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Utilization of the Auxiliary Seismic Station APG (AS37) for the Analysis of Seismicity Induced by Tropical Depressions Eta and Iota in the Karst Region of Northern Guatemala

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The 2020 Atlantic hurricane season was one of the most active on record, with tropical storms Eta and Iota causing widespread disasters in Nicaragua, Honduras, and Guatemala. These storms triggered floods and landslides in Guatemala, leading to fatalities, disappearances, and significant damage to housing and livelihoods, exacerbating a humanitarian crisis already strained by COVID-19 restrictions. During and after the storms, the Red Sismológica Nacional (RSN), operated by INSIVUMEH in Guatemala, recorded seismic activity triggered in the departments of Alta Verapaz and Quiché, both severely affected by flooding, increasing public concern. The APG station (AS37) in Baja Verapaz (south of the epicenters) was critical for monitoring most of these events. This study explores the relationship between the seismicity and regional floods, highlighting the karst geology and complex hydrogeological systems. Documented studies in similar geological environments in Europe attribute such seismicity to sudden flooding, pore pressure changes, and diffusion processes, consistent with the temporal evolution of the observed seismicity. The spatial distribution of epicenters and correlation analyses of earthquake families from two nearby seismic stations suggest the activation of minor seismic sources, resembling cases of artificially induced seismicity. This marks the first instrumental analysis of meteorologically induced seismicity in Guatemala's karst environments.

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