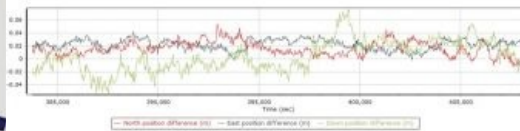
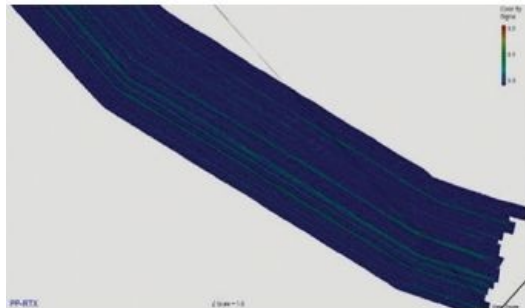
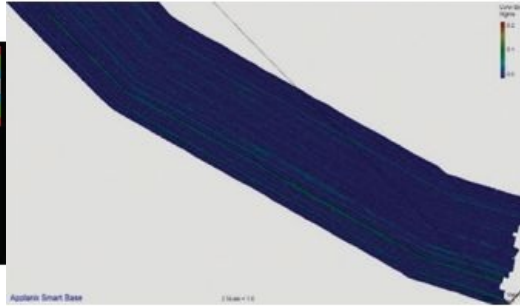
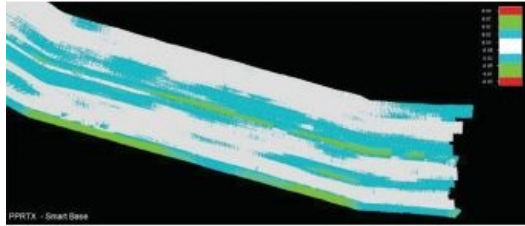


Direct Referencing Multibeam Data



Applanix's POSPac MMS GNSS Inertial software, in particular the Applanix SmartBase (ASB) post-processed virtual reference station technique, has been widely adopted as a robust and reliable method of direct georeferencing multibeam data.

POSPac MMS 8.0 is a PP-RTX GNSS aided-inertial module that provides centimetre-level post-processed positioning accuracies without the use of local reference stations. This method integrates Trimble CenterPoint RTX technology into POSPac MMS. RTX is Trimble's approach to PPP (Precise Point Positioning) with advanced ambiguity resolution, providing its own ephemeris correction service, leading to integer-level ambiguities for accuracy approaching that of RTK.

A global network of approximately 100 stations tracking GPS, GLONASS, BDS, QZSS and Galileo provides the raw data for analysis and processing to produce the PP-RTX corrections, which are then made available via the internet within one hour.

The rapid data turnaround ensures the same for the solution, previously unavailable for post-processed PPP services. In comparison to real-time PPP services, archiving the data on the internet ensures more robust and reliable access to the correction data – improving availability and accuracy.

Performance Results

Performance analysis of 14 different datasets from various locations around the world was done by comparing the PP-RTX solution to that from ASB (see table).

PP-RTX - ASB	Mean (m)	std (m)	rms (m)	68% (m)	95% (m)
North	0.000	0.019	0.019	0.012	0.033
East	-0.003	0.021	0.021	0.016	0.035
Down	0.018	0.046	0.049	0.043	0.086

Port of London Case Study

A dataset has been collected by the Port of London Hydrographic Service on their vessel Maplin – equipped with a POS MV OceanMaster GNSS-aided INS for georeferencing the R2Sonic 2024 multibeam sonar. Hypack was used for data acquisition, and Fledermaus for the visualization of some results.

The data was collected in the Thames Estuary, where Ordnance Survey OSNet GNSS reference stations provided the data necessary to compute an ASB post-processed VRS network. The ASB technology allows the computation of a centimetric-accurate position solution, with distances to the nearest reference station on the order of 20-60km. A comparison was then done between the ASB solution and that from PP-RTX (see chart).

The maximum difference is approximately 0.04m in horizontal, and about 0.07m in vertical. Both the ASB and PP-RTX SBET (Smoothed Best Estimate Trajectory) solutions were applied to the bathymetry, and the results were compared by RMS surface derived from each

SBET (see images).

Differencing the two surfaces confirms the level of agreement, with no differences greater than 10cm, and the majority less than 5cm.

Summary and Conclusions

POSPac MMS using PP-RTX aided-inertial technology has been shown to match the North, East and Down position computed using the ASB network Carrier Phase DGNSS processing for 15 POS MV data sets to an accuracy of 0.019m, 0.021m and 0.049m RMS respectively, which is enough to meet the requirements for most mapping applications. It does not need local reference stations and provides a convergence-free solution by combining the forward and backward solutions. Data is available one hour after collection and allows for the direct georeferencing of a sample MBES data series in agreement with the equivalent ASB solution to better than 0.10m, with the majority agreeing to better than 0.05m. It is available to be used by all models of POS MV.

Applanix would like to thank the Port of London Authority for their generous assistance in collecting the data.

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<https://www.gim-international.com/content/article/direct-referencing-multibeam-data>
