

Auxiliary material for
Estimating the benthic efflux of dissolved iron on the Ross Sea continental shelf

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Introduction

The auxiliary material includes “2014gl061684-ts01.txt” (Table S1), which contains all of the dissolved iron (dFe) data used in this study, along with stations details. In “2014gl061684-ts02.txt” (Table S2), the near-bottom, model-derived values of k_z for each station are presented. File “2014gl061684-fs01.pdf” (Figure S1) shows the dissolved iron depth profiles for each station, along with profiles fitted (to stations of >400m depth) using equation (2) from the manuscript. File “2014gl061684-text01.pdf” contains a more detailed description of the physical circulation model (Text S1) and file “2014gl061684-text02.pdf” consists of a sensitivity analysis of the flux calculations in the manuscript (Text S2, Figure S2, Table S3).

1. 2014gl061684-ts01.txt (Table S1) contains dissolved iron concentrations and station details for samples collected during cruise NBP12-01 (24 December 2011 to 8 February 2012) and relating to Figure 1 and Figure 2 in the manuscript: included are details of station number and trace metal cast ID, location, date and time of sampling, bottom depth, depth of sample and dFe concentration of each sample. Where more than one measurement has been made of a sample, the average measured dFe concentration and one standard deviation are given.

1.1 Column “Station number”, identification number of the hydrographic station.

1.2 Column “Cast ID”, identification number of the trace metal hydrocast.

1.3 Column “Bottom depth [m]”, depth of the water column in meters at the station.

1.4 Column “Date [UTC]”, date of hydrocast, in mm/dd/yy format, and based on UTC time.

1.5 Column “Time [UTC]”, time of hydrocast, in hh:mm format, and based on UTC time.

1.6 Column “Lat [N]”, latitude of hydrocast in degrees; positive is North.

1.7 Column “Long [E]”, longitude of hydrocast, in degrees; positive is East.

1.8 Column “Depth [m]”, depth of sample, in meters.

1.9 Column “dFe [nM]”, dissolved iron concentration, in nmol/L. Some data points are mean values of two or more measurements of the same sample.

1.10 Column “dFe STD [nM]”, one standard deviation of measured dissolved iron concentration where more than one analysis performed.

2. 2014gl061684-ts02.txt (Table S2) tabulates for the same stations the model-derived values for the benthic vertical eddy diffusivity coefficient, k_z , which are shown in Figure 3a in the manuscript. Values were extracted from a ROMS-based physical circulation model hindcast, covering the austral summer period of 29 November 2011 to 26 February 2012 (details and references relating to the

model are included in the methods section of the manuscript and the supplementary file “2014gl061684-text01.pdf”). The values listed are mean values from the top surface of the deepest model layer at each station (3.8-10.7 m above the seafloor, depending on the water column depth). The table also includes the height above seafloor of the top surface of the deepest model layer.

2.1 Column “Station number”, hydrographic station that the model data corresponds to.

2.2 Column “latitude [N]”, latitude of station, in degrees; positive is North.

2.3 Column “longitude [E]”, longitude of station, in degrees; positive is East.

2.4 Column “kz [m²/s]”, model-derived mean vertical eddy diffusivity for the top surface of the deepest model layer, over the period 29 November 2011 to 26 February 2012. Values are in meters-squared per second.

2.5 Column “layer height av [m]”, mean height above seafloor of the top surface of the deepest model layer, over the period 29 November 2011 to 26 February 2012.

3. 2014gl061684-fs01.pdf (Figure S1) Depth profiles of dFe for all stations on the Ross Sea continental shelf, with fitted profiles (using equation (2) from the manuscript) shown in red and extrapolated to the seafloor (dashed horizontal line) for all stations of >400m water depth. Station numbers are shown in red, station depths are shown in black.