International Journal of Geology, Earth & Environmental Sciences ISSN: 2277-2081
An Open Access, Online International Journal Available at http://www.cibtech.org/jgee.htm
2025 Vol. 15, pp. 179-195/Karl
Research Article

CHLOROPHYLL/TURBIDITY PATCHES AND EDDIES NEAR A MARINE PLATFORM: THE BAHAMAS

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ABSTRACT
Observations on eddy appearance and patchiness of turbid water in the vicinity of the Bahamas identified two major sources that are responsible for the complex distribution patterns of chlorophyll/suspended matter. The first source that originates in the north is mainly biologically produced and is related to the dynamic field of the Florida Current and propagation of cyclonic and anticyclonic eddies. The second source of patches originates by precipitation of calcium carbonate and resuspension of sediments (whiting) at the Bahama Banks. It was observed that, in general, anticyclonic eddies carry a higher load of suspended matter compared to cyclonic eddies. However, the rotational direction of eddies does not always determine the level of suspended matter in the surface water. Year-to-year fluctuations and episodes with anomalies are recognized, and long-term changes are apparent throughout the region. Time series reveal changes in patterns within a few days through eddy action, and substantiates the reasoning that eddy action is a major driver in developing the distribution pattern of suspended matter close to the Bahamas. The southern region close to the banks shows during the summer highest salinity, and sea surface temperature reaches its maximum in August at a time when whiting is at a minimum. In September, the Great Bahama Bank releases turbid water on the eastern flank and the Little Bahama Bank follows with whitings four weeks later. In December, both banks have in their surroundings, elevated concentrations in turbidity/chlorophyll concentrations. However, anomalies were observed during the tropical storm Nicole in November 2022 when large turbidity patches were leaving the Little Bahama Bank at an estimated velocity of 0.19 m s^{-1}. That speed increased to about 0.65 m s^{-1} after travelling about 140 km away from the bank.

Keywords: *Bahamas, Geostrophic Surface Currents, Eddies, Chlorophyll/Turbidity, Whitings, Patchiness*

INTRODUCTION
The archipelago of the Bahamas consists mainly of two large submerged banks and smaller more isolated banks that have only a depth of less than twenty meters (Buchan 2000). However, geologically the Bahama Banks are part of the North American continent, but channels that may be about 2000 m deep, separate them. The Florida Current and the Antilles Current are the major current systems in the vicinity of the Bahamas (Day, 1954; Ingham, 1975; Johns et al., 2008; Frajka-Williams et al., 2021), but the flow of the Antilles Current is not a continuous near surface current, and the current appears more as an eddy field along the Bahamas (Gunn and Watts, 1982). The near-surface flow close to the Bahamas is complicated and observations showed that adjacent to the Bahamas, isolated anticyclonic circulation cells exist and are centered northeast of Abaco Island in the northern Bahamas (Olson et al., 1984). However, details on surface eddies approaching the Bahamas, have not been well documented.
A general view of the surface circulation in the vicinity of the Bahamas is presented in Figure 1A and B. Figure 1C shows that the Antilles Current is neither surface intensified nor bottom intensified like the larger and deep western boundary currents (Meinen et al., 2019; Tomczak and Godfrey, 1994). Northeast of the Bahamas, the Antilles Current is not apparent in the upper 150 m, but rather a southeastward flow is observed and the current forms eddies through interaction of the Antilles Current with the lower

bathymetry close to the Bahama Islands and surrounding banks (Day, 1954). The coastal currents in the vicinity of The Bahamas are highly variable, are generally aligned with bottom isobaths and may reach maximum current speeds of about 40 cm s^{-1} (Lee, 1977). However, mean currents have only a speed of around 3 cm s^{-1}, and fluctuations appear at times to be the direct result of local wind forcing. Tides in the Bahamas have a mean range of about 0.7 m, but they are amplified where resonance takes place in deep-water. This is evident in the Tongue of the Ocean and Exuma Sound where the velocity may reach close to 200 cm s^{-1} (Bergman et al., 2010).

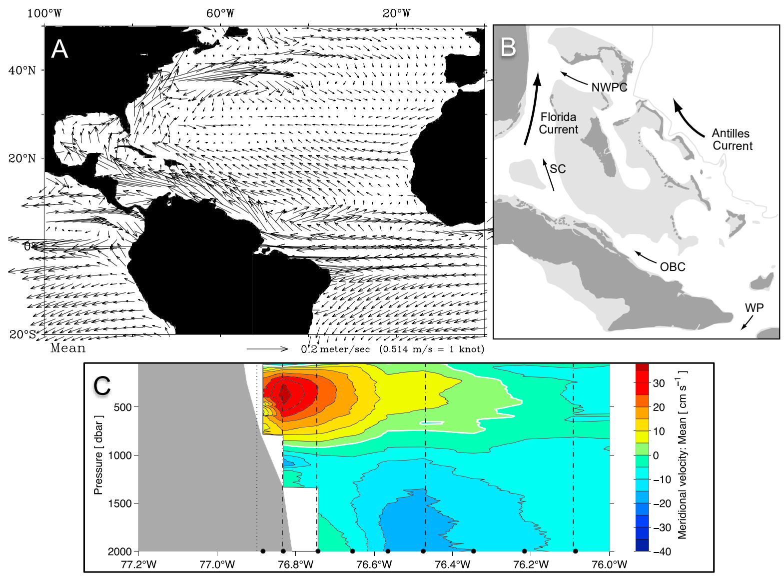

Figure 1: A: Averaged ocean surface currents (m s^{-1}) for January to December 2014 composed with NOAA/NESDIS data. B: Currents around the Bahama Islands (Bergman et al., 2010). NWPC: Northwest Providence Channel; SC: Santaren Channel; OBC: Old Bahama Channel; WP: Windward. C: Average meridional velocity along $26^0$30'N where positive values indicate a northward flow. The zero contours are indicated by the bold white lines (Meinen et al., 2019).

The salinity around the islands is about 35 psu and is more or less steady along the platform margins of the Banks. However, high evaporation over the banks may result in abnormal high salinity values (Smith, 2001) that can spread over tens of kilometers away from its source (Hickey et al., 2000). Simulation of the circulation in the Bahamas showed that bank waters build near-shore fronts, but there is indication that the influence on the surrounding waters seems to be limited, because the local production of water masses is by wind and cyclone driven upwelling (Chérubin, 2014). Turbid water patches close to the Bahamas are frequently observed and some are mainly caused by precipitation of calcium carbonate and resuspended sediments from both banks (Yao et al., 2023; Bustos-Serrano et al., 2009; Broecker et al., 2000; Boss and Neumann, 1993). The formation of those patches is referred to as whiting and the residence time of white patches may range from days to weeks (Dierssen et al., 2009). Both Bahama banks show seasonality in whiting events but they are more prevailing and widespread during winter compared to the summer season (Purkis et al., 2017).
The waters around The Bahamas are oligotrophic, however, in addition to white drifting patches, elevated chlorophyll concentrations are occasionally observed in the north of the archipelago, and are explained by mesoscale variability and sea level anomalies (Szekielda, 2025). Cyclonic and anticyclonic eddies propagate regularly to the region east of the Bahamas, where they interact with the bathymetry of the

continental shelf and disintegrate, but they cause a complicated distribution pattern of chlorophyll and suspended matter. Propagated eddies from the Atlantic play also an important role in controlling bio-geochemical processes in the euphotic zone by modifying the depth of the nutricline (Domingues et al., 2019; Frajka-Williams et al., 2013), and are therefore likewise responsible for the distribution patterns of turbid surface water. The frequent drift of eddies close to the Bahamas shows the important impact of eddies on the marine environment of the Bahamas and therefore this research further elaborates on the relationship between eddy appearance and patchiness of turbid water (whiting) and the distribution pattern of chlorophyll concentrations. The lack of major oceanographic inventories in the Bahamas, however, sets limits to this goal, and therefore this research is based on remote sensing data only because they provide more frequent coverage compared to conventional and non–continuous ship operations. As changes and heterogeneity in the distribution of oceanographic parameters appear at different temporal-spatial scales, the observations around the Bahamas were analyzed with a data that were collected over approximately two decades. Thus, geostrophic turbulence, meteorological and annual term effects, and up to large-scale events related to global change can be resolved with this data set.

DATA SOURCES AND TEST-SITE DESCRIPTION

The investigated area is given in Figure 2A showing the selected sites for this research, and Figure 2B outlines the major topographic features of the Bahama banks as viewed from outer space. The study used sea surface temperature, chlorophyll concentrations and sea surface height anomalies to observe regions where surface anomalies appeared. Sea surface temperature and chlorophyll data were processed with NASA GIOVANNI via https://giovanni.gsfc.nasa.gov/ (Acker and Leptoukh, 2007). Sea surface temperature data in GIOVANNI are based on 11µm-measurements at 4 km resolution and are retrieved from Aqua MODIS Global Mapped C1615905770-OB_DAACVersion R2019.0. Sea level anomalies (SLA Map NRT, CMEMS) and the geostrophic surface current streamlines (Globcurrent, CMEMS) were obtained via the Ocean Virtual Laboratory (https://ovl.oceandatalab.com/) of the European Space Agency and consist of the zonal and meridional velocity mapped at 1/4 degree.

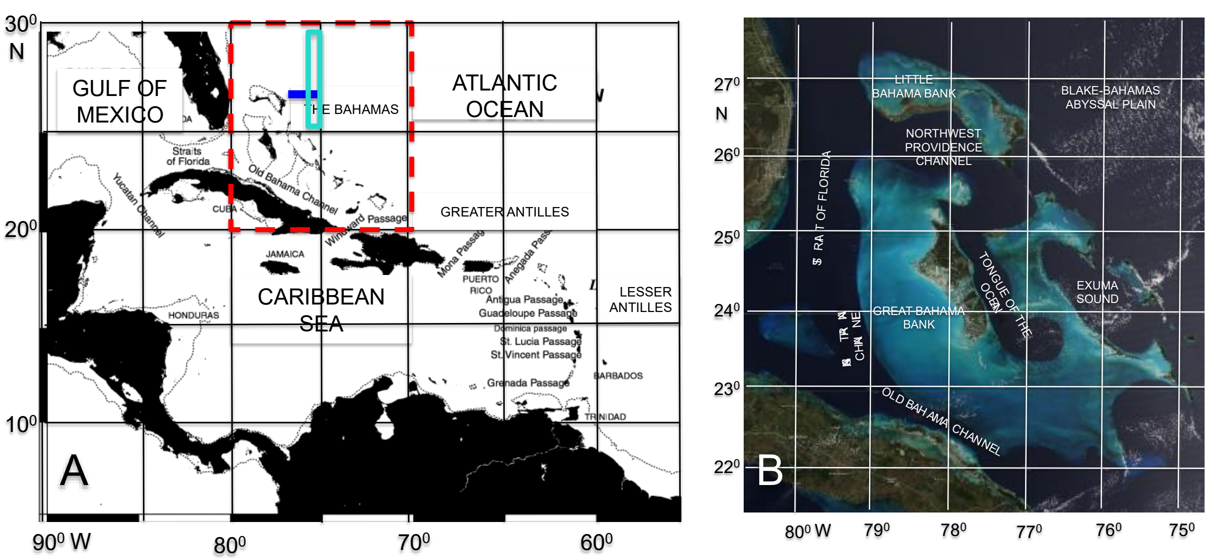

Figure 2: The main site for the investigations is shown within a red rectangle in Figure 2A. The smaller blue rectangle indicates the position of an offshore section that is located at 27^0N, $77^0$18'W to $27^0$9'N, $75^0$42'W. The blue-green rectangle shows the region 25^0N, 76^0W to 30^0N, 75^0W. Figure 2B shows the major topographic features connected to the Bahama Banks.

The use of chlorophyll concentrations as an indicator for biological material needs some clarification, because the algorithm to retrieve chlorophyll concentrations is strongly impacted by the presence of material other than phytoplankton. Occasionally, meteorological events and surface currents generate increased turbidity in the shallow waters overlying the carbonate platforms in the Bahamas, and as a result, higher reflectance is observed (Acker et al., 2002) that interferes with the chlorophyll algorithm, and the color scale for chlorophyll is not applicable especially over the bank region due to the strong bottom reflection. Furthermore the reflectance of dense seagrass over the banks' meadows and color produced by microbial colonization and cementation of recrystallized ooids may change the color from light to dark green (Dierssen et al., 2010). Taking these constraints into account, the values based on the chlorophyll algorithm will respond in some instances also to a chlorophyll/turbid water mixture. Therefore, in the case of suspected influence of inorganic suspended sediments on the chlorophyll signal, a corresponding remark will be made when necessary, and the term suspended matter will be used.

RESULTS AND DISCUSSION

General hydrography of the Bahamas

The uniqueness of the Bahamian environment is shown with the distribution of sea surface temperature in Figure 3. The dominant influences on the water temperature of the Bahamas are the Atlantic Ocean, the warm water from the Florida Current and warm water propagating from the south. In addition, the low bottom bathymetry of the Bahama platform also regulates the heat budget of the surface waters around the Bahamas.

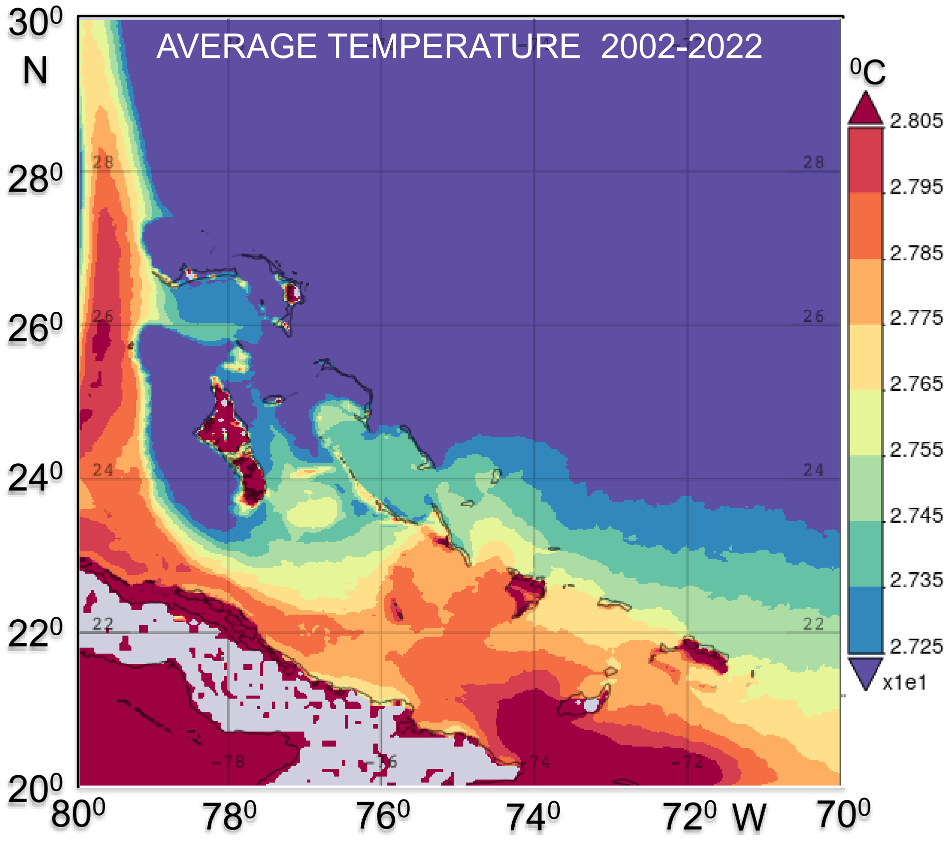

Figure 3: Distribution of averaged sea surface temperature (^{0}C) from 2002 to 2022 at 4km-resolution.

The surface water characteristics in the vicinity of the Bahamian Banks go through seasonal changes, but sudden meteorological events initiate anomalies in the distribution of turbidity, chlorophyll concentrations and surface water temperature. Furthermore, events on the decadal scale also affect the surroundings of the Bahamas. This is elaborated with the Hovmöller analysis of chlorophyll measurements in Figure 4 where heterogeneity and anomalies in the seasonal cycles of chlorophyll concentrations are shown, but also long-term changes in the distribution pattern of chlorophyll are recognized. The Hovmöller longitude-averaged chlorophyll concentrations in Figure 4A show the year-to-year fluctuations, and in particular, three episodes where anomalies are recognized and are displayed in Figures 4B, C and D. Anomalous high chlorophyll concentrations shown in Figure 4B exceeded 0.1 mg m^{-3} during the winter season 2003/2004 and were only once recorded during a period of two decades. A year with minimum chlorophyll concentration appeared in winter 2011/2012 and is recognizable in Figure 4C, but it still showed relatively elevated concentrations in January 2012. Figure 4D covers the period September 2023 to April 2024 and showed that from December to February 2024 an increase of chlorophyll concentration was observed.

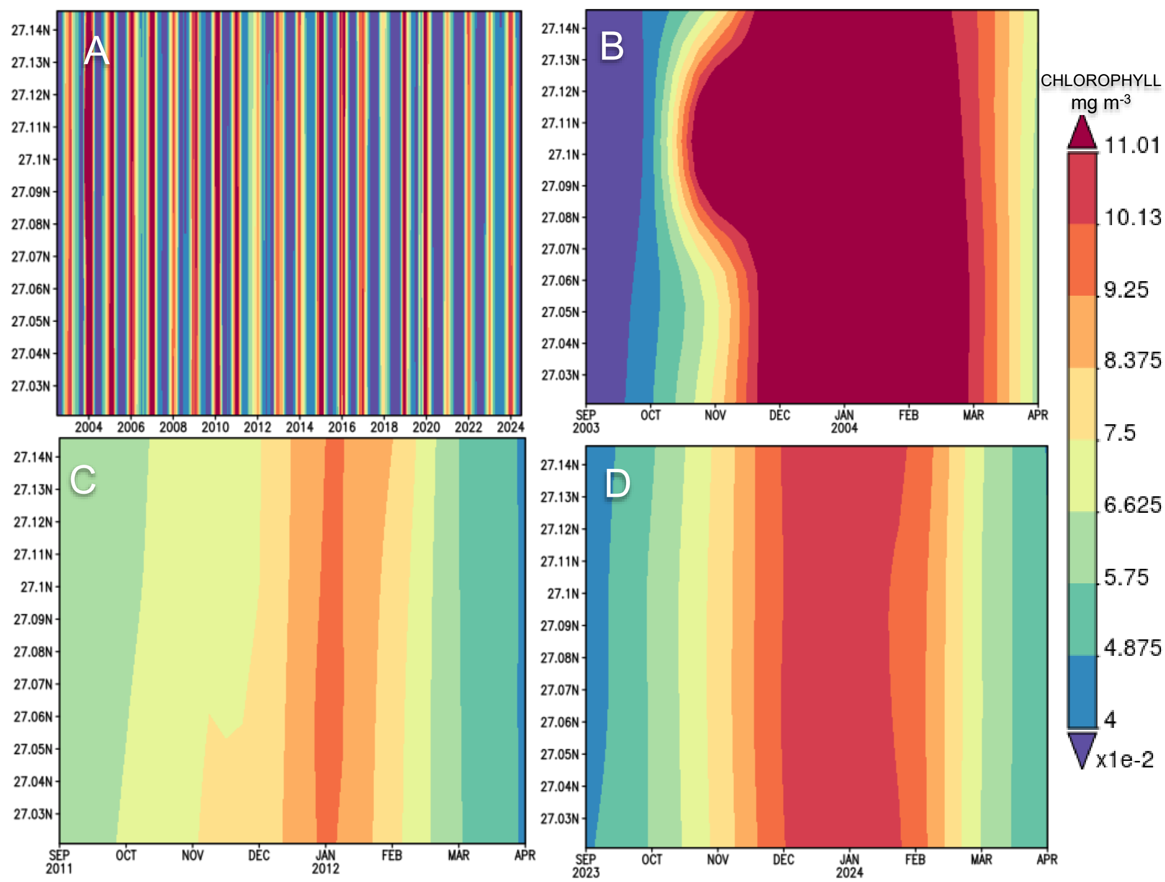

Figure 4: Hovmöller longitude-averaged chlorophyll concentrations based on monthly time-averaged data at 4km resolution. The analysis covers the region at 27⁰N, 77⁰18'W to 27⁰9'N, 75⁰42'W, located off Great Abaco Island and shown as a small blue rectangle in Figure 2A. 4A: 2002 to 2024; B: September 2003 to April 2004; C: September 2011 to April 2012; D: September 2023 to April 2024.

The nature of the observed fluctuations cannot be explained with the data set alone, but they are most possibly an outcome of large-scale events like the El Niño-Southern Oscillation and/or the Atlantic Meridional Overturning Circulation. Long-term changes in temperature and chlorophyll are shown in Figure 5 with area-averaged time series for the same offshore station as analyzed in Figure 4. The time series for temperature and chlorophyll in Figures 5A and 5B, show that temperature may reach a monthly average of about 31^0C, and a minimum temperature is observed to be between 23^0C and 24^0C.

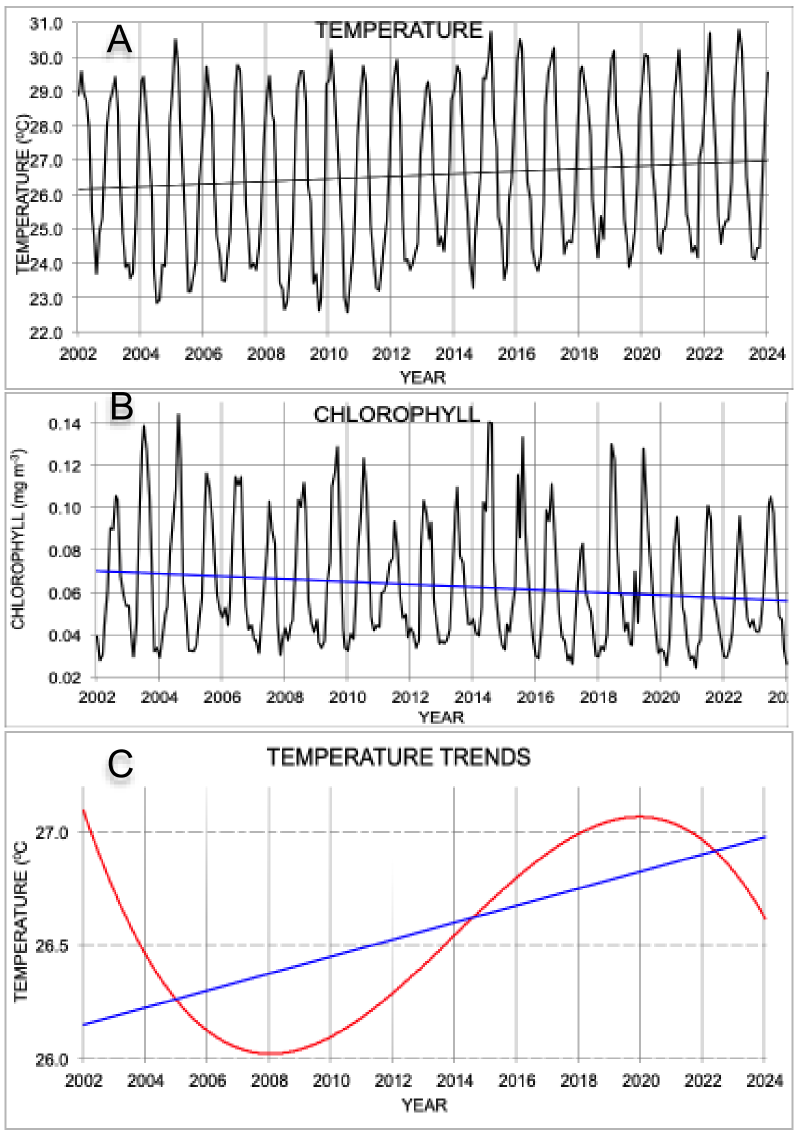

Figure 5: Observations at an offshore station that covers the area at 27^0N, $77^0$18'W to $27^0$9'N, $75^0$42'W and is shown in Figure 2 as a small blue rectangle. 5A: Temperature, B: Chlorophyll concentrations, C: the linear and polynomial fit for the temperature series.

The general trend in the data shows an increase in sea surface temperature and follows the global trend observed in sea surface warming, while the corresponding chlorophyll data indicate a decline in concentrations, but they are more complex in their seasonal and long-term patterns. The comparison of the linear with the polynomial fit of the temperature data in Figure 5C reveals the oscillating nature of the temperature increase, and the polynomial fit heightens also a cooling period that was observed around 2008. The linear fit in Figure 5C gives an estimated temperature increase of about 0.05^0C y^{-1} that agrees with a previous similar analysis of the whole region around the Bahamas (Szekielda and Watson, 2021, Szekielda, 2022), but the temperature increase seems to be equally apparent throughout the Bahamas region (Szekielda, 2024).

Patchiness in surface distribution of suspended matter and eddies

From Figures 4 and 5, it is evident that environmental changes around the Bahamas develop at various time scales and temperature, and chlorophyll patches may vary in the neighborhood of days. Accordingly, daily coverage of surface events is required in order to recognize changes in patchiness at local levels. Patchiness that is frequently observed in the waters around the Bahamas is caused by two major sources that contribute to the complexity in the distribution pattern of suspended matter. This can be demonstrated with the distribution of chlorophyll/suspended matter shown in Figure 6. Figure 6A shows the distribution of chlorophyll concentrations that are due to the Florida Current in the north, whereas the area enlarged, seen in Figure 6B, shows the location of suspended matter around the Little Bahama Bank. Based solely on the algorithm of chlorophyll, no distinction can be made between the inorganic and organic suspended matter. However, it is known that the distribution pattern of suspended material at the margin of the Bahama Banks is controlled by tidal currents and wind-induced currents, and is composed of eroded material from the banks (Lopez-Gamundi et al., 2023). The cause for the distribution pattern of suspended matter around the Bahamas is not well documented, but the image in Figure 6B clearly identifies four eddy-like features located north of the Little Bahamas Bank. This observation is more substantiated by comparing the occurrence of eddies that is identified by the location of surface geostrophic streamlines, with patterns in the distribution of chlorophyll and/or suspended matter as shown in Figure7.

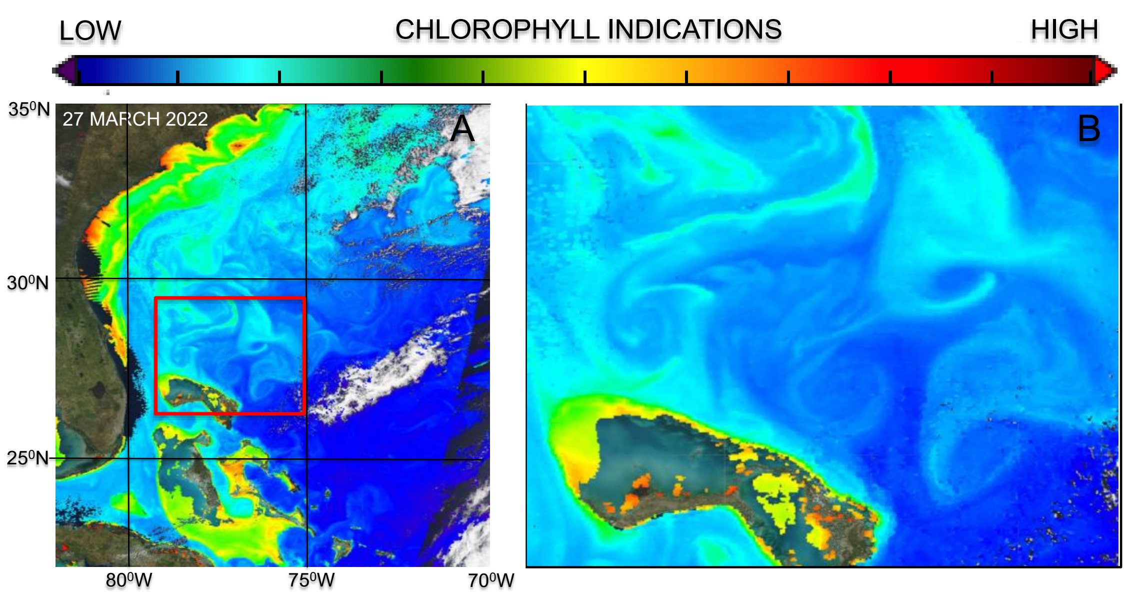

Figure 6: A: Chlorophyll/suspended matter distribution on 27 March 2022. B: Enlarged area within the red rectangle in the left figure.

The comparison of chlorophyll/suspended matter with surface geostrophic streamlines as shown in Figures 7.1 and 7.2 substantiate the reasoning that eddy action can be an important driver in developing a complex distribution pattern. In particular, around 32^0N, chlorophyll is concentrated in an anticyclonic eddy. Figures 7.3 and 7.4 show eddies and their association to the distribution pattern of suspended matter close to the Little Bahama Bank. The anticyclonic eddy A in Figure 7.3 is well marked by elevated concentrations of chlorophyll, and in connection with the cyclonic eddies C_1 and C_2, the origin of the high concentrations of chlorophyll can be traced to the north. Near the Little Bahama Bank, suspended matter shows a distinct gradient between the eddy A and coastal water. The plume-like structure of coastal water leaving the bank is further elaborated on in Figure 8.

The comparison of chlorophyll concentrations with the surface geostrophic streamlines in Figure 8 shows that the surface system consists of two anticyclonic eddies, A_1 and A_2, that dominate the surface circulation in the region with high concentrations of chlorophyll, and can be tracked originating from the north, as indicated in Figure 8.1. However, a broad band with low chlorophyll concentrations, shown in Figure 8.2, separates eddy A_2 from the Little Bahama Bank and shows that the surface flow is in a northwest direction. The three eddies A_1, A_2 and C_1 are located in open water, but some smaller eddies were detected over the Little Bahama Bank and did not have the same intensity as eddies over open water. Low chlorophyll concentrations in the vicinity of the Little Bahama Bank are frequently observed during the winter season, indicated by a red arrow in Figure 8.

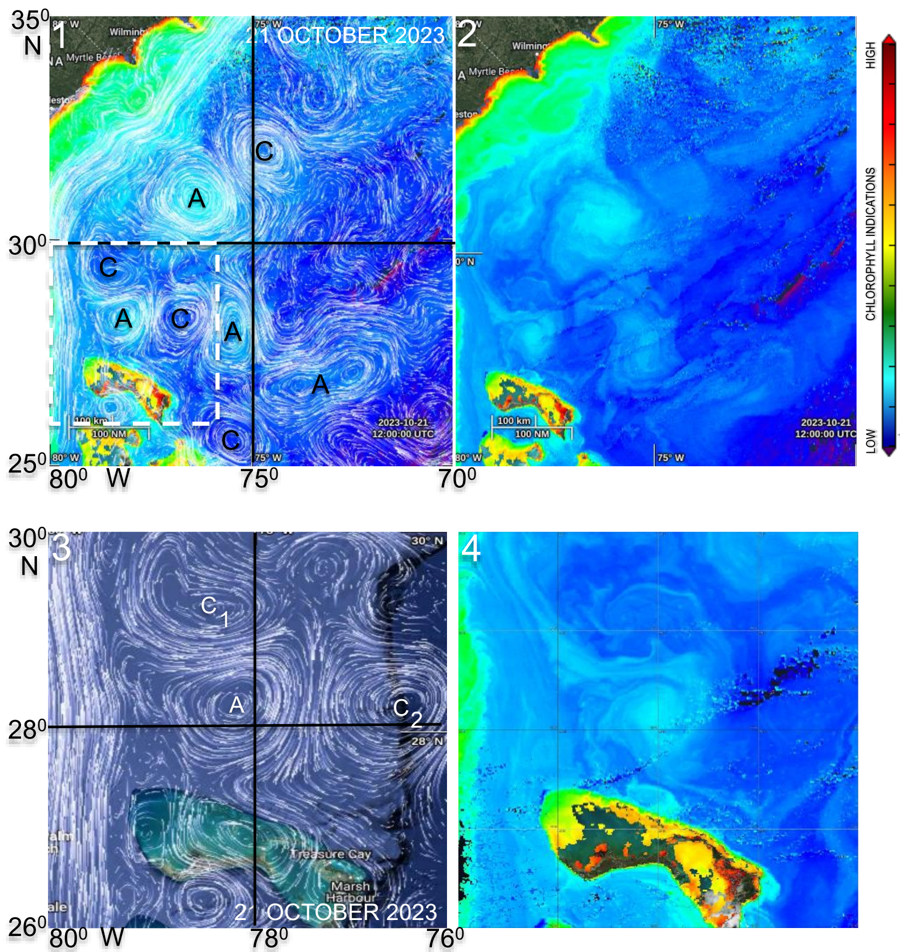

Figure 7: Eddy observations on 21 October 2023. 1: Chlorophyll concentrations with superimposed surface geostrophic streamlines; 2: Chlorophyll concentrations without surface geostrophic streamlines. Figures 3 and 4 show an enlarged area that is indicated in Figure 1 as a white dashed rectangle. 3: Surface geostrophic streamlines, 4: Chlorophyll concentrations.

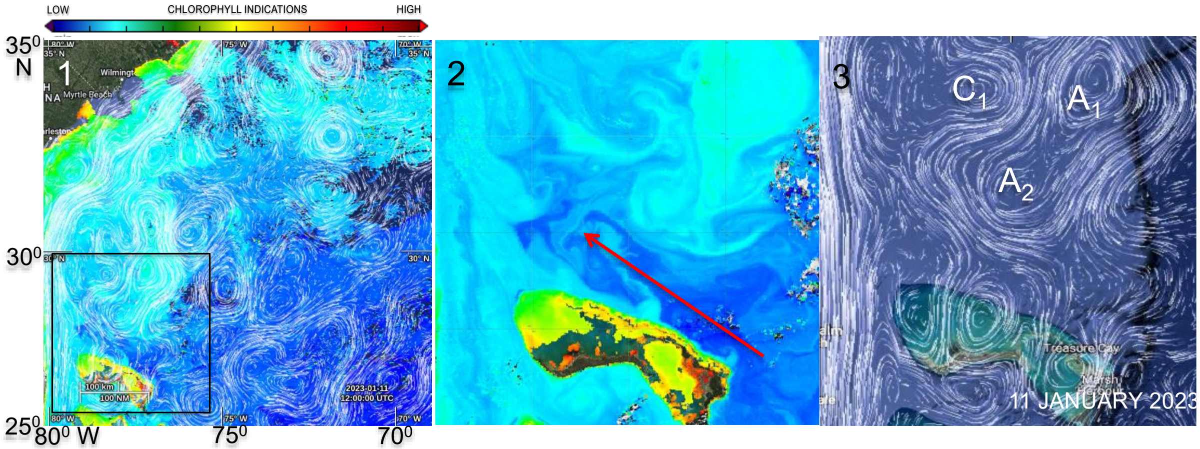

Figure 8: 1: Chlorophyll concentrations and surface geostrophic streamlines on 11 January 2023. Figures 2 and 3 cover the area indicated in the square in Figure 1. 2: Chlorophyll concentrations. 3: Surface geostrophic streamlines superimposed on a natural color image.

Figure 9 shows that the low concentrations of chlorophyll may also appear as a narrow belt adjacent to an anticyclonic eddy that has elevated chlorophyll concentrations in its center. It was observed in the region, that anticyclonic eddies carry a higher load of suspended compared to cyclonic eddies. However, the rotational direction of eddies does not always indicate the level of particle load in the water. By comparing the distribution of chlorophyll in cyclonic and anticyclone movements, it showed that about 85% of anticyclonic eddies carry higher chlorophyll load in their outer periphery, but only 69% of cyclonic eddies carry elevated concentrations outside. However, this relationship may be valid only for the particular environment that was investigated (Szekielda, 2025).

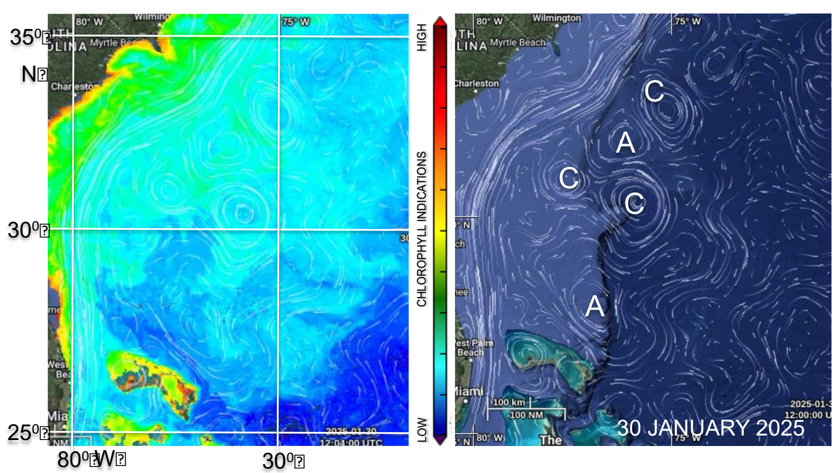

Figure 9: Comparison of chlorophyll concentrations and surface geostrophic streamlines showing the jet-like intrusion of water with low chlorophyll concentrations on 30 January 2025.

Special attention is given to the shallow area of the Little Bahama Bank that has a depth of less than 100 meters, showing gyres that are indicated with the geostrophic streamlines. The mechanism of the surface circulation over the bank may be different compared to those of the open ocean eddies. However, as Figure 10 indicates, bank water may connect to larger eddies as is recognized with eddy A that is characterized by high chlorophyll concentrations in its outer periphery, whereas the region where cyclonic eddy C is located, high concentrations of chlorophyll appear on its northeastern part.

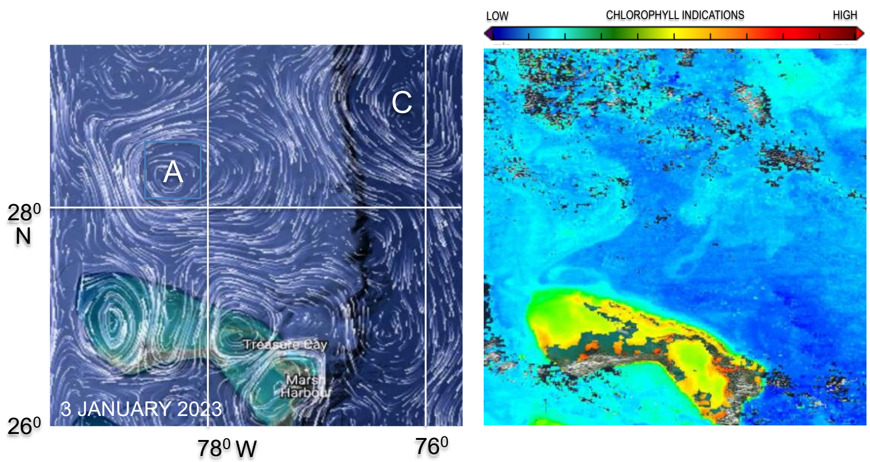

Figure 10: Comparison of surface geostrophic streamlines and chlorophyll concentrations on 3 January 2023.

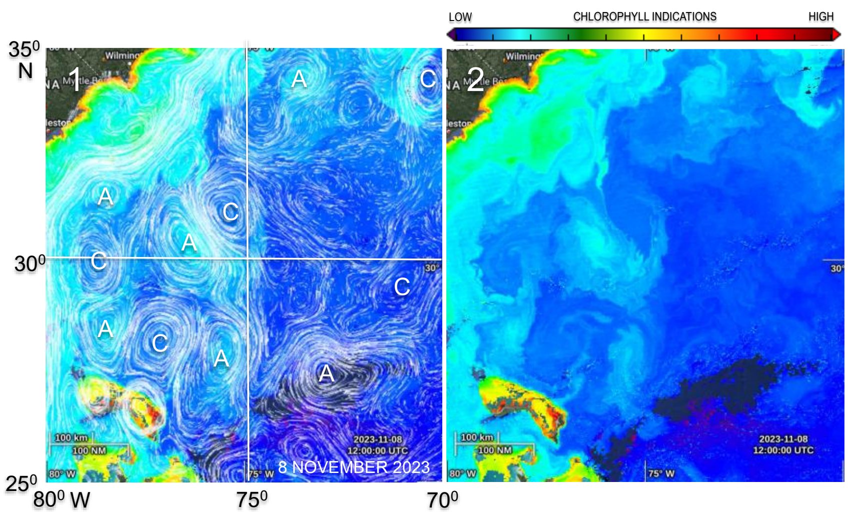

Figure 11: Comparison of chlorophyll concentrations and surface geostrophic streamlines, and identification of major eddies, on 8 November 2023. The right image shows the same area of chlorophyll concentrations as on the left, but without surface geostrophic streamlines and eddy annotations.

Frequently, sharp boundaries exist between an eddy and the surrounding water. However, the boundaries do not always coincide with the position of an eddy because of physical disturbances at the sea surface, such as convergence zones and wind-generated Langmuir circulation. The level of suspended matter in an eddy is also influenced by interaction with other water masses, and those processes are occasionally responsible for the complex surface distribution of chlorophyll/suspended matter, and accumulation of suspended matter may be observed along fronts between different eddies. An example of the complexity in distribution of suspended matter is demonstrated in Figure 12 where surface geostrophic streamlines are compared with chlorophyll distribution concentrations. Strong gradients are recognized at the outer periphery of cyclonic eddies C_1, C_2 and C_3, whereas the anticyclonic eddies show a rather chaotic dissemination of streaks with enhanced chlorophyll concentrations and building of fronts.

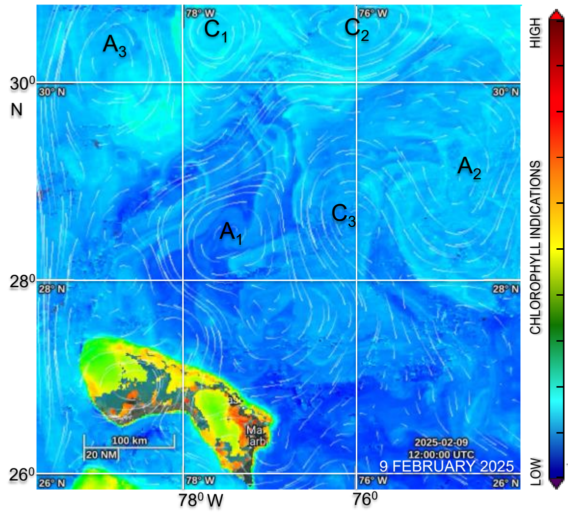

Figure 12: Patchiness in chlorophyll/suspended matter concentrations and geostrophic surface streamlines on 9 February 2025.

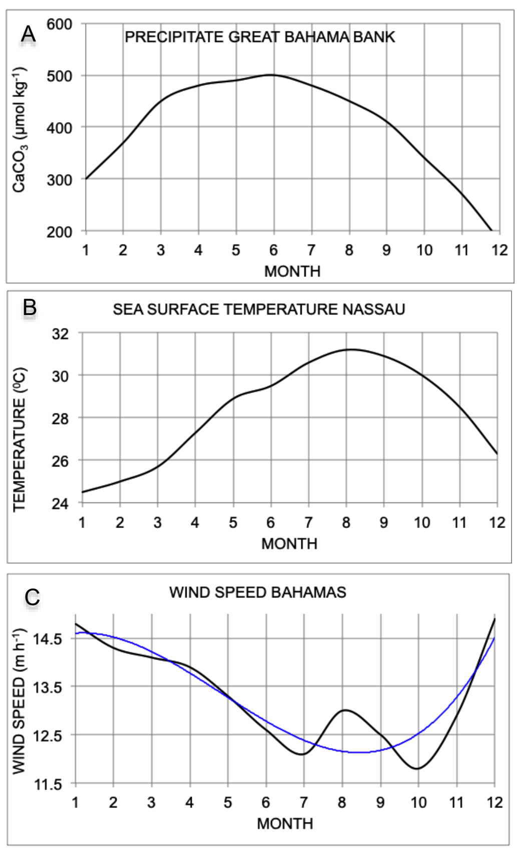

Figure 13: A: Average $CaCO_3$ precipitate in solution (modified from Bustos-Serrano et al., 2009). B: Sea surface temperature at Nassau, New Providence. C: Average wind speed over The Bahamas (m h^{-1}) where the blue line shows a 3[rd] polynomial fit.

Turbid patches in the near shore water of the bank are frequently observed, but it is not possible to distinguish between organic and/or inorganic matter with the present chlorophyll algorithm, although it

International Journal of Geology, Earth & Environmental Sciences ISSN: 2277-2081
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2025 Vol. 15, pp. 179-195/Karl
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can be used to track and recognize turbidity patches in connection with eddy activity. The release of suspended matter from the bank is based on bio-geochemical process and erosion of surface sediments, and chemical precipitation of calcium carbonate is a major cause for occasional turbid patches that are commonly referred to as whiting. However, the development of whitings in the Bahama region is a complex mixture of different processes (Larson and Mylroie, 2014; Lloyd, 2012), and whiting events are mainly observed in spring and winter with patch sizes of up to about 226 km² close to the Great Bahama Bank, whereas in the Little Bahama Bank, patch size may appear up to 95 km² (Yao et al., 2023). Highest frequency of whiting is observed for the east and west sides of the Little Bahama Bank from November to February of the following year. During the summer, maximum precipitation occurs at a time of low wind speed, and this is also the season when the bank water reaches its highest salinity at maximum temperature. During this period, the frequency of whitings is at its minimum (Bustos-Serrano et al., 2009). Figure 13 summarizes some of the factors that are connected to the appearance of whitings and are related to the seasonal changes.

Whiting events close to the Bahamas is documented in Figure 14 that provides information on the dynamics of suspended matter in surface waters. The presence of suspended matter close to the banks is noticeable throughout the year, but areal coverage of whiting is noticed during the winter season from December to March the following year. The season June to August shows a minimum of whiting, however, extreme conditions may emerge during the hurricane season lasting approximately from early June to late November with storms occurring from mid-August to October. This is shown with observations in September when turbid water is seen along the Great Bahama Bank at the eastern flank, and the Little Bahama Bank shows turbid water at the western part four weeks later in October.

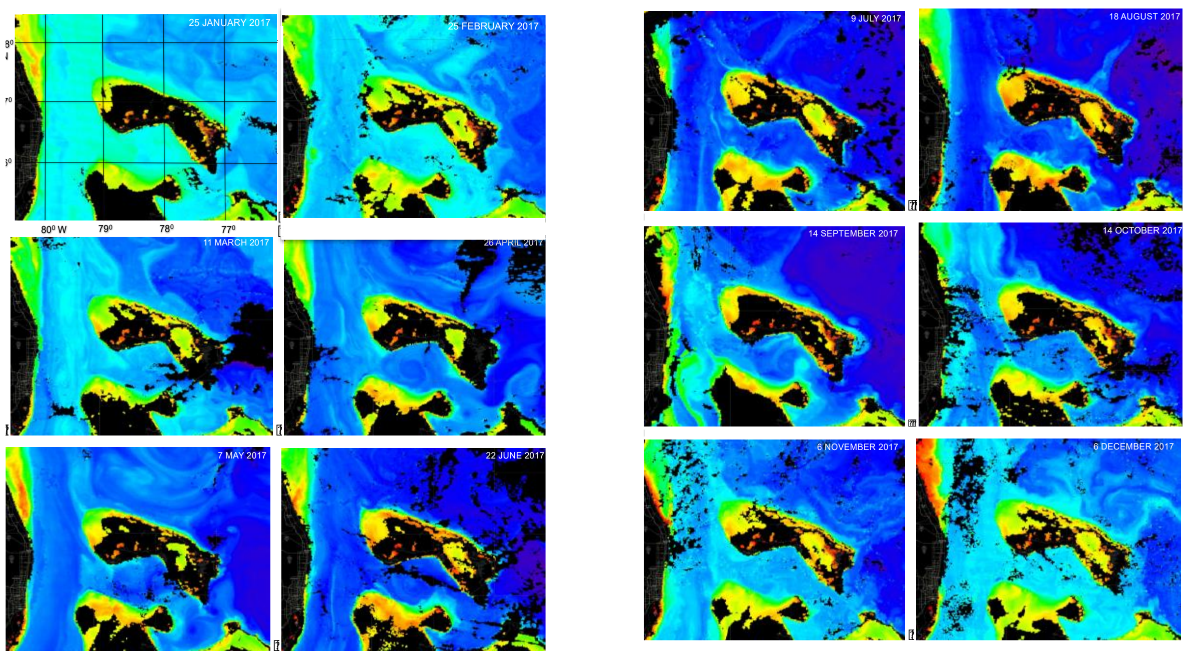

Figure 14: Whiting events from January to December 2017. Single day images were selected according to most favorable cloud conditions.

Extreme weather conditions during hurricanes have a dramatic impact on the redistribution of surface sediments and its transport away from the banks. Turbidity areas could be observed during the tropical storm Nicole that formed on 7 November 2022 and made landfall as a hurricane on 9 November in the northern Bahamas (www.weather.gov/tbw/HurricaneNicole). The surface distribution of suspended matter, shortly after the storm, is shown in Figure 15, indicating a strong offshore flow. This flow was initiated by a cyclonic water movement over the western part of the bank and transported suspended matter in a northwest direction adjacent to an anticyclonic eddy A_1. In addition, three cyclonic eddies are identified in relation to the patterns of suspended matter.

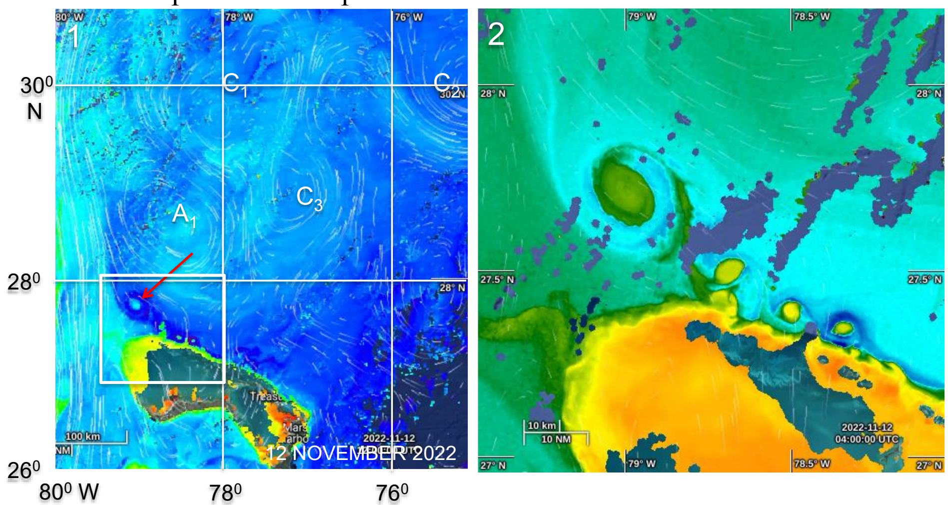

Figure 15: 1: Comparison of chlorophyll and eddy occurrence based on geostrophic current streamlines on 12 November 2022. The red arrow shows a separated patch with a strong spectral response. 2: Enhanced image of area that is shown in the white rectangle in the left image.

A red arrow in Figure 15.1 identifies an unusual patch with a strong spectral response, and its spectral intensity suggests a different composition compared to the suspended matter derived from the western part of the bank. Figure 15.2 shows also smaller isolated patches farther east along the coast of the bank. The dynamics of these patches were highlighted with a sequence of images in natural color and are shown in Figure 16. The high brightness of the bank on 10 November, as shown in Figures 16.3 and 16.4 compared to the image in Figure 16.1, implies resuspension of bottom surface sediment during the storm and transport from the bank into offshore waters. Figures 16.4, 16.5 and 16.6 reveal that patches are released along the barrier reefs and are moved in a northwest direction. Those patches were tracked with a sequence of images over several days. The partial enlargement of Figure 16.4 shown in Figure 16.7 discloses that the western part of the bank is most affected by erosion and that the turbidity patch produced during the hurricane consists mainly of sand shoals and mud.

The sequence of images received during hurricane Nicole allowed an estimate for the progression of the patches after leaving the bank. The largest patch left the bank with a velocity of about 0.19 m s^{-1} and increased the speed to about 0.27 m s^{-1} on 12 November 2022, and it reached one day later at a velocity of about 0.65 m s^{-1} after travelling about 140 km away from the Little Bahama Bank. These findings agree with previous observations that suspended sediments at the margin of Great Bahama Bank can be attributed to wind-induced currents and waves (Lopez-Gamundi et al., 2023), and local currents can transport particles with a size of up to about 63 µm from the interior of the platform to a distance of 200 km (Lopez-Gamundi et al., 2022). However, strong winds related to hurricanes do not only resuspended sediments but can also erode components such as seagrass, benthic macroalgae, and microalgae attached to sediments (Dierssen et al., 2006), therefore, material carried away from the bank is a conglomerate of varies fractions.

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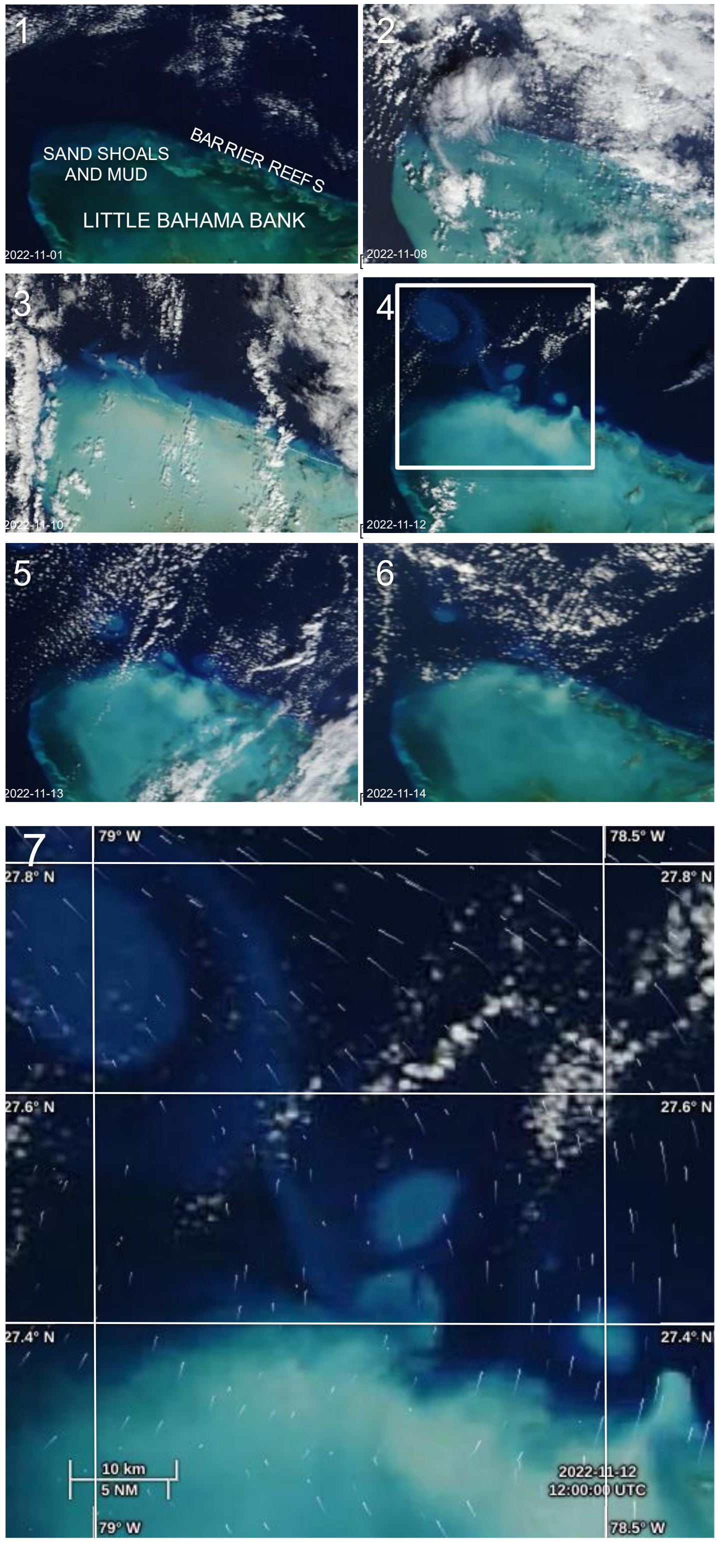

Figure 16: Sequence of natural colored images at 250m spatial resolutions over the northeastern part of the Little Bahama Bank 1 November to 14 November 2022. Figure 16.7 is an enlargement of the area that is marked by a white rectangle in Figure 16.4.

CONCLUSION

The study on eddy appearance and patchiness of chlorophyll/turbidity distribution provides new insight in the connection with geostrophic sea surface currents that appear close to the Bahamas. It is concluded that eddy action is the major driver in developing the complex distribution pattern of chlorophyll/turbidity and two different sources of suspended matter have been identified to provide chlorophyll/turbid water to the Bahama region. The first source of chlorophyll patches is located in the north, and its distribution complexity is related to propagating eddies that transport elevated chlorophyll concentrations to the south. The second source of patches that is referred to as whiting, originates by precipitation of calcium carbonate and resuspension of sediments on the Bahama banks and their subsequent interaction with eddies. The time when whitings are observed is at minimum during the summer, and both banks and their surroundings have elevated concentrations in turbidity/chlorophyll during the winter. However, anomalies were found during tropical storm Nicole when large patches leaving the Little Bahama Bank propagate at an estimated velocity of about 0.65 m s^{-1} over a distance of about 140 km. An interesting finding is that the rotational direction of eddies does not always indicate the level of particle load in the water although it was observed that most anticyclonic eddies carry a higher load of suspended matter than cyclonic eddies. It is presumed that the repeated presence of low turbidity/chlorophyll concentrations close to the northern part of the Little Bahama Bank during winter is connected to the local surface currents, though the surface expression of currents in the investigated area seem to be rather weak. Compared to an offshore station, long-term series suggest that year-to-year fluctuations and long-term changes are apparent and are equally distributed throughout the region, but that the fluctuations and changes can be interrupted by eddy activity.

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