**SUPPLEMENTARY MATERIAL**

**Geological setting and environmental characterization of the studied area**

The configuration of Argentine Patagonia’s Atlantic coast is the result of several factors, related mainly to sea level fluctuations associated with climate change (Clapperton, 1993; Rostami *et al*., 2000; Schellmann & Radtke, 2000; Ponce *et al*., 2011; Pedoja *et al*., 2011, 2014). Pleistocene and Holocene deposits are restricted to a coastal strip, where these levels are preserved as marine terraces and beach ridges formed of gravel, sand and varying amounts of calcareous mollusc exoskeletons (Feruglio, 1950; Boretto *et al*., 2013, 2014; Gordillo *et al*., 2014; Morán *et al*., 2018; Malvé *et al*., 2019).

It is important to highlight that the Caleta de los Loros reserve has been affected by marine transgressive-regressive processes during the Holocene; as a result of these events, morpho-sedimentological features and sub-environments, such as dunes, rocky and sandy shores, cliffs, salt marshes, beach ridges and spits, characterize the present-day littoral area (Del Río & Colado, 1999; Morán *et al*., 2018; Sander *et al*., 2018).

The current climate on the northern shore of the SMG is characterized by semi-arid and temperate conditions with an annual mean temperature of between 5 and 23ºC, corresponding to the months of July and January, respectively, and an annual precipitation of 200-­400 mm. These conditions are reﬂected in the sparse vegetation cover composed of low shrubs and grasses. Being a semi-enclosed basin, the distribution of the physical properties and its evolution are basically governed by the interchange which occurs with the atmosphere and with the open ocean through the mouth of the gulf (Gagliardini & Rivas, 2004). Although this exchange with the open sea affects the physical conditions found inside the gulf, its particular geometry (shallow, with a pronounced sill that limits its mouth) means that the atmospheric forcing is of greatest importance (Rivas, 1990). The presence of the sea reduces the thermal amplitudes, while the circulation of the cold Malvinas current lowers the general level of temperatures.

The SMG has been studied through oceanographic surveys which show the presence of two distinct areas: the northern and western areas with relatively high temperature and salinity, a marked thermocline, limited concentrations of nitrate and a low renewal rate; and the southern and south-eastern areas, which are strongly influenced by the intrusion of water from the south with lower temperature and salinity, no stratification and relatively higher nitrate concentrations (Piola & Scasso, 1988; Williams *et al*., 2010, 2014). Piola & Scasso (1988) used hydrographic data to describe a thermal front located at around 41°50’S, which separates these two areas during the austral summer (Williams *et al*., 2014). The SST satellite data showed an average difference of 1–3°C between the northern and the southern areas, except during winter when the thermal front vanishes and the SST distribution is spatially homogeneous (Piola & Scasso, 1988; Gagliardini & Rivas, 2004). The mean SST for the warm and cold seasons is around 20°C and 10°C, respectively. Salinity increases toward the northern area and reached values of ≥34 UPS, while the southern sector recorded values of ≤33.8 UPS (Guerrero & Piola, 1988).

The tides in the area of the SMG show marked differences, with the equinoctial height reaching more than 7 m. A macro-semidiurnal tidal regime characterizes the SMG and it is the main circulation factor, with a mean amplitude range of 6.04 m (SHN, 2017). The tides in the gulf show marked differences between the equinoctial height reaching among 9 m while the highest astronomical reaches among 7.5 m (Gagliardini & Rivas, 2004; Moreira et al., 2011; Tonini & Palma, 2017).

In addition, cyclonic gyres have been documented near Caleta de Los Loros (Piola & Scasso, 1988), and these have important consequences for marine ecosystems. Cyclonic gyres result in the rise of deep waters (upwelling), involving the wind-driven motion of dense, cooler, and usually nutrient-rich water towards the surface, replacing the warmer, usually nutrient-depleted surface water (Piola & Scasso, 1988).

The littoral area of Pozo Salado corresponds to a macro-tidal flat environment, with long, sandy beaches extending towards the west of the Caleta de Los Loros coastal lagoon which formed over the Holocene (Del Río & Colado, 1999; Sander *et al*., 2015, 2018). These beaches have a width of around 5 km, with extensive, gently sloping intertidal areas and a narrow supratidal zone limited by dunes or cliffs. In this sense, Dyer *et al*. (2000) and Stutz & Pikey (2002) underlined the importance of the tidal flat environments as highly productive components of shelf ecosystems responsible for recycling organic matter and nutrients from both terrestrial and marine sources. The natural protected area Caleta de los Loros is characterized by geomorphological and sedimentary features such as dunes, cliffs, abrasion platforms and a broad intertidal zone.

Dunes. Eolian deposits of fine to very fine sand are a common feature in the area, and semi-fixed and fixed dunes of variable height can be distinguished, being the maximum height of 7 m. Some of these have been anthropogenically modified by vegetation that stabilizes their natural dynamics. However, a prominent wedge of transgressive dunes moves in an ENE direction inland from the reserve’s beaches and sand ﬂats.

Cliffs. The cliffs are made up of layers of Miocene to Quaternary sand and gravel deposits of predominantly ﬂuvial origin (Andreis, 1965; Del Río *et al*., 2007; Kokot *et al*., 2004). The lithology and age of the deposits deﬁne their overall friable character and thus a disposition towards wave erosion at the cliff foot (Del Río & Colado, 1999). The cliffs reach heights of between 10 and 55 m a.s.l. and retreat at an average rate of 0.8 m/y (Del Río *et al*., 2007).

Abrasion platforms (Restinga). A spectacular sloping flat rock surface extending out from the foot of the cliffs dominates the eastern zone, offering features such as pits, joints, fossil traces, and mass wasting processes, among others.

Broad intertidal zone. The beaches are characterized by sand grain sizes with variable degrees of sorting. Along the intertidal zone, a system of ridges and tidal channels has developed due to the considerable tidal range, the low wave energy and the great availability of sandy material. A variety of sedimentary structures are generated in this area, related to different types of ripples marks, such as rhomboid ripples, with wavelengths ranging from 5 to 40 cm. These structures are associated with the action of waves and reflux.

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