Introduction for Radar Nowcasting of Severe weather events over Lake Victoria Basin in East Africa

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Unlike mid and low latitudes, in tropics severe weather (heavy rains, gust fronts) can be formed and finish in a very short time. In this study we are focusing on the area around the largest fresh water lake in the tropics that is called Lake Victoria. This lake supports the livelihood of thousands of fisherman and it is estimated that 5000 human deaths occur per year over the lake and most of them are caused by severe weather events. These fatalities are due to localized, severe winds produced by intense thunderstorms over the lake during the rainy season and larger scale, intense winds over the lake during the dry season.

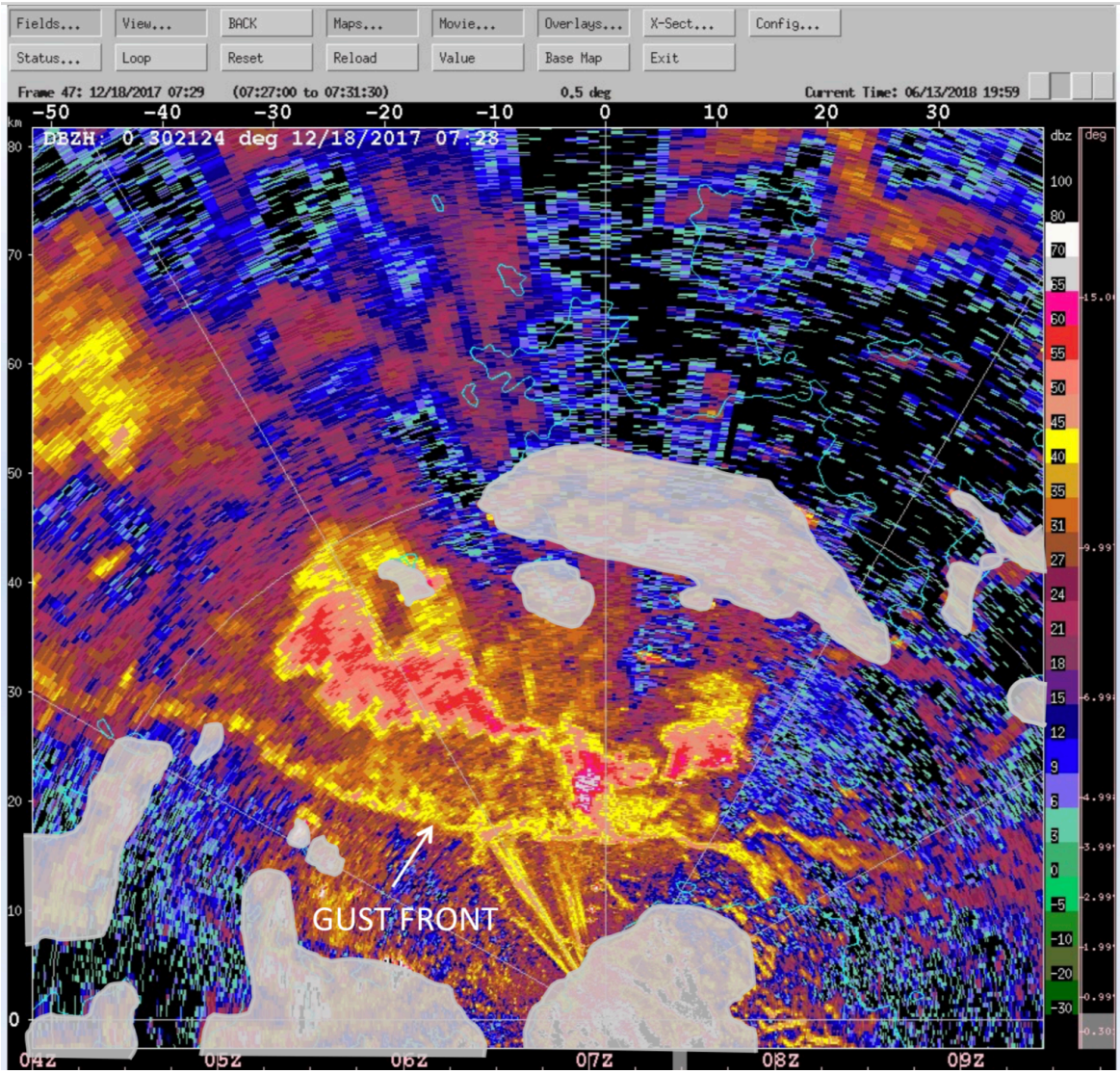
The intense winds produce a rough state of the lake (big wave heights) that cause fishing boats to capsize. The microclimate of the Lake Victoria Basin also makes the region to experience the highest frequency of daylight thunderstorm in the world, thunder is heard on average more than 240 days of the year.

It is hypothesized that land-breeze convergence over the lake during the night releases latent instability of the moist lower layers of air over the lake, which participate in the land breeze circulation, resulting in the development of cumulonimbus clouds and thunderstorms over the lake most nights of the year.

Following the evolution of these severe weather events in this region is usually conducted using satellites images received every 15 minutes. This makes the lead-time to warn citizen about approaching severe weather event very minimal, and most of the time late. Using Tanzania Meteorological Agency (TMA) S-band polarimetric radar in the southern shore of the lake (Mwanza, Tanzania), have made nowcasting of these events possible. Nocturnal thunderstorms and convection initiation over the lake are well observed by the Mwanza radar and are strongly forced by lake and land breezes and gust fronts. Two weather events are presented illustrating distinctly different nocturnal convection initiation over the lake that evolves into intense morning thunderstorms. Unexpected is the detection of clear air echo to ranges â‰¥ 100 km over the lake that makes it possible to observe low-level winds, gust fronts and other convergence lines near the surface of the lake.

The frequent observation of extensive clear air and low-level convergence lines opens up the opportunity to nowcast strong winds, convection initiation and subsequent thunderstorm development and incorporate this information into a regional Early Warning System proposed for Lake Victoria Basin.

Keywords: Radar Nowcating , severe weather of Lake Victoria weather, convergence lines, thunderstorms



Outflows
7-15 m/s