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Swell and thunder : infrasound signatures of Mediterranean hurricanes

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Infrasound detections of Mediterranean cyclones known as medicanes (for « Mediterranean hurricanes ») are demonstrated in low- and high- frequency ranges, respectively. We summarize the main findings of a recently published study [1]. We use data from the infrasound station IS48 of the International Monitoring System, in Tunisia, to investigate the infrasound signatures of these meso-cyclones, using a multi-channel correlation algorithm. We discuss cases of detections and non-detections, based on the state of the middle atmosphere and of the wind noise measured at the station. Detections and likely sources are discussed in light of other datasets, comprising satellite observations of deep convection [2] and cloud-to-ground lightning detections from a ground-based network. Detections of infrasound emitted by the cyclone-related swell are modelled using a microbarom source model [3] and are in agreement with observations, comforting the identification of the lower frequency sources. This multi-technology and modelling approach allows to discuss the various sources at plat that may contribute to the monitoring of such extreme meteorological events.

[1] Listowski, C.; Forestier, E.; Dafis, S.; Farges, T.; De Carlo, M.; Grimaldi, F.; Le Pichon, A.; Vergoz, J.; Heinrich, P.; Claud, C. Remote Monitoring of Mediterranean Hurricanes Using Infrasound. Remote Sens. 2022, 14, 6162. https://doi.org/10.3390/rs14236162

[2] Dafis, S.; Claud, C.; Kotroni, V.; Lagouvardos, K.; Rysman, J. Insights into the convective evolution of Mediterranean tropical-like cyclones. Q. J. R. Meteorol. Soc. 2020, 146, 4147–4169.

[3] De Carlo, M.; Accensi, M.; Ardhuin, F.; Le Pichon, A. ARROW (AtmospheRic InfRasound by Ocean Waves): A new real-time product for global ambient noise monitoring. In Proceedings of the EGU General Assembly 2022, Vienna, Austria, 23–27 May 2022