

FIELD TIPS – QUALITY CONTROL: Integration of Topographic and Hydrographic Surveys

Mike Williams (US Army Corps of Engineers)

Introduction

As a Survey Team Leader for the U.S. Army Corps of Engineers - Norfolk District, I commonly survey dredge placement areas, beaches, and other shallow water federal projects which involve both hydrographic and topographic surveys. For the hydrographic work, I have a single beam depth recorder, DGPS system, and use HYPACK software on a 22' SeaArk that drafts about 1.2' (fully loaded). For topographic work I use either a SOKKIA Set 2B Total station or a Trimble 5700 RTK unit. Often, our survey work requires the integration of hydrographic and topographic data. There are a number of factors that must be considered when making the overlap from two different survey types in order for data to be consistent and accurate. From my thirteen years of experience I have learned and developed several real-time quality control techniques to quickly appraise the information so that we can overcome the variables introduced by mixing these survey types.

Data Acquisition

Being located on the Mid-Atlantic coast of the United States, our tidal range varies from 0.9' to 5.0'. By taking advantage of high and low tides we can facilitate the process of integrating surveys by scheduling survey times and styles based on tide. When a survey requires data integration there are several methods we use to ensure data agreement and overlap. When performing the hydrographic survey first, we will get a target position (X, Y, Z) at the end of each hydrographic section when the boat has reached its sounding limit. This provides us points to meet with our topographic work. These targets can be input into our data collector to make certain the data is in agreement and assures coverage overlap. When performing the topographic work first, we will record the last point acquired on each section and will bring these points into HYPACK as targets. If there is enough time between surveys, we will download the entire topographic data and generate a file format compatible with our HYPACK software (such as .XYZ or .DXF). Once this format is created it can be imported into our hydrographic surveying software and viewed real-time, guaranteeing conformity and overlap.

Data Analysis

When combining the data from two different sources, overlap data becomes a key quality assurance check. The comparison of vertical data in overlap areas is something that needs to be readily available and carefully monitored. If vertical and/or horizontal information does not match well, quality control procedures for both surveys would be evaluated. Differences can quickly indicate the possibility of such errors as: poor equipment calibration, improper tidal modeling, vertical datum disagreement, and blunders.

NOTE: Because the vertical error budget for the acoustic hydrographic work is larger than the topographic methods, the topographical data is usually more accurate. This unfortunately does not preclude the introduction of blunders such as incorrect instrument height etc.

Conclusion

There are many different ways to perform this integration of data. These simple procedures outlined above allow for the quick on-site evaluation of the harmony of the data. Routine adherence of quality control and quality assurance procedures is a must for verifying the accuracy of all work we perform.