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Surface compound extremes and Mediterranean cyclones

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The co-occurrence of extreme events, resulting generally in stronger surface impacts compared to isolated extreme events, constitutes a hazard for the public and can be associated with severe damage to buildings, infrastructure and means of transport. Within the context of the MedCyclone initiative (see e. g. the Mediterranean cyclone track dataset defined in [1]), we investigate the "impact area" of the cyclones crossing the Mediterranean region by linking their passage with the appearance of hazards at the surface, in particular extremes of accumulated precipitation, near surface wind intensity, height of combined swell and wave. This analysis is expected to produce an estimate of the fraction of compound extremes - combinations of the extremes listed above - associated with the MedCyclones tracks in the recent climatological period, including geographical and seasonal details. The large-scale characteristics of the cyclones are taken into account by using a classification based on their upper-level potential vorticity pattern, and eventually by considering dynamical features with strong impacts on surface weather, such as cold fronts, warm conveyor belts and dry intrusions.

[1] Flaounas, E., Aragão, L., Bernini, L., Dafis, S., Doiteau, B., Flocas, H., L. Gray, S., Karwat, A., Kouroutzoglou, J., Lionello, P., Pantillon, F., Pasquero, C., Patlakas, P., Picornell, M. A., Porcù, F., D. K. Priestley, M., Reale, M., Roberts, M., Saaroni, H., Sandler, D., Scoccimarro, E., Sprenger, M., and Ziv, B.: A composite approach to produce reference datasets for extratropical cyclone tracks: Application to Mediterranean cyclones, *Weather and Climate Dynamics Discuss.* [preprint], <https://doi.org/10.5194/wcd-2022-63>, in review, 2023.