



Physical controls on the location and initiation of a regular phytoplankton bloom north of the Crozet Plateau, Southern Ocean

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Satellite ocean colour images show a regular phytoplankton bloom north of the Crozet Plateau (50°E, 46°S, Southern Ocean). This contrasts with the low chlorophyll to the south, which is more typical of the High Nutrient Low Chlorophyll conditions of the Southern Ocean. The bloom occurs in an area bounded by the Crozet Plateau to the south and the Sub-Antarctic Front to the west and north. Residence times of Argo floats in this area are significant, of order 100 days. The weak inflow is from Ekman flux off the plateau, flow around the eastern end of the plateau and through detrainment of water from the Sub-Antarctic Front. Water mass characteristics from Argo float profiles show that there is not significant mixing across the front. The mixed layer depth was found from Argo float profiles in the area and the effects of day of year removed. The residual mixed layer depths shallow to the north by 10.9 ± 1.0 m/degree of latitude. The significant changes this creates in the light environment across the bloom area causes the bloom to start away from the plateau and spreads south towards it. Though the bloom initiation is controlled by the removal of light limitation, the peak chlorophyll reached is independent of the light availability. Argo derived mixed layer depths together with co-located SeaWiFS irradiance and chlorophyll data show that the area to the south of the Crozet Plateau has lower light availability but is not light limited. These results support the hypothesis that the contrast in chlorophyll values is due to iron entering the surface waters from the plateau and islands and being advected north by the circulation.