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Detection of deep water formation from remote sensing chlorophyll in the NW Mediterranean Sea

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The Northwestern Mediterranean Sea is one of the few regions in the world where Deep Water Formation (DWF) occurs. During wintertime cold and dry winds that typically occur in strong bursts lasting a few days, are able to erode the near-surface stability over this area, exposing the weakly stratified underwaters and initiate a phase of violent mixing and deep convection. DWF is not a steady-state process that recurs every year. Variations in wind stress and heat flux over the winter can induce a marked interannual variability: during some years the process is specially intense and completely absent during others. The extent of the area over which DWF occurs is also uncertain. The interannual variability of the DWF process is also associated to the variability in the seasonal phytoplankton dynamics over the area. The extent of the vertical mixing set the total amount of nutrients available for the phytoplankton during the following spring bloom. However, before the bloom, when deep convection is still active, surface chlorophyll (an index for phytoplankton biomass) is vertically diluted showing low surface concentration. The occurrence of these patches of anomalously low chlorophyll concentration can, in principle, be associated to the presence of active deep convection. In this study we investigate the possibility of exploiting such association in order to quantify the duration of deep convection and the extent of the area over which it occurs. These goals will be achieved through the analysis of remote sensing chlorophyll data and in-situ Argo-floats profiles.