

**Title: Integrating Other GNSS with GPS and its Implication for DP Positioning**

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***Abstract***

With satellite navigation moving into a new era with more satellites in orbit than ever before, users are beginning to see the benefits such as better geometry, availability and new signals. This paper looks at the current status of all Global Navigation Satellite Systems (GNSS) and presents some early results from tracking of the European Galileo and Chinese Compass signals.

The main focus of the paper looks at the experience of integrating the GPS and GLONASS constellations to provide a combined position solution looking specifically at the issues, the benefits and the positional results. Experience gained will be fundamental to integrating the new Galileo and Compass constellations and new signals from the modernized GPS and GLONASS constellations. While most people are aware that better accuracy and availability are the main benefits of the improvement to satellite navigation there are also other benefits that will assist users. These include stronger signal power which should help during increased ionosphere activity and better multipath mitigation which will make high accuracy positioning more robust. The paper considers what users can expect from a multi-constellation system and also look at integrating other sensors. Finally, the paper examines the implications that all these changes will have for DP operators and manufacturers. With multiple constellations coupled with use of other sensors such as INS and acoustics there is clearly a benefit in terms of position robustness, accuracy and reliability. However, that means more information is available to the user and DP system and how this information is processed and used will need to be addressed. Another area that will impact the future is whether the regulatory bodies such the IMO can keep up with the pace of technological development. This could result in operators not being able to make use of new technology or techniques until the standards catch up.

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