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Submarine geomorphology and depositional processes along the George V Land continental slope and upper rise (East Antarctica)

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Recent swath bathymetric and subbottom acoustic survey on the continental slope and upper rise of the George Vth Land documents a geomorphological setting much more complex than expected. Previous regional studies on multichannel seismic data demonstrated that thick shelf margin prograding wedge buried most of the previous rugged glacial morphology, such as in most of the Antarctic margin.

The new multibeam survey shows that the continental slope and rise seaward of the Mertz-Ninnis Glacial valley sill is actually incised by a complex network of converging submarine canyons (the Jussieu Canyon system), some of which directly connected to the shelf depression. This sea bed character differ from that observed in other Antarctic margins (e.g. the Antarctic Peninsula) that generally show gullies across the shelf edge, smooth slope morphology and channel systems incising the upper rise. Oceanographic data suggest that cold, dense water (High Salinity Shelf Water), produced in the Mertz coastal polynya spills out and flows down the continental slope, probably channelled within the canyons. The strata truncation along the flanks of the canyons, the exhumation of buried, relict features along the present slope and thick turbiditic deposit (up to 1 m) recovered from the Jussieu Canyon levees in the rise would suggest that erosive processes still strongly affect the George V Land margin. In analogy with other areas of dense water production, we believe that shelf water cascading currents driven by salinity contrast and also entraining fine organic and terrigenous particles, might have the capacity for reshaping submarine canyon floors and carrying sediment to the deep sea environment. During the present polar interglacial we believe that this represented the main process for sediment supply to the rise in this sector of the East Antarctic margin.

The sloping sea floor seaward of the Mertz Bank is characterised by failure accumulation that partially fills the present southern termination of the WEGA channel. Previous studies on sediment cores and high resolution acoustic data have shown that the most recent (upper Pleistocene) and modern environment in the WEGA channels has not been affected by turbiditic current, although evidence of continuous downslope and along slope sediment transfer is observed and interpreted to be due to bottom currents action. This is confirmed by the less rugged character of the present sea floor in the WEGA channel and by its shallow depth respect to the Jussieu canyon system.

Further investigation of this margin in the frame of coordinated multidisciplinary International Polar year initiatives are planned in order to completing the swath bathymetry of the all margin, including the upper slope and shelf. Multiyear oceanographic measurement of the bottom current both in the shelf and slope and biological sampling will be carried out to constraint the present environment and ecosystem