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Application Note
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Aanderaa DataStudio3D

EFFECTIVE TOOL FOR CURRENT AND WATER QUALITY MONITORING DATA ANALYSIS

Background

In situ monitoring of the marine environment has allowed us to detect possible anomalies which are not possible during spot and profiling measurement methods as they are carried out at fixed timing and permissible conditions. Often, continuous monitoring would generate large amount of data. Navigating through the immense amount of data can be overwhelming and time consuming for the end user. In certain cases, a user has to make a quick decision and has little time to sieve through huge datasets. In these situations, a quick and yet powerful data viewer will be required.

Figure 1: Line graph in DataStudio3D clearly show each layer horizontal velocity. These layers are easily selectable by checking the parameter boxes.

Solution

Aanderaa (Xylem Analytics) is a technology provider of oceanographic sensors, instruments and systems which are able to measure environmental parameters such as wave, current and water quality (Dissolved Oxygen, Salinity, Temperature, Depth and Turbidity) over long deployments, several years.

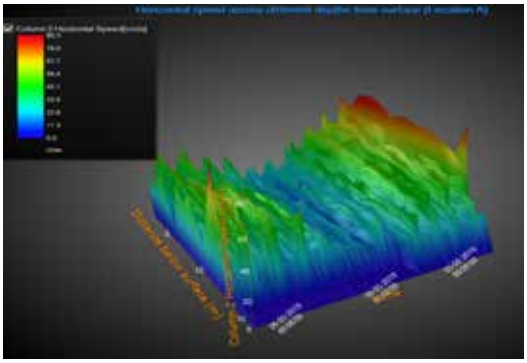

Figure 2: 3D graph allows user to observe overall depth layers of horizontal velocities through the use of mouse rotating the graph in DataStudio3D.

"To aid in data analysis, Aanderaa has developed their own propriety software, DataStudio3D which allows users to download field data and plot them on different graphical formats. "

To aid in data analysis, Aanderaa has developed their own propriety software, DataStudio3D which allows users to download field data and plot them on different graphical plots. This mode of data analysis can be carried out within minutes to help user to compare parameters, view trends, anomalies, and to control the data quality.

Case Studies: Coral Reef (Sisters' Island Marine Park) and Offshore Aquaculture Fish Farm

At many offshore fish farms, current conditions are monitored to support fish farms operations related to maintenance, efficient feeding procedures and accumulation of fish waste below fish cages. The use of DataStudio3D provides quick overview of the information.

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Horizontal current velocities from an ADCP can be plotted as line graph (figure 1), 2D (figure 4) or 3D graphs (figure 2) that can be rotated in space.

At Sisters' Island Marine Park, water quality is logged at 5 minutes interval during March - April 2019. From Figure 3, we observed two periods of super saturation DO levels occurring within the coral reefs. Spikes in salinity levels indicate the presence of suspended particles or animals affecting conductivity readings. A steady rise in temperatures from 28.8–30.5 °C was also observed. Matching temperature readings from Optode and Conductivity sensors confirms both sensors are in working conditions, thereby confirmed that the temperature has risen by 1.4 degrees celsius over a month period. Read application note on the topic here.

DataStudio3D is also able to plot current quality control data from Aanderaa ADCPs to assure the quality of current data. Referring to figure 4, graphical plots show high values in the cross difference and standard deviation of the horizontal current speed which implies disturbance in one or more of the acoustic beams. This analysis is further verified with field photos showing that the profiler was installed next to a reef overhang. This analysis has prompted the user to exercise more vigilance in site selection for future deployments.

Conclusion

Data analysis is an important stage in all environmental monitoring campaigns. In many situations, users have to download and filter through large data quantities for analyses. DataStudio3D is a free data analysis software available to Aanderaa SeaGuard and SmartGuard users. For link to DataStudio3D manual, see here. It does the job of crunching large quantities of data into easily useable information for users in the research or commercial industry to assess data quality, comparison of multiple data parameters and hereby extracting more value from data collected by Aanderaa sensors. This ultimately improves efficiency of users' field monitoring campaigns, leading to greater greater understanding of the environment as demonstrated by the two case studies involving coral reef monitoring and fish farm operations.

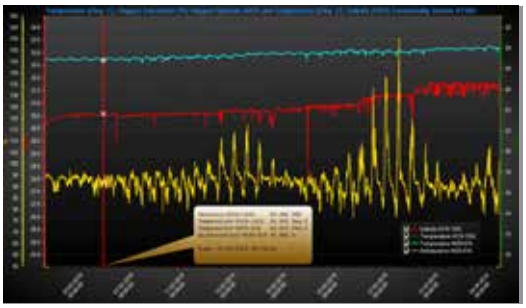

Figure 3: Graphical plot of dissolved oxygen, salinity and temperatures parameters measured by Aanderaa Optode 4835 and Conductivity sensor 4319 which are installed on Seaguard II DCP that is bottom mounted. Air Saturation (%) indicates periods of high oxygen saturation levels. Temperature data from both sensors indicate temperature rise of 1.2 degrees during the deployment. Spikes in salinity data indicates presence of animals and particles affecting conductivity readings. Rectangular bubble in the graph provides data values as user scrolls through the parameter graph lines.

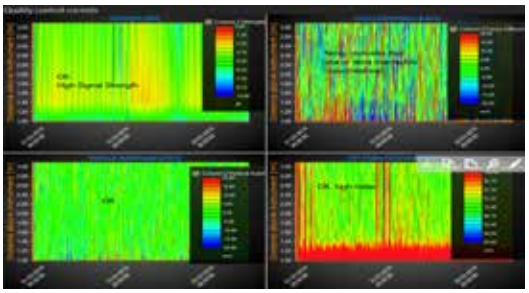

Figure 4: DataStudio3D has various options to plot current profiling and data quality measurements. Cross difference and standard deviation values do in this case indicate disturbances in one or several of the acoustic beams.

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