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A proposal for medicane detection in long high-resolution climate model simulations with a minimal amount of data

Alba de la Vara¹, Jesús Gutiérrez-Fernández², Juan Jesús González-Alemán³, and Miguel Ángel Gaertner⁴

¹Universidad de Castilla-La Mancha, Instituto de Ciencias Ambientales, Toledo, Spain (alba.delavara@uclm.es)

²Universidad de Castilla-La Mancha, Instituto de Ciencias Ambientales, Toledo, Spain (jesus.gfernandez@uclm.es)

³Departamento de Física de la Tierra y Astrofísica, Universidad Complutense de Madrid, Madrid, Spain (juanjego@ucm.es)

⁴Universidad de Castilla-La Mancha, Facultad de Ciencias Ambientales y Bioquímica, Toledo, Spain (miguel.gaertner@uclm.es)

Medicanes are tropical-like cyclones that form in the Mediterranean Sea. Due to their harmful potential, the characterization of medicanes has become an increasingly-studied topic within the scientific community. In the current context of climate change, their future characterization from a climatological perspective can only be attained using high resolution climate model output. The thermal structure of medicanes is generally examined with the Cyclone Phase Space (CPS) described in Hart (2003). This necessitates geopotential data from 300 hPa to 900 hPa every 50 hPa. Notwithstanding, in long, high-resolution climate simulations, model output requires very high storage space and only data from a few geopotential levels are typically saved. To overcome the lack of geopotential data at some levels, available model data are vertically interpolated in order to obtain data for the 13 levels required. In this work, we use high horizontal resolution data from the ERA-5 reanalysis (1979 - 2018) to analyze the climatology of medicanes simulated using the 13 vertical levels required based on Hart (2003), as well as different combinations of geopotential data from a few selected levels. Our results allow us to propose, for the first time, a limited set of recommended geopotential levels needed to adequately detect medicanes in long, high resolution climate change simulations, taking into account the associated limitations of output data storage.