

Report of the EPN Troposphere Coordinator

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- Operational Solutions
- EPN-Repro3: 1996-2022

Operational Solutions

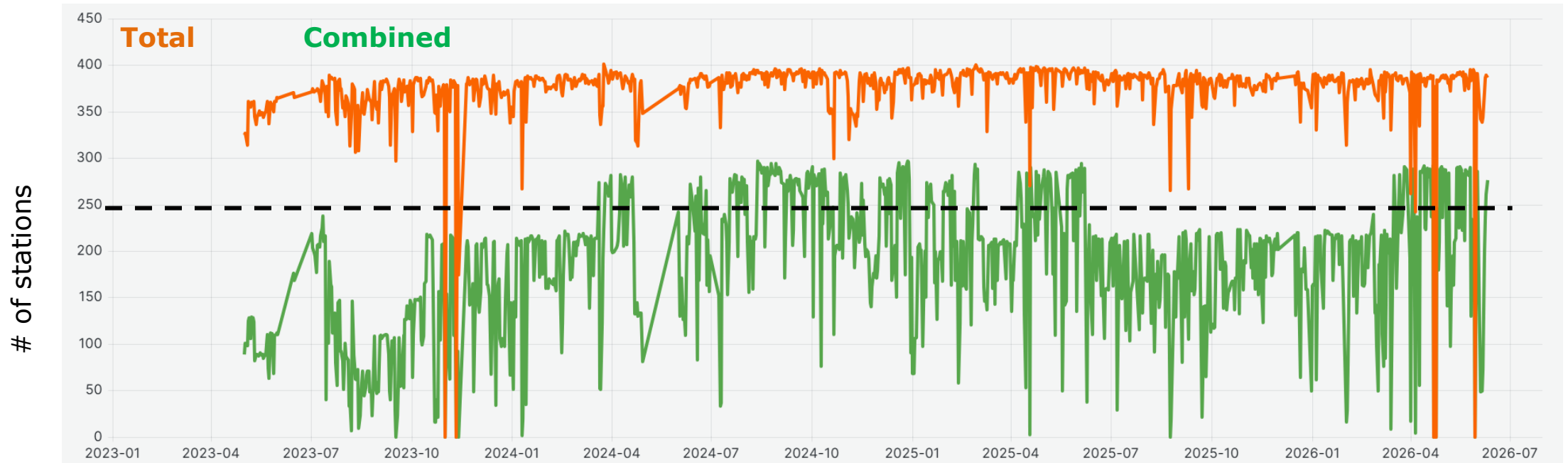
Operational Solutions: Final and Rapid

AC	Solution Type		Software	GNSS
ASI Italy	F	R	GipsyX-2.1	GRE
BEK Germany	F	R	BSW 5.4	GRE
BEV Austria	F		BSW 5.4	GRE
BKG Germany	F	R	BSW 5.4	GRE
COD Switzerland	F		BSW 5.5	GRE
GFZ Germany	F		EPOS.P8	GRE
IGE Spain	F	R	BSW 5.4	GRE
IGN France	F	–	BSW 5.4	GRE
LPT Switzerland	F		BSW 5.3	GRE
MUT Poland	F	R	GG 10.71	GE
NKG Sweden	F	R	BSW 5.4	GRE
RGA Serbia	F		BSW 5.4	GRE
ROB Belgium	F	R	BSW 5.4	GRE
SGO Hungary	F		BSW 5.4	GRE
SUT Slovakia	F	R	BSW 5.4	GRE
UPA Italy	F	R	BSW 5.4	GRE
WUT Poland	F	R	BSW 5.4	GRE

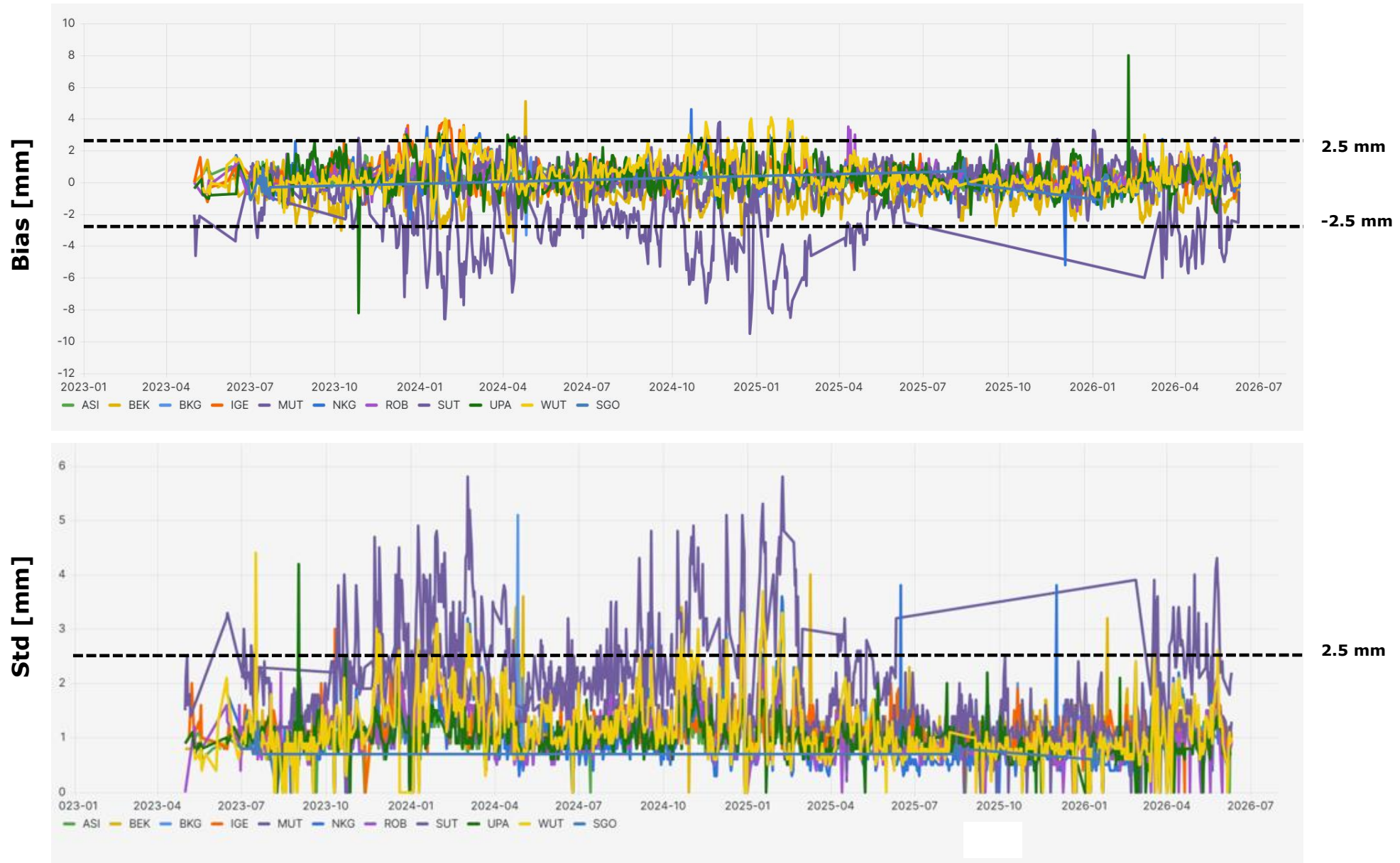
- **17 ACs** are providing daily final solutions
- **10 ACs** are providing daily rapid solutions
- **Processing Options:** refer to 'Guidelines for EPN Analysis Centres'
- **GNSS SW:** Bernese, EPOS, GAMIT, GIPSYX
- **Processing Strategy:** PPP and DD
- **Distributed Processing:** The EPN stations are distributed among the ACs in such a way that each station is analyzed by at least three ACs. This ensures the reliability of the EPN products

Rapid tropo combination - Status

- **10 EPN ACs** are delivering rapid tropo estimates as a by-product of the rapid site coordinate processing
- **Filename** for daily troposphere solution and summary:
EUR0OPSRAP_YYYYDOY0000_01D_01H_TRO.TRO.gz/SUM.gz
- **Latency**: 22 hours after the end of observations of the analyzed day



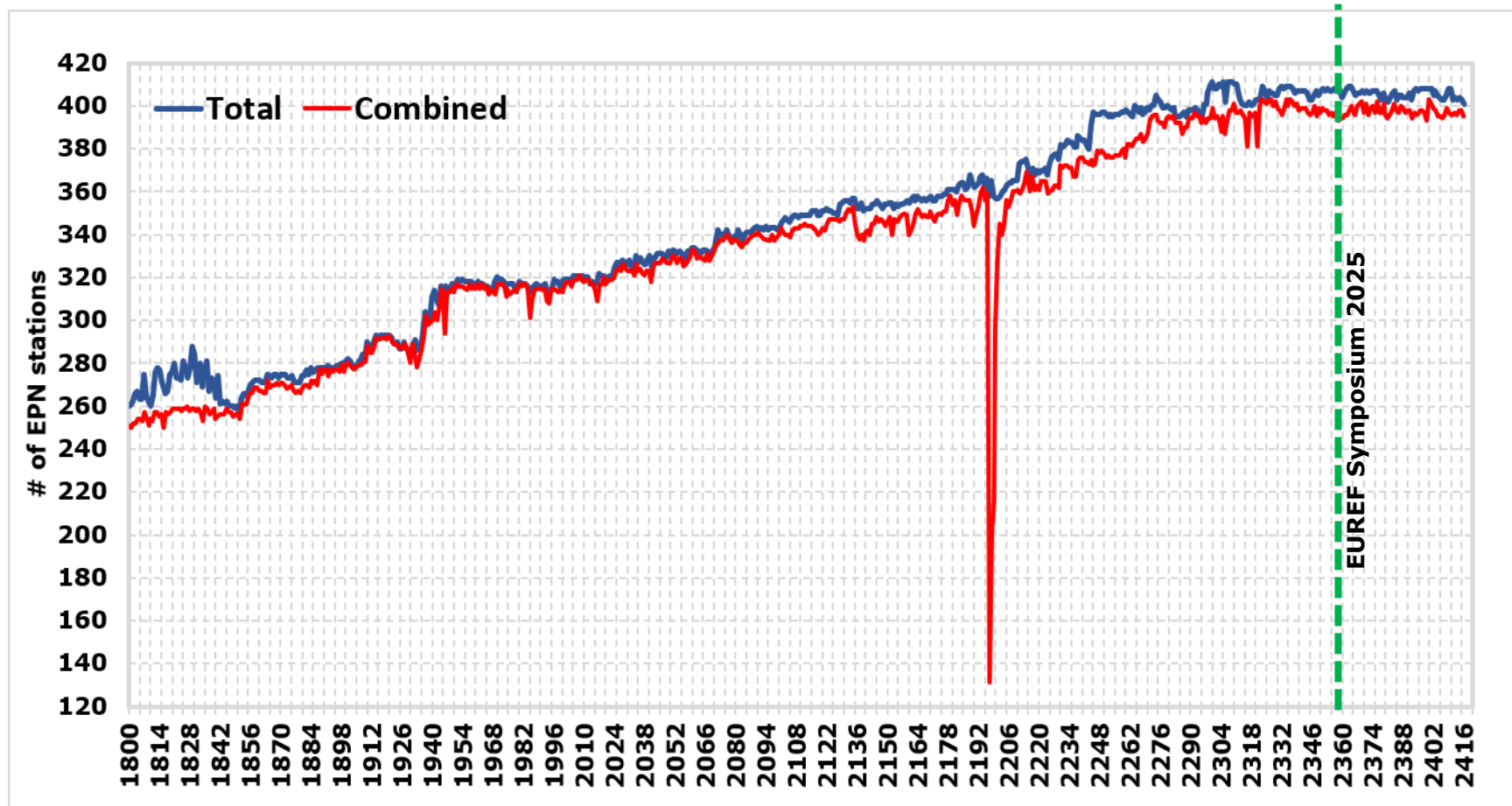
Rapid - Mean ZTD biases & std for all ACs w.r.t. the combination



Final - Number of Combined Stations

Last final Combined Solution: GPS week 2416 (26Apr26):

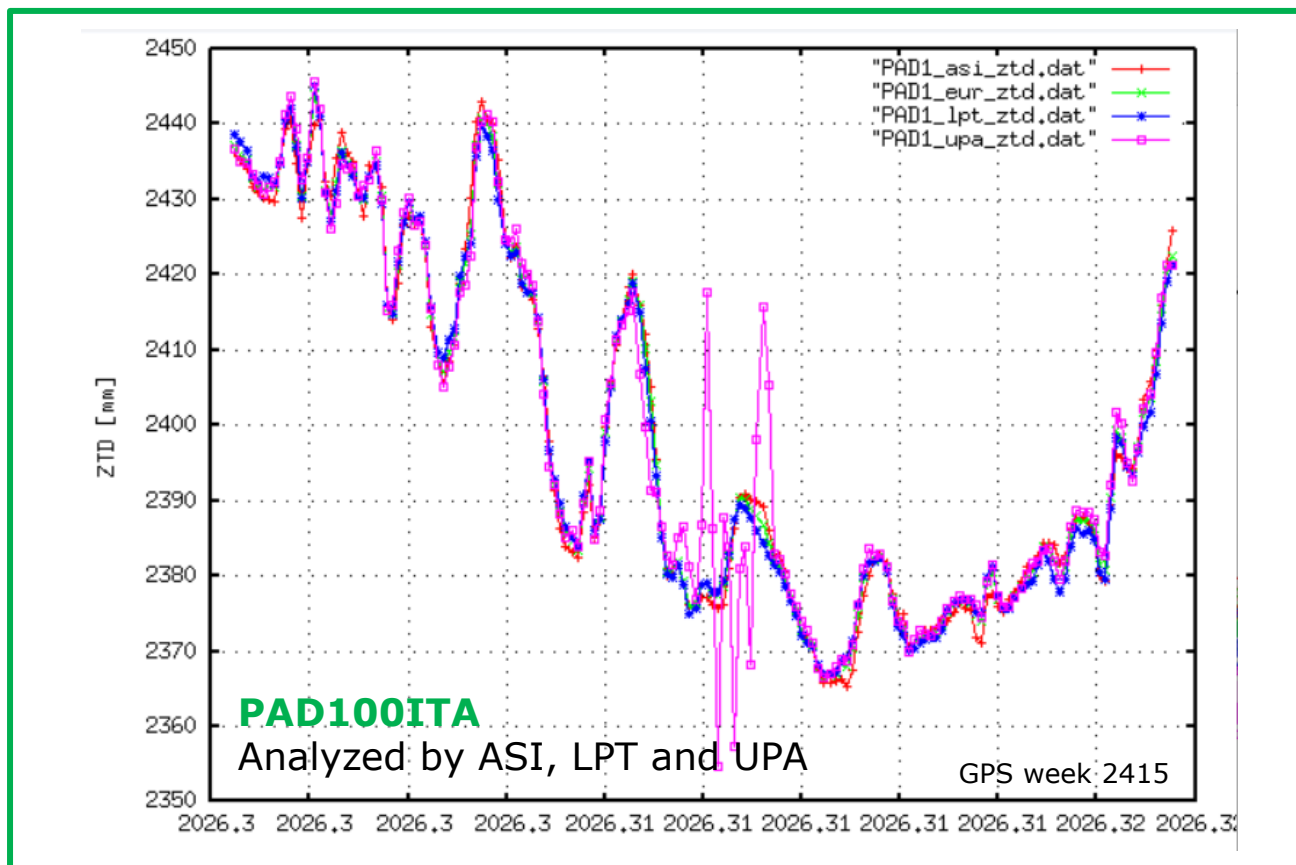
- Total Stations available 401
- Combined Stations 395



Final - New stations since EUREF Symposium 2025

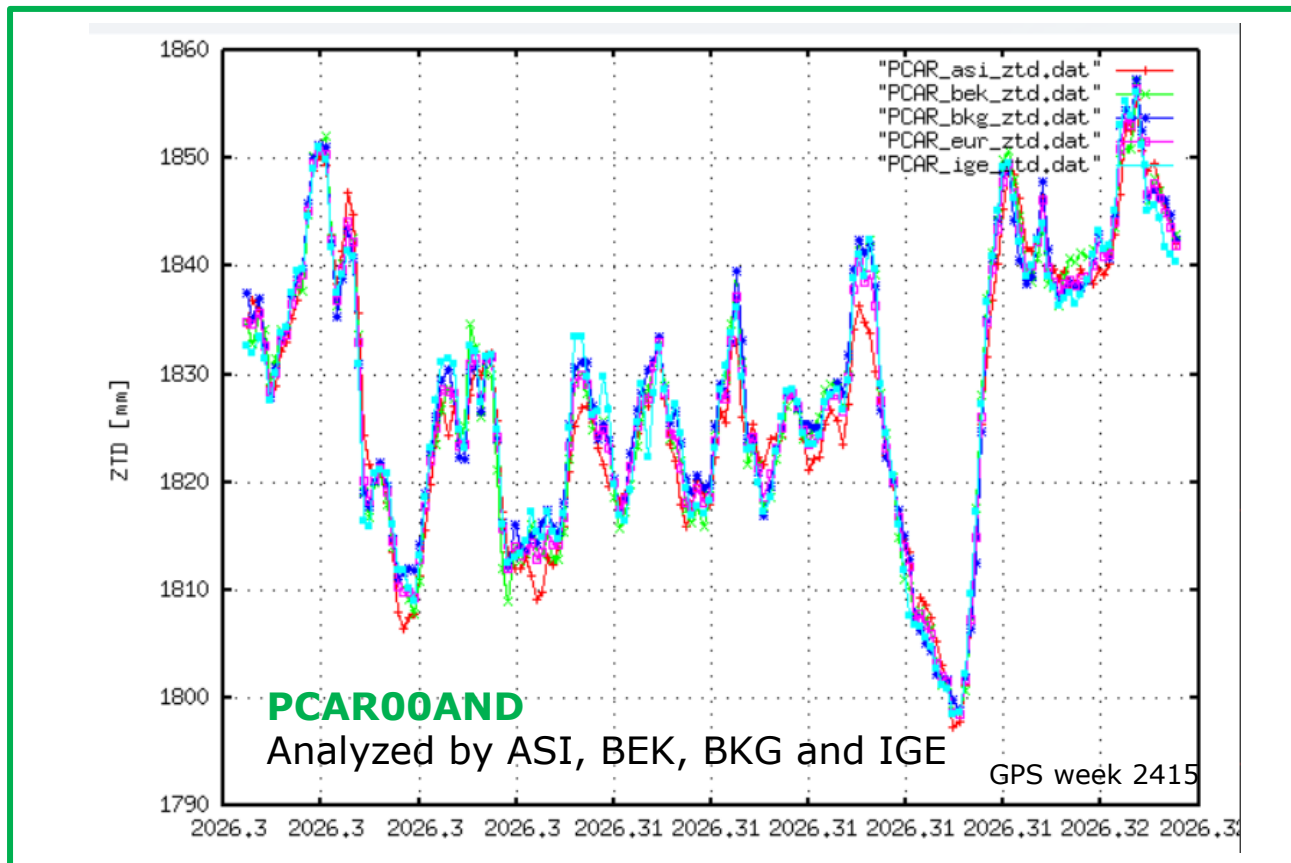
Since EUREF Symposium 2025

- 8 new stations
- 7 stations included



#	Country	Station
1	Italy	PAD100ITA
1	Andorra	PCAR00AND
1	Germany	WT2100DEU
2	Romania	FOCS00ROU MURE00ROU
2	Latvia	ALKS00LVA DLKS00LVA
1	Great Britain	BFST00GBR

Final - New stations since EUREF Symposium 2025



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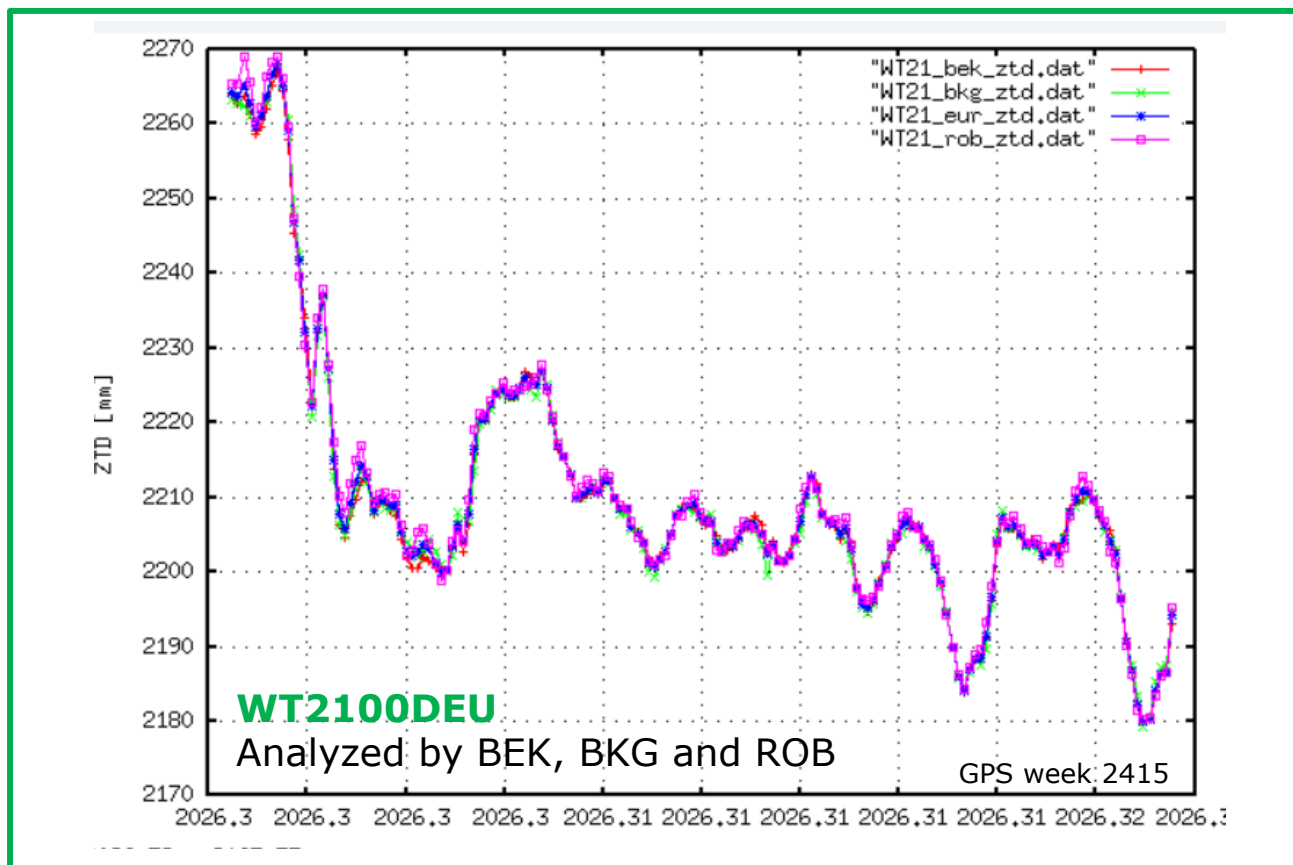
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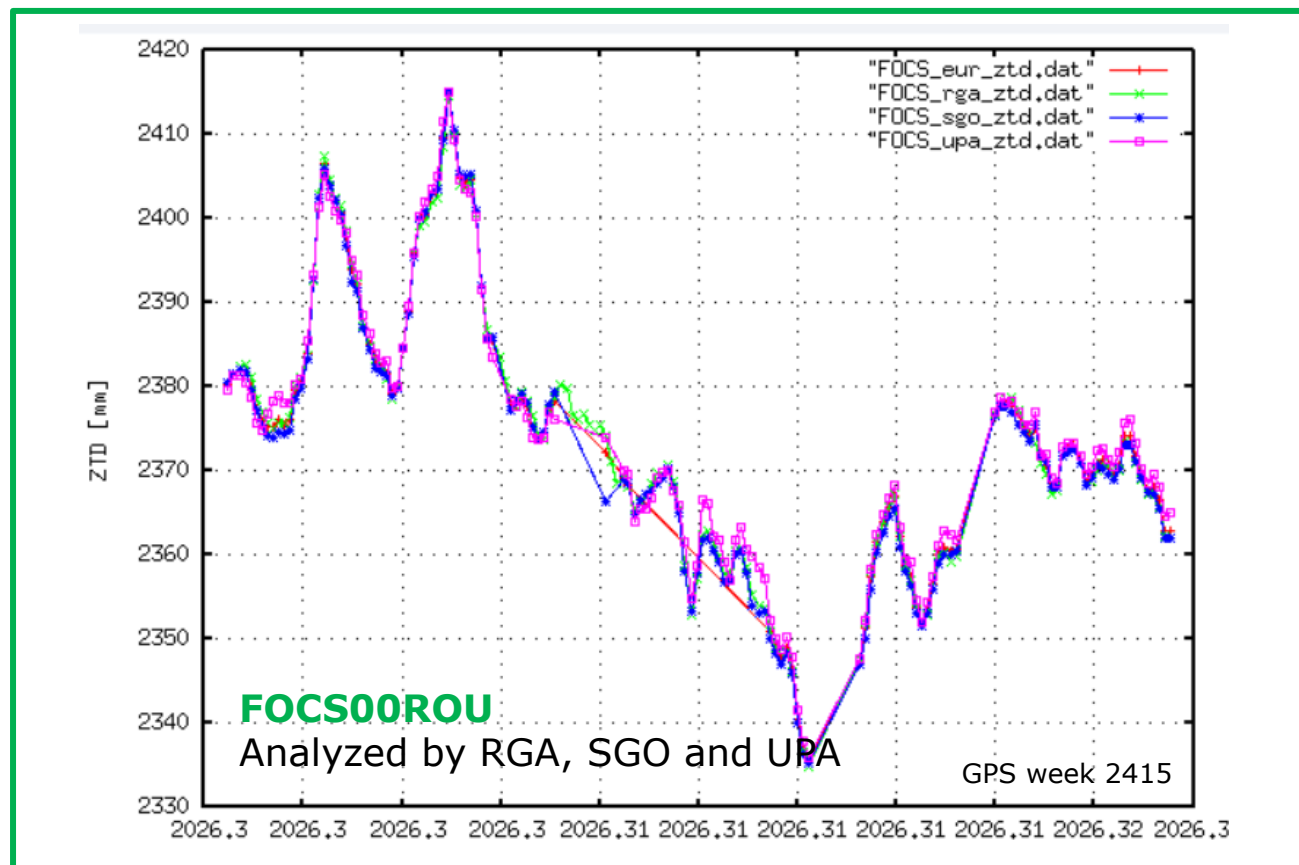
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Final - New stations since EUREF Symposium 2025

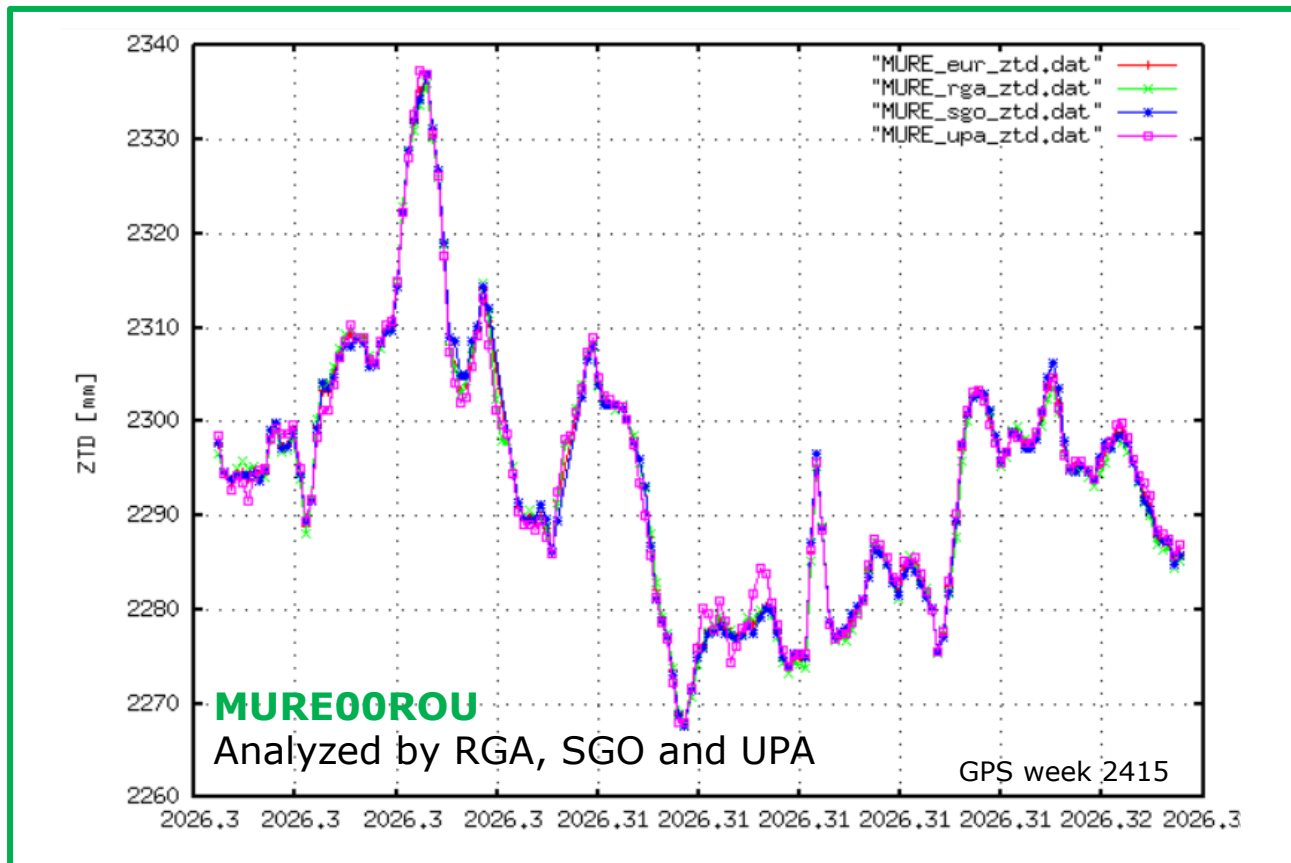
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Final - New stations since EUREF Symposium 2025



Since EUREF Symposium 2025

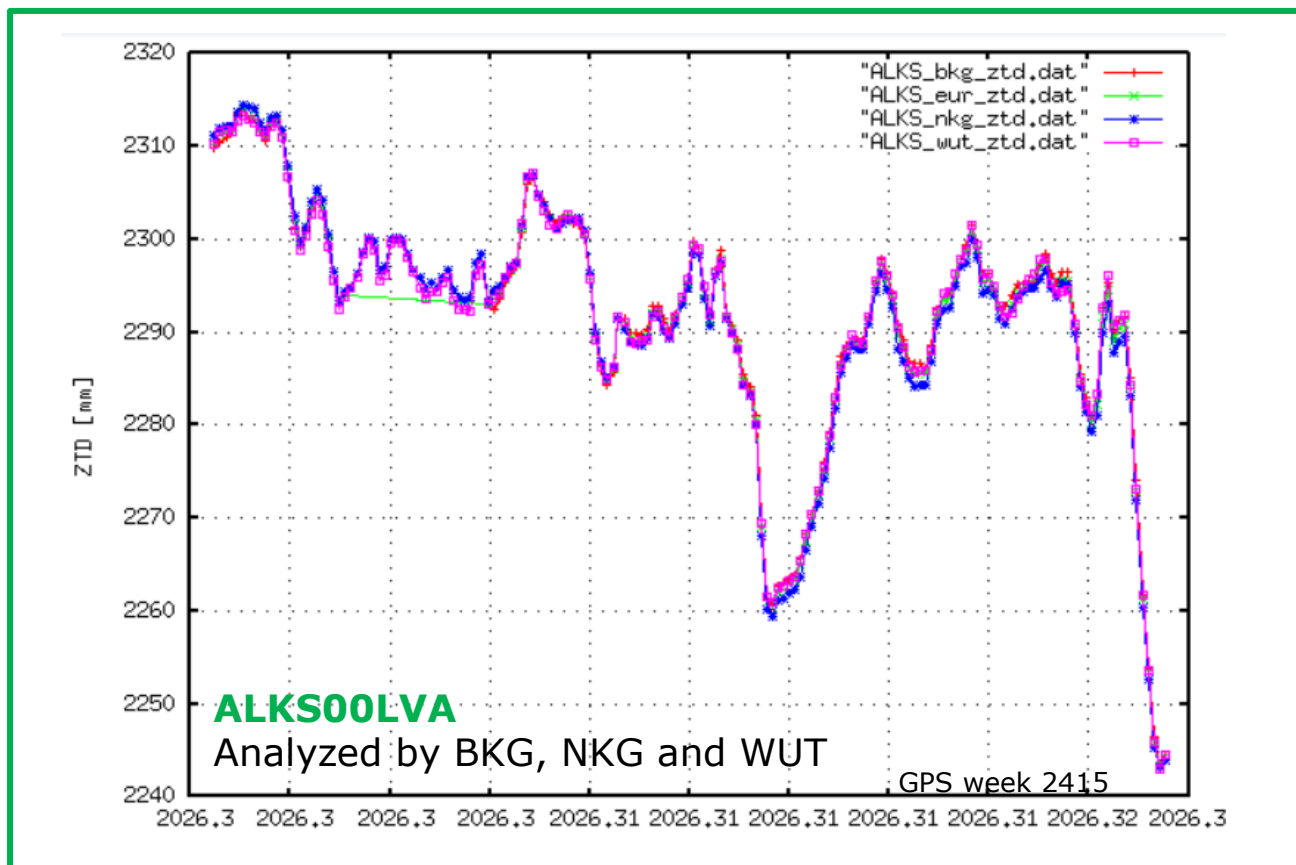
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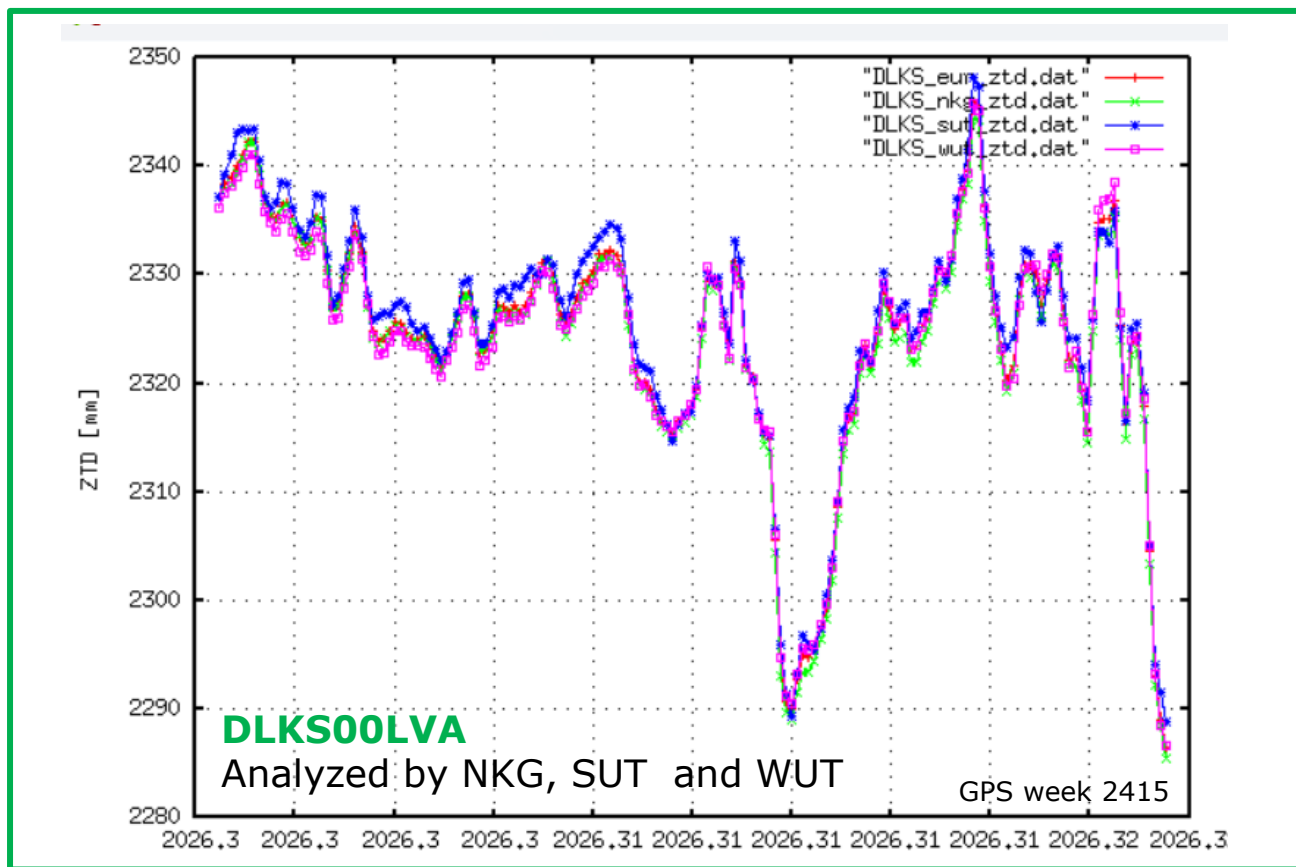


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Final - New stations since EUREF Symposium 2025

Since EUREF Symposium 2025

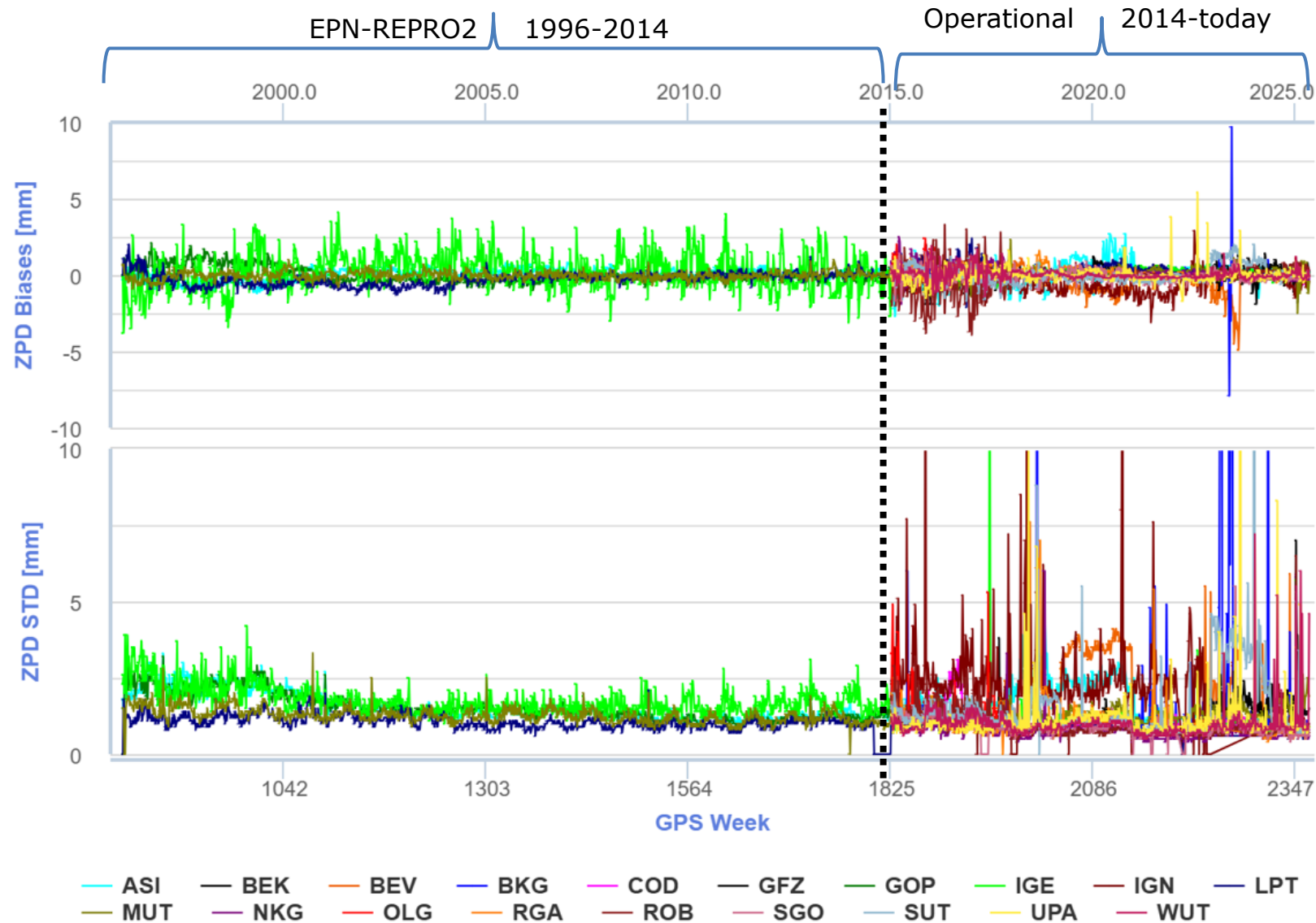
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2	Latvia	ALKS00LVA DLKS00LVA
1	Great Britain	BFST00GBR

- Filename for weekly troposphere solution and summary:
 - EUR0OPSFIN_YYYYDDD0000_07D_01H_TRO.TRO.gz
 - EUR0OPSFIN_YYYYDDD0000_07D_01H_TRO.SUM.gz
- Latency: 5 weeks after the end of observations of the analyzed week
- Combined EPN products available at BKG and BEV data centers:
 - https://igs.bkg.bund.de/root_ftp/EUREF/products/
 - <https://gnss.bev.gv.at/at.gv.bev.dc/data/products>
- EPNCB web page with AC bias/sdt w.r.t. the combined product
 - https://epncb.oma.be/_productsservices/troposphere/mean_zpd_biases.php

Final - Mean ZTD biases & std for all ACs w.r.t. the combination



© EPN Central Bureau

http://www.epncb.oma.be/_productsservices/sitezenithpathdelays/

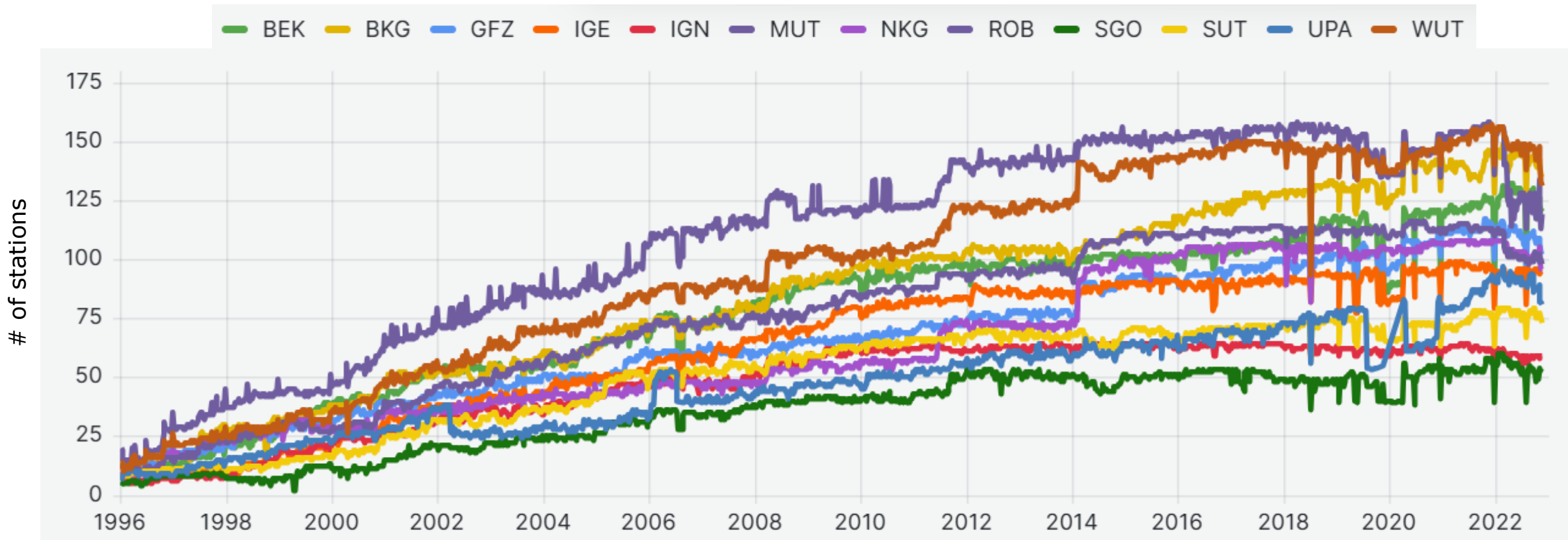
EPN-Repro3: 1996-2022

EPN-Repro3 – 27 Years of Reprocessed GNSS Data

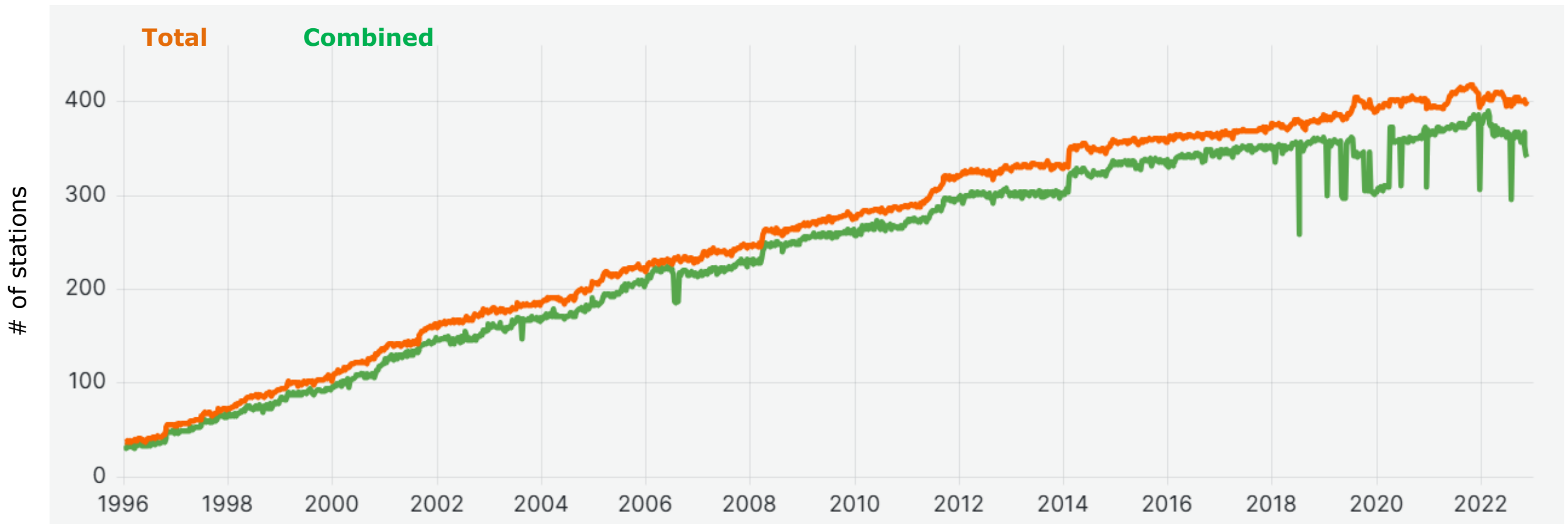
- Period:1996-2022
- input snx_tro 117.049
 - snx_tro downloaded from BKG/BEV
 - snx_tro checked and adjusted to snx
 - 'manual' cleaning
- output snx tro 1.404

#	AC	Software	GNSS	# stations	# SNX	# SNX_TRO	missing snx_tro	manual cleaning
1	BEK Germany	BSW 5.4	GRE	156	9827	9827	0	1
2	BKG Germany	BSW 5.4	GRE	189	9827	9821	6	2
3	GFZ Germany	EPOS.P8	GRE	134	9827	9826	1	6
4	IGE Spain	BSW 5.4	GRE	118	9827	9827	0	7
5	IGN France	BSW 5.4	GRE	76	9827	9819	8	2
6	MUT Poland	GG 10.71	GE	180	9826	9813	13	1
7	NKG Sweeden	BSW 5.4	GRE	125	9827	9827	0	2
8	ROB Belgium	BSW 5.4	GRE	142	9827	9827	0	5
9	SGO Hungary	BSW 5.4	GRE	76	9804	9775	29	1
10	SUT Slovakia	BSW 5.4	GRE	109	9827	9827	0	1
11	UPA Italy	BSW 5.4	GRE	126	9041	9033	8	19
12	WUT Poland	BSW 5.4	GRE	191	9827	9827	0	17
	EUR	weekly comb			1404			

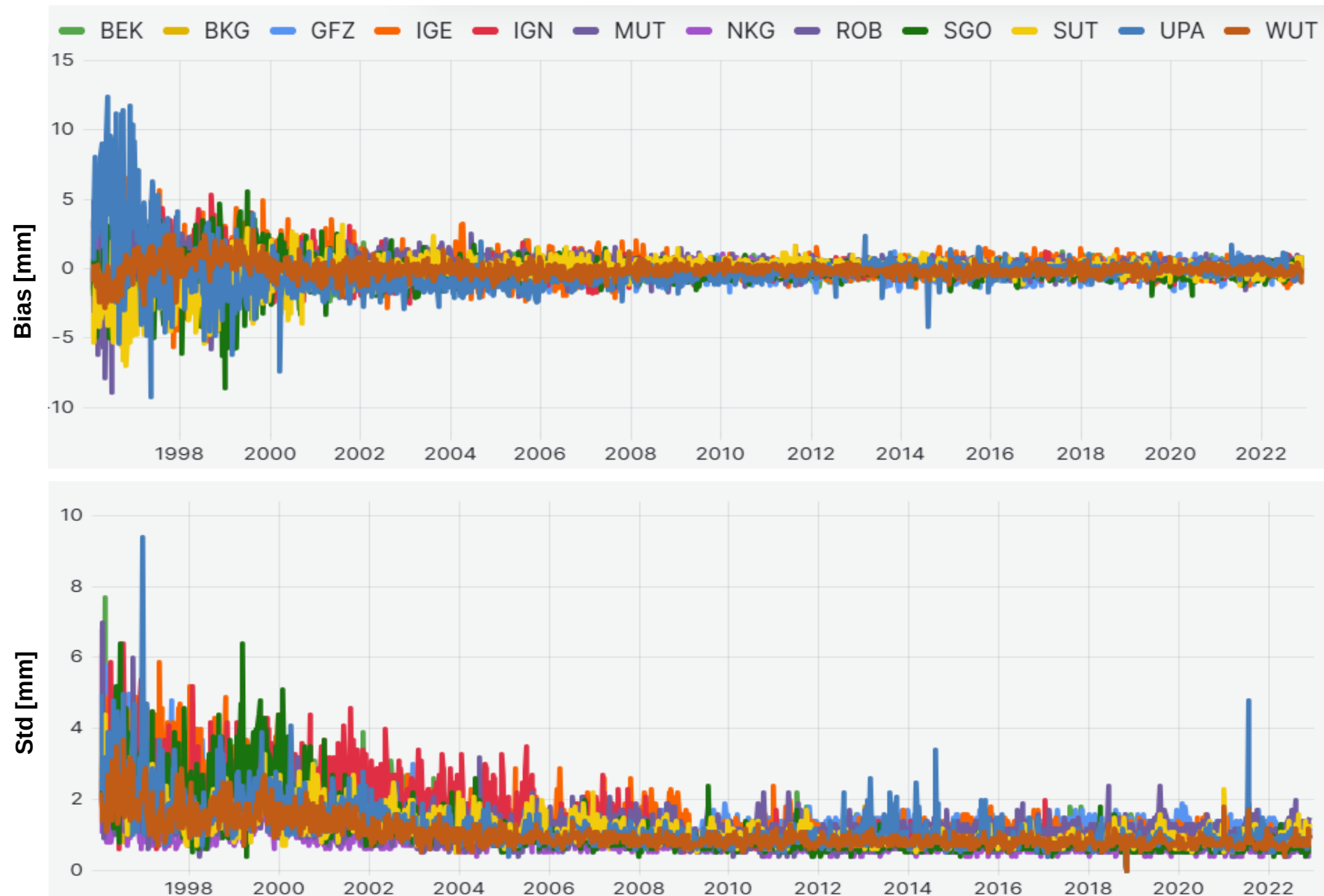
EPN-Repro3 – Stations per ACs



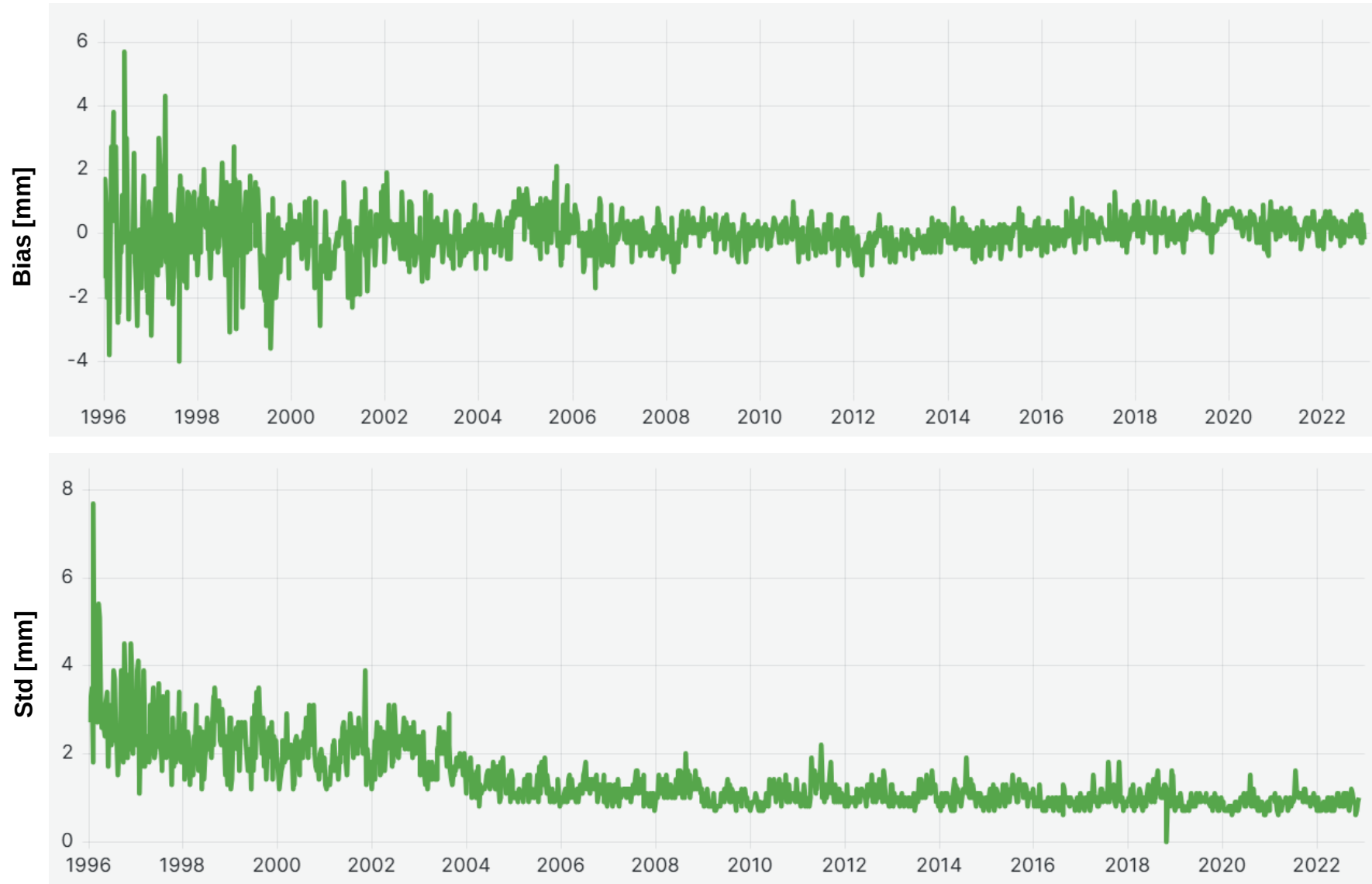
EPN-Repro3 – Stations Total vs Combined



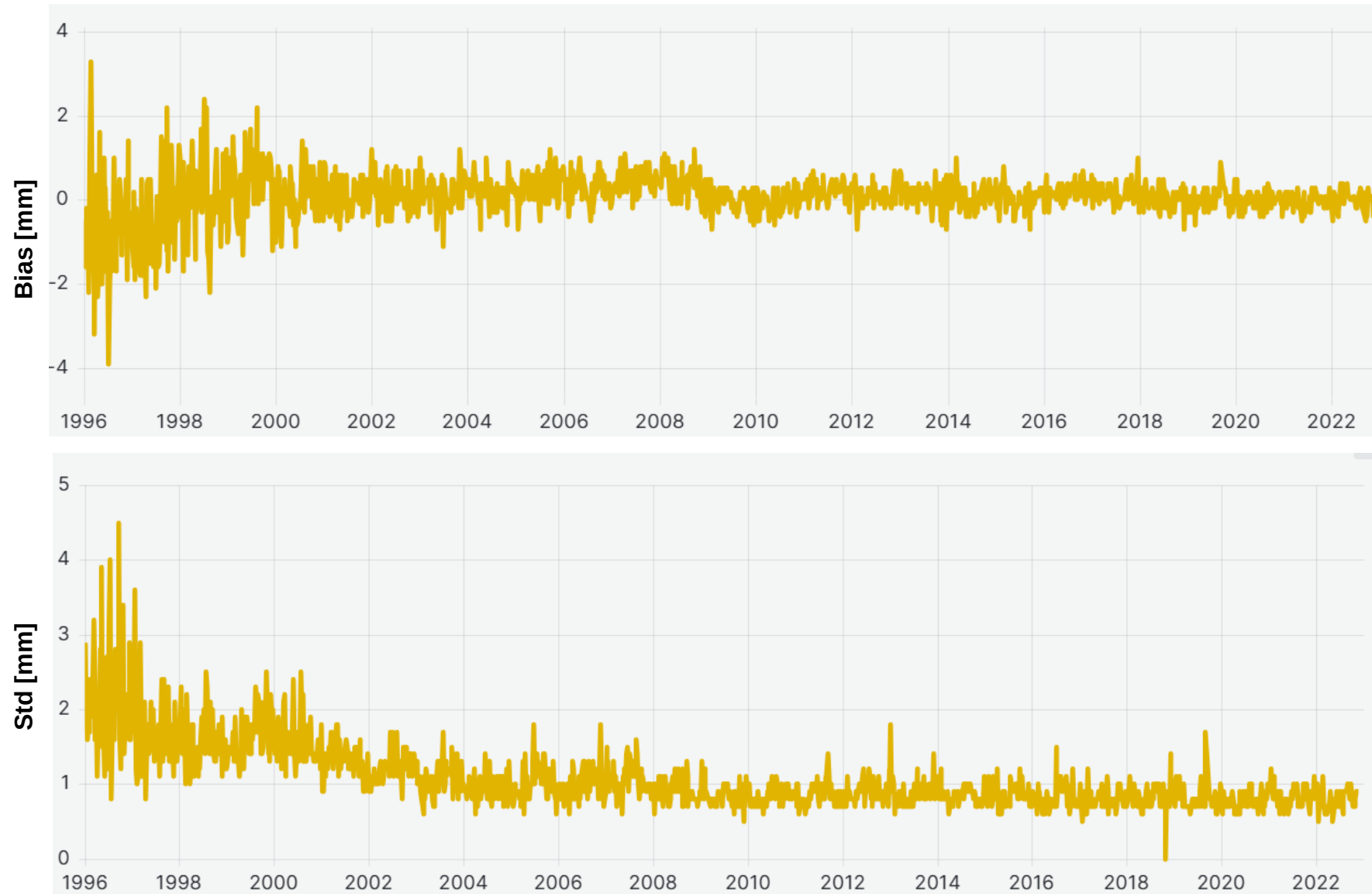
EPN-Repro3 – Mean ZTD biases & std for all ACs



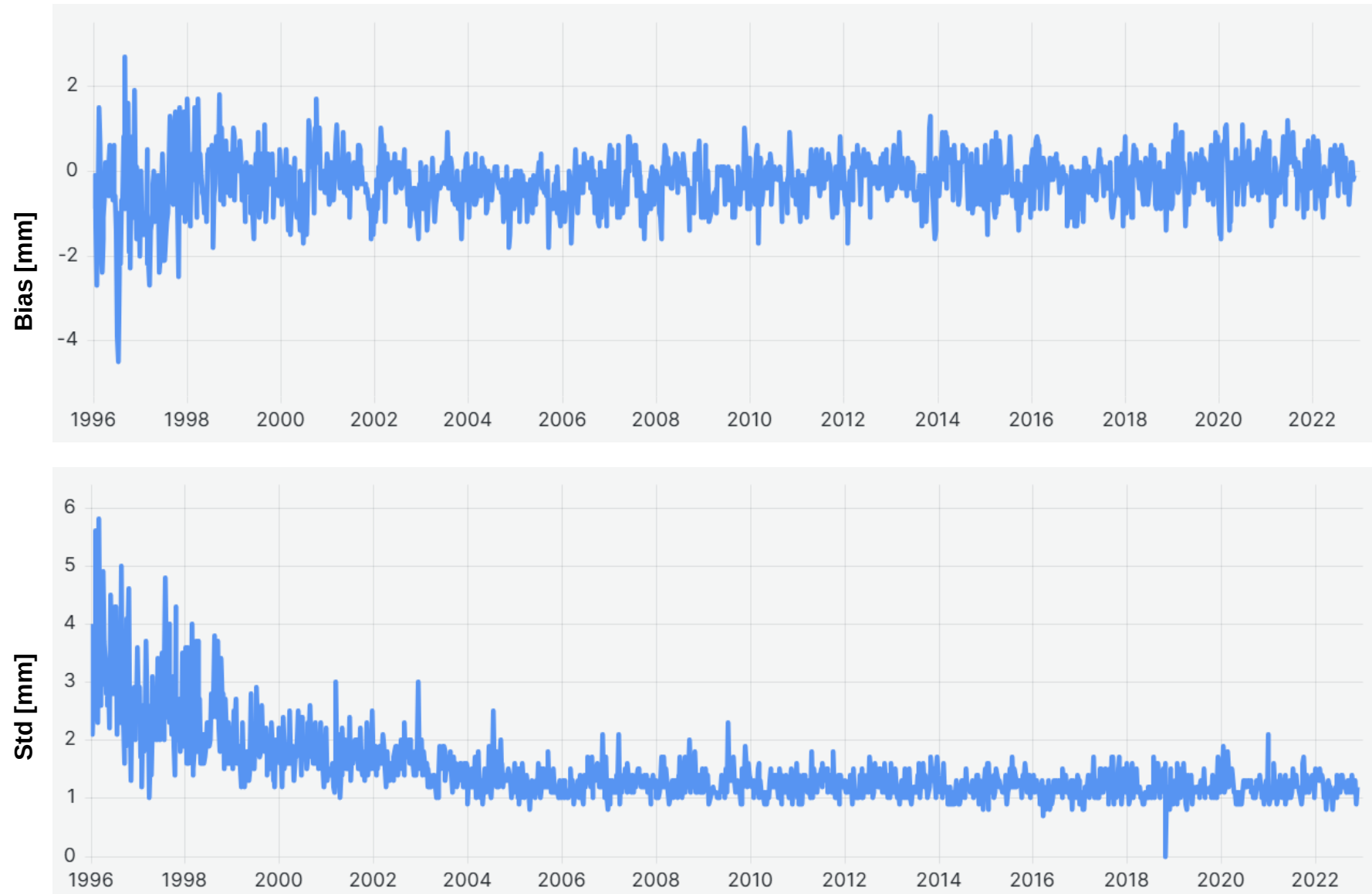
EPN-Repro3 – BEK Mean ZTD bias & std



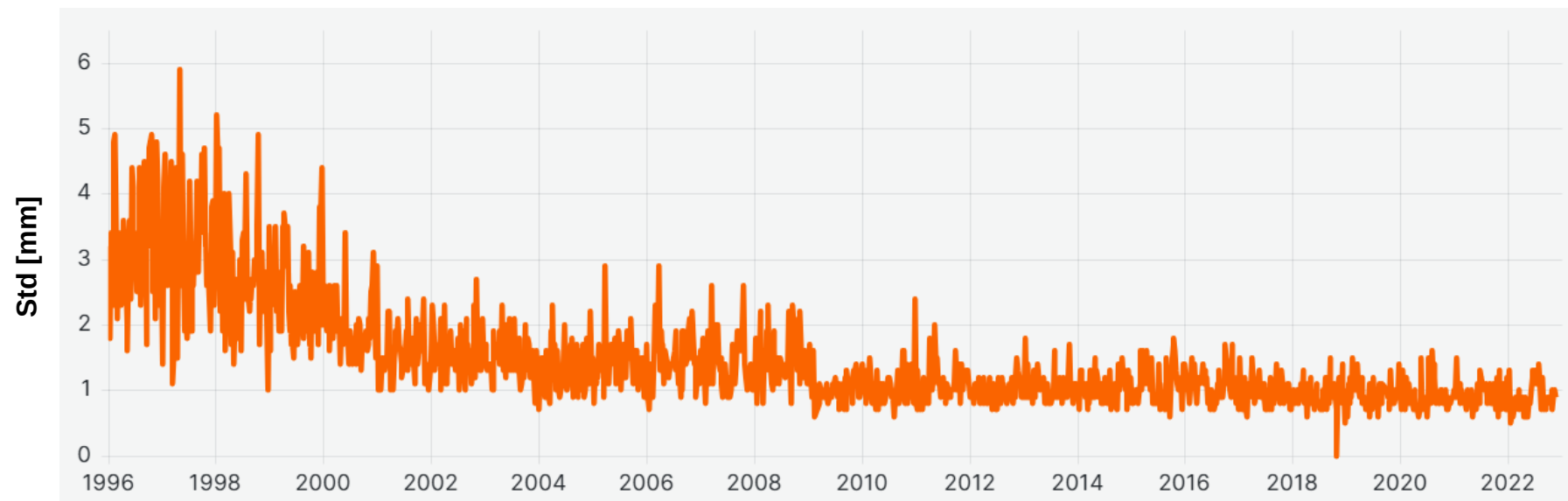
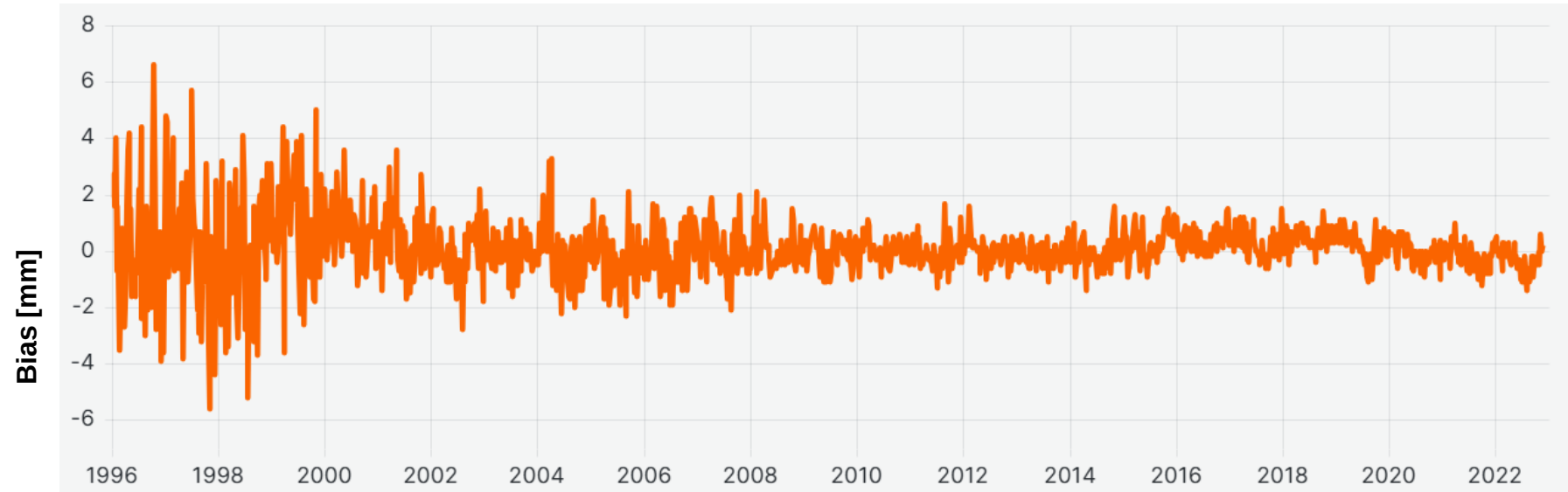
EPN-Repro3 – BKG Mean ZTD bias & std



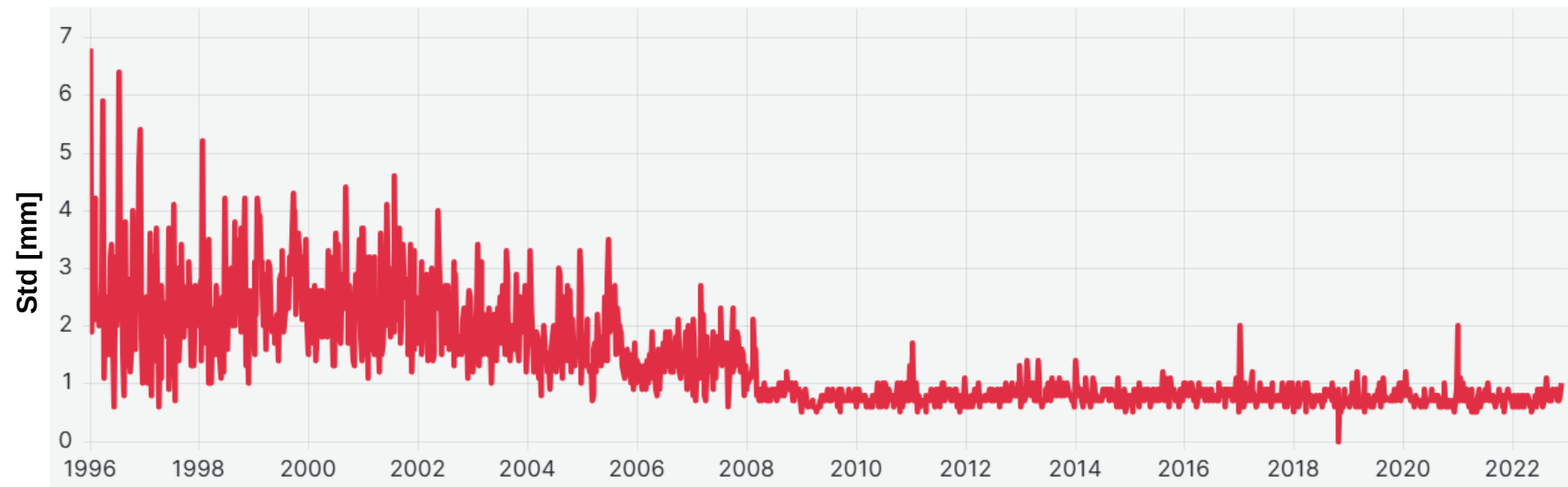
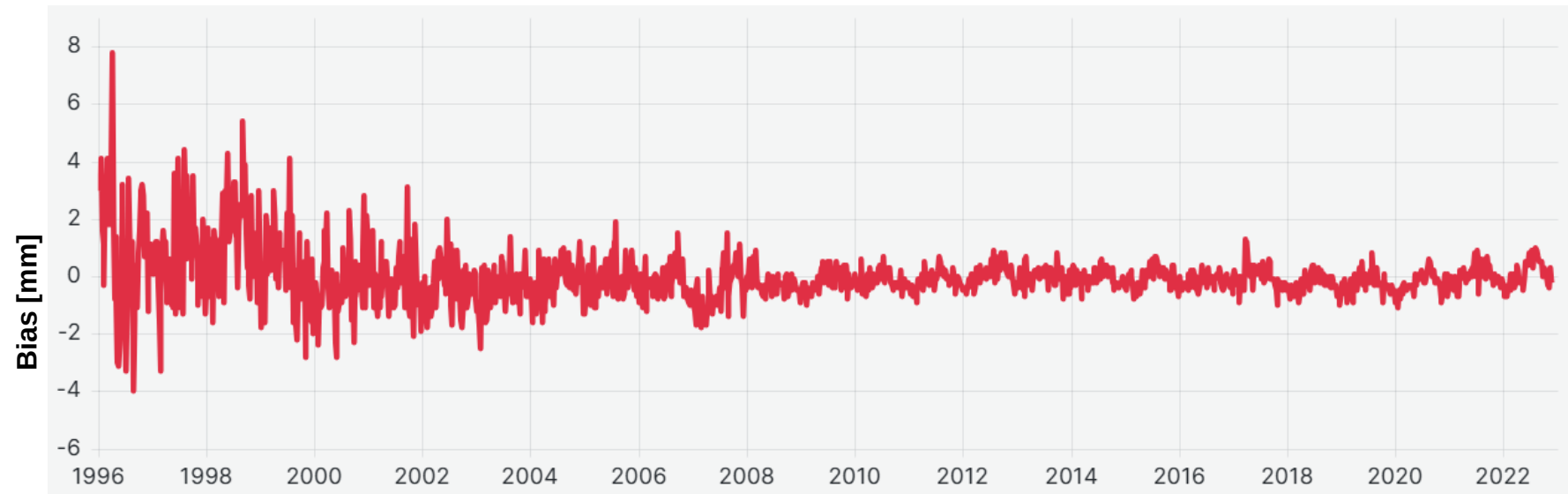
EPN-Repro3 – GFZ Mean ZTD bias & std



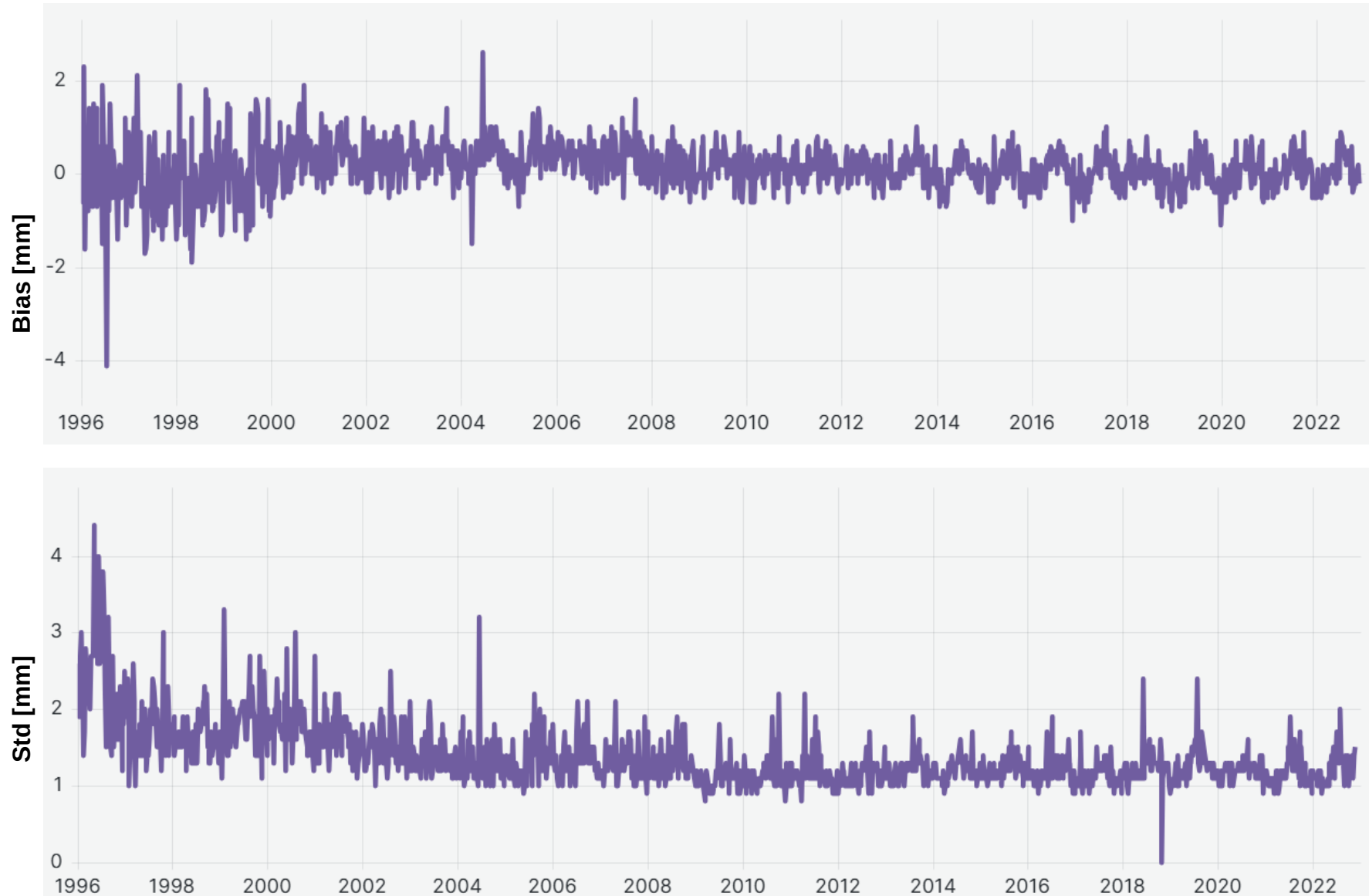
EPN-Repro3 – IGE Mean ZTD bias & std



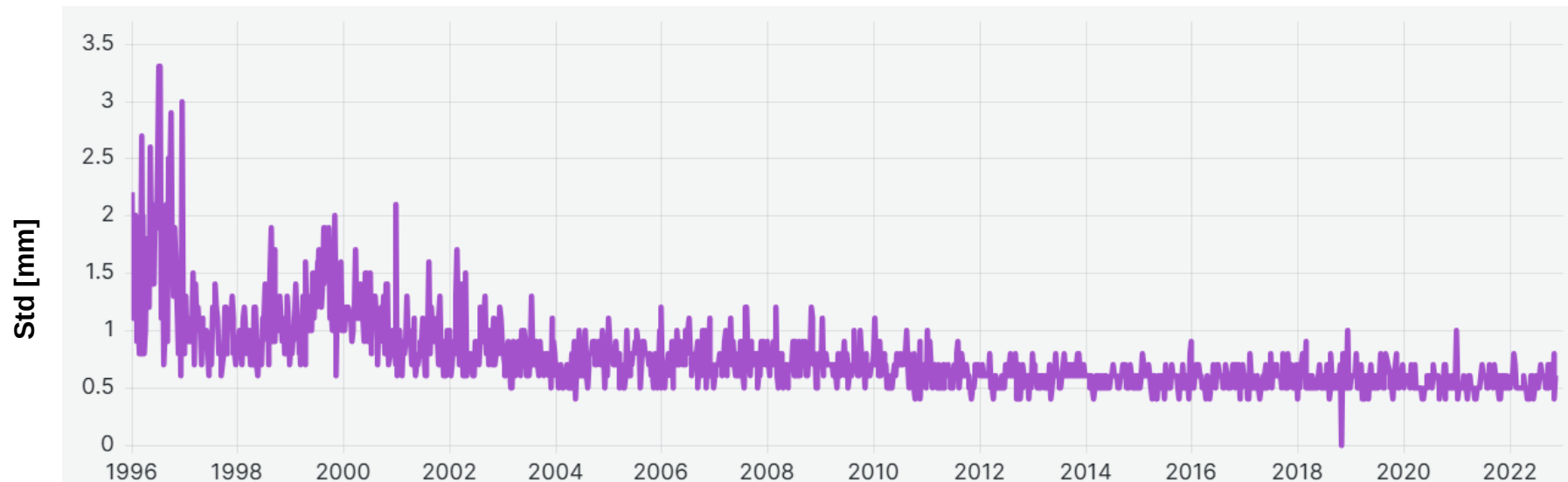
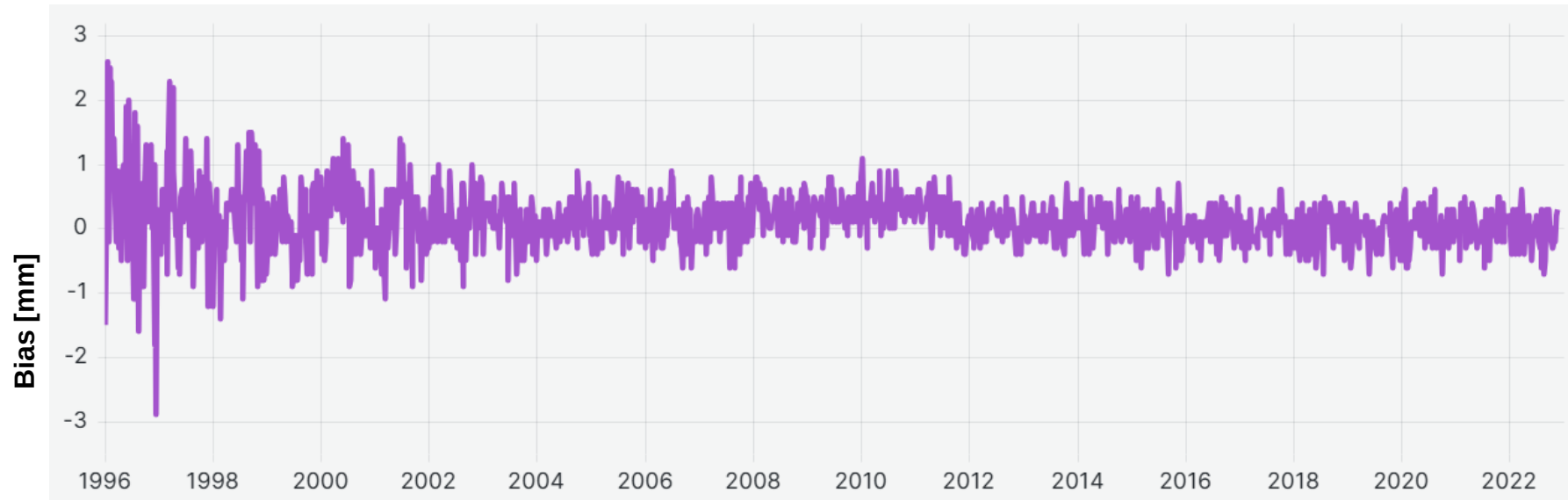
EPN-Repro3 – IGN Mean ZTD bias & std



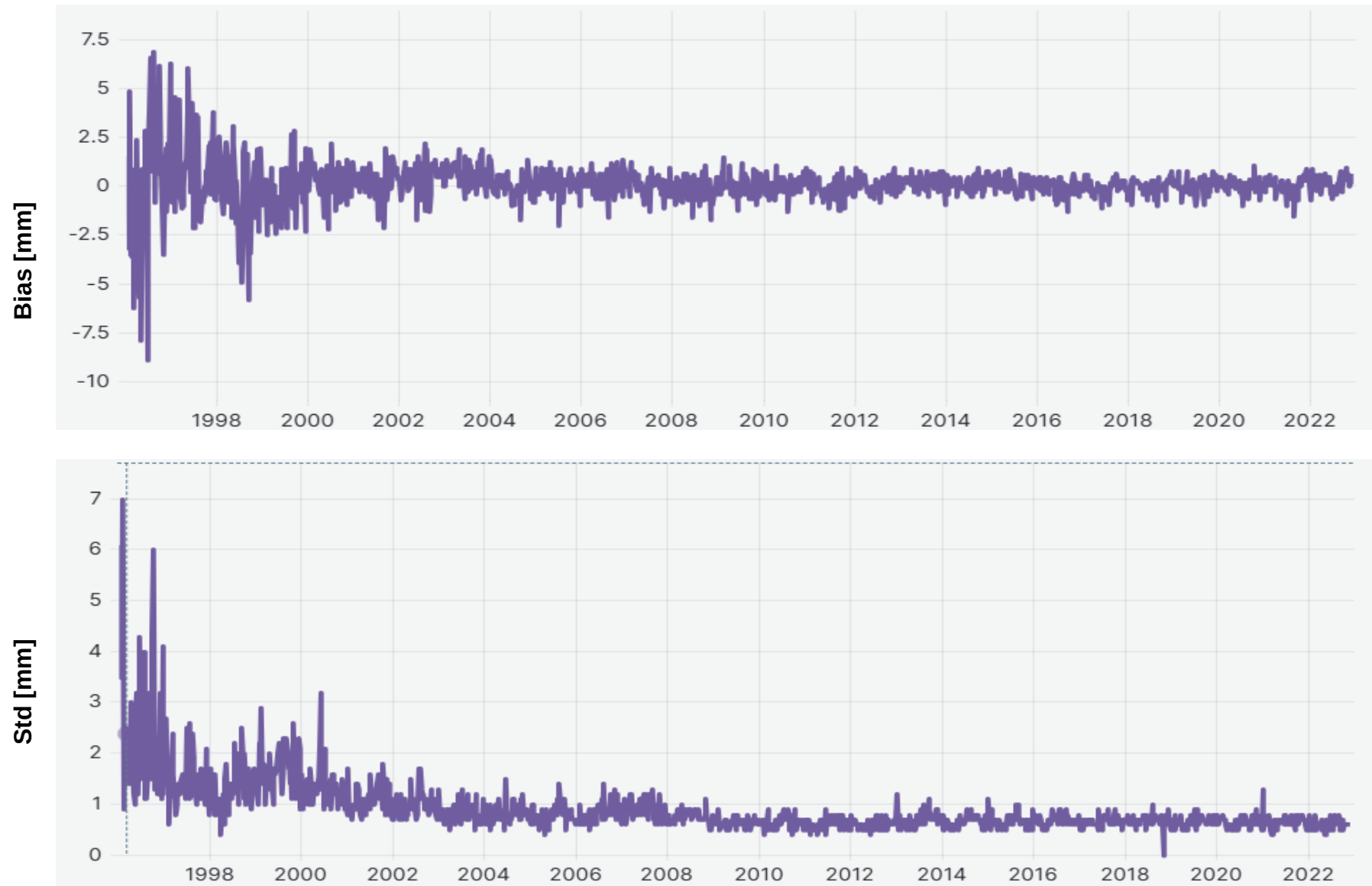
EPN-Repro3 – MUT Mean ZTD bias & std



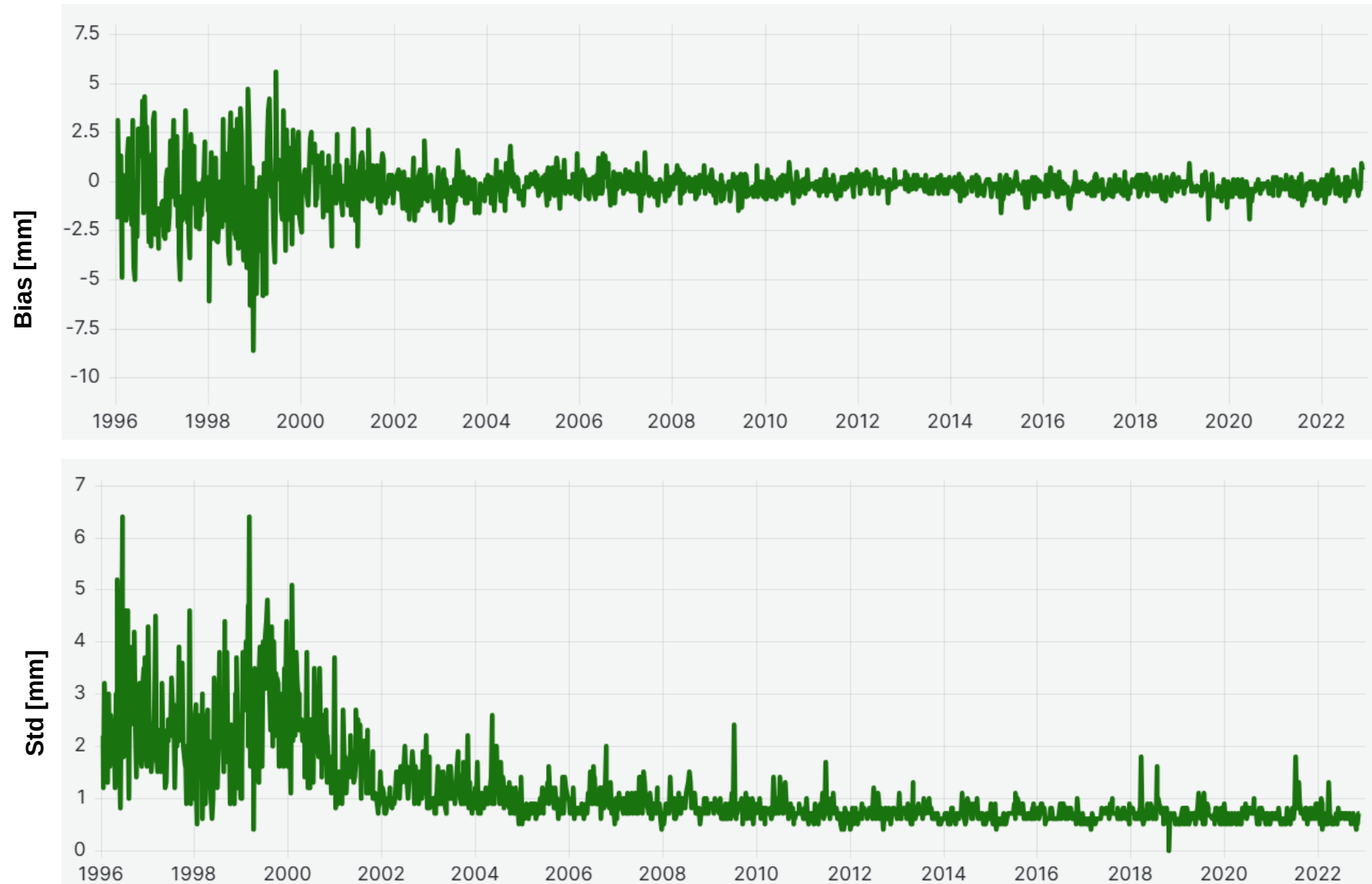
EPN-Repro3 – NKG Mean ZTD bias & std



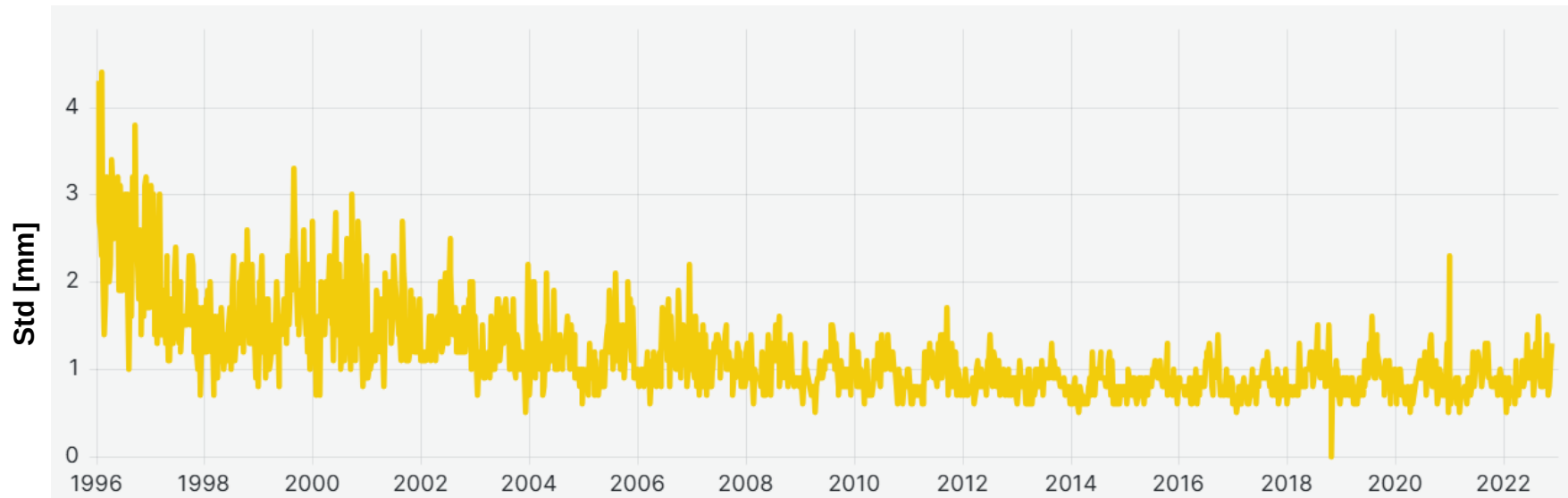
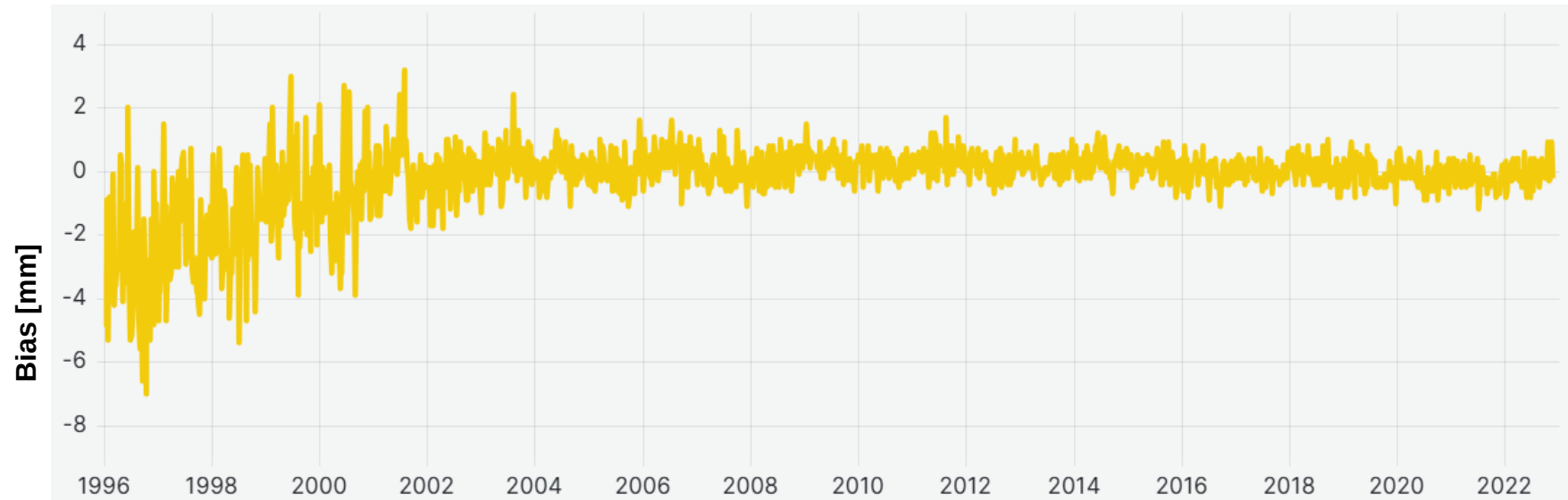
EPN-Repro3 – ROB Mean ZTD bias & std



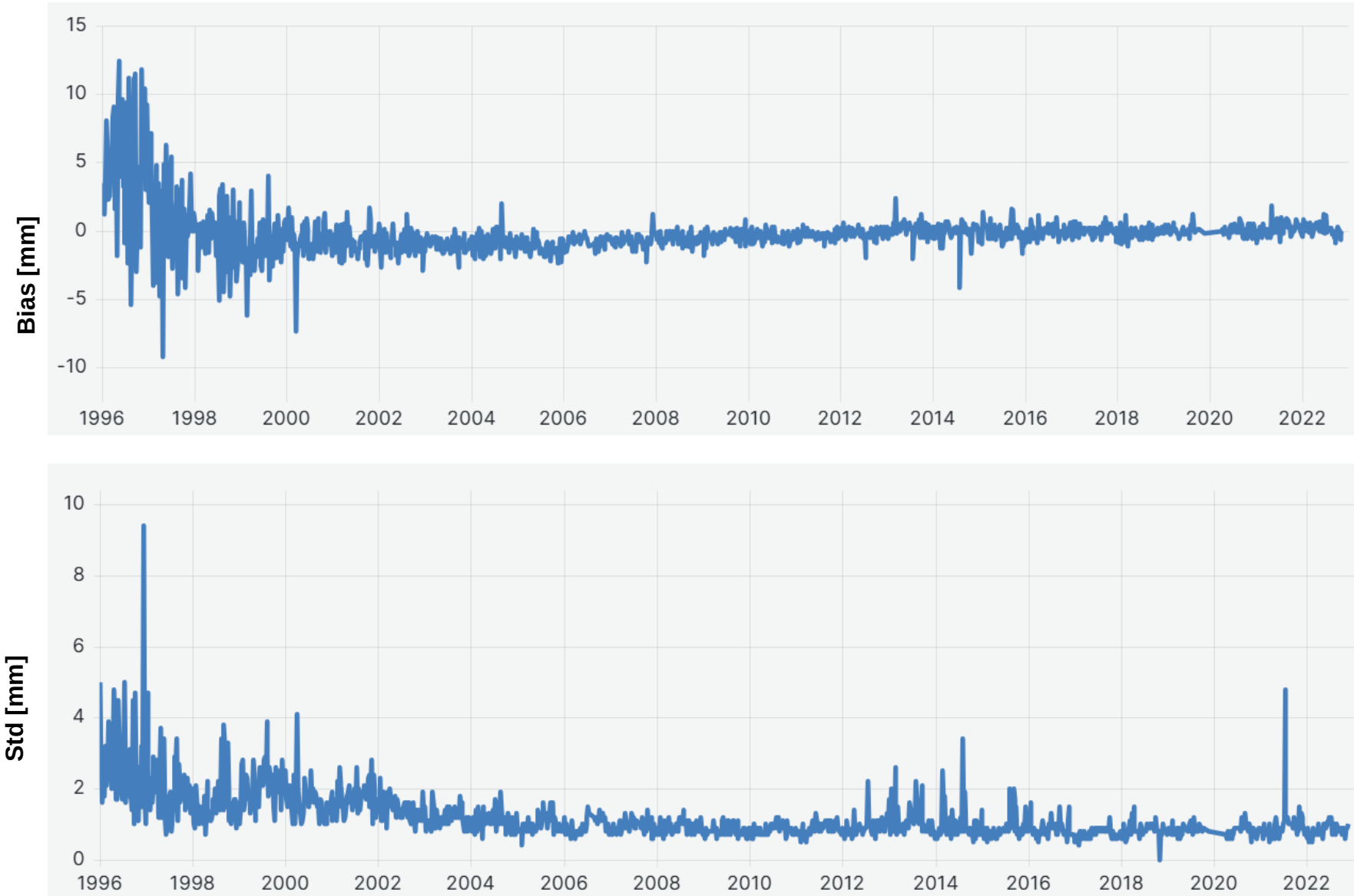
EPN-Repro3 – SGO Mean ZTD bias & std



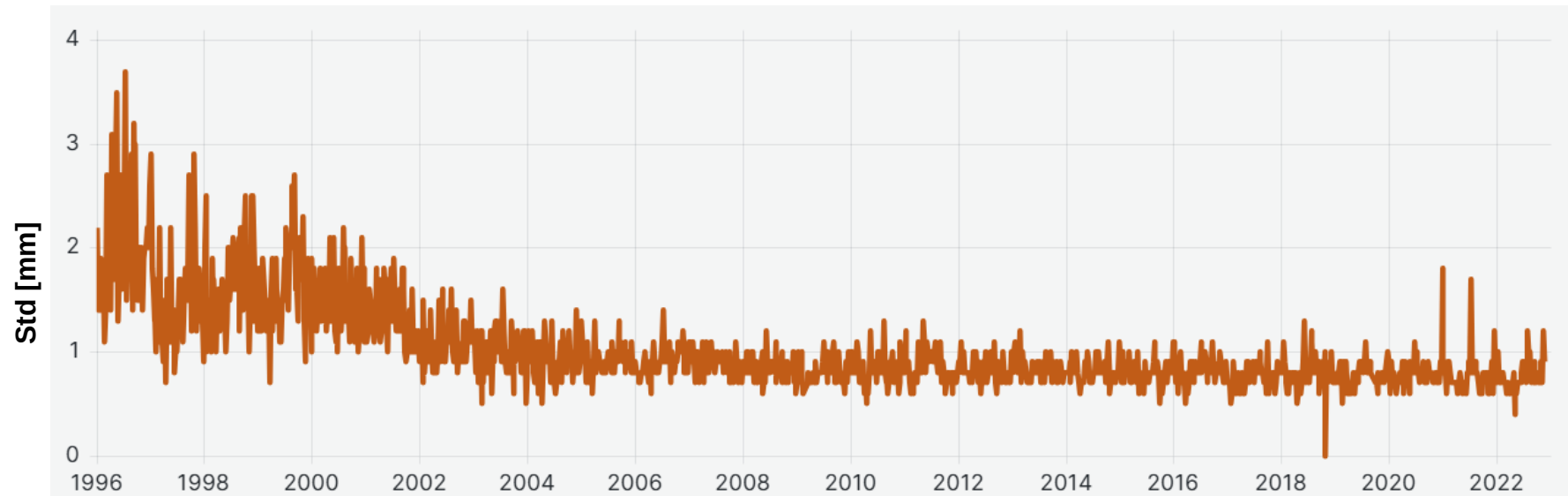
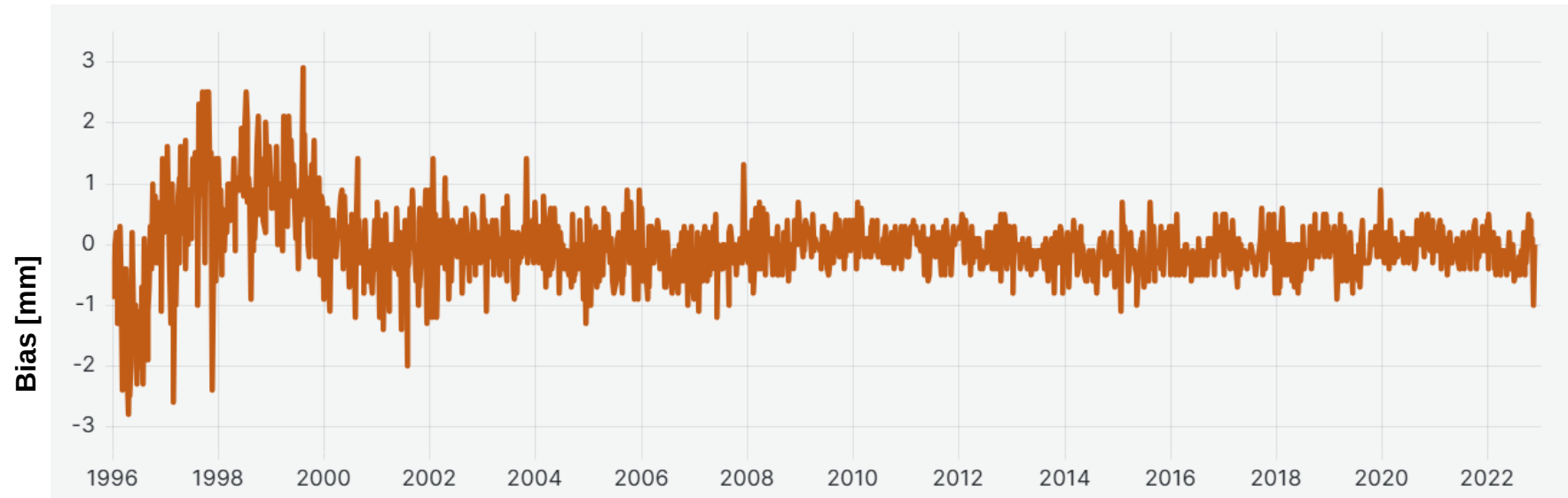
EPN-Repro3 – SUT Mean ZTD bias & std



EPN-Repro3 – UPA Mean ZTD bias & std



EPN-Repro3 – WUT Mean ZTD biases & std



- Final and Rapid Operational Solutions are running smoothly.
- EPN-Repro3 combination is done. Still items in the 'to do list':
 - outlier statistics
 - multi-year tropo solution
 - ZTD monthly mean
 - evaluation against radiosonde
 - EPN-Repro3 vs EPN-Repro2
 -
- EPN-Repro3 will be a Climate Data Record of GNSS tropospheric products over Europe. A unique Data Record that will improve the knowledge of climatic trends over Europe and can be used to train ML algorithm to predict atmospheric signal delays for improving, for example, GNSS positioning accuracy.

Thank you for your attention

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Acknowledgment:

the EPN ACs for providing the solutions (operational and reprocessed) used for the combination.
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