
Content

1	Introduction	1
1.1	Research questions	8
1.2	Structure of this work	9
2	Study Area	12
3	Data sets	15
3.1	General remarks	15
3.2	Data used in Part I	18
3.3	Data used in Part II	21
3.4	Data used in Part III	21
	How to estimate comparable, robust and consistent return water levels on regional scales?	23
4	Motivation	24
5	Theoretical background	27
5.1	Detrending	28
5.2	Sampling	30
5.3	Parameter estimation	34
5.4	Theoretical distribution	34
5.5	Empirical distribution	35
5.6	Return level assessment	36
6	Method set-up and results	37
6.1	Detrending	37
6.2	Sampling	38
6.2.1	Block maxima method	38
6.2.2	POT method	40
6.2.3	Declustering	45
6.3	Distribution	46
7	Transferability	49

Content	VIII	
8	Summary and discussion	53
9	Key findings of Part I	56
	How to estimate return water levels in un-gauged areas?	57
10	Motivation	58
11	Regionalization	60
11.1	Principle of the method	60
11.2	Identification of homogeneous regions	62
11.3	Regional distribution	64
11.4	Choice of appropriate regions	66
12	Alternative regionalization approach	69
12.1	Model configuration	69
12.2	Model calibration	71
12.3	Bias-correction	73
12.4	Validation	76
13	Extreme value analysis	78
14	Summary and discussion	81
15	Key findings of Part II	83
	How does sea level rise affect extreme water levels?	85
16	Motivation	86
16.1	General	86
16.2	Observed changes in storm surge water levels	86
16.3	Investigations on possible future changes in extreme water levels	88
16.4	Objectives of this study	90
17	Changes in potential driving factors	92
17.1	Tidal changes	92
17.2	Changes in atmospheric forcing	93
17.3	Mea sea level changes	95
18	Analytical assessment	97

18.1	Processes involved	98
19	Methodology	104
19.1	Numerical model	104
19.2	Model specifications	104
19.3	Tidal analysis	107
19.4	Extreme water level assessment	109
20	Results	110
20.1	Changes in high water levels due to SLR	110
20.2	Changes in high water occurrence times due to SLR	112
20.3	Spatial appearance of changes	112
20.4	Changes in high water level distributions	113
20.5	Changes in tidal constituents	117
20.6	Impact on EVA	119
21	Summary and discussion	123
22	Key findings of Part III	125
23	Overall summary and conclusions	126
24	Recommendations for further research	130
	References	135
A	Appendix	157
B	Appendix	162
C	Appendix	164
D	Appendix	170