



TPU Updates in MBMAX64

By Mike Kalmbach

INTRODUCTION

TPU (Total Propagated Uncertainty) is a calculation of sounding uncertainty. It is based on sonar, environmental and sensor (e.g., GPS) information. The calculations in HYPACK® are from the spreadsheet developed by Rob Hare of the Canadian Hydrographic Service.

There are vertical and horizontal components of TPU—TVU and THU.

MBMAX64 (the 64-bit HYSWEEP® EDITOR) color codes soundings depending on TVU and THU values. A recent update, version 13.0.23, expands TPU with comparison to a selected IHO or USACE accuracy standard. A future version, HYPACK® 2014 (or earlier if things go well!) will use TPU to include/exclude beams used in the CUBE depth model.

HYPACK® TPU EDITOR

Parameters are entered using the HYPACK® TPU EDITOR. There are quite a few parameters and some of them are perplexing. HYPACK® assists with default values and information for common GPS, MRU and sonar systems. My recommendation is to enter TPU parameters in four steps:

1. **Assign default values.** In TPU EDITOR File menu, select the Restore Defaults option.
2. **Fill in parameters for common systems using the menu.** For example; Multibeam menu, Reson Seabat 7125.
3. **Load the HYSWEEP.INI for offset information.**
4. **Enter the remaining parameters you know.** If you don't know them all, do not stress. Many of the parameters have miniscule effect on TPU results, and some of them are unknowable and require approximation.

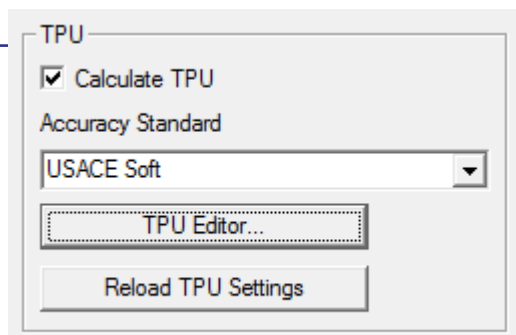
After all is entered, save changes then select FILE-MAKE CURRENT. MBMAX64 and HYSWEEP® SURVEY both use the 'current' copy of TPU parameters.

MBMAX64 - TPU SETUP

Setup is done in the Survey tab of the Read Parameters.

FIGURE 1. TPU Options

- **Calculate TPU:** Enables or disables TPU calculations. If you don't care about TPU, definitely leave this unchecked. TPU calculations can be slow.
- **Accuracy Standard:** Select from the list or leave unspecified.



- **[TPU Editor]:** Runs the HYPACK TPU Editor to check or change parameters.
- **[Reload TPU Settings]:** Makes sure the most recent TPU parameters are loaded into MBMAX64. Only required if parameters have been changed.

TPU Setup can be changed any time during an MBMAX64 edit session. The program will make the necessary recalculations.

MBMAX64 COLOR CODING

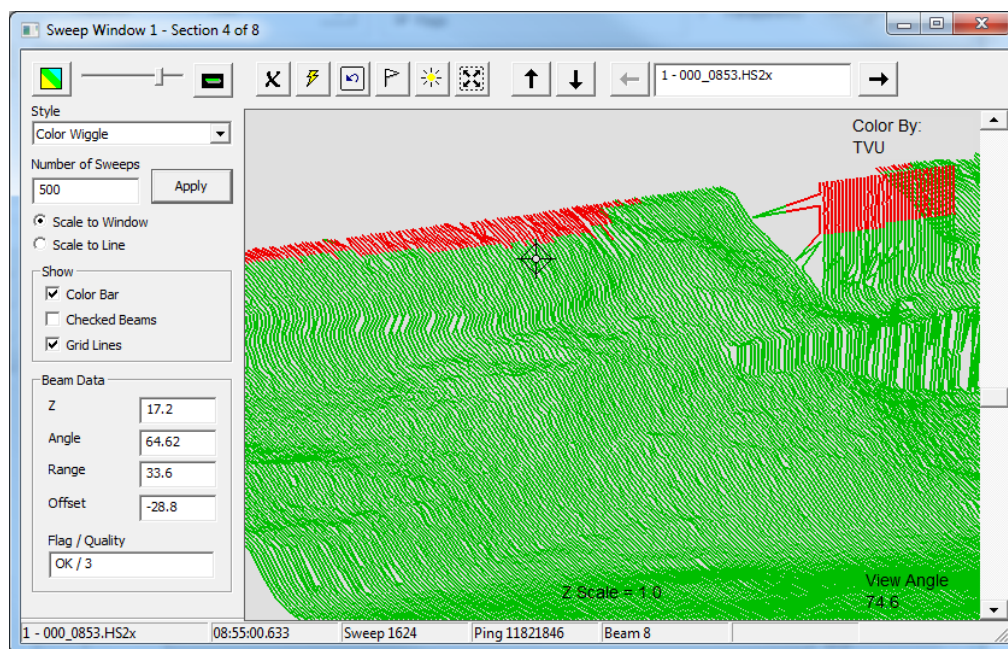
TPU colors can be used anywhere soundings are displayed: the Sweep, Cloud, Profile, A-B Cross Section and Cell windows. Use the View or right-click popup menu, Color Settings and select TVU or THU from the list.

The first example shows TVU compared to USACE soft bottom accuracy standard. A few shallow soundings exceed the TVU limit (red) because higher accuracy is expected for depths less than 15 feet.

FIGURE 2. Showing TVU Compared to USACE Soft Bottom Accuracy Standard

Soundings	
Color By:	TVU
☒ Auto Scale Z Range	Minimum: 0.0 Maximum: 1.0
☒ Compare TVU and THU to Survey Accuracy Standard	
TVU	0.6
THU	6.0

FIGURE 3. Resulting Sweep Window Display



The second example shows THU compared to a user-defined limit of 6 feet. The sounding display is all green, meaning that THU of each sounding is within (less than) the 6 foot limit.

FIGURE 4. Showing THU Compared to a User-defined Limit of 6 Feet

Soundings

Color By: THU

Minimum: 0.0 Maximum: 1.0

☒ Auto Scale Z Range

☐ Compare TVU and THU to Survey Accuracy Standard

TVU: 0.6

THU: 6

FIGURE 5. Resulting Sweep Window Display

