## Comparison of Unabara Z Axis Products

What salient characteristics do the **Z Axis-2F ™**product and **Z Axis-2F+ ™ (Plus)** have in common ?

-Same standard 1.25 inch NPT mounting of BSU.
-Same size housing.
-Same power input and consumption.
-Same length (4.5 meter) cable on BSU.
-Same Z-Axis-2F™ PC APP for setup of BSU and monitoring via COM-1 port.
-User choice of same three depth(s) output sentences available via COM-2 port.
-Same F1 and F2 frequencies
-Same acoustic beam widths for F1 and F2.
-Same User Inputs using SETTINGS screen of Z-Axis-2F ™ PC APP (i.e.Sound Velocity, Offset-Draft, Units-Feet or Meters, Blanking Gate Depth)
-Same Maximum and Minimum Depths.
-Same user selectable Ping Rates.
-Both products provide the thickness of the siltation (sedimentation) layer (meaning the "delta" between the surficial layer and consolidated sub-bottom).
-Both products include integral EMI shielding and noise suppression to prevent problems on low frequency (F2) when the Z Axis-2F™ is used aboard USV's which have propulsion/thrusters which utilize 3-phase brushless motors (i.e. Blue Robotics and others).

What features are included in the **Z Axis-2F+™ (Plus)** which are not present in the **Z Axis-2F™** ?

In addition to dual frequency derived depth(s) data, the **+** product provides Bottom Contrasting™ and Sediment View™ graphic displays. Presentation of these two display types requires HydroMagic™ PC Mapping Software which is <u>not</u> included in the $ 6,840.00 USD End-User price; Unabara can provide HydroMagic™ with the Z Axis-2F+™ package for an End-User adder price of $ 1,875.00 USD.

Depth(s) data is available from COM-2 port as is the case with the basic Z Axis-2F in case the user wants data for whatever reason from that port; however, with the **+** product, there is no need to use COM-2 because there is bi-directional

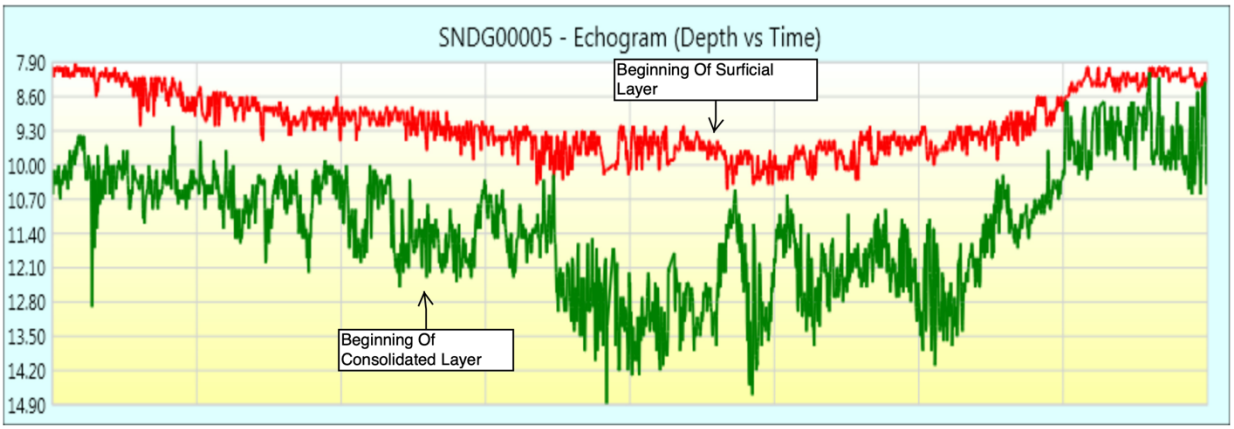
communication via the COM-1 port and HydroMagic™; in this sceneario, all depth data and data to generate displays for Bottom Contrasting and Sediment View is logged by HydroMagic ™ and various maps generated.

What are the benefits of **Bottom Contrasting™** to the user ?

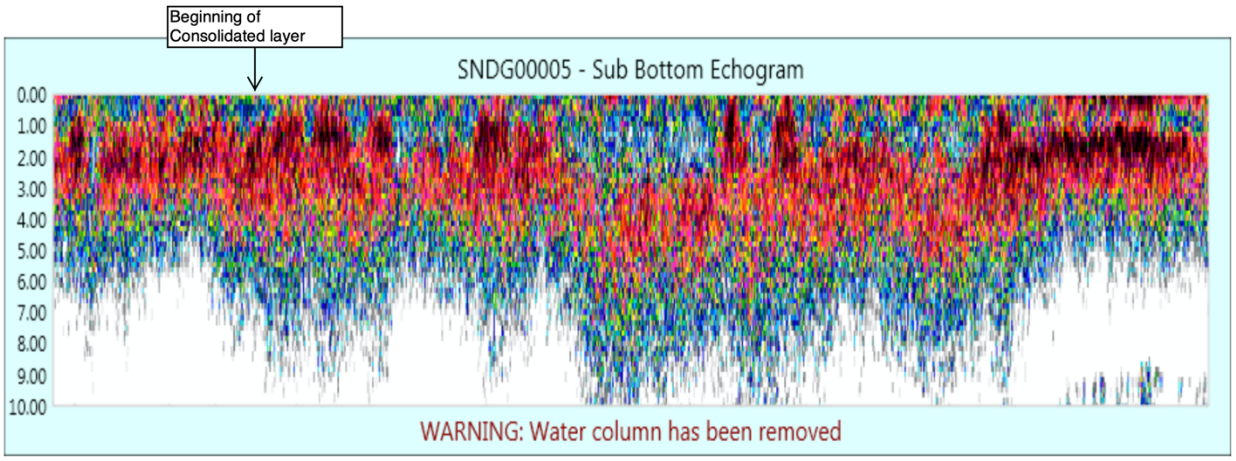
To non-sedimentologists there are many misconceptions with regard to estuarine and sea bottoms. It is a common misbelief that the sea floor consists of a single layer of homogeneous material; with little geotechnical and geochemical variation in both vertical and horizontal spatial expanse. This assumption is usually wrong. So, the user often wants to know the various sediment types (both surficial and consolidated sediment layers) across the horizontal field of his study area and the geoposition of each sediment type. This can easily be done by comparison (Bottom Contrasting™) of acoustic bottom losses of the sediment layers horizontally across the survey area. The maximum bottom loss will be from the most soft sediment (i.e. muddy bottom); the minimum loss will be from hard sediments (i.e. sand, rock). Using HydroMagic™ PC mapping software, the bottom losses over the survey area can be mapped and plotted on a heat map display or contour map. The Bottom Contrasting™ publication which can be found on the web at: https://unabarahydrographics.com/Mandeville-Harbor-Study-2018.pdf has augmented reality maps (Charts D & E) which shows the location and general type of sediments over the horizontal expanse of the survey area. These maps can be used to determine where to collect bottom grab or core samples to exactly determine the characteristics of each sediment type present in the survey area.

What are the benefits of **Sediment View™** ?

Users of HydroMagic™, HYPACK™ and other PC-based mapping software use high and low frequency derived depths from the Z Axis-2F to generate surficial and consolidated sediment layer echograms*; as shown on the TOP of the next page of this document.* Such echograms are available for all survey lines of a survey. But users of the Z Axis-2F+™, which includes the Sediment View™ feature, who also have HydroMagic, will have the ability to view vertical slices of the sub-bottom sediment along the survey lines. This feature provides a multi-color display of the area between the surficial bottom and hard consolidated bottom; showing both natural geological features and embedded objects. *An example of a Sediment View™ display is shown on the bottom of the next page.*




Typical echogram along a survey line as presented by HydroMagic™, HYPACK™, or similar PC-based Hydrographic Mapping Software.




Sediment View™ display generated by HydroMagic™ software using the same Unabara data as was used for the above echogram. User must have Z Axis-2F+™ and HydroMagic™ license.

Note: The above Sediment View™ display does not show the water column, thus the "0.00" indicates the start of the surficial sediment; accordingly, units (in feet) below "0.00" indicate depth(s) into the seabed below the initial sea bottom surface.