merged with data derived from synthetic aperture radar (SAR) and scatterometer data, to provide a complete sub-scale analysis. Additionally sea state parameters from SAR data provide detailed information on the underlying wave fields. It is shown that the synergetic use of high resolution passive and active space borne remote sensing data, reveals structural changes during the extratropical

transition of a cyclone, which are often not resolved by NWP data.