GNSS: How advances may benefit hydrography

Twenty-cm accuracy GPS-based systems are already available offshore in many parts of the world, and progress is being made towards centimeter-accuracy systems. Can we find real benefits from this increased accuracy, or is it just a question of innovative thinking coming up with real business benefits once greater accuracy is achieved?

So where are we today? Stand-alone GPS has an accuracy of +/- 10-20m globally. Global offshore DGPS accuracies are in the order +/-1-3m and high-accuracy offshore GPS service providers are delivering +/- 20cms accuracy systems such as Starfix XP & HP, C-NAV and Veripos Ultra. Galileo launched its first test satellite in December 2005 and is expected to have four fully operational satellites by 2006. All replacement GPS satellites (Block IIR-M) will be equipped with a second civil frequency, which when fully operational will provide the opportunity for ionospheric corrections and further redundancy. Glonass presently complements GPS with fourteen additional satellites, three launched recently.

There are an increasing number of reliable positioning systems available free of charge to offshore users. Examples are Wide Area Augmentation Systems (WAAS) like the European Geostationary Navigation Overlay Service (EGNOS), which is available in Europe to augment GPS & Glonass and consists of three geostationary satellites and a network of ground stations. There is also the Trinity house IALA DGPS service. Finally, satellite-receiver manufacturers have already produced fifty-channel receivers for tracking of both GPS and Glonass.
Some examples of the business benefits already being realised by the hydrographic industry from the present increase in accuracy are:

- reduction in overall positioning error for underwater positioning systems, negating the need for long baseline acoustic in certain water depths - setting out wells, structure positioning, pipeline-out-of-straight survey
- accurate positioning for seabed mapping, giving better quality results and a reduction in post-processing time
- vessel heading better than conventional gyro compasses
- online tidal corrections negating the need for tide gauges in all but the highest accuracy surveys
- vessel fuel savings due to stable station-keeping for dynamically positioned vessels
- safer navigation, with the mariner knowing more accurately the location of ship's keel and mainmast with respect to the seabed.

What is tomorrow likely to bring? It is clear accuracy and quality of stand-alone satellite positioning will continue to improve over the coming years. Multi-channel GPS, Galileo & Glonass-compatible receivers are likely to deliver stand-alone sub-metre accuracy by 2010. More efforts will be made to achieve greater accuracy, availability, integrity and robustness. GPS plan to make the first of nine Block IIF available for launch in 2008; these satellites will carry the L1, L2, and L5 frequencies to improve accuracy, availability and signal redundancy. GPS III is being worked on, with the first of the new satellites expected to be launched in 2010 (it promising to be the best value system, space-based position and timing solution.) Glonass is revitalising the system, potentially to the full complement of 24 satellites. Galileo is expected to install all thirty satellites to reach full operational capability in 2008. Will the future GNSS augmentation service providers survive by continuing to push the quest for better accuracy real-time systems? I am sure that once real-time centimetre accuracy is widely available global offshore innovative thinking will find real business benefits for its use.