Masters project idea
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The role of tropical waves on extreme rainfall at the Guinea Coast

Figure 1 Urban flooding in Abidjan in June 2021

Extreme daily rainfall at the populous Guinea Coast in West Africa can reach 200–300 mm/day and is associated with deep, often organized tropical convection. Tropical waves, like African Easterly Waves or Kelvin waves are known to modulate rainfall in southern West Africa, including the Guinea Coast, yet there role for extreme events has not been studied in detail yet. The "Tropical Meteorology" group has existing algorithms to detect, track, and characterise tropical waves using reanalysis and satellite data. We also possess a large data base of daily rainfall from stations in the region . Learning more about the role of Tropical waves on rainfall extremes shall ultimately help to improve the prediction of the extreme events and thus lead to better early warnings.

In this Master's project, you will apply wave detection algorithms to reanalysis data from 1979-2022. There are various methods available, so you have some flexibility, and you will have an option to incorporate your own ideas and interests. Where station density permits, you will interpolate the daily data to a 1°x1° grid and identify days that exceed the 99th percentile per grid cell. You will answer questions like how often are these extreme events co-occurring with tropical waves, a single one, or a combination of two or three. We will also answer the questions in which season and regions which of the waves are most important. The project has the potential t to end up in a publication – this is an option and not part of the Master thesis.