DOES AVHRR-SEA SURFACE TEMPERATURE FRONTS IN THE BEAUFORT SEA, REVEALS BIOLOGICAL HOTSPOTS ?

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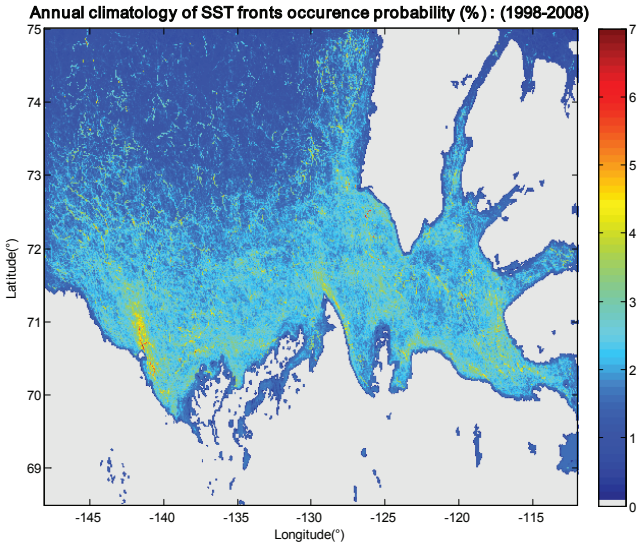
Recent observations indicated an enhanced open ocean primary production in the Arctic Ocean related to the reduction of sea ice cover. Polynyas play a major role in high latitude ecological and biogeochemical process. These areas have higher biological production than offshore waters. To study the possible impacts of changing physical processes on phytoplankton productivity in response to climate change we need to assess spatial and temporal variability of chlorophyll and to relate it to physical parameters. Satellite remote sensing is a powerful tool for monitoring key environmental parameters at global, regional and local scales. Fronts are particular physical features that play a major role in marine ecosystems. Their mapping is thus of great importance to study physical and biological correlation.

Recent study documented some fronts in the Arctic Sea and proposed a provisional classification of fronts using low resolution satellite data (9 Km). However, there is a need to go beyond the mesoscale processes and address regional features in south-eastern Beaufort sea. The goal of this paper is to investigate the spatial and temporal variations of SST and SST fronts to detect regions where biological hotspots can occur.

An analysis of 11 years of high spatial resolution sea surface temperatures maps allowed the determination of the frontal occurrence probability in the southeastern Beaufort Sea. The Cayula-Cornillon algorithms for front detection and cloud screening were applied to the daily NOAA(AVHRR) images 1.1 Km resolution from 1998 to 2008.

The use of 1 km resolution SST data allowed the detection of new features not previously described. Fronts can be detected everywhere but as the season progresses, fronts become more detectable due to solar heating of the surface layer. Our analysis indicates that some recurrent features can be identified in the summer time frontal climatology. The Shelf break front (SBF) and the Mackenzie river plume front (MRPF) have been more documented.

New frontal regions: Cape Bathurst Polynya hotspot front (CBHSPF), Mackenzie Trough front (MTF) and Amundsen Gulf coastal fronts (AGCF)) were identified mostly driven by wind and tidal mixing along steep shelf slopes. These areas may be playing an important role in the biological processes. They could act as drivers to local enhanced biological productivity.



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