In this section, we compare the ZTD estimates obtained by BNC v2.6 and the PPP-Wizard to those from the hourly near-real-time system (UL01). The comparison has been performed for 10 stations from the IGS and EURIF permanent networks for the time period of 2012-11-14 to 2012-11-20 UTC. UL01 provides ZTD estimates with a sampling interval of 15 minutes whereas BNC2.6 and the PPP-Wizard provide estimates with sampling intervals of 1 second and 5 seconds, respectively.

Figure 7 shows the ZTD time series for 4 out of the 10 stations obtained from UL01, BNC2.6 and the PPP-Wizard. Figure 8 shows the box-plots between the near-real-time (UL01) and the real-time (BNC2.6, PPP-Wizard) ZTD time series shown in Figure 7. From the dataset obtained from the PPP-Wizard, only those epochs have been taken into account for which the number of solved ambiguities is greater than 4.

Conclusions

The accuracy of the real-time ZTD estimates obtained by BNC v2.6 and the PPP-Wizard has been assessed by comparing them to the near-real-time ZTD estimates from UL01. For BNC v2.6, this comparison resulted in a mean bias of 10.7 mm with a standard deviation of 8.3 mm whereas for the PPP-Wizard, the mean difference was found to be 47.2 mm with a standard deviation of 10.5 mm in ZTD.

The achieved accuracies of ZTD (or IWV) estimates were then compared to the user requirements for GNSS Metrology as described by the COST Action 716. The averaged RMS difference of ZTD measurements, as a measure of absolute accuracy, for the estimates obtained by BNC v2.6, the IWV accuracy of 3.3 km was met for the requirements for near-castings whereas the estimates obtained by BNC v2.6 met the requirement of 7.4 km to 11 km. Other than this, the ZTD accuracy requirements for near-castings are met. More work is required to identify the nature of the large mean bias of this real-time system.

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Figure 7: Comparison of ZTD time series obtained from UL01, BNC2.6 and the PPP-Wizard for a selection of 2012-11-14 to 2012-11-20 UTC. UL01 provides ZTD estimates with a sampling interval of 15 minutes whereas BNC2.6 and the PPP-Wizard provide estimates with sampling intervals of 1 second and 5 seconds, respectively.

Figure 8: Box-and-Whisker plots showing statistics for comparison between UL01 and BNC2.6.

Figure 9: Box-and-Whisker plot showing comparison between UL01 and the PPP-Wizard.

Figure 10: Box-and-Whisker plots showing statistics for comparison between UL01 and the PPP-Wizard.