Issues with Drift

While inertial navigation methods provide a smooth, high-rate, and stable navigation estimate that is far superior to any one measurement source can provide for subsea applications, drift is an unpleasant fact of life. Drift occurs due to noise in the inertial measurement unit or as the inertial measurement unit develops a bias over time. High-end IMUs have less drift than low-end IMUs and is proven by the simple formula that states the accuracy of an IMU is directly proportional to its cost, size, and power requirements. Thus, to be accurate means big, expensive, and power hungry — a few incredibly unfavorable characteristics for underwater vehicles.

The IMUs commonly used subsea have noticeable drift over a relatively short period of time. We use aiding sensors to manage drift and correct the INS solution. A good spin up will help manage drift because it allows the INS to accurately compensate its filters with the observed IMU biases. Zero Velocity Correction algorithms also provide real time drift management by allowing the INS to recalculate the IMU biases during periods of stability. Operators can force a ZVC event in Greensea INS's by keeping the vehicle still for 20 seconds.

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