Actas

CERTIFICADO II-2

# XIX CONGRESO GEOLÓGICO ARGENTINO

## CÓRDOBA · REPÚBLICA ARGENTINA

## 2 al 6 de junio 2014

ISBN: 978-987-22403-5-6



www.congresogeologico.org.ar · info@congresogeologico.org.ar

# RECONSTRUCTION OF THE LATE QUATERNARY GLACIAL GEOLOGY ON KING GEORGE ISLAND, SOUTH SHETLAND ISLANDS: FIRST STEPS OF A GEOSCIENTIFIC PROJECT

Pablo A, Heredia Barión[1, 3], Jorge A. Strelin[1,2], Ricardo A. Astini[1] y Gerhard Kuhn[4]

*[1]Centro de Investigaciones en Ciencias de la Tierra (CICTERRA, CONICET-UNC); [2]Instituto Antártico Argentino; [4] Alfred Wegener Institut-Helmholtz Zentrum; [3]herediabarionpablo@yahoo.com.ar*

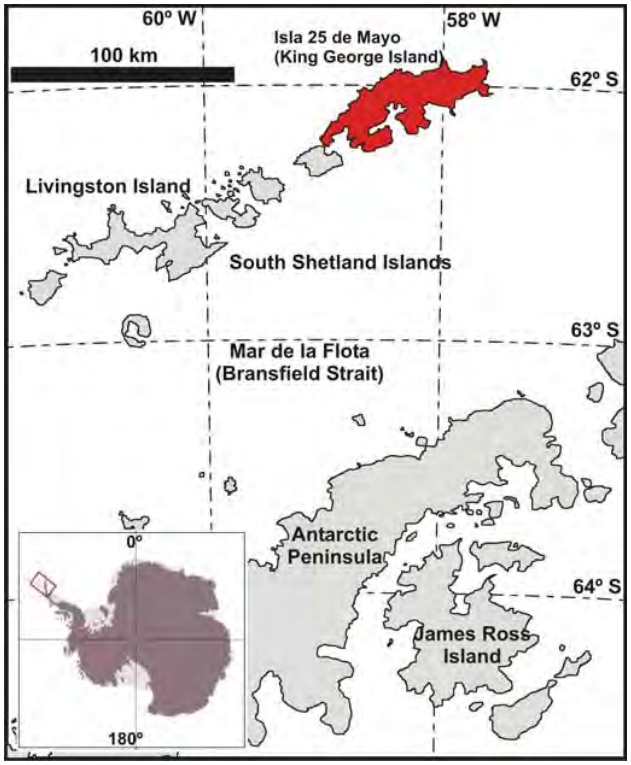


**Figure 1**: Overview of the study area with the location of King George Island (*Isla 25 de Mayo*)

King George Island (*Isla 25 de Mayo*) is the largest one of the South Shetland Islands (SShI). This archipelago is located approximately 120 km NW of the Antarctic Peninsula, from which it is separated by the Bransfield Strait (*Mar de la Flota*). The SShI are located just south of the Antarctic Convergence Zone in a key location for investigating glacial and climatic fluctuations relative to both the Southern Hemisphere and the rest of Antarctica.

The geomorphology and glacier geology of the SShI (Sugden and John 1973, Hall 2003 and 2007, Del Valle *et al.* 2007, Strelin 2010, Simms *et al.* 2011) constitutes a fragmentary record. Despite the deglaciation, inland ice free areas are scarce and are strongly affected by the thaw with the consequent destruction of previous geoforms. The few obtained radiocarbon ages on land exposures have poor stratigraphic control being necessary to consider the problems of pollution and the reservoir effect that affect them. Based on geochemical and sedimentological proxies and radiocarbon dating in sedimentary cores obtained from bays, some glaciers advances and warm periods have been inferred for the middle and late Holocene, among them are those corresponding to the Medieval Climate Optimum and the Little Ice Age (LIA) (Yoon *et al.* 2000 and 2004, Hass *et al*. 2010, Monien *et al*. 2011). It should be noted that for some glaciological reconstructions based on organic radiocarbon dating on marine sediments the ages are still questionable. Often it does not exist yet a clear criteria of correlation that allow to link between glaciterrestrial sediments and glacimarine ones.

The study of the glacial, periglacial and coastal marine record of King George Island has a particular importance to enhance the knowledge of its paleoenvironmental evolution since the Marine Isotopic Stage 3 (MIS 3). There is no precision on the beginning and end of the Last Glacial Maximum (LGM), nor on the rhythm of the deglaciation post-LGM, known as Termination 1, both for coastal and marine areas, as well as offshore areas from King George Island. In the same way, it´s not known if there was a glacial advance linked with the Antarctic Cold Reversal clearly detectable in Antarctic ice cores or sediment deposits in southern Patagonian exposures (Strelin *et al*. this congress). The way in which the deglaciation continued during the early Holocene, the peak of the Holocene marine transgression (Strelin *et al*. this Congress), the later chronology of the Neoglacial advances, including the LIA, and the warmer periods that separate them are as well topics to deepen.

The objective of this project is to study and date the geomorphological and glaciterrestrial evidences linked to the glacial history in the area of South Shetland Islands, since MIS 3, correlate them with bathymetric records and proxies from marine cores and discuss its link with other sectors of the Antarctic Peninsula, particularly with James Ross Island (Fig. 1) (Strelin and Malagnino 1992, Hjort *et al.* 1997, Strelin *et al*. 2006).

Del Valle, R. A., Montalti, D., Inbar M., y Boaretto E. 2007. Holoceno marino en la Península Potter, isla 25 de Mayo, Antártida. Revista de la Asociación Geológica Argentina 62 (1): 35-43.

Hall, B.L. 2003. An overview of late Pleistocene glaciation in the South Shetland Islands. In: Domack, E.W. (Ed.), Antarctic Peninsula Climate Variabiltiy. American Geophysical Union, Washington D.C: 103-113.

Hall, B.L. 2007. Late-Holocene advance of the Collins Ice Cap, King George Island, South Shetland Islands. The Holocene 17: 1253-1258.

Hass, H. C., Kuhn, G., Monien, P., Brumsack, H. J., Forwick, M. 2010. Climate fluctuations during the past two millennia as recorded in sediments from Maxwell Bay, South Shetlan Islands, West Antarctica. En Howe, J. A., Austin, W. E. N., Forwick, M. y Paetzel, M., (eds.). Fjord systems and archives. Geological Society of London, Special Publication 344: 243-260.

Hjort, C., Ingólfsson, O., Möller, P. y Lirio, J. M. 1997. Holocene glacial history and sea-level changes on James Ross Island, Antartic Peninsula. Journal of Quaternary Science, 12 (4): 259-273.

Monien, P., Schnetger, B., Brumsack, H-J., Hass, H. C. y Kuhn, G. 2011. A geochemical record of late Holocene palaeoenvironmental changes at King George Island (maritime Antarctica). Antarctic Science 23 (3): 255-267.

Simms, A. R., Milliken K. T., Anderson J. B. y Wellner J. S. 2011. The marine record of deglaciation of the South Shetland Islands, Antarctica since the Last Glacial Maximum. Quaternary Science Reviews 30: 1583–1601.

Strelin, J. 2010. Chronology of the ice-cored marginal-moraine In Potter Peninsula, South Shetland Islands. 4th. Open Science Conference CD-ROM. Abstract number 736, 1 p.

Strelin, J. A. y Malagnino, E. C. 1992. Geomorfología de la isla James Ross. En Rinaldi (ed.): Geología de la Isla James Ross. Dirección Nacional del Antártico: 7-36, Buenos Aires.

Strelin, J. A., Sone T., Mori, J., Torielli, C. A. y Nakamura, T. 2006. New Data Related to Holocene Landform Development and Climatic Change from James Ross Island, Antartic Peninsula. Fütterer, D. K., Damaske, D., Kleinschmidt, G., Millar, H., Tessensohn, F. (ed.) Antartica Contributions to global earth sciences. Springer-Verlag, York: 455-460, Berlin Heidelberg New York.

Sugden, D. y John, B. 1973. The age of glacier fluctuations in the South Shetland Islands, Antarctica. In: van Zinderen Bakker, E.M. (ed.), Palaeoecology of Africa, the Surrounding Islands, and Antarctica. A.A. Balkema, Cape Town, p. 139–159.

Yoon, H. I., Park, B.-K., Kim, Y. y Kim, D. 2000. Glaciomarine sedimentation and its paleoceanographic implications along the fjord margins in the South Shetland Islands, Antarctic during the last 6000 years. Palaeogeography, Palaeoclimatology, Palaeoecology 157: 189–211.

Yoon, Ho Il; Yoo, Kyu-Cheul; Park, Byong-Kwon; Kim, Yeadong; Khim, Boo-Keun; Kang, Cheon-Yun 2004. The origin of massive diamicton in Marian and Potter coves, King George Island, West Antarctica. Geosciences Journal 8: 1–10.