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Large scale spatial variation of accumulation rate across ice promontory in coastal Dronning Maud Land, Antarctica.

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Ice rises are known to play a key role on ice shelf dynamics. By buttressing the flow, they constrain the flow of ice from the continent toward the ocean. However, since they are small hills surrounded by extremely flat area, they also play a role on atmospheric circulation. However, this impact is relatively unknown. Here, we show evidence that ice rises play a significant role on the wind redistribution of the snow. We report observations of persistent features observed all around the coast of Dronning Maud Land (DML). By analyzing radio-echo sounding data, we identified internal reflection horizons assumed to be isochronous. These layers show a remarkable variability in layer depth at both sides of the ridge, pointing to variability in surface accumulation rates. We show that a strong gradient of accumulation rate exist across, at least, 5 different ice rises in DML : Halvfarryggen Ice Rise nearby Ekstromisen (7°W), 2 ice rises into the Fimbulisen (2°E) and 2 ice rises within the Roi Baudoin Ice Shelf (25°E, Derwael & FranKenny Ice Rise). We used deepness of radar reflector as a proxy of the accumulation rate as long as we removed the influence of ice dynamics. All collected data (both low and high frequency) all show the similar persistent gradient in accumulation rate. Comparison of accumulation rate distribution and meteorological data shows that accumulation rate is twice as high on the wind side of the ridge compared to the lee side, which makes ice rise topography playing a significant role in snow redistribution. This feature is important in term of ice coring and paleoclimatic reconstruction of on time scales of 2 to 20k years.