EGU25-4516, updated on 19 Jan 2026
https://doi.org/10.5194/egusphere-egu25-4516
EGU General Assembly 2025

Meteorological conditions leading to a catastrophic, rain-induced landslide in Cameroon in October 2019

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After an exceptionally wet October 2019, the city of Bafoussam in the Cameroon Highlands was hit by a devastating landslide on 29 October, resulting in around 50 deaths. This study examines the atmospheric drivers leading up to this fatal event on a sub-monthly scale. Leveraging long-term station rainfall data from Bafoussam and the nearby city of Dschang, three marked wet spells during October 2019 are identified, the multi-day rainfall amounts of which exceed the maximum value within the historical data of the stations. Using ERA5 reanalysis data of the European Centre for Medium-Range Weather Forecasts to explore the meteorological background, favourable conditions in each of these wet spells were created by moist southwesterlies from an anomalously warm eastern equatorial Atlantic, induced by cyclonic-anticyclonic vortex couplets over the eastern Gulf of Guinea. The release of the intense rainfalls is associated with strong moisture flux convergence (MFC), likely through an interaction between the southwesterlies and prevailing easterlies from central Africa. On the large scale, the Saharan heat low, extending anomalously far to the northeast towards Libya during large parts of October 2019, appears to have facilitated the recurrence of such vortex couplets by establishing an environmental setting usually found during peak monsoon in August. Eventually, a tropical-extratropical interaction caused the wettest period of the month over the Cameroon Highlands. Dry and initially cool airmasses were advected equatorward from the Mediterranean towards the study region, generating the last strong episode of MFC linked with the landslide event. Subsequently, tropical-extratropical interactions were also involved in the termination of the rainy season. This study highlights not only the importance of the extratropics for rainfall variability in the African inner tropics, but also points to the hitherto understudied role of recurring vortex couplets over western tropical Africa and the Gulf of Guinea for multi-day wet spells.