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Spatial pattern of BSi-Dissolution-Index in the Southern Ocean

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Biogenic silica (BSi) is a major component in marine geochemical cycles and a suitable proxy for paleoproductivity. The Southern Ocean plays a key role in the biogeochemical cycle of silicon. To understand opal preservation mechanisms and to assess the global biogenic silica cycle it is important to study the processes controlling BSi dissolution kinetics. Common techniques for the assessment of dissolution kinetics are flow-through and batch experiments. In this study, information on BSi dissolution kinetics will be considered in a regional context. For this purpose about 60 samples from the Atlantic sector of the Southern Ocean were investigated. To identify spatial patterns of a BSi-Dissolution-Index, the result from fitting the leaching curves, derived by wet-alkaline-extraction of biogenic silica, gives an estimate of the reactivity of biogenic silica in sediments. To get detailed information on kinetics and solubility of biogenic silica, continuously stirred flow-through experiments were performed. Use of flow through reactors allows quantification of dissolution rates and saturation concentrations under well defined conditions. Dissolution rates of sediment samples in stirred flow-through reactors were measured as a function of the degree of undersaturation by varying the silica acid concentrations or the flow rate of the inflow solution. Sediment samples were selected from different regions of the Southern Ocean, e.g. Weddel Sea, Scotia Sea, Polar Front Zone. The results of the BSi dissolution kinetics and detailed information on diatom assemblages and clay mineralogy are considered. The combination of results from laboratory measurements and regional distribution of parameters affecting the benthic silica cycle can be used to decipher processes regulating the BSi burial. In addition a more detailed understanding of the dissolution of BSi

in surface sediments within certain regions of the Southern Ocean can be provided.