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Climate projections in fine resolution downscaling over South America: trends and classification of cyclonic systems

Rosmeri Porfírio da Rocha¹, Michelle Simões Reboita², Natália Machado Crespo¹, Eduardo Marcos de Jesus¹, Andressa Andrade Cardoso¹, Lívia Márcia Mosso Dutra¹, and Ana Maria Bueno Nunes³

¹Universidade de São Paulo, Astronomia, Geofísica e Ciências Atmosféricas, Ciências Atmosféricas, São Paulo, Brazil (rosmerir@model.iag.usp.br)

²UNIFEI

³UFRJ

Cyclones developing in eastern coast of South America impact weather and control the climate in most parts of the continent as well as over the South Atlantic Ocean. Current knowledge of these cyclones shows that they can have different thermal and dynamic structures along their lifecycles being classified as tropical, subtropical or extratropical. Cyclones occurring over the sea generate intense near-surface winds with major impacts on human activities and ecosystems. Given this context, we are producing fine resolution (~25 km) dynamic downscaling with RegCM4 to investigate the climatic trends of the different phases of cyclones over the southwest South Atlantic Ocean. Special emphasis will be given on the contribution of subtropical cyclones causing extreme events (rainfall and wind) in eastern Brazil. The simulations cover South America and wider area of South Atlantic Ocean. For evaluation simulation RegCM4 is forced by ERA-Interim reanalysis, while for the projections by CMIP5 models under RCP4.5 and RCP8.5 scenarios. Cyclones are tracked using an algorithm based on cyclonic relative vorticity. In this study we present the climatology of all cyclones provided by the ERA-Interim evaluation simulation in the period 1979-2015. Basically, we discuss the ability of fine resolution simulation in reproducing the main cyclogenetic areas over the continent, seasonality and interannual variability of cyclones. Comparisons with previous simulations allow discussing the impact of fine resolution downscaling on the climatological features of all cyclones and their classification in South America domain.