

Hydrological Information 2024

Hydrological Year 2023

(01.11.2022 - 31.10.2023)



Primary Values	Year 2023	5-year period 2019 - 2023	5-year period 2016 - 2020
HHW	NHN + 3,94 m (14.10.23)	NHN + 5,87 m (19.02.22)	NHN + 5,48 m (29.10.17)
LHW	NHN - 0,44 m (20.10.23)	NHN - 0,44 m (20.10.23)	NHN - 0,07 m (03.01.16)
HLW	NHN + 0,54 m (30.01.23)	NHN + 1,68 m (17.02.22)	NHN + 1,39 m (26.12.16)
LLW	NHN - 3,50 m (20.10.23)	NHN - 3,50 m (20.10.23)	NHN - 3,64 m (18.03.18)
MHW	NHN + 2,17 m	NHN + 2,15 m	NHN + 2,15 m *)
MLW	NHN - 1,66 m	NHN - 1,67 m	NHN - 1,66 m *)
MTR	3,83 m	3,82 m	3,81 m
MHW	NHN + 2,13 m	Values defined by the Federal Maritime and Hydrographic Agency (BSH) for year 2024	
MLW	NHN - 1,70 m		
MTR	3,83 m		

Extreme values until 01.11.2023

HW (since 1788)	LW (since 1901)
1. NHN + 6,45 m (03.01.1976) = HHW 2. + 6,08 m (06.12.2013) 3. + 6,02 m (28.01.1994) 4. + 6,02 m (10.01.1995) 5. + 5,95 m (03.12.1999) 6. + 5,87 m (19.02.2022) 7. + 5,81 m (24.11.1981) 8. + 5,76 m (23.01.1993) 9. + 5,75 m (28.02.1990) 10. + 5,74 m (05.02.1999)	1. NHN - 3,64 m (18.03.2018) = LLW 2. - 3,50 m (20.10.2023) 3. - 3,48 m (02.03.1987) 4. - 3,48 m (21.10.2023) 5. - 3,46 m (01.03.2018) 6. - 3,45 m (18.12.1997) 7. - 3,41 m (18.03.2018) 8. - 3,39 m (07.02.2021) 9. - 3,38 m (15.02.1994) 10. - 3,38 m (01.03.2018)

Mean annual number of tides above or below specified water levels (HW: period 2004 - 2023, LW: period 2014 - 2023)

Mean annual number of exceedances (HW) of water level... (Σ = 706 tides)	Mean annual number of underruns (LW) of water level... (Σ = 706 tides)	
NHN + 4,00 m 2,7 - times	NHN - 1,60 m 459,8 - times	For detailed information see Fig. 3
NHN + 3,00 m 24,2 - times	NHN - 2,00 m 125,1 - times	
NHN + 2,20 m 279,0 - times	NHN - 2,40 m 14,6 - times	

Runoff at Neu Darchau gauge (m³/s) (Daily 6 o'clock-values)

	Year 2023	98-year period 1926 - 2023	5-year period 2019 - 2023
LQ	188 (25.07.2023) #	145 (02.10.1947)	160 (08.09.2019) #
MQ	488	691	460
HQ	1290 (22.03.2023)	4050 (11.06.2013)	1320 (14.02.2021)

Water level data refer to the reference level valid at the time of occurrence. Data since 01.11.2019 refer to DHHN2016.

*) Hydrological primary values calculated according to decision of HPA executive board from 19.04.2016.

Value occurred multiple times in observation period after specified date.

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Hydrological Information 2024

Hydrological Year 2023
01.11.2022 - 31.10.2023

Hamburg - St. Pauli gauge

Prim. values	Year 2023	5-year period 2016 - 2020
HHW	NHN + 3,94 m (14.10.23)	NHN + 5,48 m (29.10.17)
LHW	NHN - 0,44 m (20.10.23)	NHN - 0,07 m (03.01.16)
HLW	NHN + 0,54 m (30.01.23)	NHN + 1,39 m (26.12.16)
LLW	NHN - 3,50 m (20.10.23)	NHN - 3,64 m (18.03.18)
MHW	NHN + 2,17 m	NHN + 2,15 m *)
MLW	NHN - 1,66 m	NHN - 1,66 m *)
MTR	3,83 m	3,81 m

Hamburg - Harburg gauge

Prim. values	Year 2023	5-year period 2016 - 2020
HHW	NHN + 3,98 m (14.10.23)	NHN + 5,53 m (29.10.17)
LHW	NHN - 0,43 m (20.10.23)	NHN - 0,06 m (03.01.16)
HLW	NHN + 0,51 m (30.01.23)	NHN + 1,39 m (26.12.16)
LLW	NHN - 3,42 m (21.10.23)	NHN - 3,41 m (18.03.18)
MHW	NHN + 2,20 m	NHN + 2,20 m
MLW	NHN - 1,67 m	NHN - 1,67 m
MTR	3,87 m	3,87 m

Seemannshöft gauge

Prim. values	Year 2023	5-year period 2016 - 2020
HHW	NHN + 3,88 m (14.10.23)	NHN + 5,40 m (29.10.17)
LHW	NHN - 0,48 m (20.10.23)	NHN - 0,10 m (03.01.16)
HLW	NHN + 0,54 m (30.01.23)	NHN + 1,43 m (26.12.16)
LLW	NHN - 3,45 m (21.10.23)	NHN - 3,55 m (17.03.18)
MHW	NHN + 2,11 m	NHN + 2,08 m
MLW	NHN - 1,61 m	NHN - 1,62 m
MTR	3,72 m	3,70 m

U.F. Blankenese gauge

Prim. values	Year 2023	5-year period 2016 - 2020
HHW	NHN + 3,81 m (14.10.23)	NHN + 5,35 m (29.10.17)
LHW	NHN - 0,52 m (20.10.23)	NHN - 0,11 m (03.01.16)
HLW	NHN + 0,54 m (30.01.23)	NHN + 1,46 m (26.12.16)
LLW	NHN - 3,41 m (21.10.23)	NHN - 3,49 m (17.03.18)
MHW	NHN + 2,03 m	NHN + 2,02 m
MLW	NHN - 1,57 m	NHN - 1,55 m
MTR	3,60 m	3,57 m

Bunthaus gauge

Prim. values	Year 2023	5-year period 2016 - 2020
HHW	NHN + 4,03 m (14.10.23)	NHN + 5,51 m (29.10.17)
LHW	NHN - 0,36 m (20.10.23)	NHN + 0,03 m (03.01.16)
HLW	NHN + 0,59 m (30.01.23)	NHN + 1,43 m (26.12.16)
LLW	NHN - 2,80 m (21.10.23)	NHN - 2,58 m (18.03.18)
MHW	NHN + 2,29 m	NHN + 2,27 m
MLW	NHN - 1,29 m	NHN - 1,31 m
MTR	3,58 m	3,58 m

Schöpfstelle gauge

Prim. values	Year 2023	5-year period 2016 - 2020
HHW	NHN + 3,98 m (14.10.23)	NHN + 5,54 m (29.10.17)
LHW	NHN - 0,42 m (20.10.23)	NHN - 0,01 m (03.01.16)
HLW	NHN + 0,52 m (30.01.23)	NHN + 1,42 m (26.12.16)
LLW	NHN - 3,23 m (21.10.23)	NHN - 3,19 m (18.03.18)
MHW	NHN + 2,22 m	NHN + 2,21 m
MLW	NHN - 1,59 m	NHN - 1,60 m
MTR	3,81 m	3,81 m

Water level data refer to the reference level valid at the time of occurrence. Data since 01.11.2019 refer to DHHN2016.

*) Hydrological primary values calculated according to decision of HPA executive board from 19.04.2016.

Value occurred multiple times in observation period after specified date.

Hydrological Terms

Term	Definition												
NHN = Normalhöhennull (<i>"standard elevation zero"</i>)	Officially defined reference plane for height measurements in the Federal Republic of Germany. Water level data in this information refer to the reference level valid at the time of occurrence. Data since 01.11.2019 refer to DHHN2016.												
SKN = Seekartennull (= Lowest Astronomical Tide, LAT)	Officially defined reference plane for depth measurements at sea and in tidal rivers. Seekartennull (LAT) is defined as the lowest tide level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions. In Hamburg SKN (LAT) has been fixed at NHN - 1.90 m since 01.01.2005.												
KN = Kartennull (= Chart datum, CD)	In the port of Hamburg, Kartennull (KN) exists parallel to SKN (LAT). KN is based on the height of the local MLW (Mean Low Water). Since 01.05.2016 KN has been fixed at NHN -1.60 m.												
PNP = Pegelnullpunkt (= Gauge datum)	Altitude of gauge datum related to Normalhöhennull (NHN). Gauge datum of the tidal gauges within the Hamburg port area since 01.11.2019 are as follows: <table> <tr> <td>St. Pauli</td><td>-500.4 cm NHN (DHHN2016)</td></tr> <tr> <td>Harburg</td><td>-501.5 cm NHN (")</td></tr> <tr> <td>Seemannshöft</td><td>-501.7 cm NHN (")</td></tr> <tr> <td>UF Blankenese</td><td>-501.8 cm NHN (")</td></tr> <tr> <td>Schöpfstelle</td><td>-501.8 cm NHN (")</td></tr> <tr> <td>Bunthaus</td><td>-501.7 cm NHN (")</td></tr> </table>	St. Pauli	-500.4 cm NHN (DHHN2016)	Harburg	-501.5 cm NHN (")	Seemannshöft	-501.7 cm NHN (")	UF Blankenese	-501.8 cm NHN (")	Schöpfstelle	-501.8 cm NHN (")	Bunthaus	-501.7 cm NHN (")
St. Pauli	-500.4 cm NHN (DHHN2016)												
Harburg	-501.5 cm NHN (")												
Seemannshöft	-501.7 cm NHN (")												
UF Blankenese	-501.8 cm NHN (")												
Schöpfstelle	-501.8 cm NHN (")												
Bunthaus	-501.7 cm NHN (")												
HW = High Water	Highest value of the tidal curve between two consecutive LW.												
LW = Low Water	Lowest value of the tidal curve between two consecutive HW.												
TR = Tidal Range	Mean difference in height between HW and the two neighbouring LW.												
MTR = Mean Tidal Range	Average of all tidal ranges observed over a period of one year or several years.												
HHW = Highest High Water	Highest observed HW (in a period of time).												
LHW = Lowest High Water	Lowest observed HW (in a period of time).												
MHW / MLW = Mean High Water / Mean Low Water	Average of all daily tidal high (or low) water levels observed over a period of one year or several years.												
HLW = Highest Low Water	Highest observed LW (in a period of time).												
LLW = Lowest Low Water	Lowest observed LW (in a period of time).												
Tmw = Tidemittelwasser (= Mean Tide Level, MTL)	Water level of the horizontal gravity line of a tidal curve. MTmw (MTL) at Hamburg - St. Pauli for the period 2016 - 2020 is NHN +0,37 m. MTL corresponds to MSL (Mean Sea Level).												

Attachment

Hydrological Information 2024 (Hydrological Year 2023)

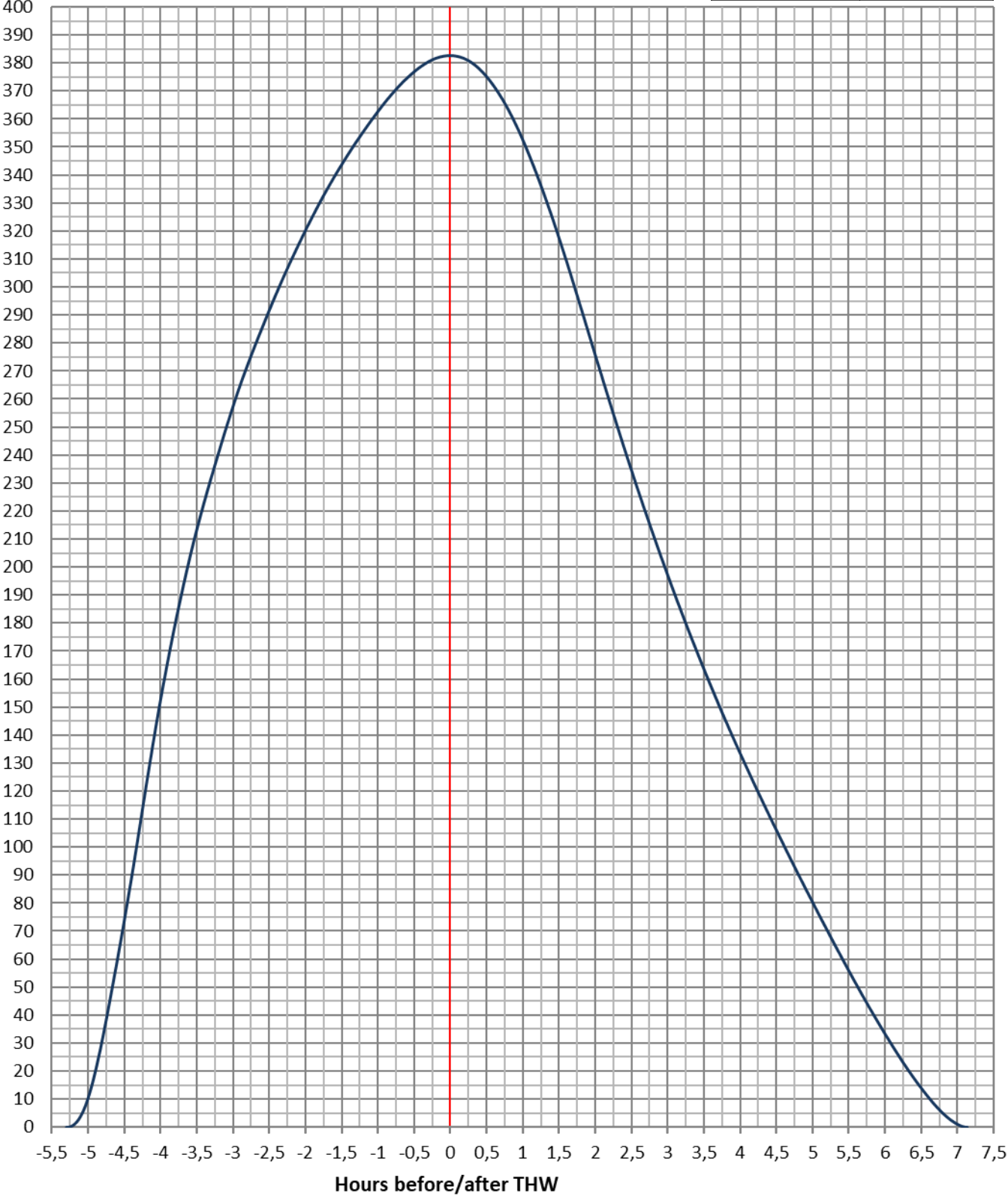
- Fig. 1: Mean tide curve Hamburg - St. Pauli gauge, hydrological year 2023
- Fig. 2: Mean High Water, Mean Low Water and Mean Tidal Range at Hamburg - St. Pauli gauge since 1950
- Fig. 3: Mean annual number of tides above or below specified water levels
- Fig. 4a: Elbe runoff at Neu Darchau gauge:
Annual mean values since 1990
- Fig. 4b: Elbe runoff at Neu Darchau gauge:
Monthly mean values 2023 and long-term monthly mean values
- Fig. 5: Number of storm surges at Hamburg - St. Pauli gauge since 1951
- Fig. 6: Reference horizons and hydrological parameters in the port of Hamburg (Hamburg - St. Pauli gauge)

Fig. 1

Mean tide curve at **St. Pauli gauge**
Hydrological year: **2023**

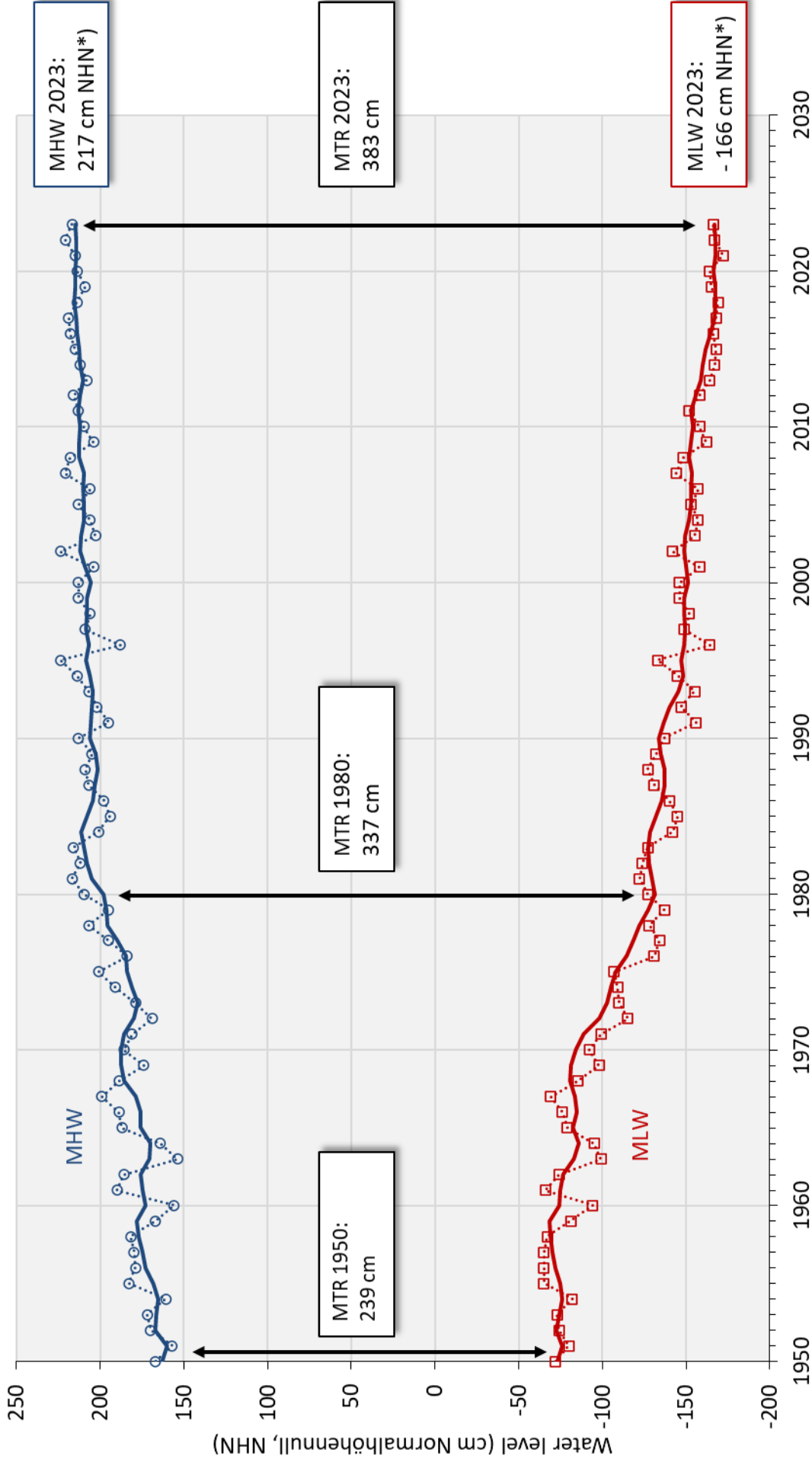
Parameters:	
MTR:	3,83 m
MHW:	2,17 m NNH
MLW:	-1,66 m NHN
Flood period:	318 Min
Ebb period:	428 Min

[cm] Tidal range above MLW



MHW, MLW and MTR at Hamburg-St. Pauli gauge since 1950
- Annual mean values and 5-year mean values -

Fig. 2



*) Hydrological primary values (Mean 2016-2020): MHW 215 cm NHN, MLW -166 cm NHN, MTR 381 cm

Fig. 3

Mean annual number of tides above or below specified water levels

Hamburg - St. Pauli gauge

HW Water Level (m NHN)	Number of Exceedances per Year	Frequency (%)
2,20	279,0	39,53%
2,40	146,4	20,74%
2,60	76,5	10,83%
2,80	41,6	5,89%
3,00	24,2	3,42%
3,20	14,2	2,00%
3,40	9,5	1,34%
3,60	6,4	0,91%
3,80	3,9	0,55%
4,00	2,7	0,38%
4,20	1,7	0,23%

Data Basis: 2004 - 2023 (20 Years)

Hamburg - Harburg gauge

LW Water Level (m NHN)	Number of Underruns per Year	Frequency (%)
-1,60	459,8	65,16%
-1,70	375,4	53,20%
-1,80	288,7	40,92%
-1,90	196,2	27,81%
-2,00	125,1	17,73%
-2,10	71,3	10,10%
-2,20	41,9	5,94%
-2,30	23,4	3,32%
-2,40	14,6	2,07%
-2,50	9,6	1,36%
-2,60	6,1	0,86%

Data Basis: 2014 - 2023 (10 Years)

HW Water Level (m NHN)	Number of Exceedances per Year	Frequency (%)
2,20	330,4	46,82%
2,40	183,1	25,94%
2,60	96,6	13,69%
2,80	51,4	7,28%
3,00	29,5	4,17%
3,20	16,6	2,35%
3,40	10,7	1,52%
3,60	7,6	1,08%
3,80	4,8	0,67%
4,00	3,1	0,43%
4,20	1,9	0,27%

Data Basis: 2004 - 2023 (20 Years)

LW Water Level (m NHN)	Number of Underruns per Year	Frequency (%)
-1,60	454,3	64,38%
-1,70	369,8	52,41%
-1,80	279,4	39,60%
-1,90	185,9	26,35%
-2,00	113,8	16,13%
-2,10	62,6	8,87%
-2,20	35,3	5,00%
-2,30	19,7	2,79%
-2,40	11,4	1,62%
-2,50	7,7	1,09%
-2,60	5,2	0,74%

Data Basis: 2014 - 2023 (10 Years)

Seemannshöft gauge

HW Water Level (m NHN)	Number of Exceedances per Year	Frequency (%)
2,20	242,6	34,37%
2,40	122,8	17,40%
2,60	63,7	9,03%
2,80	35,6	5,04%
3,00	20,3	2,87%
3,20	12,4	1,76%
3,40	8,5	1,20%
3,60	5,6	0,79%
3,80	3,4	0,48%
4,00	2,1	0,30%
4,20	1,4	0,20%

Data Basis: 2004 - 2023 (20 Years)

LW Water Level (m NHN)	Number of Underruns per Year	Frequency (%)
-1,60	395,3	56,02%
-1,70	309,0	43,79%
-1,80	217,5	30,82%
-1,90	139,9	19,83%
-2,00	80,4	11,39%
-2,10	46,8	6,63%
-2,20	26,2	3,71%
-2,30	15,9	2,25%
-2,40	10,2	1,45%
-2,50	6,6	0,94%
-2,60	4,8	0,68%

Data Basis: 2014 - 2023 (10 Years)

U.F. Blankenese gauge

HW Water Level (m NHN)	Number of Exceedances per Year	Frequency (%)
2,20	197,8	28,03%
2,40	101,3	14,35%
2,60	52,5	7,43%
2,80	30,2	4,28%
3,00	16,8	2,37%
3,20	10,9	1,54%
3,40	7,5	1,06%
3,60	4,6	0,65%
3,80	3,1	0,44%
4,00	2,0	0,28%
4,20	1,2	0,17%

Data Basis: 2004 - 2023 (20 Years)

LW Water Level (m NHN)	Number of Underruns per Year	Frequency (%)
-1,60	353,0	50,03%
-1,70	261,4	37,05%
-1,80	174,3	24,70%
-1,90	106,6	15,11%
-2,00	62,0	8,79%
-2,10	35,8	5,07%
-2,20	20,1	2,85%
-2,30	11,5	1,63%
-2,40	8,5	1,20%
-2,50	5,8	0,82%
-2,60	3,9	0,55%

Data Basis: 2014 - 2023 (10 Years)

Bunthaus gauge

HW Water Level (m NHN)	Number of Exceedances per Year	Frequency (%)
2,20	407,4	57,73%
2,40	248,2	35,17%
2,60	132,1	18,72%
2,80	69,9	9,90%
3,00	39,2	5,55%
3,20	22,5	3,18%
3,40	13,6	1,93%
3,60	8,8	1,25%
3,80	6,1	0,86%
4,00	3,8	0,54%
4,20	2,5	0,35%

Data Basis: 2004 - 2023 (20 Years)

LW Water Level (m NHN)	Number of Underruns per Year	Frequency (%)
-1,60	105,2	14,91%
-1,70	51,1	7,24%
-1,80	23,4	3,32%
-1,90	12,0	1,70%
-2,00	7,8	1,11%
-2,10	5,0	0,71%
-2,20	2,5	0,35%
-2,30	1,5	0,21%
-2,40	1,3	0,18%
-2,50	0,5	0,07%
-2,60	0,3	0,04%

Data Basis: 2014 - 2023 (10 Years)

Schöpfstelle gauge

HW Water Level (m NHN)	Number of Exceedances per Year	Frequency (%)
2,20	345,1	48,89%
2,40	195,1	27,64%
2,60	103,1	14,60%
2,80	54,0	7,65%
3,00	31,2	4,41%
3,20	17,4	2,47%
3,40	11,1	1,57%
3,60	7,5	1,06%
3,80	4,8	0,68%
4,00	3,2	0,45%
4,20	1,9	0,27%

Data Basis: 2004 - 2023 (20 Years)

LW Water Level (m NHN)	Number of Underruns per Year	Frequency (%)
-1,60	386,0	54,71%
-1,70	291,1	41,26%
-1,80	192,3	27,25%
-1,90	114,8	16,27%
-2,00	60,8	8,62%
-2,10	33,9	4,80%
-2,20	18,5	2,62%
-2,30	10,1	1,43%
-2,40	7,1	1,01%
-2,50	5,0	0,71%
-2,60	3,0	0,43%

Data Basis: 2014 - 2023 (10 Years)

Information on the frequency of occurrence of even higher or lower water levels should only be provided on the basis of separate long-term statistical evaluations including historical data.
If required, please contact hydrologie@hpa.hamburg.de.

Linear extrapolation and interpolation of the table values is not appropriate.

Number of storm surges at Hamburg - St. Pauli gauge since 1951

Fig. 4

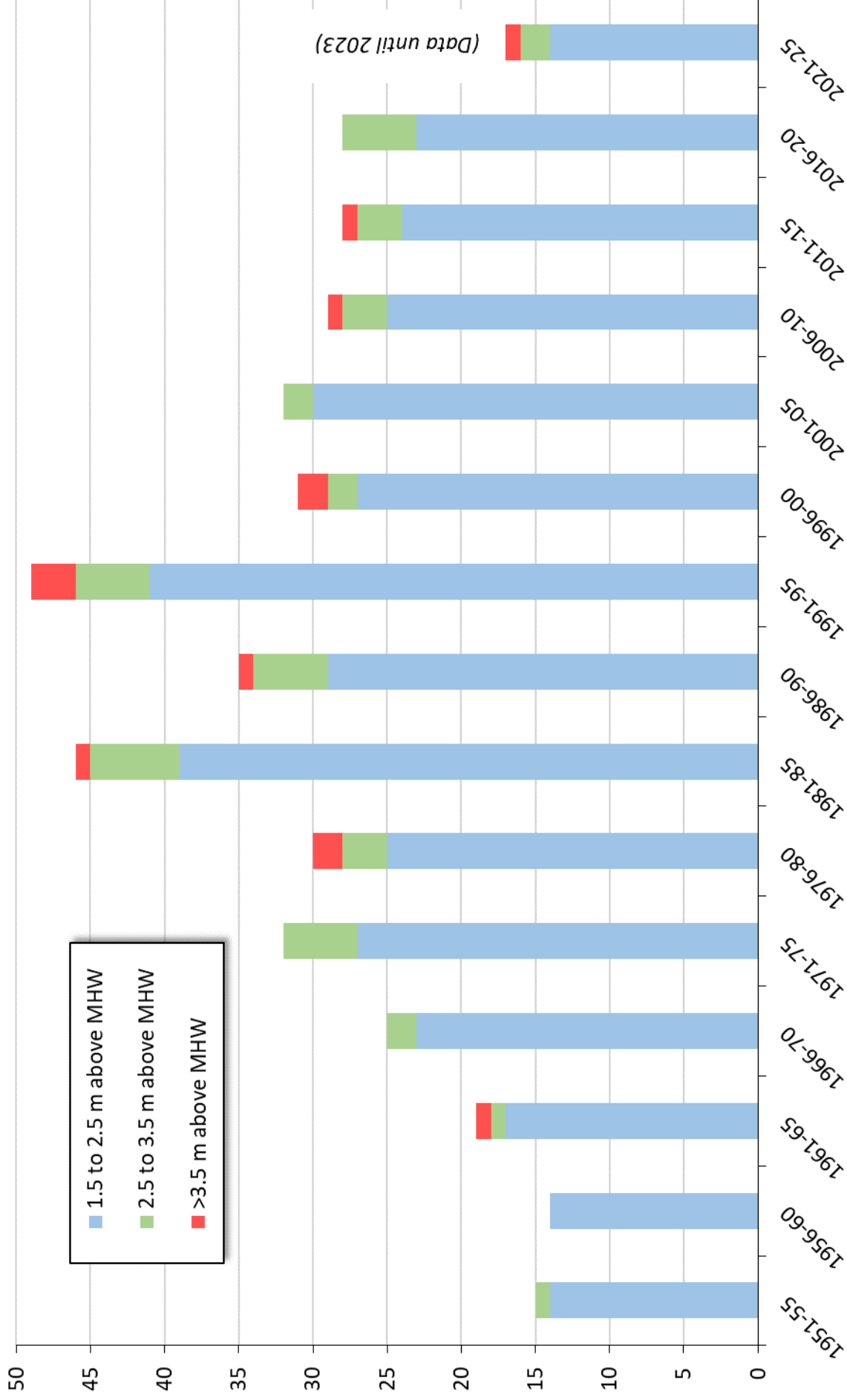


Fig. 5a and 5b

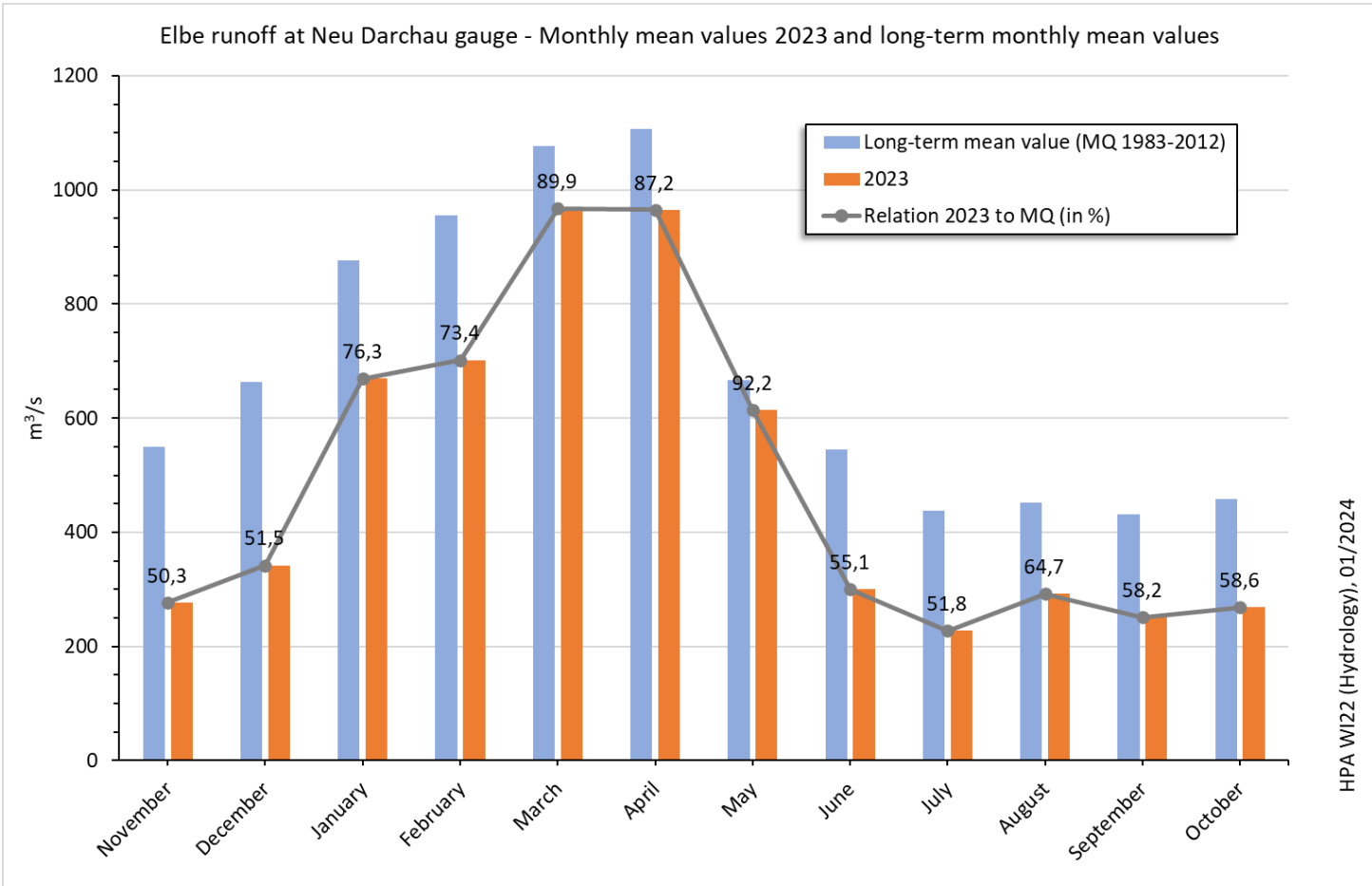
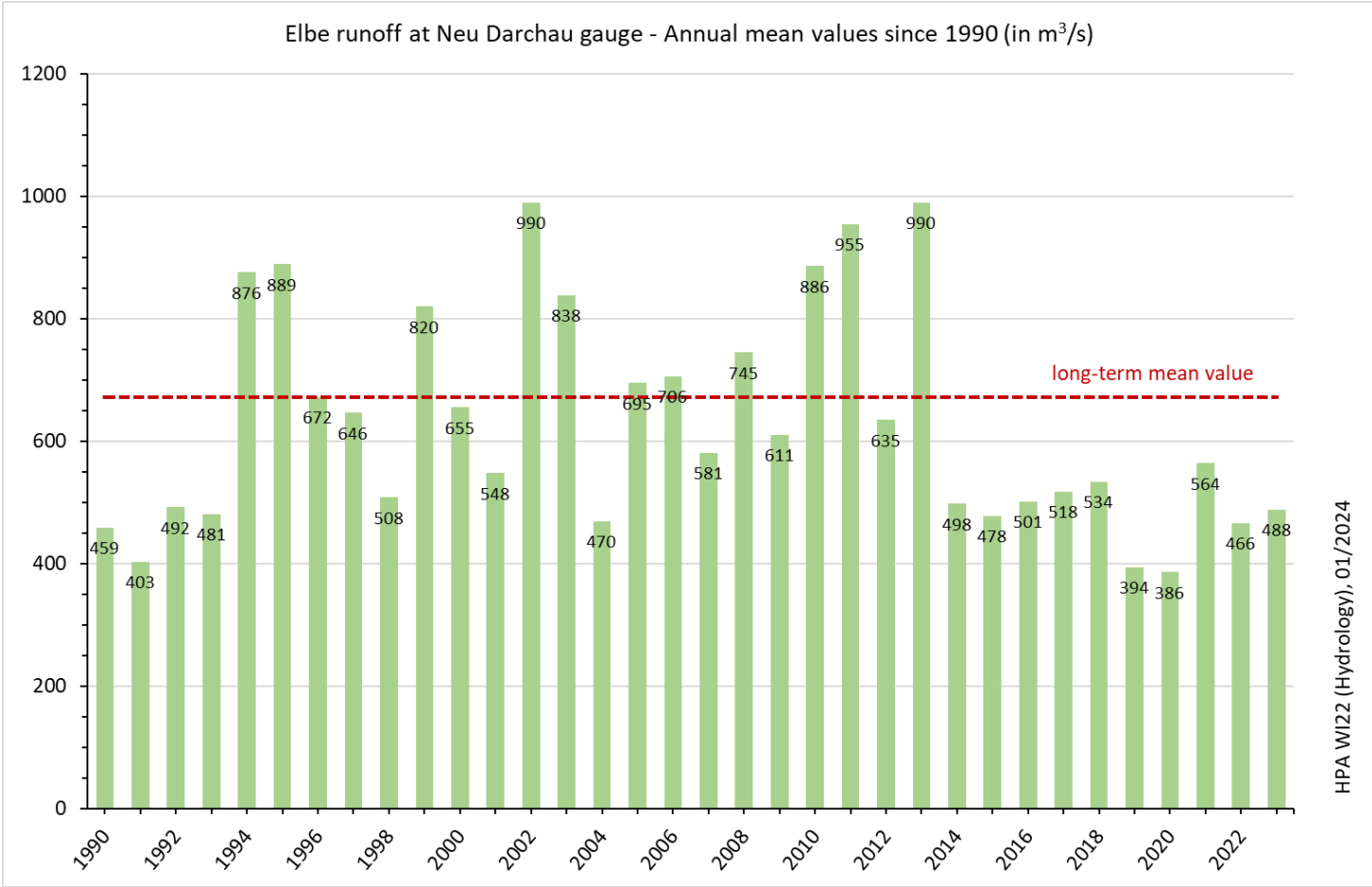


Fig. 6

Reference horizons and hydrological parameters
in the port of Hamburg (St. Pauli gauge)

Status: January 2024

