

NAVCAST: Analysing the Positioning Performance reachable with the Precise Point Positioning (PPP) software and the RETICLE Orbit and Clock Corrections

TEST REPORT

v1.0

Document Status Sheet

Issue	Date	Author	Reason for Change
1.0	20/11/2018	NAVCAST team	First version

Change Record

Issue	Page	Section	Modification

1 Introduction

This document describes the performance reachable with the Precise Point Positioning (PPP) software by using orbit and clock corrections calculated by the RETICLE algorithm as provided with NAVCAST. Specifically, the following set of recorded orbit and clock corrections from RETICLE were used:

<ftp.gsoc.dlr.de/pub/recticle/reticle0/dlr20270.sp3>

<ftp.gsoc.dlr.de/pub/recticle/reticle0/dlr20270.clk>.

In addition, supplemental 24h observations from IGS stations with 30s sample intervals were used from:

<ftp://igs.bkg.bund.de/IGS/obs/2018/315/{STATIONID} R 20183150000 01D 30S MO.crx.gz>.

For PPP processing the GNSS constellations of GPS and Galileo were used together with the L1/ L2/ L5 and E1/ E5a/ E5b signals, respectively. The accuracy of the estimated position coordinates is determined by comparing the PPP estimates with the SINEX combined weekly station coordinate solutions.

Three different types of performance assessments were carried out:

- 1) A long-term convergence analysis over 24 hours for a representative set of IGS reference stations
- 2) A repeatability analysis based on hourly restarts for a representative set of IGS reference stations
- 3) A statistical analysis of positioning accuracies for different convergence times based on all considered reference stations and executed hourly restarts.

2 Test Results

For the long-term convergence analysis as well as for the repeatability analysis, a set of 12 IGS reference stations was arbitrarily selected and analysed. The results are shown throughout Figs. 1 – 24. The dashed vertical lines in the long-term convergence plots represent markers at 20min, 1hour and 2 hours, respectively. In addition, position errors after 5min, 10min, 20min, 1hour, 2hours and 24hours are listed in the title of these figures. Dashed horizontal lines in the repeatability plots indicate user position errors of ± 20 cm along the North, East and Up-direction.

The statistical evaluation of the positioning errors in the North, East and Up-direction is presented in Figs. 25 – 27 and considers all reference stations used by the RETICLE algorithm and all hourly restarts.

Fig. 1: Station GENO, 11.11.2018: 24 hour convergence

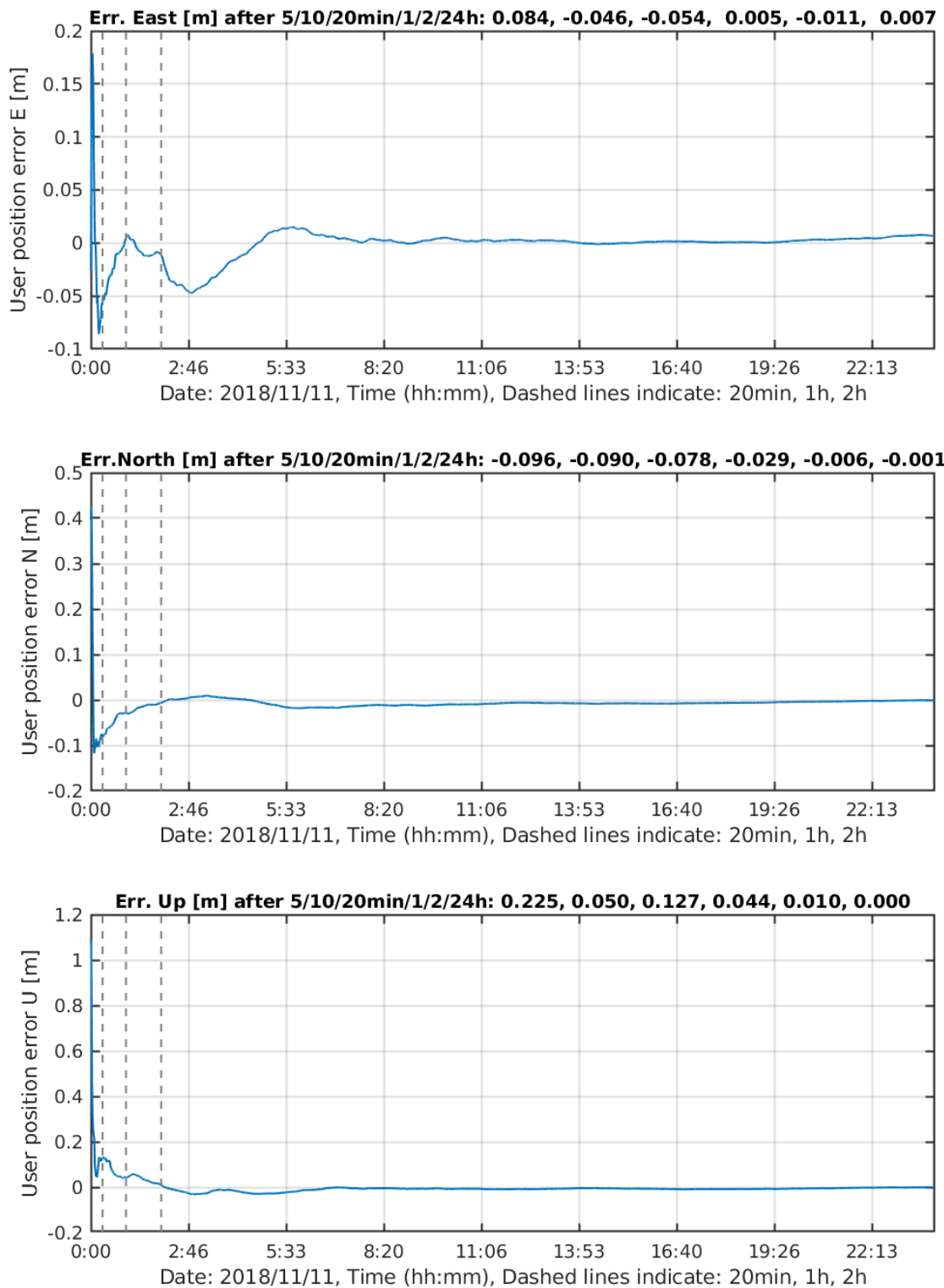


Fig. 2: Station GENO, 11.11.2018: Forced hourly restarts to analyze repeatability of perf.

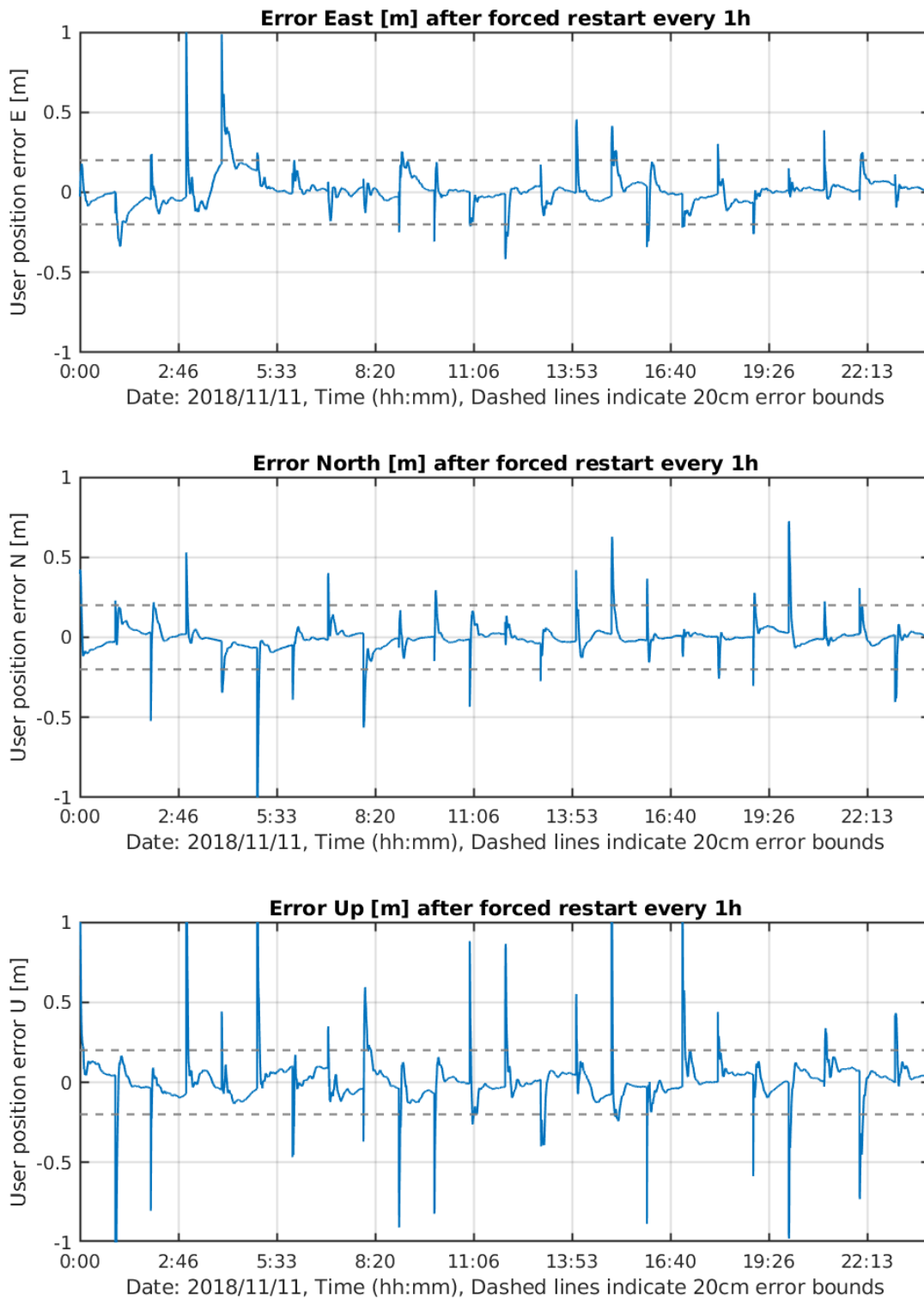


Fig. 3: Station ZIMM, 11.11.2018: 24 hour convergence

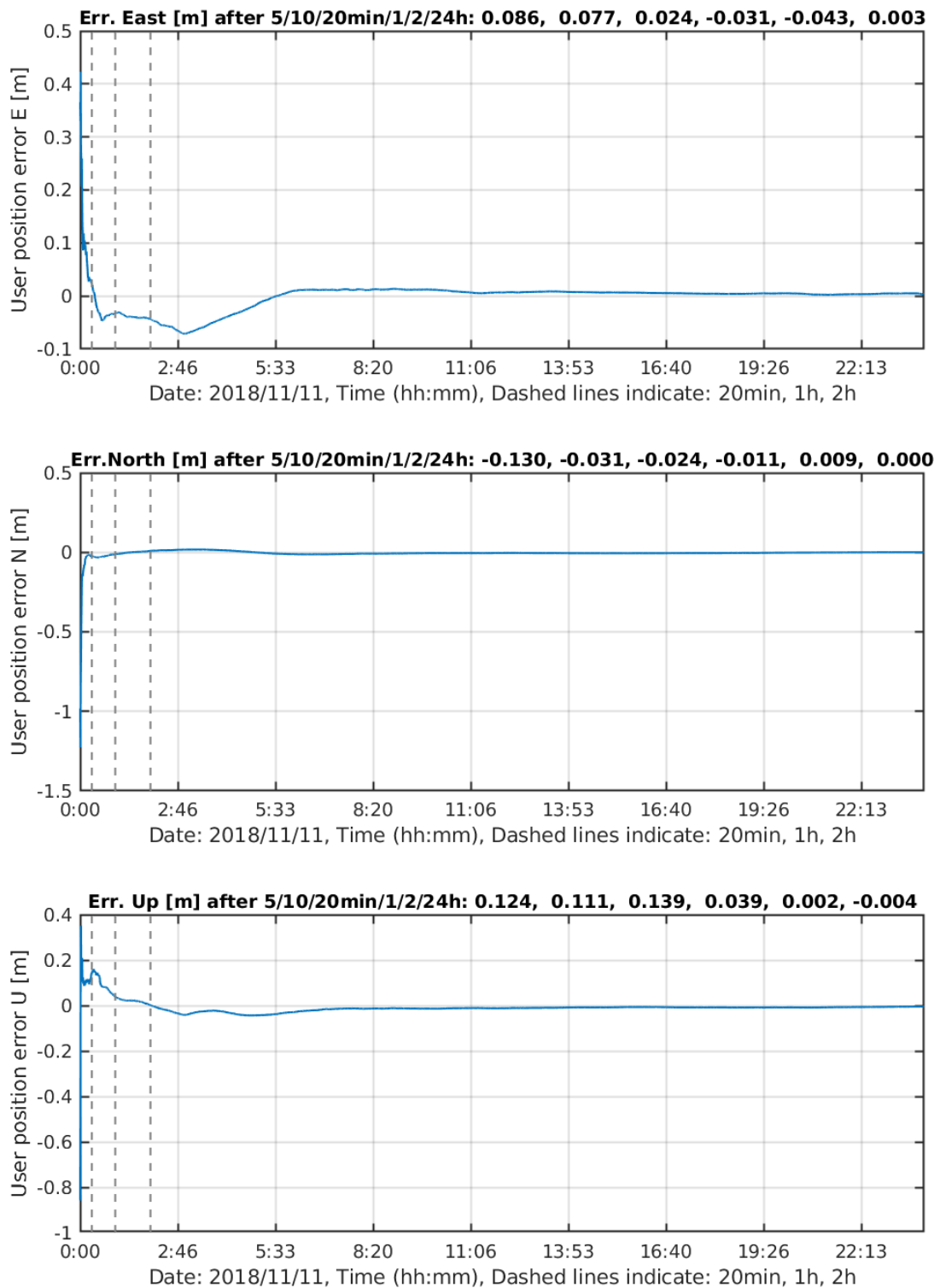


Fig. 4: Station ZIMM, 11.11.2018: Forced hourly restarts to analyze repeatability of perf.

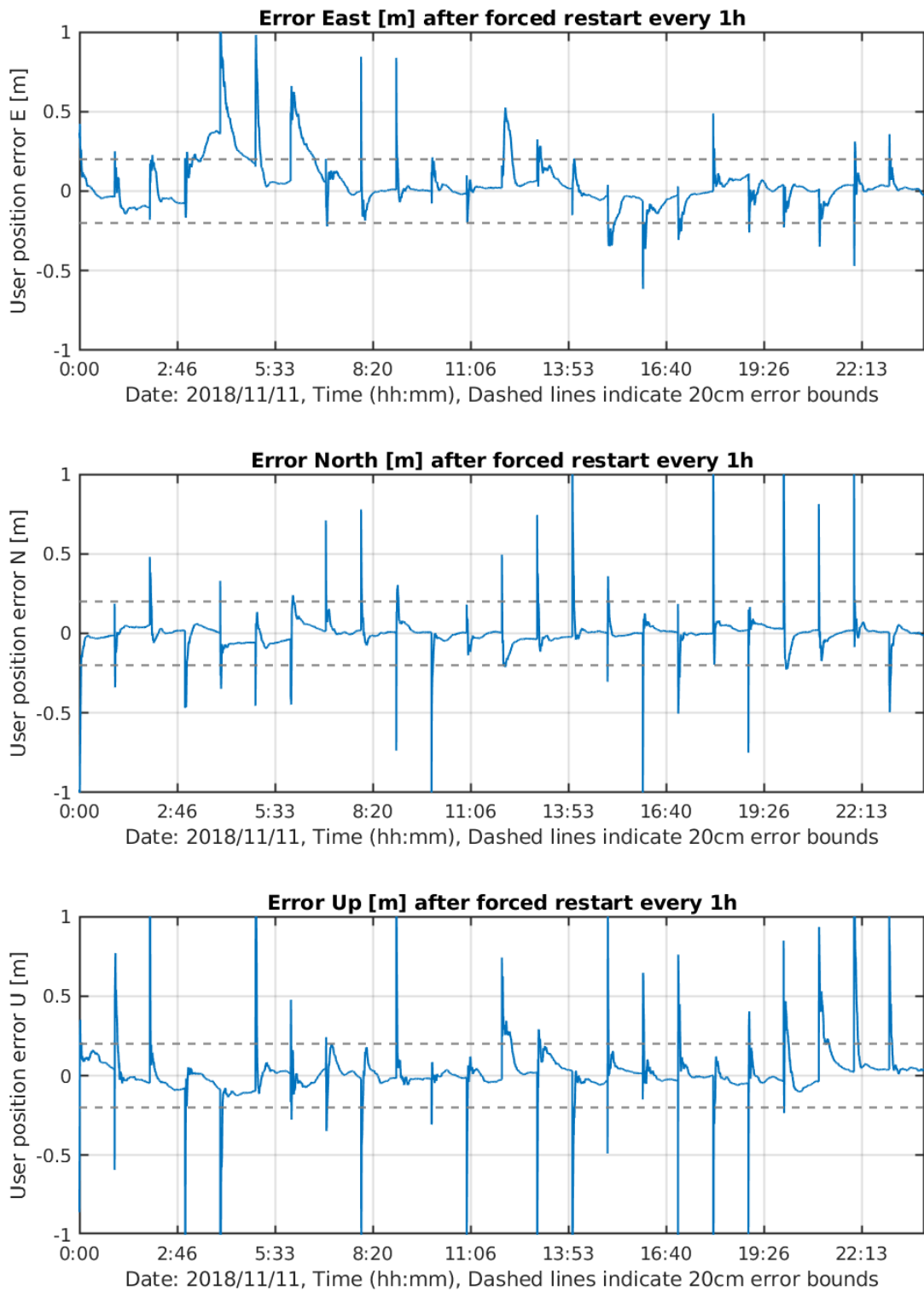


Fig 5: Station HUEG, 11.11.2018: 24 hour convergence

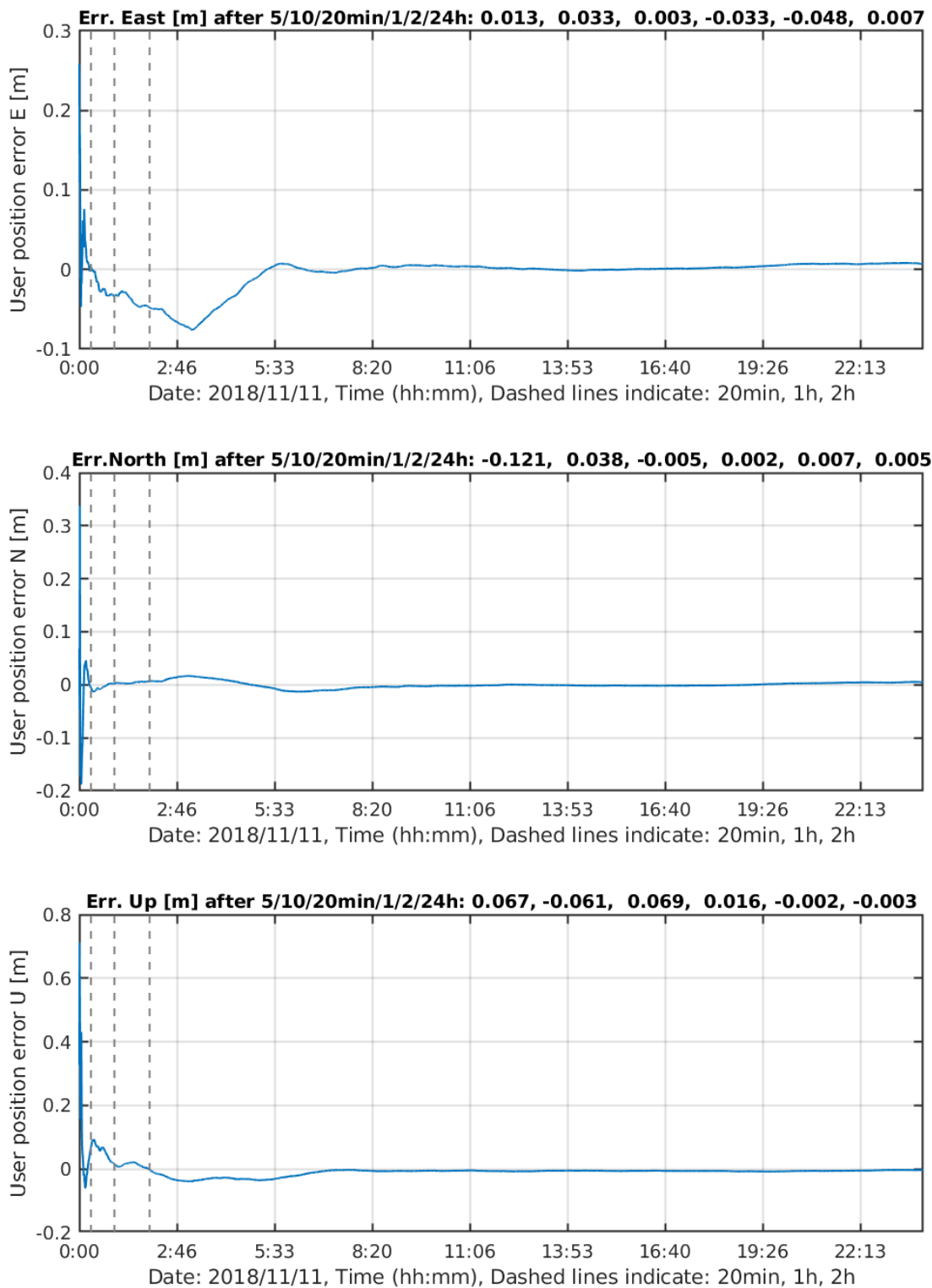


Fig. 6: Station HUEG, 11.11.2018: Forced hourly restarts to analyze repeatability of perf.

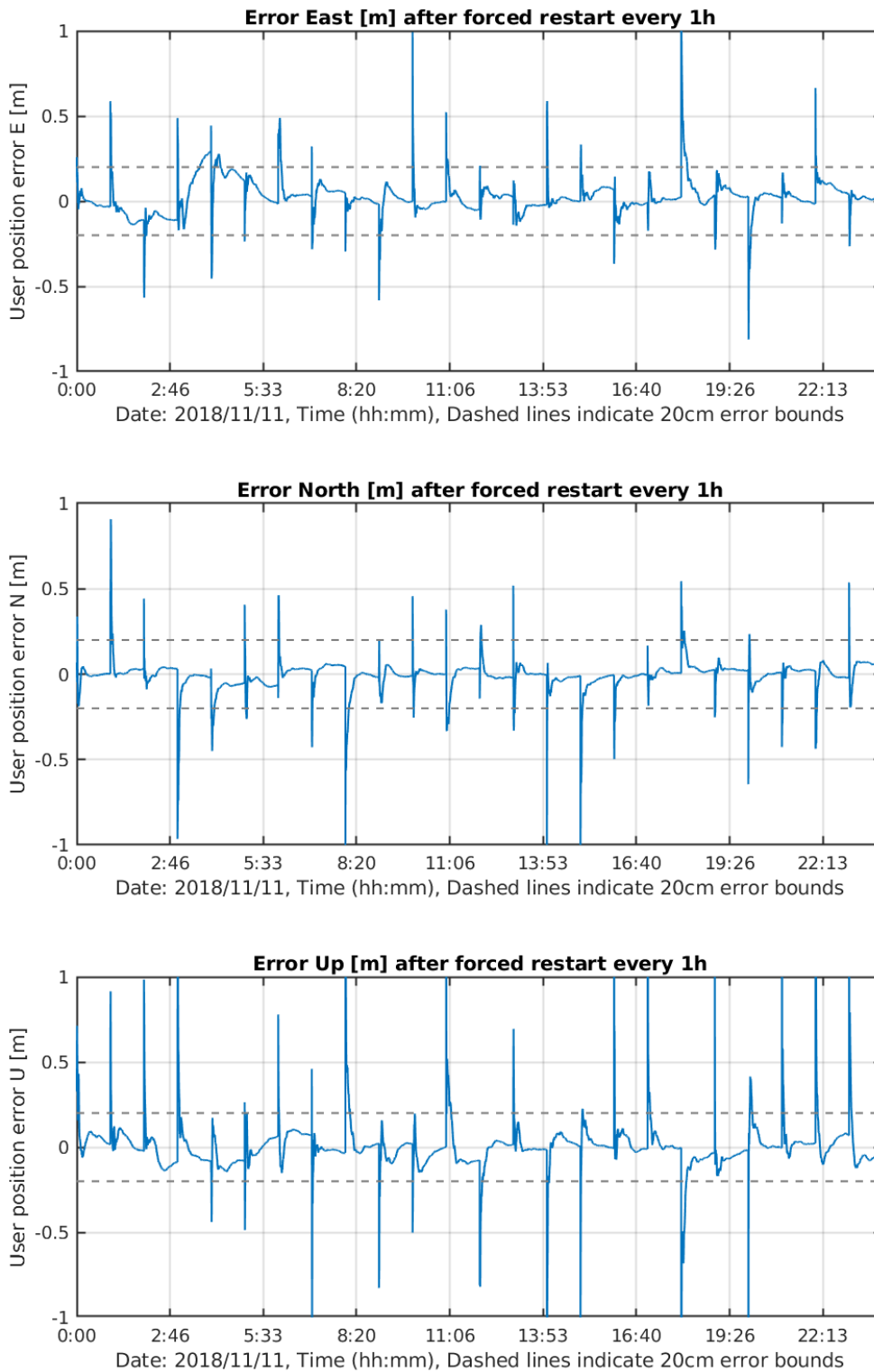


Fig. 7: Station POTS, 11.11.2018: 24 hour convergence

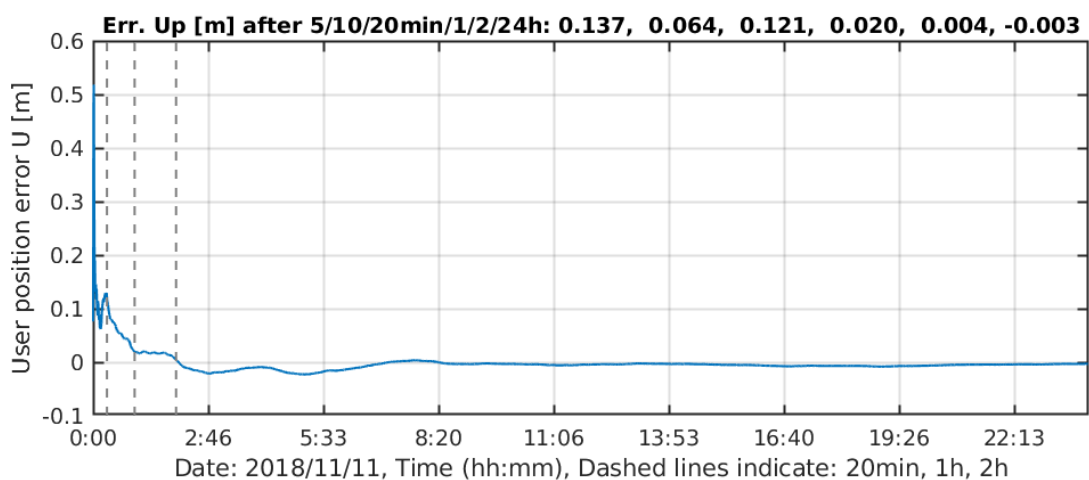
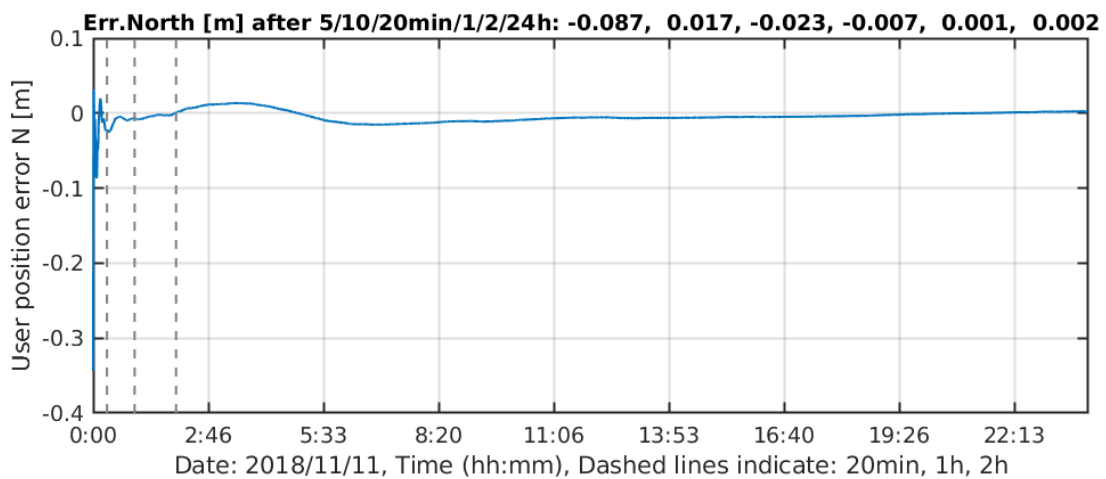
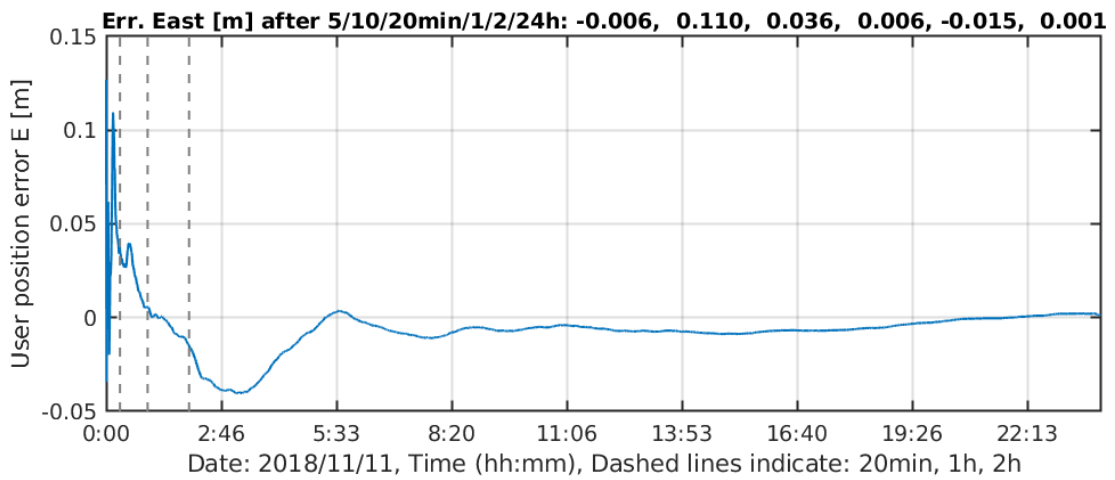


Fig. 8: Station POTS, 11.11.2018: Forced hourly restarts to analyze repeatability of perf.

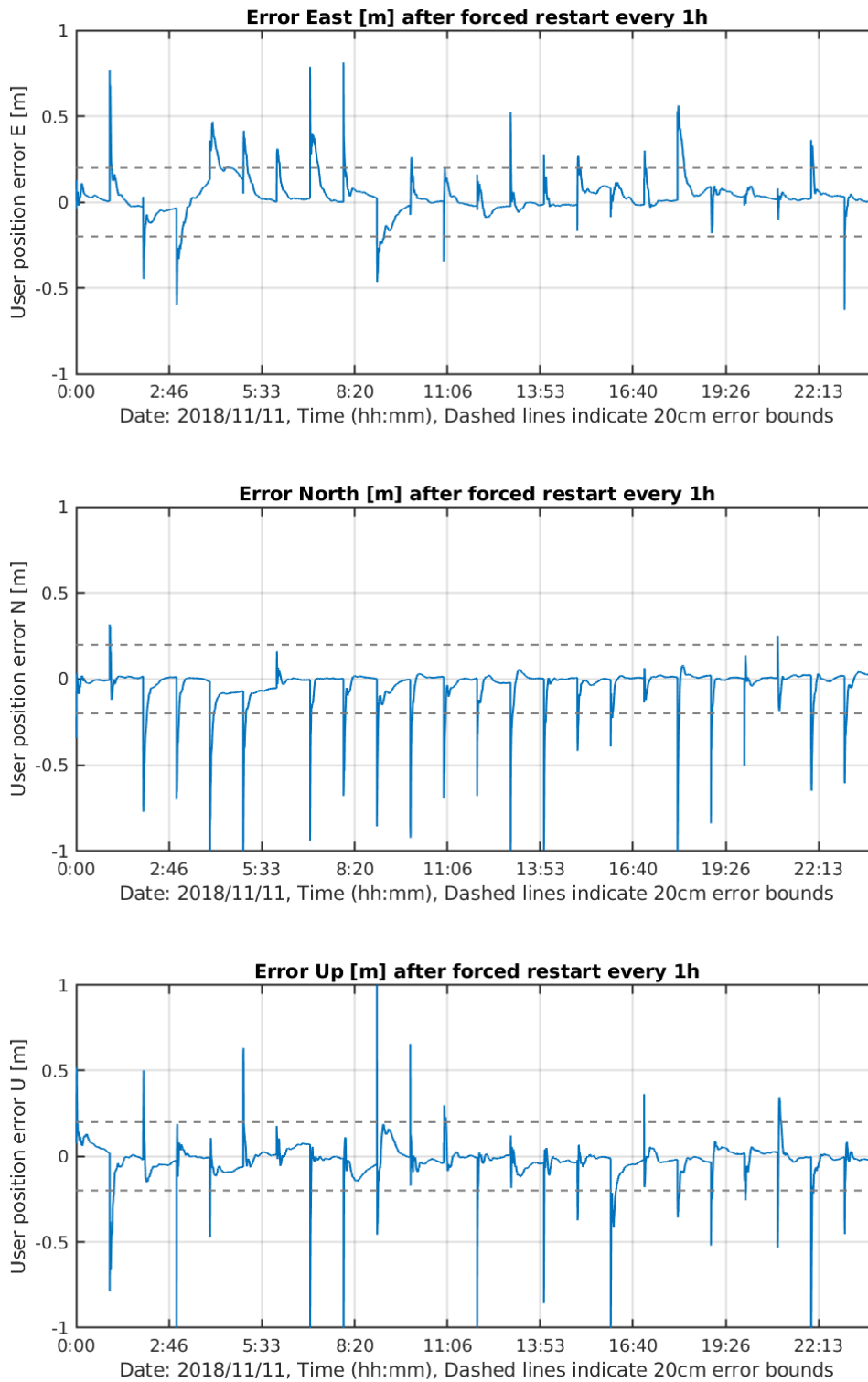


Fig. 9: Station WARN, 11.11.2018: 24 hour convergence

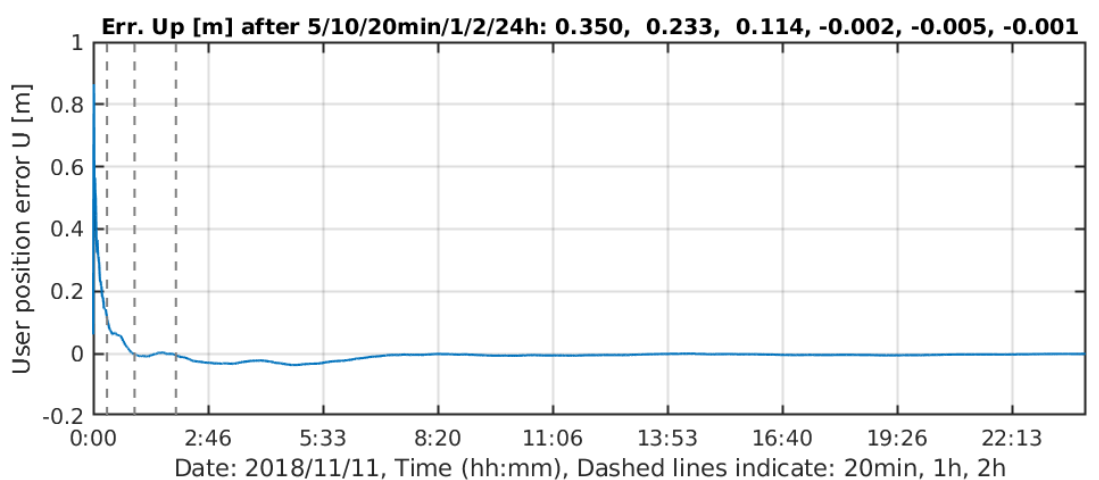
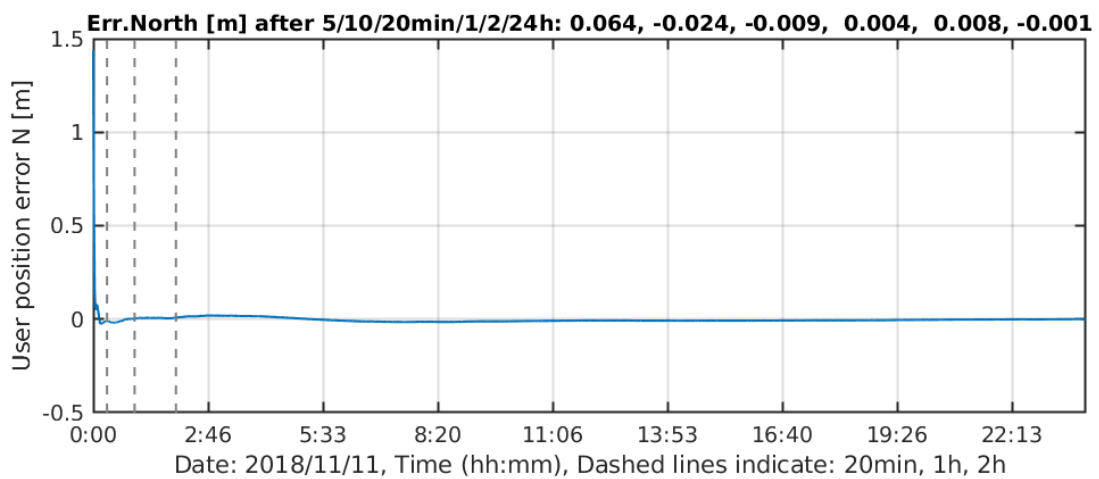
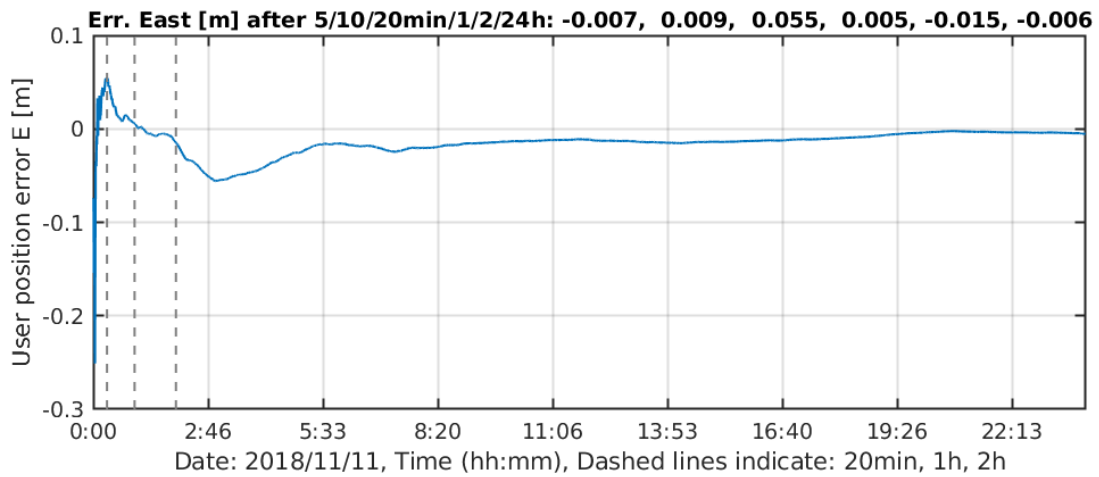


Fig. 10: Station WARN, 11.11.2018: Forced hourly restarts to analyze repeatability of perf.

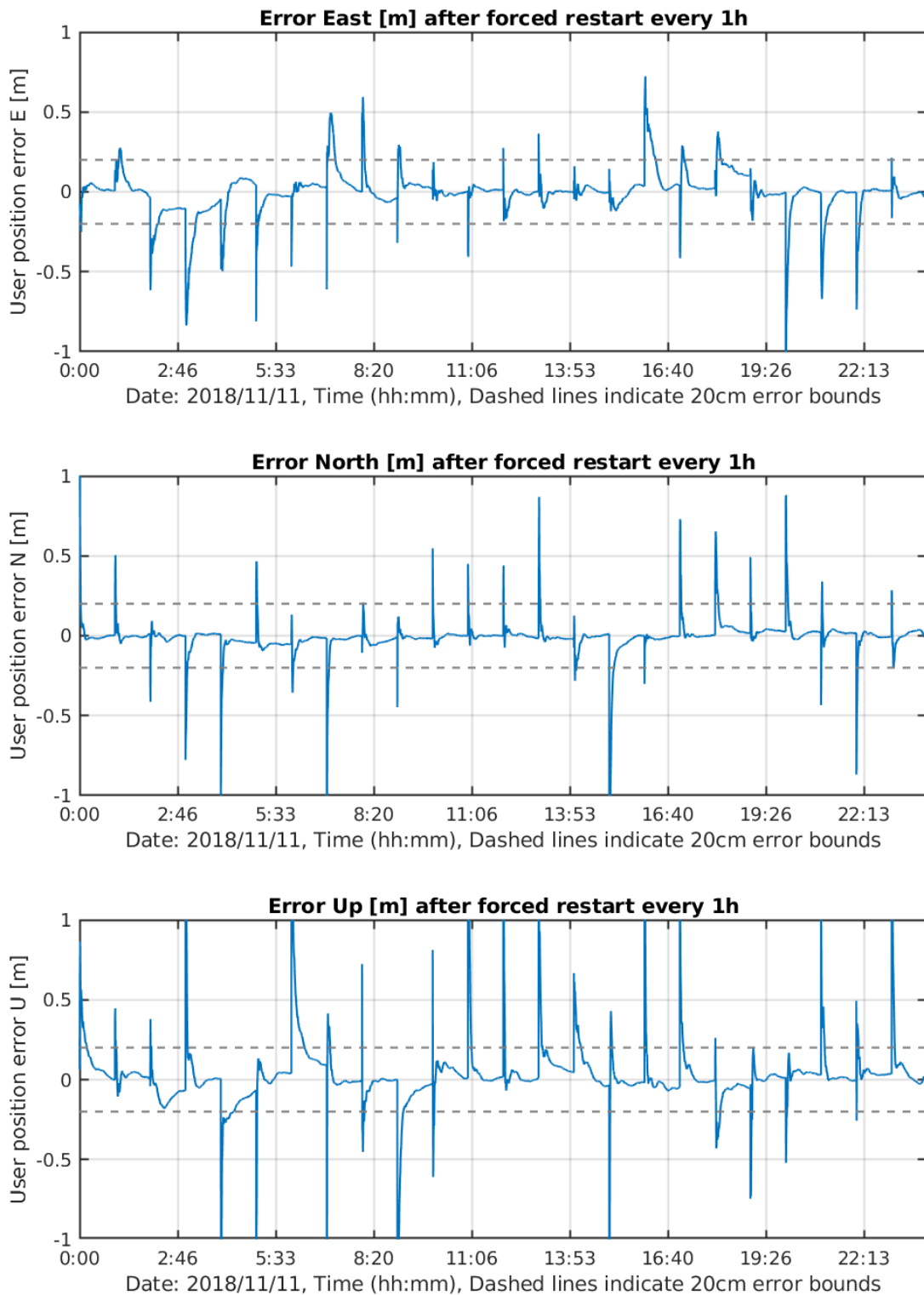


Fig. 11: Station FFMJ, 11.11.2018: 24 hour convergence

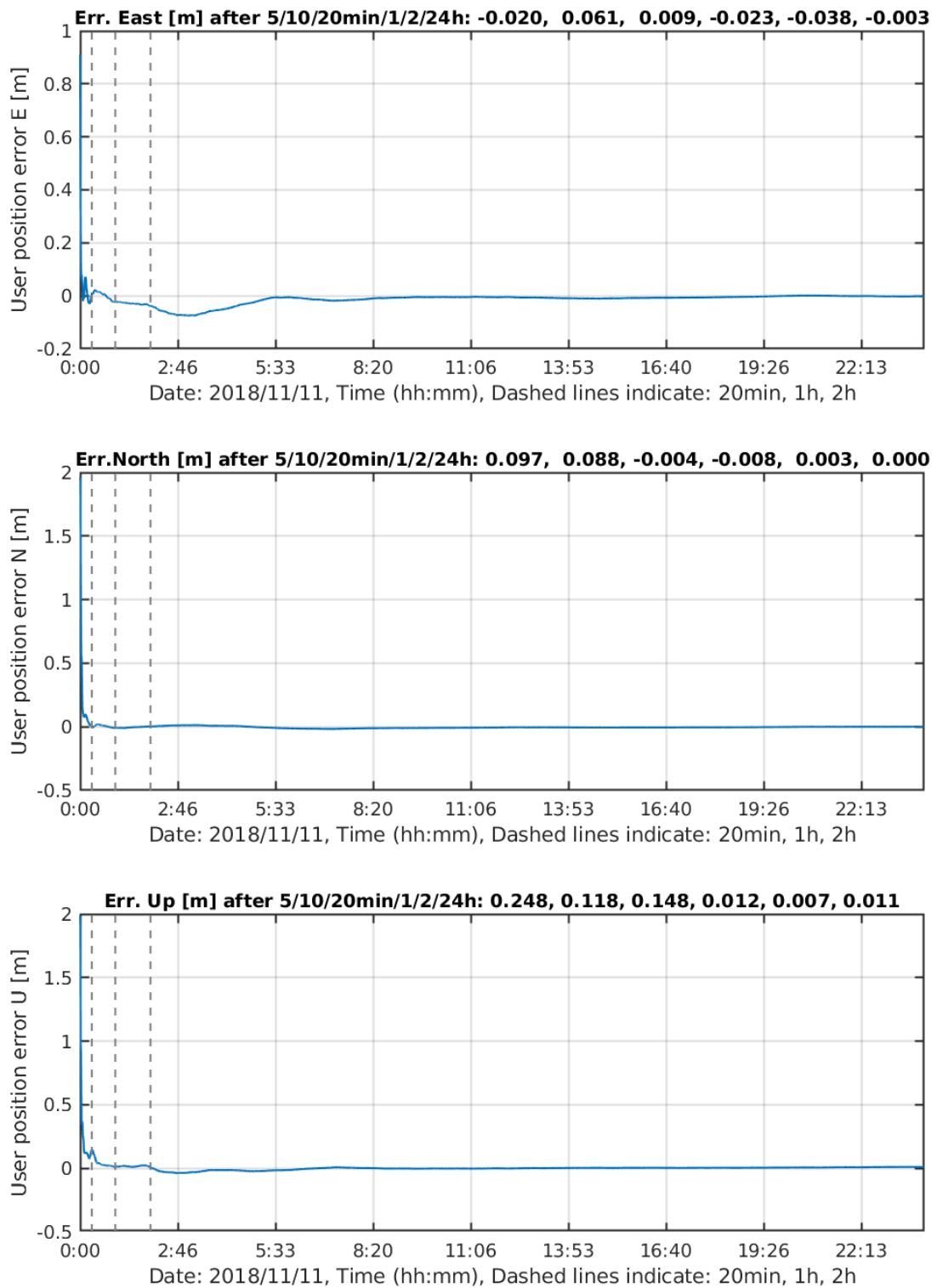


Fig. 12: Station FFMJ, 11.11.2018: Forced hourly restarts to analyze repeatability of perf.

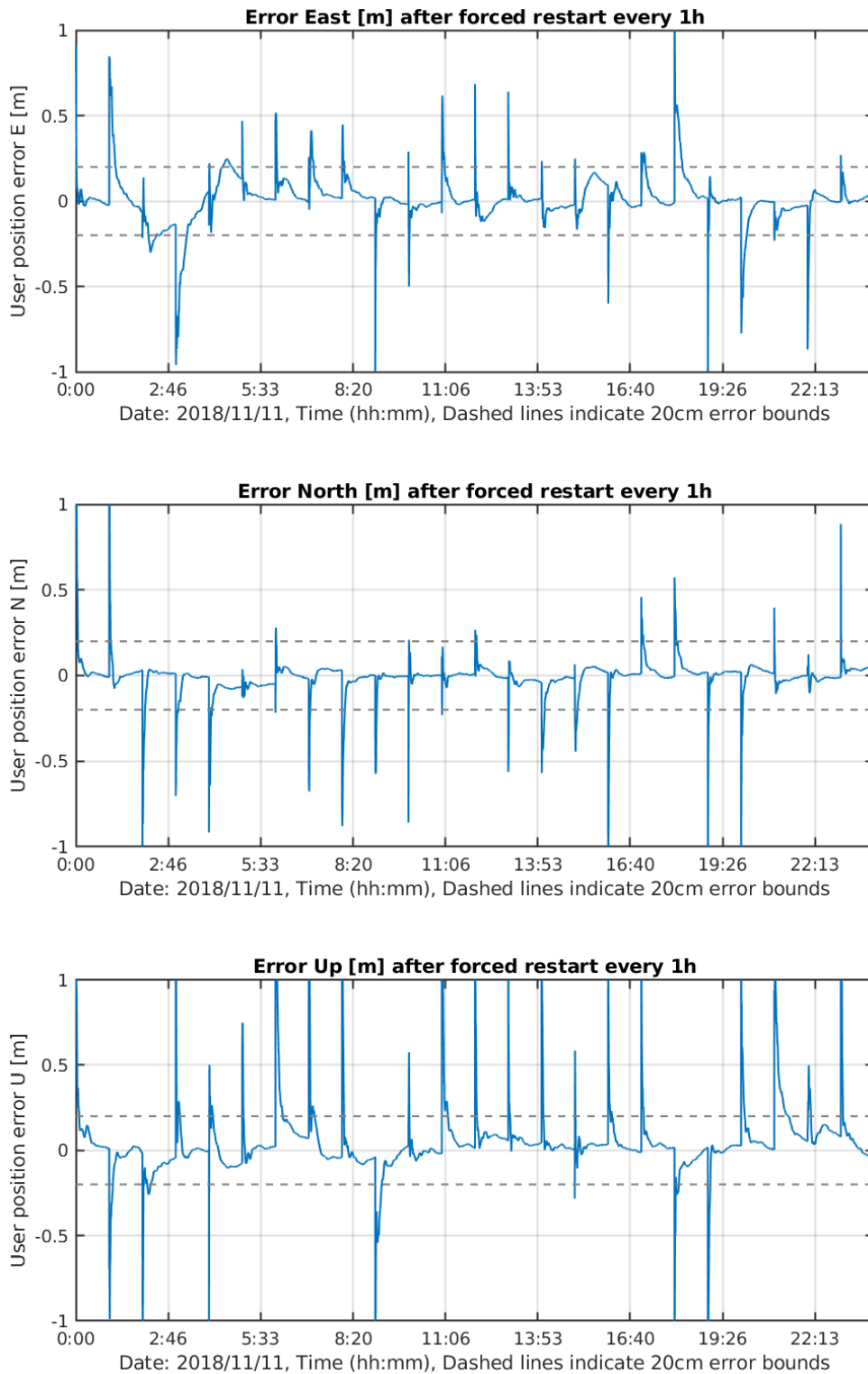


Fig. 13: Station GRAZ, 11.11.2018: 24 hour convergence

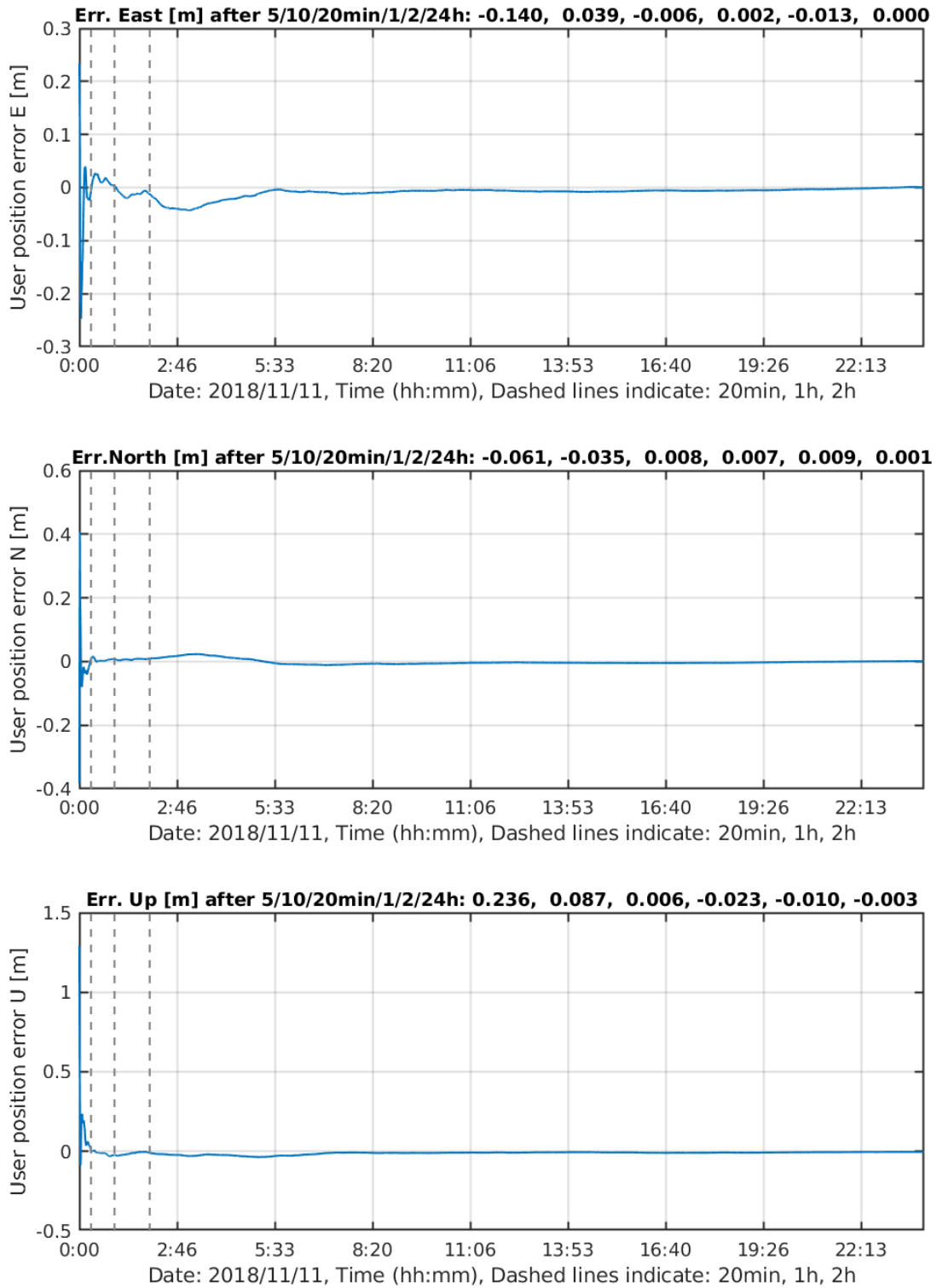


Fig. 14: Station GRAZ, 11.11.2018: Forced hourly restarts to analyze repeatability of perf.

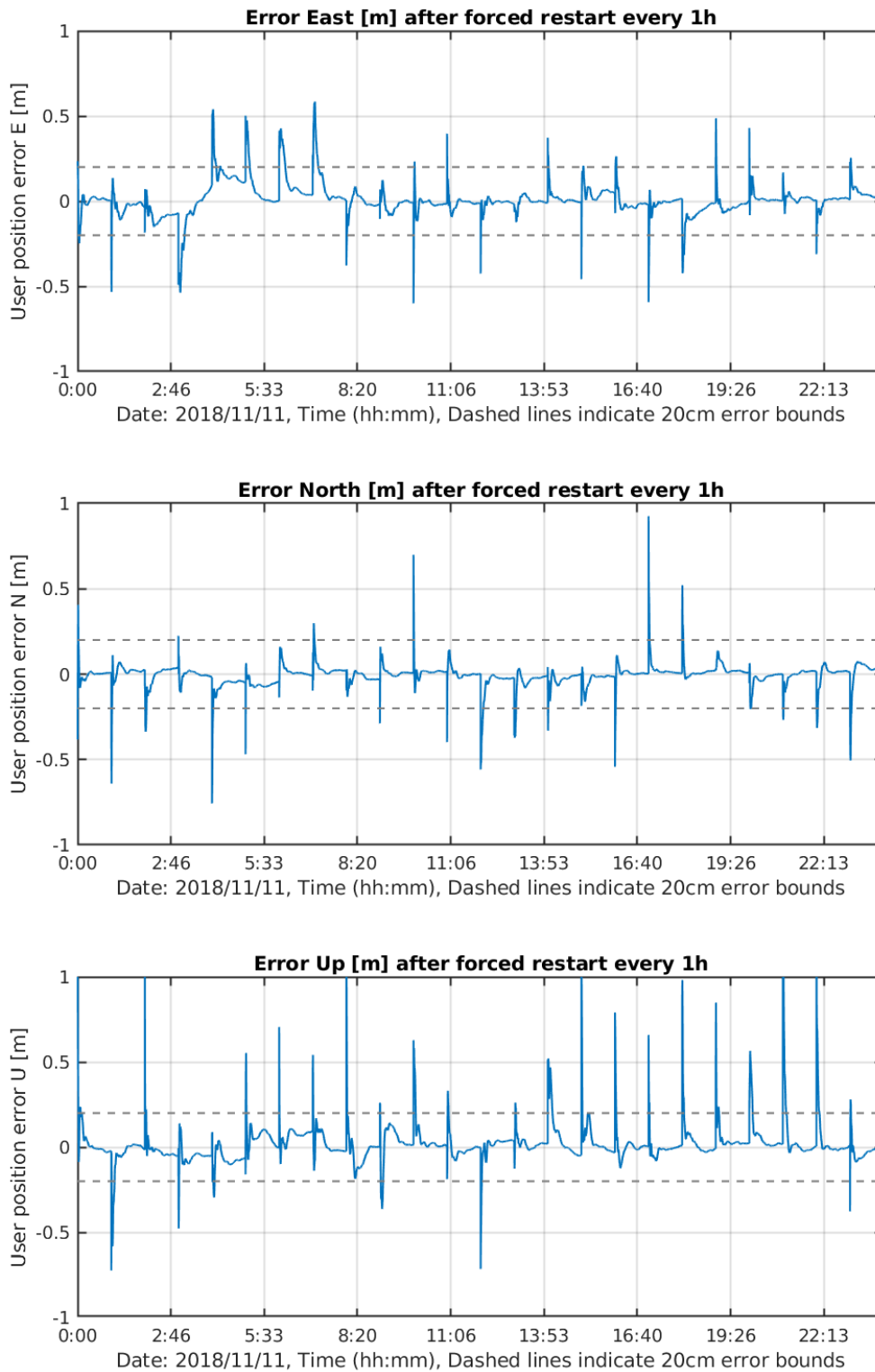


Fig. 15: Station JOZE, 11.11.2018: 24 hour convergence

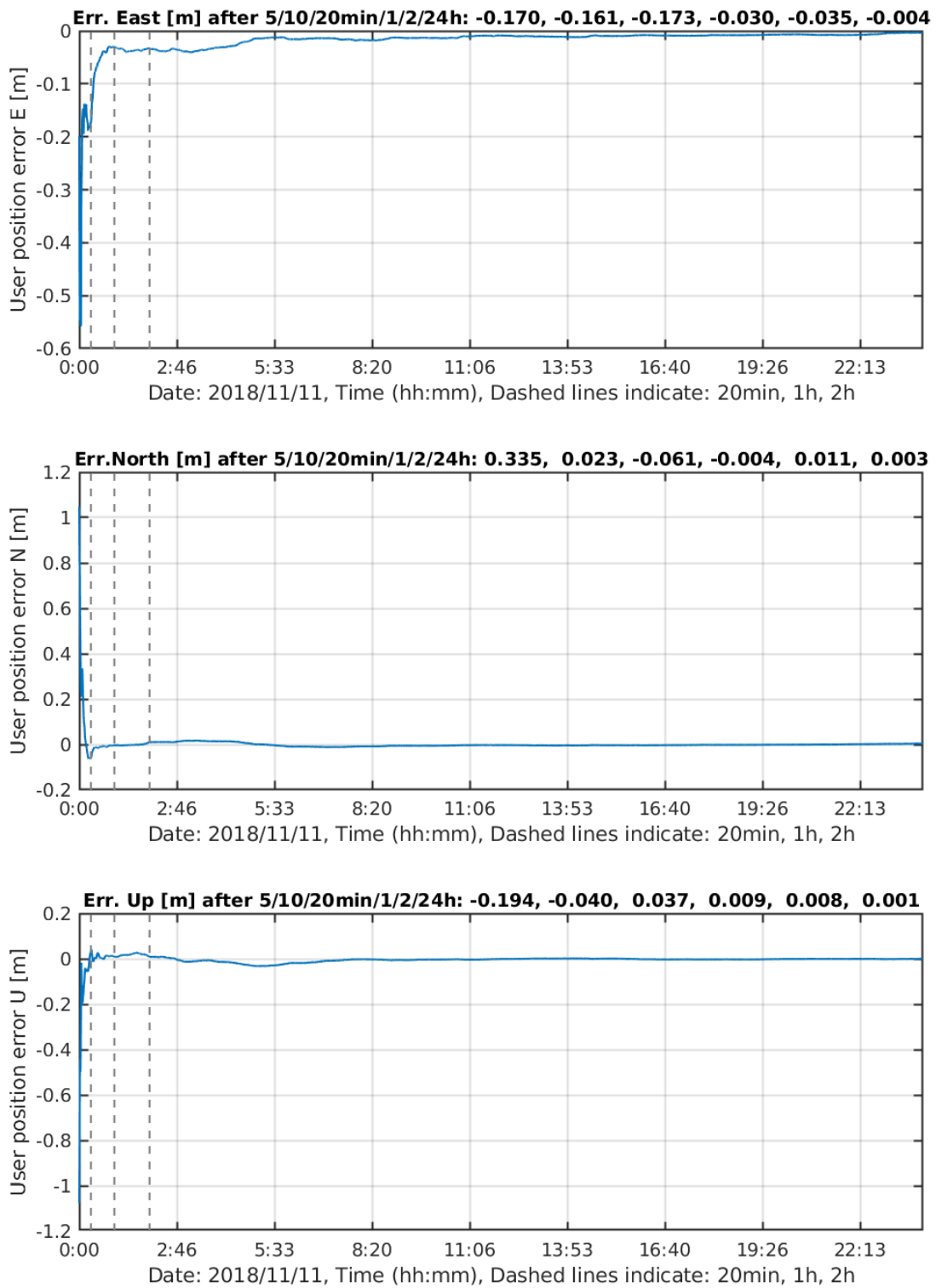


Fig. 16: Station JOZE, 11.11.201: Forced hourly restarts to analyze repeatability of perf.

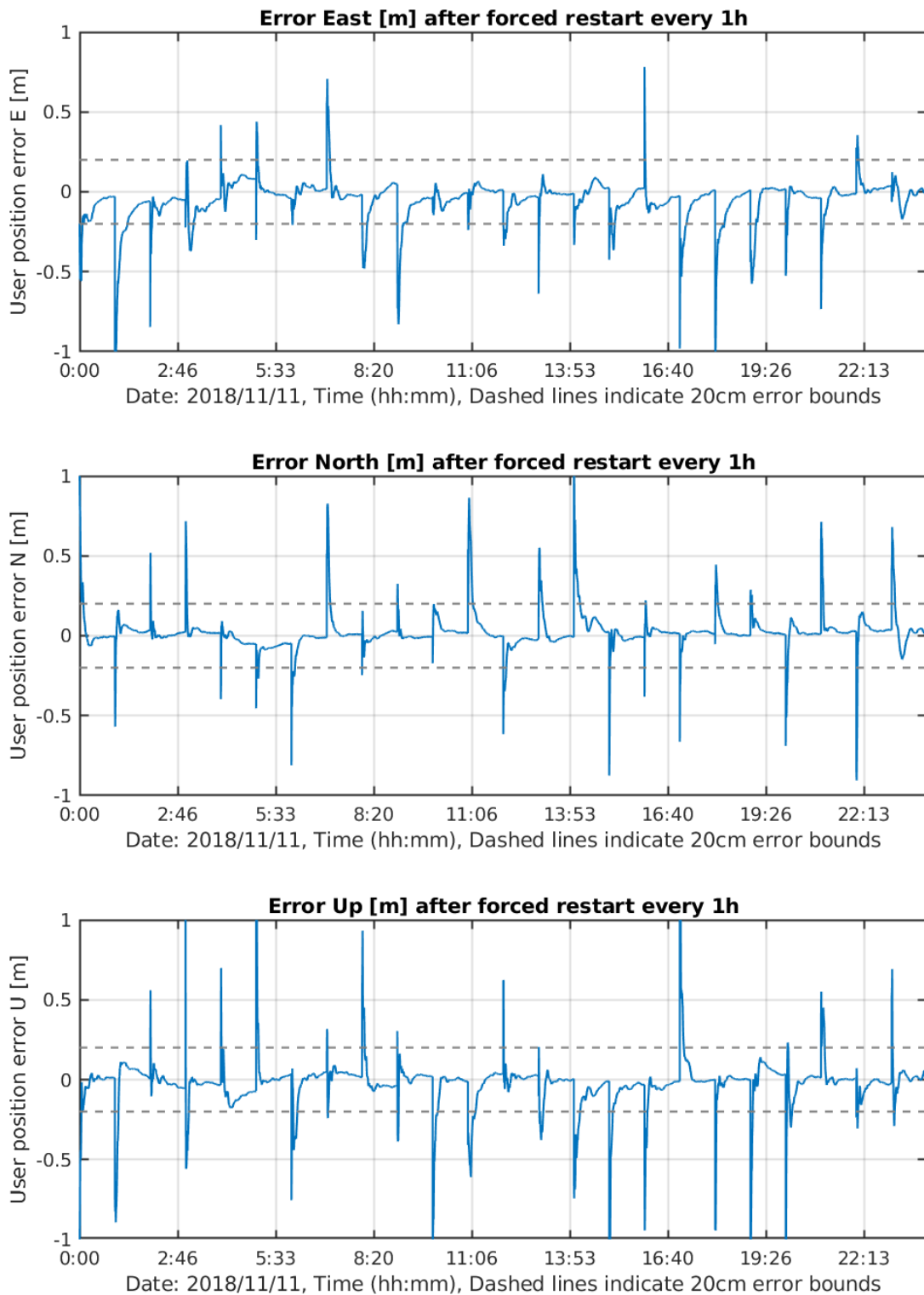


Fig. 17: Station LEIJ, 11.11.2018: 24 hour convergence

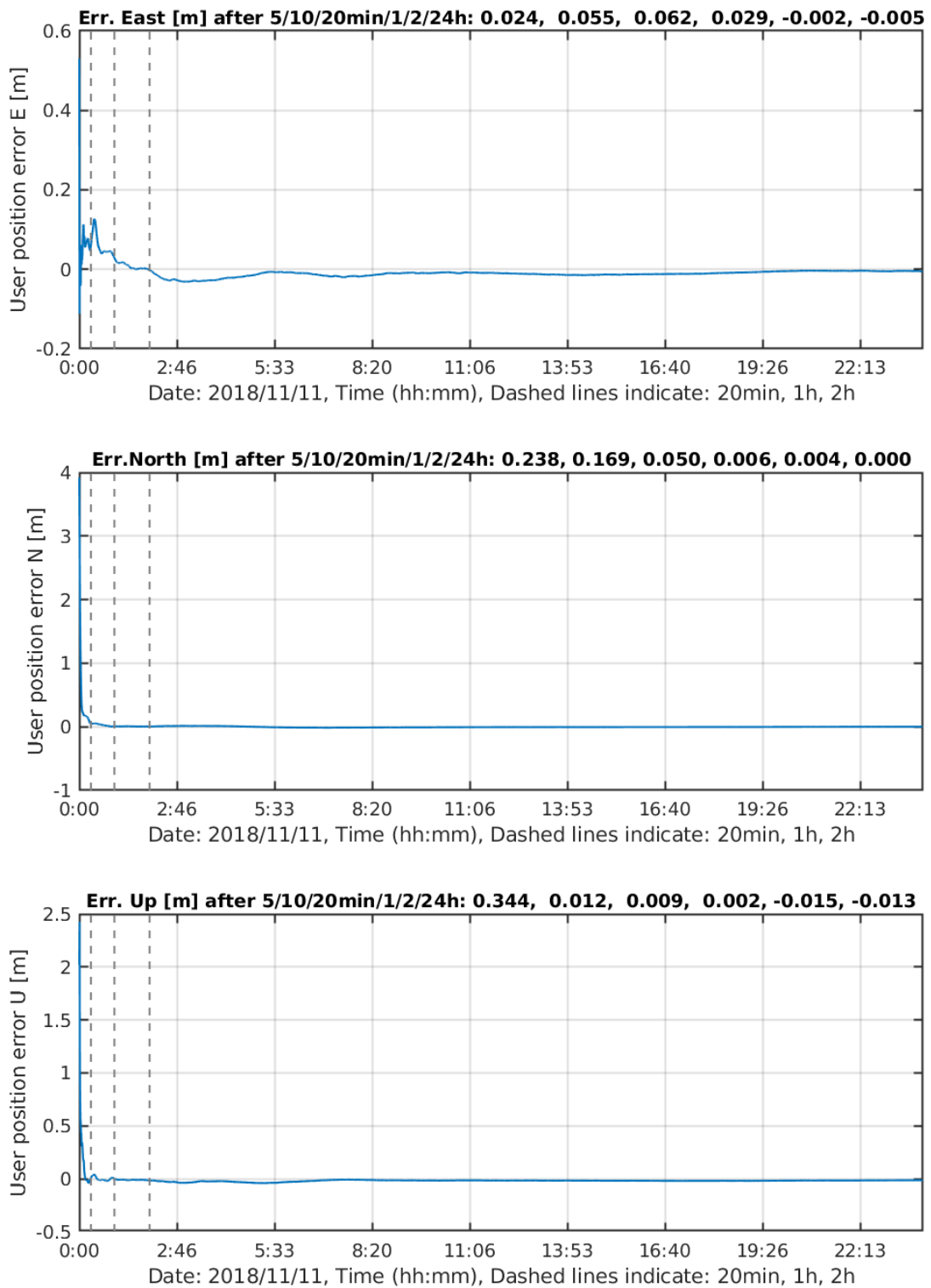


Fig. 18: Station LEIJ, 11.11.2018: Forced hourly restarts to analyze repeatability of perf.

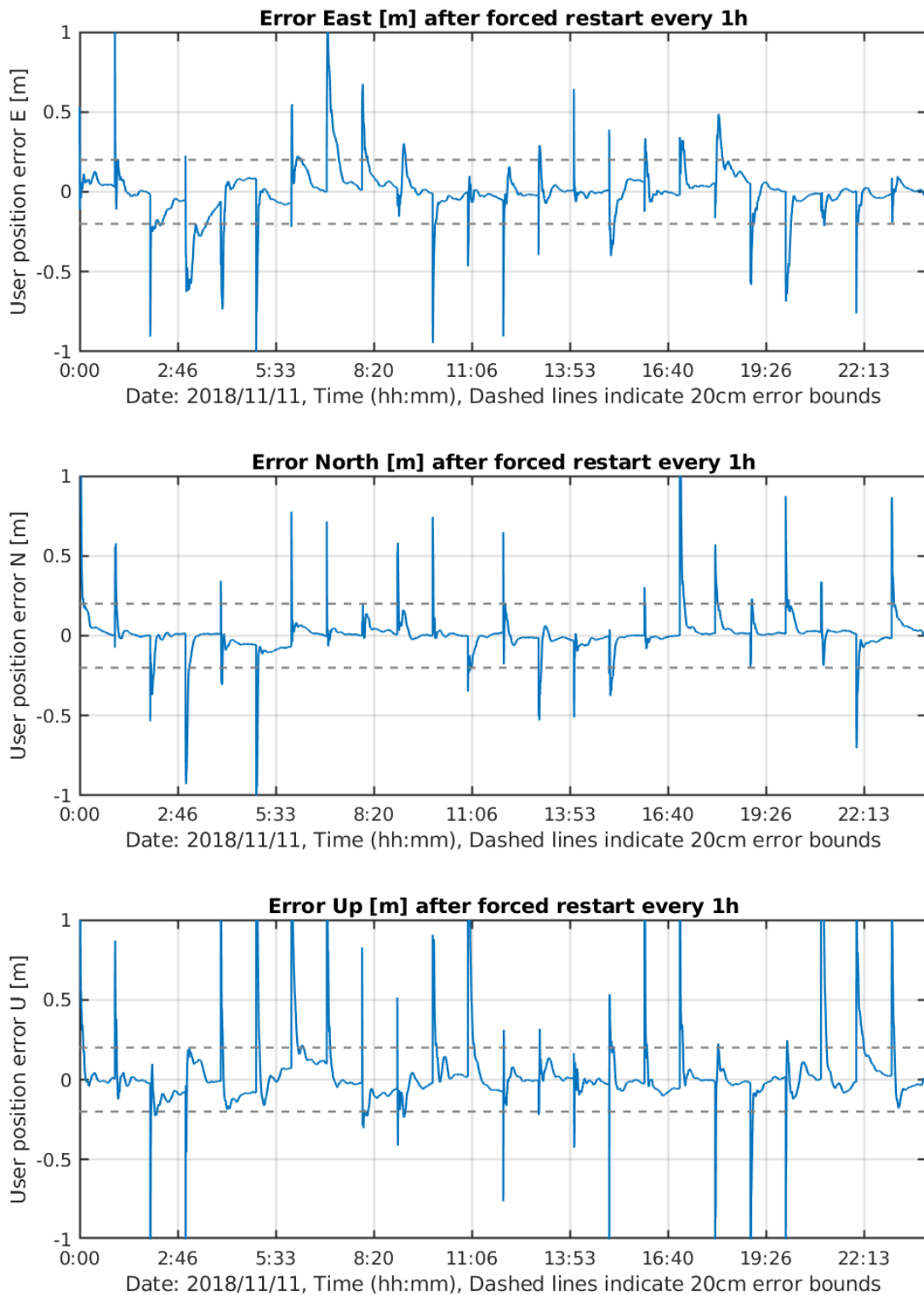


Fig. 19: Station TLSE, 11.11.2018: 24 hour convergence

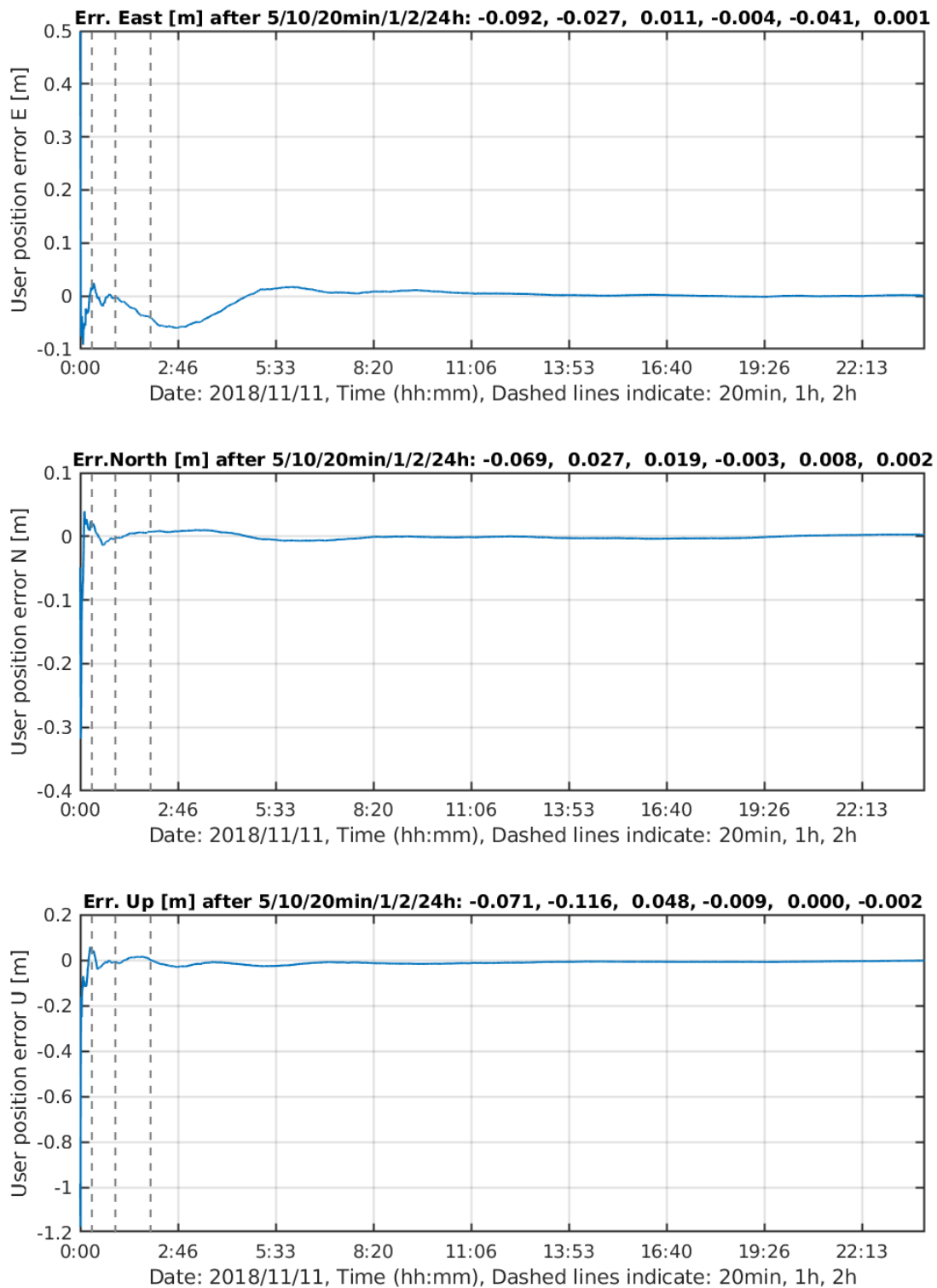


Fig. 20: Station TLSE, 11.11.2018: Forced hourly restarts to analyze repeatability of perf.

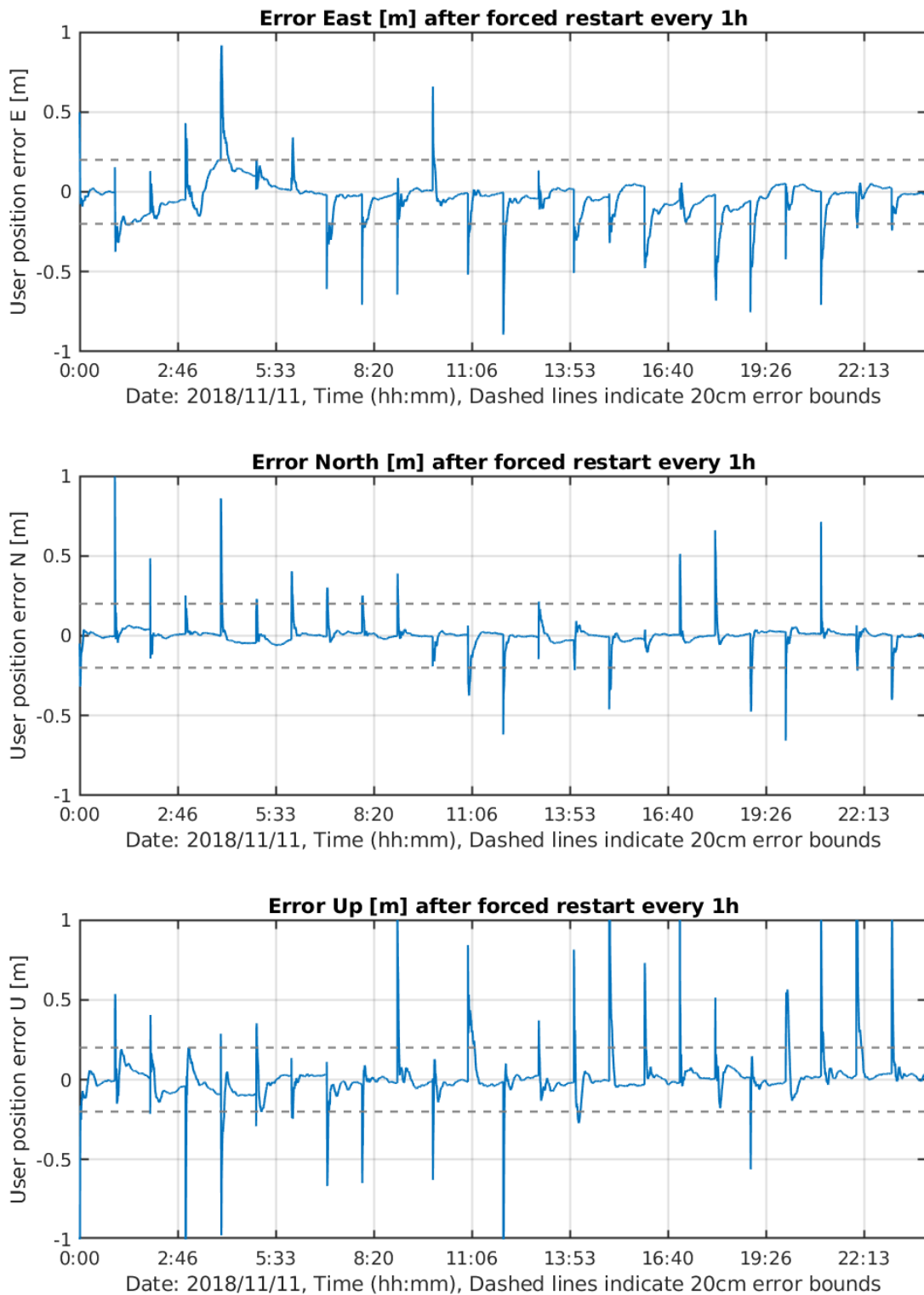


Fig. 21: Station WAB2, 11.11.2018: 24 hour convergence

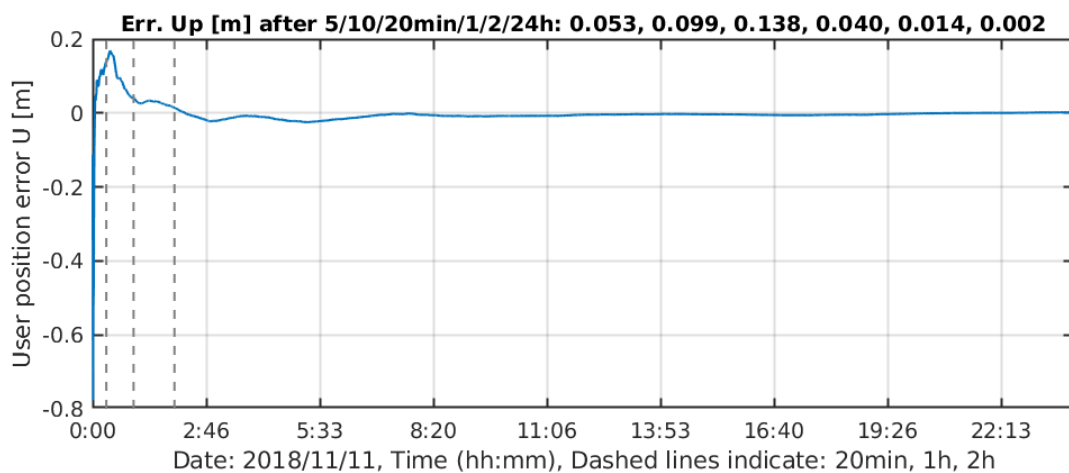
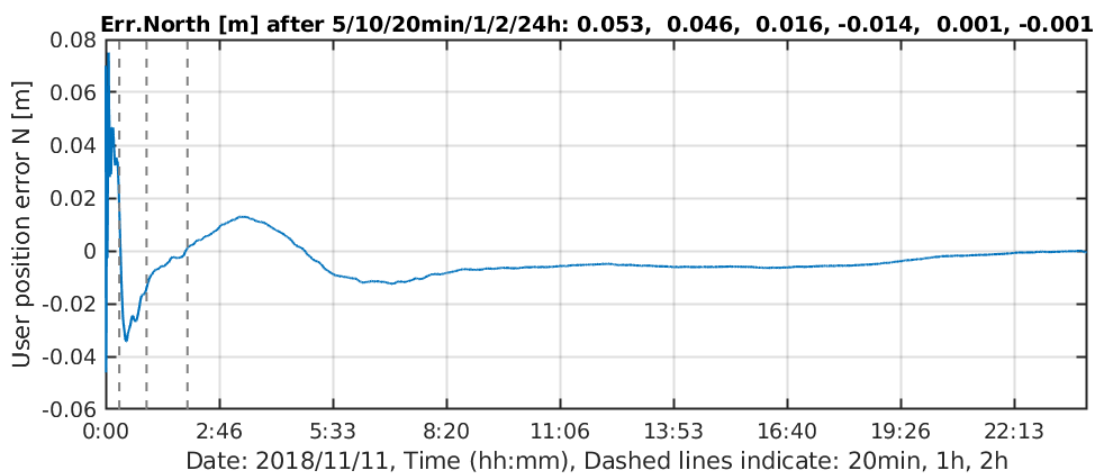
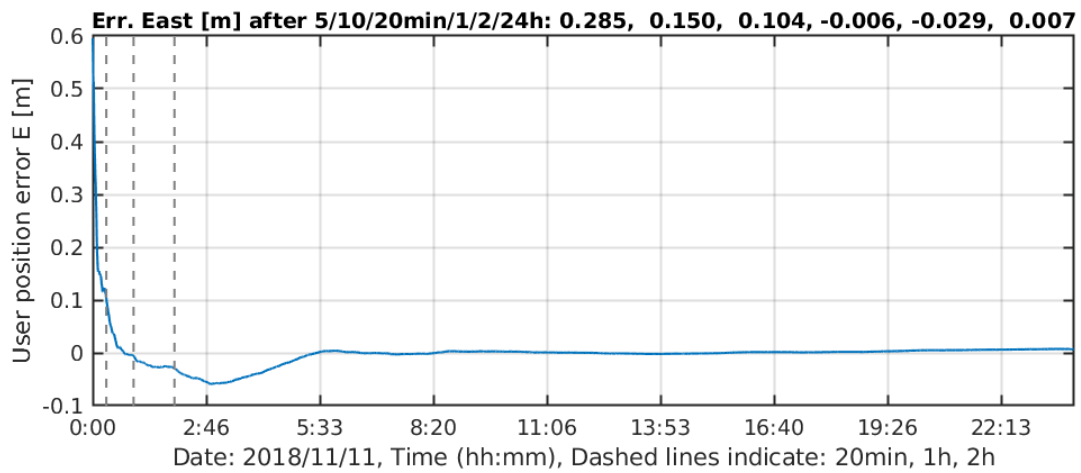


Fig. 22: Station WAB2, 11.11.2018: Forced hourly restarts to analyze repeatability of perf.

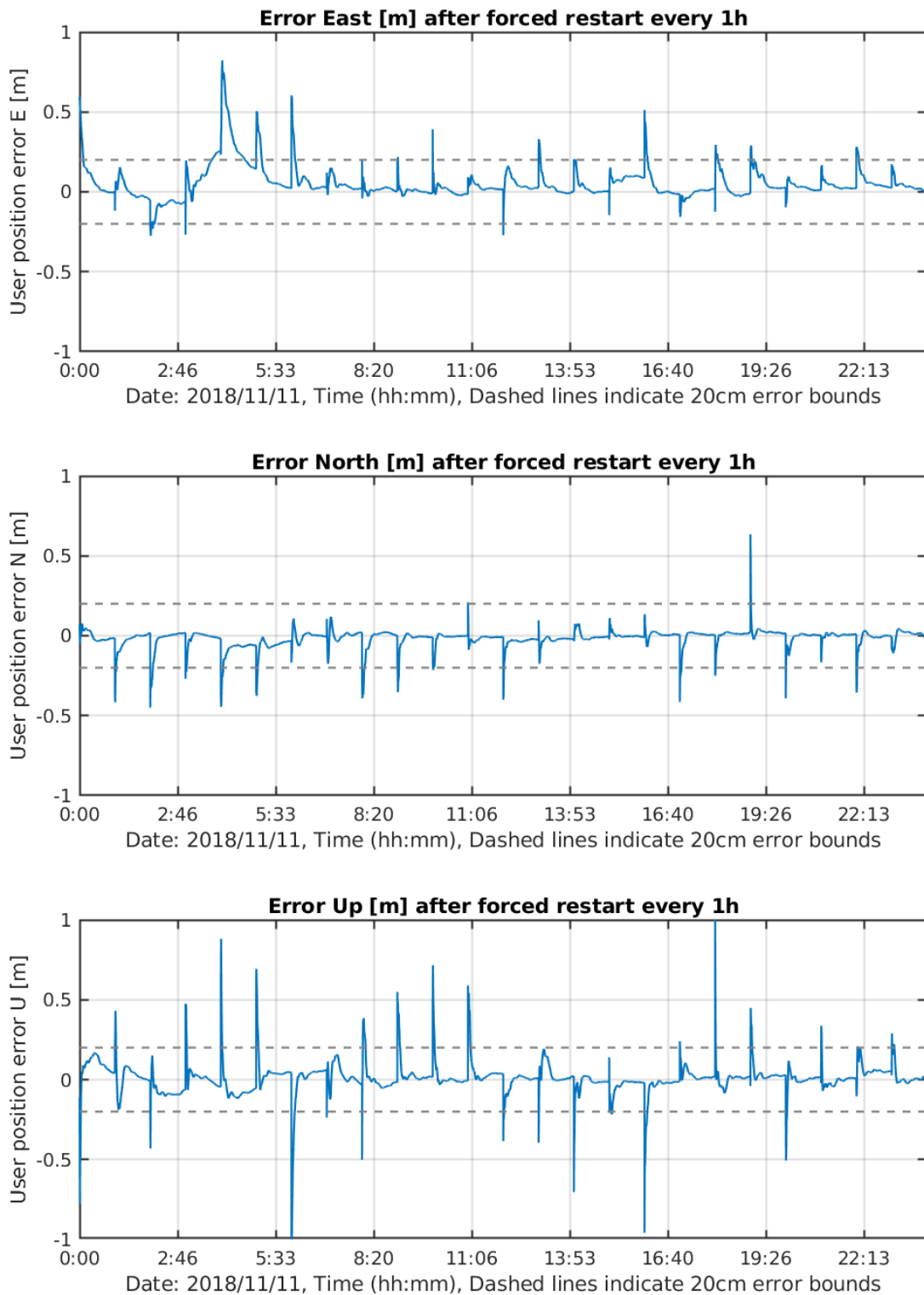


Fig. 23 Station WTZZ, 11.11.2018: 24 hour convergence

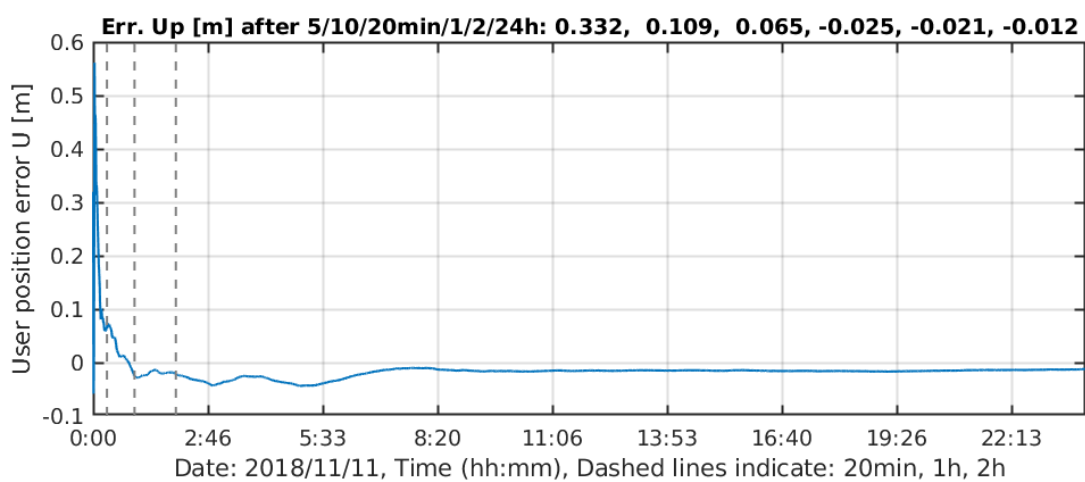
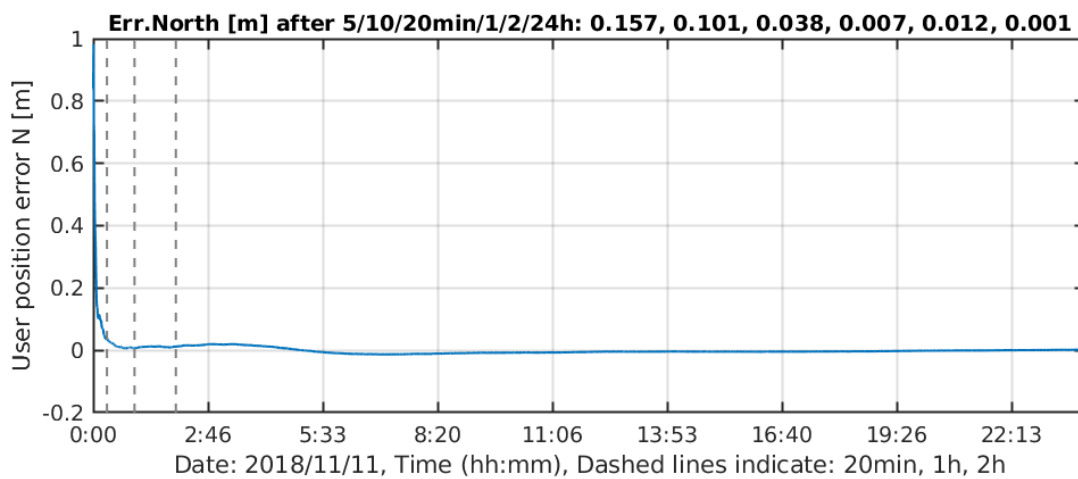
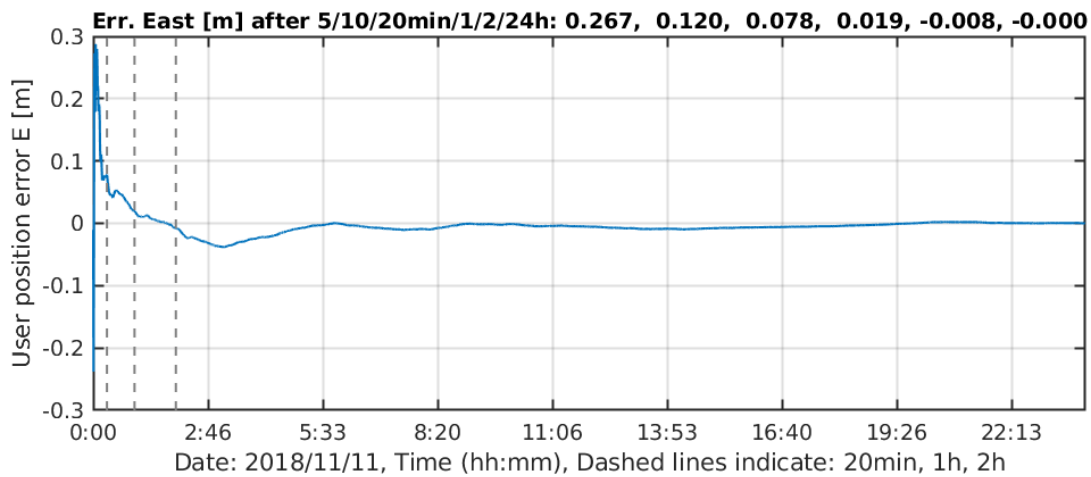


Fig. 24: Station WTZZ, 11.11.2018: Forced hourly restarts to analyze repeatability of perf.

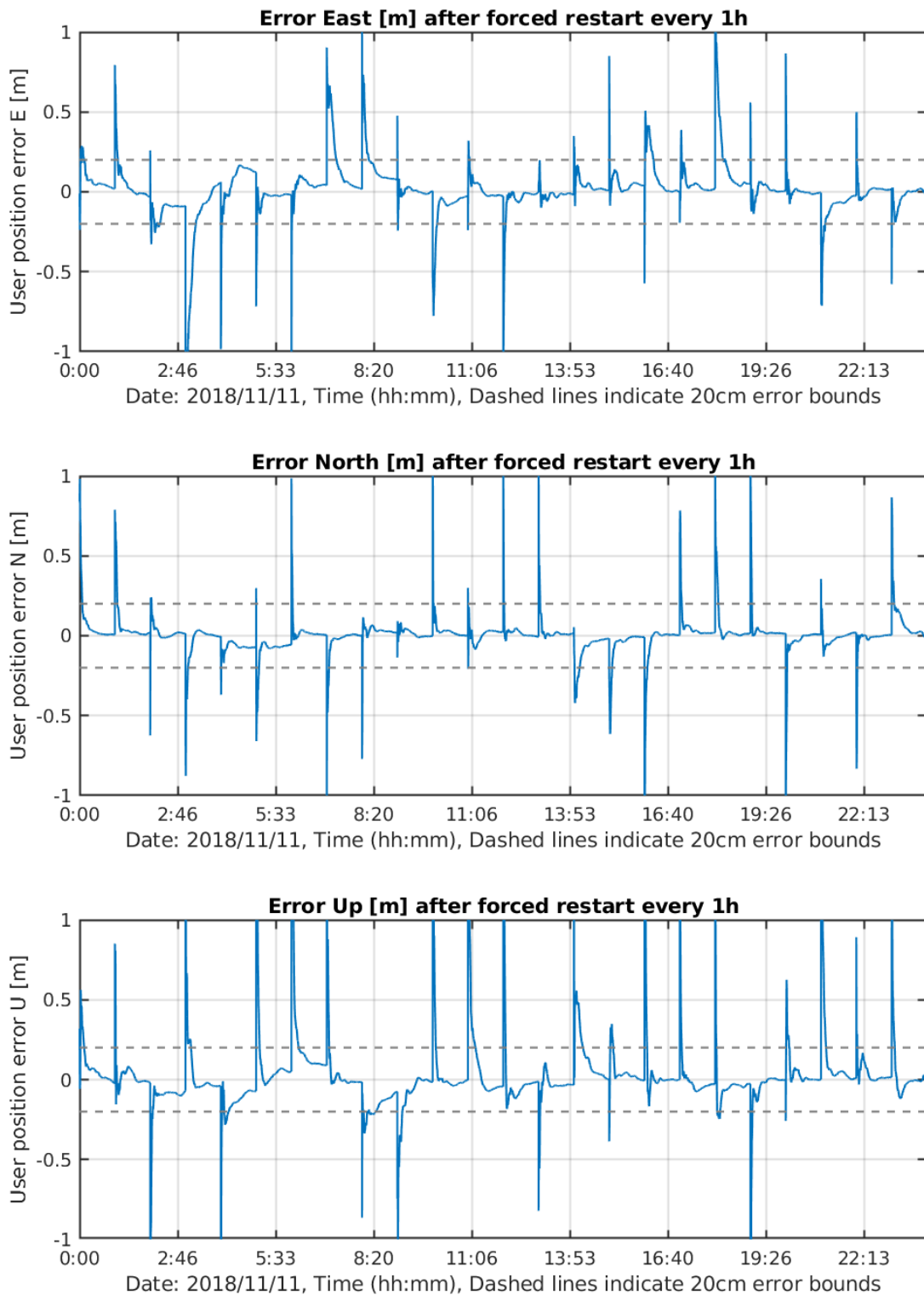


Fig. 25: Statistical Assessment of positioning error in east-direction based on all considered stations and hourly restarts

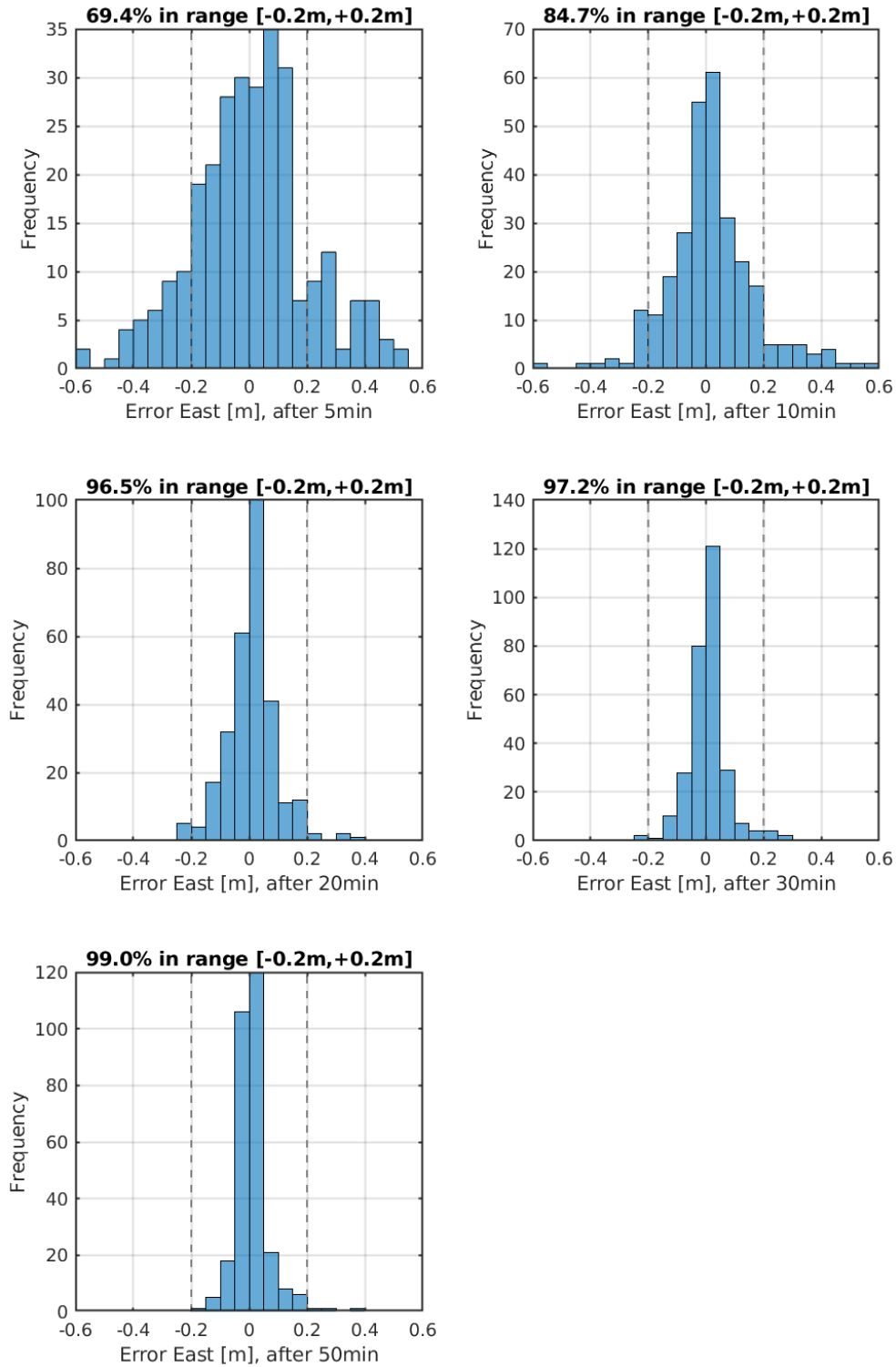


Fig. 26: Statistical Assessment of positioning error in north-direction based on all considered stations and hourly restarts

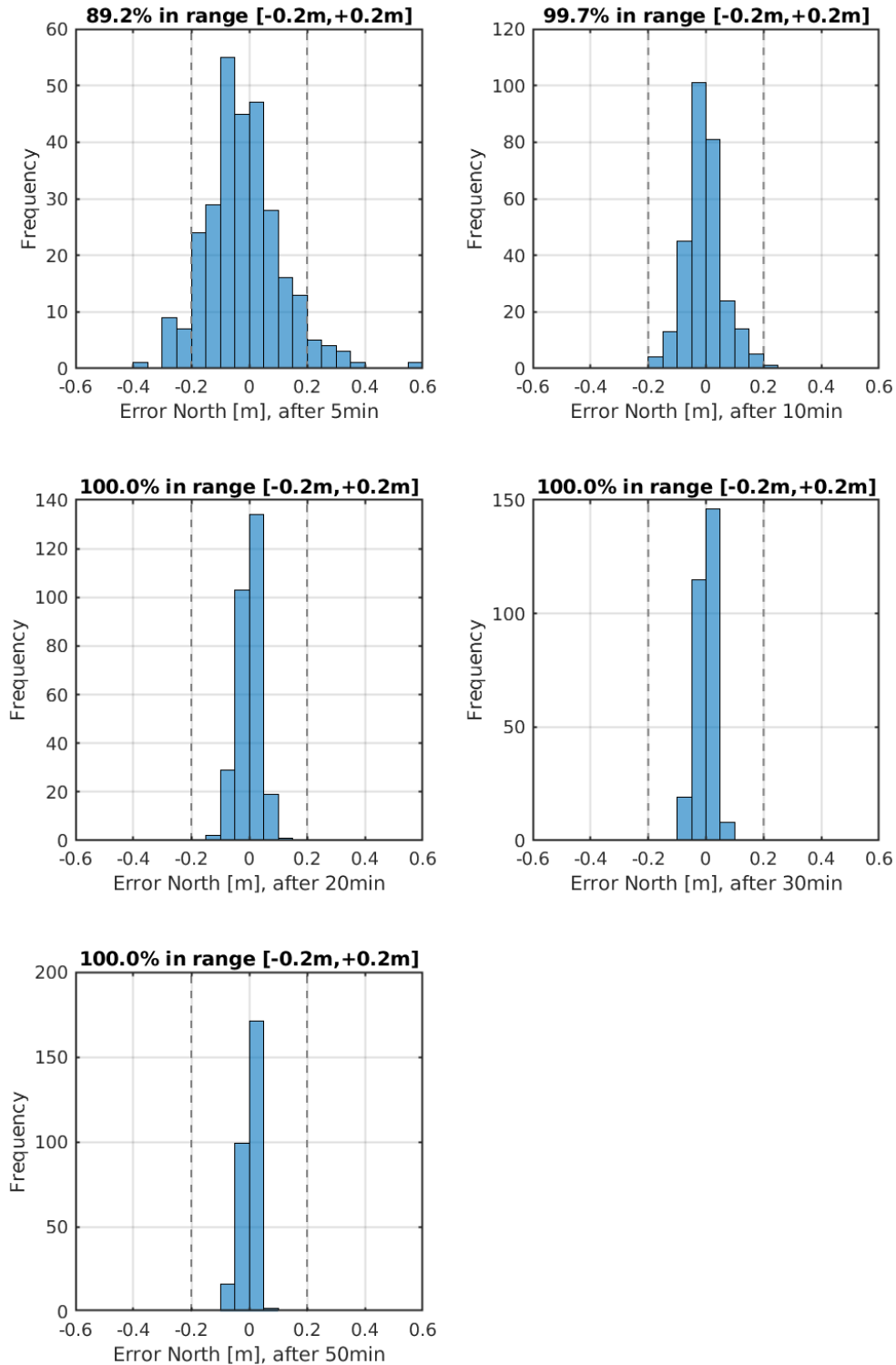
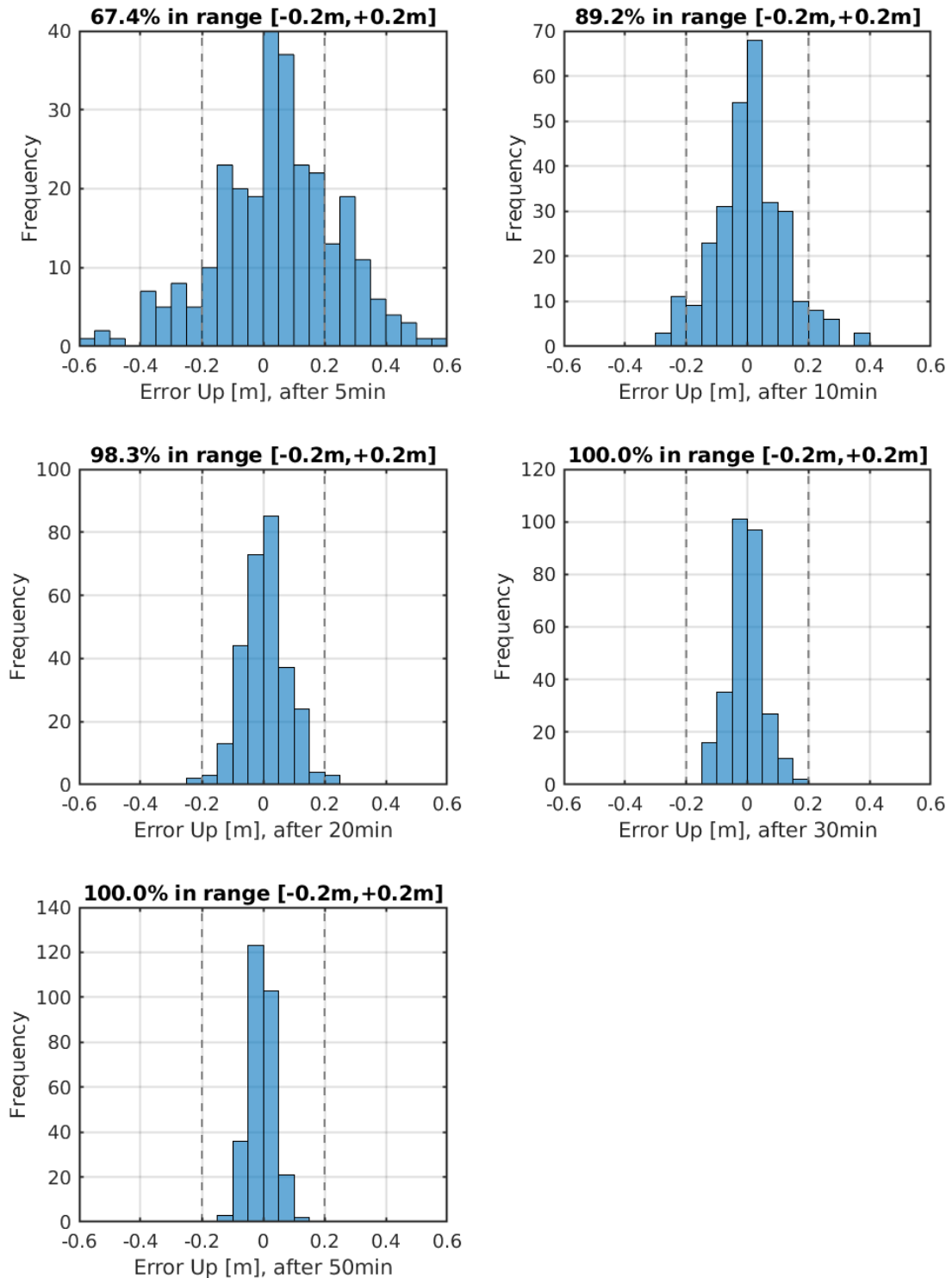


Fig. 27: Statistical Assessment of positioning error in up-direction based on all considered stations and hourly restarts



End of Document