

Preliminary analysis of Holocene penguin-rockerries at South Shetland Islands, Antarctica

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Abstract

Penguins, one of the most abundant vertebrates in Antarctica, are gregarious seabirds that establish large reproductive colonies along marine coasts. They return every year during the reproductive season, resulting in large accumulations mainly of bones, pebbles, and guano. The condensation of these elements form ornithogenic soils (Emslie et al., 2014). These soils testify the presence of penguin colonies in the area for hundreds or thousands years, and also provide data on the specific constitution of nesting sites, penguin's diet, and interaction with other organisms.

Some paleo-beaches have been previously studied in the South Shetland Islands, at 25 de Mayo Island (King George Island). The site Pingui could not be re-located follow published coordinates (Montalti et al., 2009). The preliminary analysis of sites Pingfo I and Pingfo II (Fig. 1) are here presented. The sites were re-excavated, collecting subfossil remains and for the first time, sieving sediment for picking at lab. Pingfo II (62°14'20.7"S, 58°40'21.00"W, Fig. 2a)) corresponds to raised marine deposits elevated 3.77 m.a.s.l., where there are currently not settle down colonies. The nearest nesting areas are 6 km far by the coast; therefore, no new accumulations are generated above these levels. Penguin bones, disarticulated and eroded, were dated in 7780 ± 60 yr BP and 7600 ± 80 yr BP (del Valle et al. 2007). Although ornithogenic soils were not detected here, sediment and bones were sampled in each of the levels described by del Valle et al., 2009). Preliminary results point toward some degree of transport, inferred from the concentration of bones, whereas the sedimentological features and the invertebrate fauna previously recovered in these levels (del Valle et al., 2002) suggest the deposition mostly in a high-energy marine beach (Montalti et al., 2009).

The second site, Pingfo I (62°15'26.483"S, 58°37'08.530"W, Fig. 2b)), richer in bones concentration, is elevated 17.3 m.a.s.l., and, comprised within the ZAEP 132, constituting a re-colonized nesting area for many pygoscelids. Over the top of the prospected levels that yield bones dated in 5750 ± 40 yr BP and 5840 ± 40 yr BP (del Valle et al. 2002), hundreds of *Pygoscelis adeliae* pairs nest, whereas *P. papua* are further south and near the sea level. According to uninterrupted monitoring carried out by the Instituto Antártico Argentino, the *P. adeliae* reproductive colony is very recent in this terrace; first pairs were established during the breeding season 2012-13 (Fusaro; Perchivale com. pers.). Seven different stratigraphic levels were recognized, from which penguin bones, seaweed remains, and eggshell fragments were collected.

Lab examination of the sieved sediment, in order to search for traces of penguin diet, and small organism remains of these paleoenvironment, rest to be done in order to obtain paleoclimatic, paleoecological and pedological information.

Keywords: Holocene, penguin-rockerries, raised beaches, 25 de Mayo Island/King George Island.

References

- Del Valle, R. A., Montalti, D., & Inbar, M. 2002. Mid-Holocene macrofossil-bearing raised marine beaches at Potter Peninsula, King George Island, South Shetland Islands. *Antarctic Science*, 14(03), 263-269.
- Del Valle, R. A., Montalti, D., Inbar, M., & Boaretto, E. 2007. Holoceno marino en la península Potter, Isla 25 de Mayo, Antártida. *Revista de la Asociación Geológica Argentina*, 62(1), 35-43.
- Emslie, S. D., Polito, M. J., Brasso, R., Patterson, W. P., & Sun, L. 2014. Ornithogenic soils and the paleoecology of pygoscelid penguins in Antarctica. *Quaternary International*, 352, 4-15.
- Montalti, D., Hospitaleche, C. A., & Valle, R. D. 2009. New Holocene penguin assemblages at South Shetland Islands, Antarctica. *Neues Jahrbuch für Geologie und Paläontologie-Abhandlungen*, 254(3), 349-357.

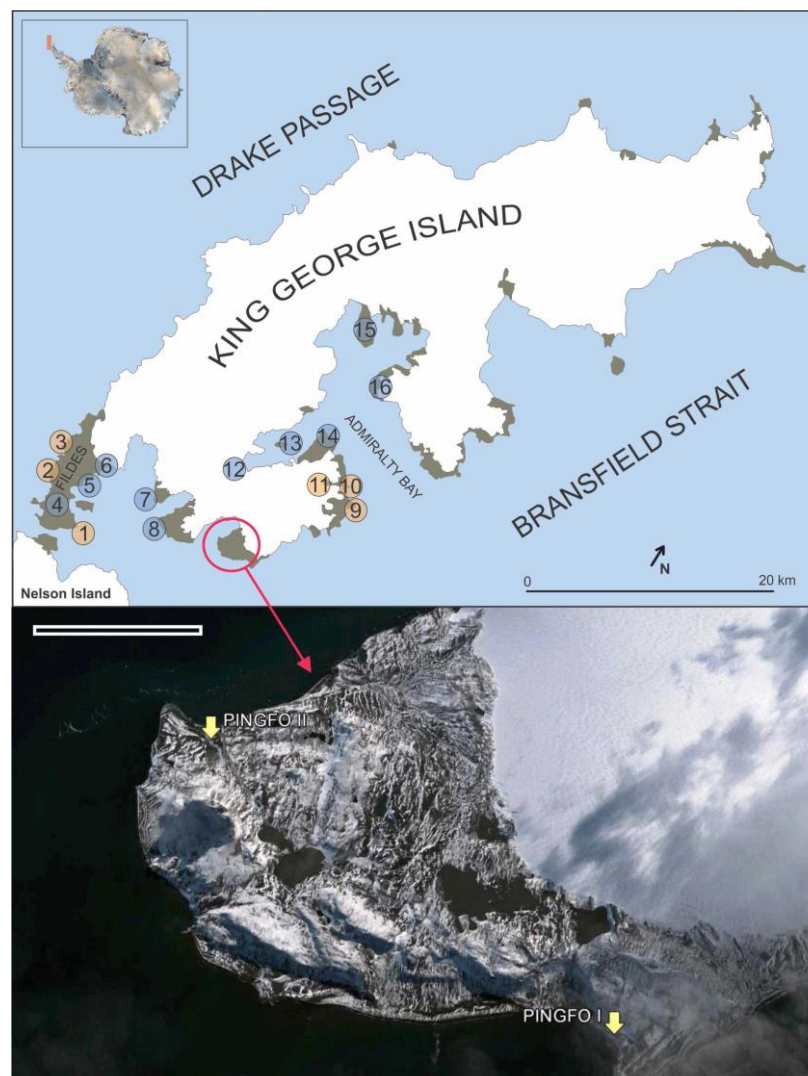


Fig. 1. Geographic location of the Holocene sites (PINGFO I and II)

Fig. 2a- PINGFO II ($62^{\circ}15'26.483''\text{S}$, $58^{\circ}37'08.530''\text{W}$)



Fig. 2b- PINGFO I ($62^{\circ}14'20.7''\text{S}$, $58^{\circ}40'21.00''\text{W}$)

