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## ANTARCTIC ICE SHEET RE-ADVANCE DURING THE ANTARCTIC COLD REVERSAL IDENTIFIED IN THE WESTERN ROSS SEA

**ABSTRACT:** BARONI C., TENTI M., BART P.J., SALVATORE M.C., GASPERINI L., BUSETTI M., SAULI C., STUCCHI E.M. & TOGNARELLI A., *Antarctic Ice Sheet re-advance during the Antarctic Cold Reversal identified in the Western Ross Sea*. (IT ISSN 0391-9838, 2022).

Marine geophysical data collected from the Ross Sea continental shelf during several oceanographic expeditions enabled evaluation of the Last Glacial Maximum (LGM) extent of the Antarctic Ice Sheet (AIS) through the presence of large Grounding Zone Wedges (GZWs),

particularly evident in the outer reaches of the Drygalski and Joides basins to the north of Coulman Island. Seismo-stratigraphic observations confirmed by geomorphological and stratigraphic data show a deep grounding line embayment dating back to the early deglacial transition, which preceded the last rapid sea-level and atmospheric CO<sub>2</sub> rise. In this work, a new reconstruction based on the analysis of morpho-bathymetric and seismic reflection data from the middle reaches of the Drygalski Basin shows that the post-LGM retreat was followed by a short-lived re-advance of the grounding line during the Antarctic Cold Reversal (ACR). Evidences include GZWs that partly overprint megascale glacial lineations associated with the Coulman Island grounding line, followed by a Holocene retreat phase, which caused the final southward withdrawal of the grounded and floating ice. This late re-advance suggests a significant impact on the extent and thickness of the grounded ice from relatively small amplitude climate oscillations, able to exert a significant control on the AIS during the latest Pleistocene (i.e. the Last Glacial Termination). Given that the marine-based portion of the AIS in the Ross Sea was sensitive to millennial-scale climate oscillations, this evidence will contribute to clarify how the ice sheet may respond to ongoing and future climate change.

**KEY WORDS:** Drygalski Basin, Seafloor geomorphology, Geophysical data, Deglaciation, Antarctic Cold Reversal, AIS Re-advance, Antarctica.

**RIASSUNTO:** BARONI C., TENTI M., BART P.J., SALVATORE M.C., GASPERINI L., BUSETTI M., SAULI C., STUCCHI E.M. & TOGNARELLI A., *Evidenze dell'avanzata della calotta glaciale antartica durante l'Antarctic Cold Reversal (ACR) individuate nel settore occidentale del Mare di Ross*. (IT ISSN 0391-9838, 2022).

I dati geofisici raccolti sulla piattaforma continentale del Mare di Ross nel corso di numerose spedizioni oceanografiche hanno permesso di valutare l'estensione della calotta glaciale antartica (AIS) nell'Ultimo Massimo Glaciale (LGM) tramite l'individuazione di corpi sedimentari associati alla linea di ancoraggio (*Grounding Zone Wedges*, GZW), particolarmente evidenti nel settore più esterno dei bacini Drygalski e Joides, a nord di Coulman Island. I dati sismo-stratigrafici, confermati da nuovi dati geomorfologici e stratigrafici, mostrano la presenza di profonde indentature delle linee di ancoraggio (*grounding zone*) attribuibili alle prime fasi della deglaciazione, che ha preceduto il rapido innalzamento del livello del mare e della CO<sub>2</sub> atmosferica nell'Olocene. In questo lavoro, una nuova ricostruzione basata sull'analisi dei dati morfo-batimetrici e sismici del settore centrale del bacino del Drygalski mostra che l'arretramento post-LGM è stato seguito da una breve ma significativa fase di ri-

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**Authorship Statement** - Project design by CB with contribute from MT, PB, MCS, and LG. MT processed geophysical data under the supervision of EMS and AT with contributes from LG, and collected US multibeam data under the supervision of PB. CB and MCS conducted seafloor geomorphological analysis and interpretation. MT and MCS organized the database and processed the GIS data. CB, MCS and MT organized the database of existent radiocarbon dates and ice core stratigraphy. CS and MB provided Italian morphobathymetric data and assisted MT during her traineeship at OGS. CB, MT, PB and MCS prepared the first draft of the manuscript, while the final version was accomplished with contribute from all authors.

**Declaration of Competing Interest** - The authors declare that they have no conflict of interest.