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Interactive comment on "Use of Ra isotopes to deduce rapid transfer of sediment-derived inputs off Kerguelen" *by* V. Sanial et al.

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The stations have different names but are indeed the names chosen by the project and consequently cannot be changed. UW stations were specific to the Ra study and refer to the surface samples collected "under way" using the ship intake.

All the 224Ra and 223Ra activities used in this study are excess 224Ra and 223Ra activities. The 224Ra activities are corrected for the 224Ra supported by 228Th and the 223Ra activities are corrected for the 223Ra activities supported by 227Ac. We clarified this in the section 2.3.2 (Sample analysis section) by adding "The 224Ra activities are corrected for the 224Ra supported by 228Th and the 223Ra activities are corrected

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for the 223Ra supported by 227Ac. The 224Ra and 223Ra activities discussed here refer to the Ra activities corrected for the Ra supported by their parent isotopes."

The Leclaire Rise is a topographic feature located west of the Kerguelen Islands (see Figure below; van Beek et al., 2008). Because it is located at ca 350 m depth (Weis and Frey, 2002), an impact of this topographic feature on the surface waters implies i) release of chemical elements from the sediments and ii) vertical mixing that would transport the chemical elements towards surface waters. Internal tides may promote such vertical transport of chemical elements in this area. In addition, because the Leclaire Rise is located north of the Polar Front (Park et al., 2014), the presence of Ra isotopes in the investigated area (east of the Polar Front) also suggests a transport across the front. If vertical mixing transports Ra in surface waters above the Leclaire Rise, it cannot be completely excluded that the Ra enrichments observed south of the Kerguelen Islands along the Polar Front (e.g. UW-23; UW-24; Figure 4) or south of the Polar Front (e.g. UW-15, UW-16 and potentially A3; Figure 4) are partly explained by an input associated with this topographic feature. However, sample UW-14 collected in surface waters lying above this rise (bottom depth at 342 m) does not show significant 223Ra and 224Ra activities and only low 228Ra activity, which suggests slight impact of this topographic feature on the Ra activities of surface waters. Station R-2, which is located east of the Leclaire Rise - but south of the Polar Front - shows slight enrichments in 223Ra and 224Ra in surface waters (0.016 and 0.057 dpm/ 100 L, respectively), which could suggest an impact - but relatively minor when considering the Ra activities - in surface waters downstream of this plateau. Fe and other trace metal concentrations (REE, Mn, Al) do not show significant trends in surface waters at R-2, which indicates that the Leclaire Rise has a minor impact on surface waters downstream of this plateau (Bowie et al., 2014; van der Merwe et al., 2014; Grenier et al., in prep.). In contrast, these latter studies suggest that the shallow sediments of the Leclaire rise may impact waters in the 200-500 m depth interval downstream of the rise.

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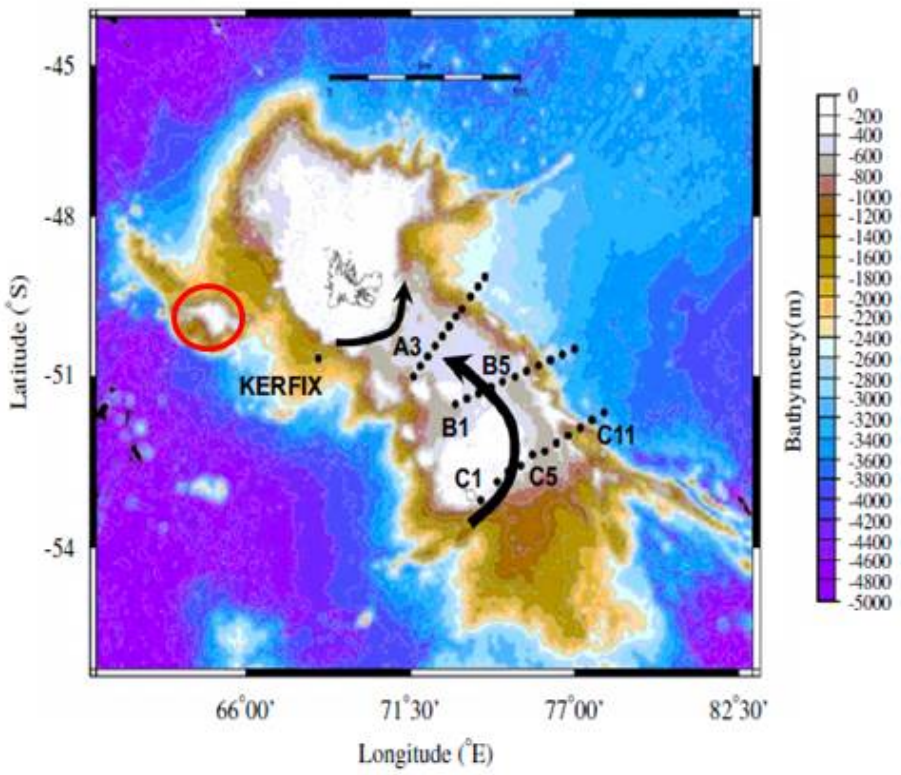

Fig. 1.

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