sometimes forced to 'stretch' the predicted motion, using the RTK elevations as anchors for the stretch.
In the second approach, shown in the bottom half of the graphic, we use the RTK Antenna heights to determine a 'Normalised Heave Reference' and then apply the exact vertical movement for the sensor as computed from the heave-pitch-roll data. The rationale for this approach is as follows. Your heave-pitch-roll sensor outputs a 'heave' value that is the height of the sensor above a normalised heave plane. If you place the sensor on the floor for a couple of minutes and then place it on a shelf 1m high, the heave will change to 1m. After a couple of minutes (depending on the settings in your unit) the heave will slowly drift back to 0. The 1m shelf has become the 'normalised' heave reference and your heave is now referenced about this level.
In the second approach, we average the RTK z-values for a specified time period before and after each RTK update to determine the 'normalised heave reference. We then apply the exact heave-pitch-roll motion relative to this value. In this approach, the RTK Antenna heights are our 'guide' and the heave-pitch-roll data is the 'gospel truth'.
In calm waters there isn't any noticeable difference between the two techniques. In dynamic conditions, the second approach seems to give a better result. With RTK GPS sensors now outputting Antenna Heights Above Ellipsoid at 10Hz, the possibility now exists to eliminate the heave-pitch-roll sensor and use just the RTK GPS updates.

In Summary

- The trend towards using RTK GPS for real-time water levels is growing
- The RTK Tide method generates correct Chart Soundings whether you measure the dynamic draft or not
- You can only compare the RTK Tide and the conventional tide if you accurately measure the ship's dynamic draft
- The separation between the Chart Datum and the Reference Ellipsoid should only be considered a constant for a very small survey area
- You have to have a heave-pitch-roll sensor to determine the sensor movements between one-second RTK updates

Biography

Pat Sanders is President and Founder of Coastal Oceanographics, a US-based company known for its HYPACK, HYSWEEP and DREDGEPACK software packages. He received his BSE and MSE in Civil Engineering from the U. of South Florida and an MSIA from Carnegie-Mellon U. He received his hydrographic 'baptism' while serving with the US Naval Oceanographic Office. Pat is a Past-president of The Hydrographic Society of America. ■

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