Title: **Comparing Tightly-Coupled versus Loosely-Coupled Integration for GNSS and INS**

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Abstract

GNSS and INS are complementary sensors which when combined can provide the ideal surface positioning system giving the user a constant, stable, accurate and repeatable position in real-time which is essential to safe and productive operations. The integration of GNSS and inertial technologies exploits the long term accuracy and precision characteristics of GNSS positioning with the continuous availability and fast update rate of inertial sensors. The resulting integrated system can bridge GNSS disruptions (e.g. ionosphere scintillation, physical obstructions, etc.) as well as detecting position outliers due to common mode failures which can affect vessel GNSS systems simultaneously.