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Coastal lows climatology along the Chilean coast using ERA5 reanalysis

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Coastal lows are prevalent along the coast of Chile. They are thermal lows that propagate poleward. The leading edge of the coastal low is associated with easterly winds, warm surface temperatures and clear skies. They are forced by the reversal of the typical meridional pressure gradient by the passage of synoptic scale high pressure systems embedded in the extratropical storm track. Coastal lows are an important feature of Southwestern South America, as they are involved in some of the major air pollution episodes in Central Chile, as well as are a factor in summertime bushfire events. Similar coastally trapped disturbances occur in Southeastern Australia, South Africa and the west coast of North America.

In this work, we characterize the climatology of coastal lows in Chile using surface pressure, wind and geopotential height at 500 hPa from the ERA5 reanalysis (1979 to 2018). These high resolution fields allow, for the first time, to characterize the behavior of coastal lows in the mesoscale, which were only coarsely represented in previous reanalyses. We identify the events using a method based on the drop of surface pressure and winds from the associated coastal low level jet. We found an average of 39 events per year, developing mostly during winter and spring. We found that the coastal low demise occurs typically at around 19:00 Local Time. We also characterize the propagation speed of the low along the coast finding a very striking change from about 40 m/s north of 30°S to about 17 m/s south of 30°S. We will discuss our findings in the light of dynamical theories proposed for the propagation of these disturbances.