



## Response of bacterioplankton to iron fertilization in the Southern Ocean

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**ABSTRACT:** We studied the bacterial response to Fe fertilization over 3 weeks during the second iron-enrichment experiment (EisenEx) in the Southern Ocean. Bacterial abundance in the Fe-fertilized patch increased over the first 12 d following Fe release and remained about twice as high as outside the Fe-fertilized patch until the end of the experiment. Bacterial production peaked a few days after each of the three Fe releases inside the Fe-fertilized patch, reaching rates two to three times higher than outside the patch. Besides the peaks in leucine and thymidine incorporation following Fe release, bacterial production was not significantly higher inside the patch than outside, suggesting direct limitation of bacterial growth by Fe. Bacterial aminopeptidase activity roughly followed the increase in bacterial abundance, whereas cell-specific  $\alpha$ - and  $\beta$ -glucosidase were higher inside the Fe-fertilized patch. The diversity of  $\beta$ -glucosidases was determined by capillary electrophoresis zymography. The different  $\beta$ -glucosidases showed much higher activity levels inside the patch than in the surrounding waters, and three additional  $\beta$ -glucosidases constituting ~55% of the total  $\beta$ -glucosidase activity were present inside the Fe-fertilized patch from day 9 onward. No major changes in response to Fe fertilization were detected in the phylogenetic composition of the bacterioplankton community, as determined by 16S rDNA fingerprinting, indicating a remarkable adaptation of the bacterioplankton community to episodic iron inputs. This stability on the phylogenetic level is contrasted by the dramatic qualitative and quantitative changes in ectoenzymatic activity.

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