remote sensing

Supplementary Material for

Land Subsidence Phenomena Vs Coastal Flood Hazard - The Cases of Messolonghi and Aitolikon (Greece)

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Pdf Supplementary Material (SM) for the manuscript includes:

(a) **(b)**

Figure S1. Ground water level contour lines for (a) October 2005 and (b) April 2006. Produced by evaluating the raw data coming from the study of Lemesios (2006) [42].

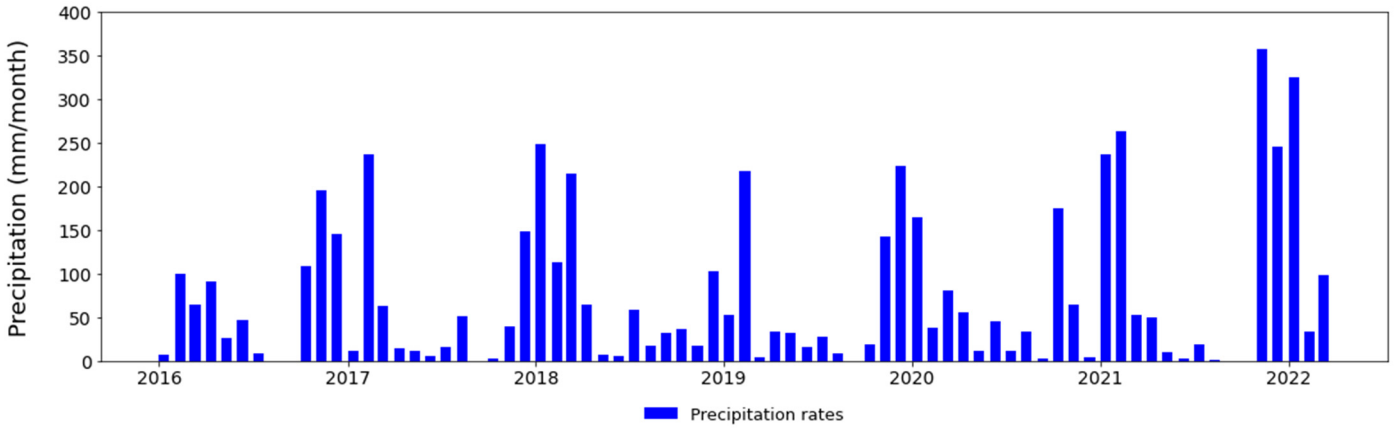


Figure S2. Monthly precipitation rates recorded by the Aitolikon weather station [63]. Each blue bar represent the precipitation rates for 1 month

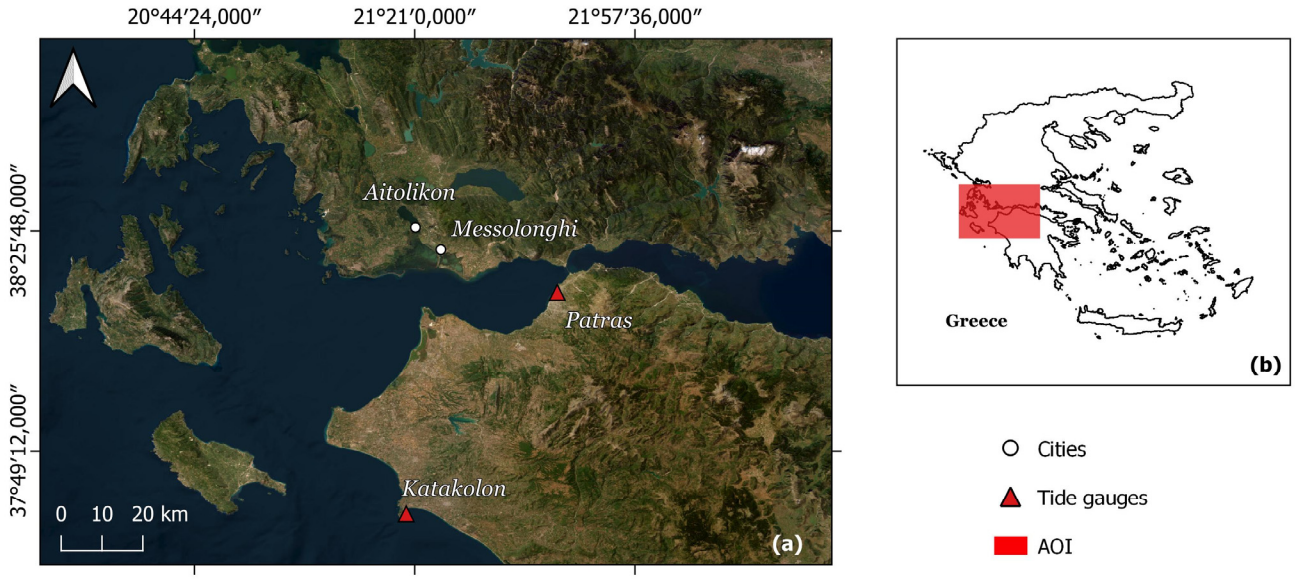


Figure S3. Patra and Katakolon tidal gauges locations.

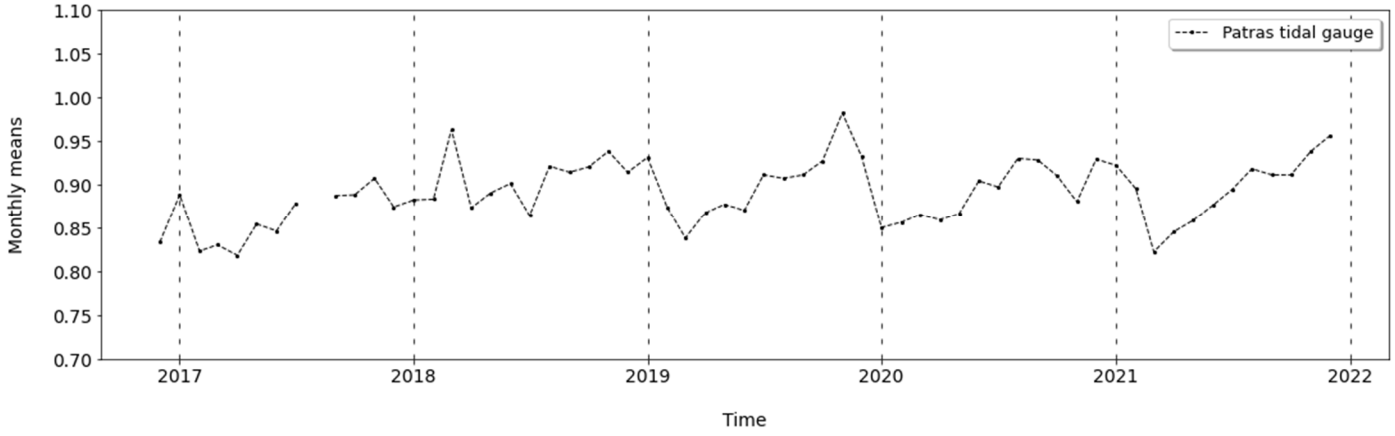
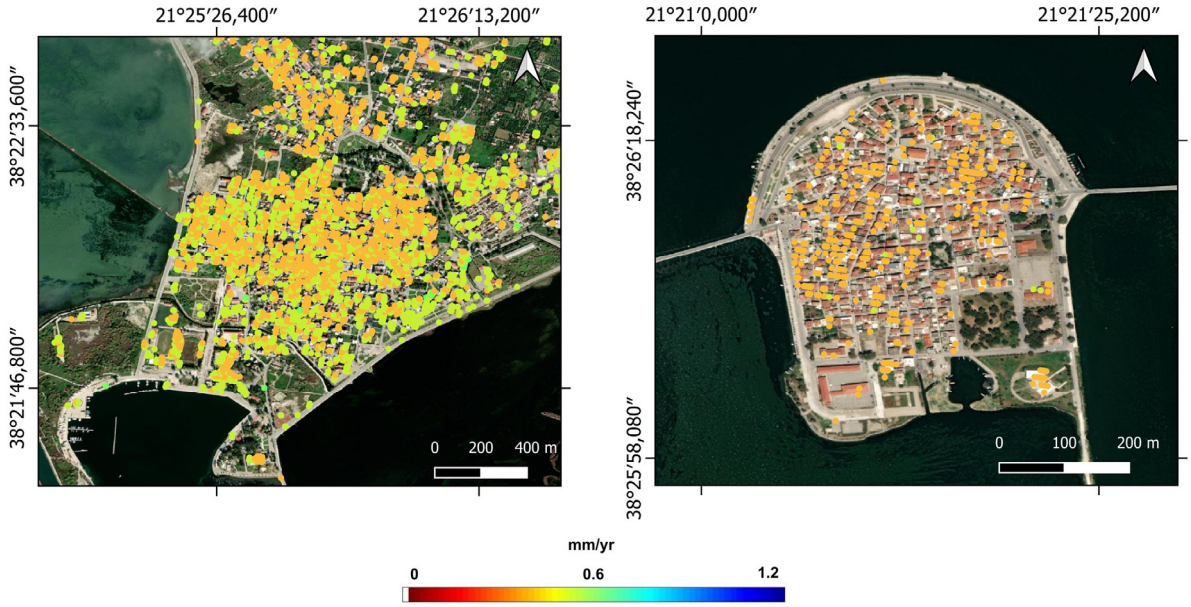
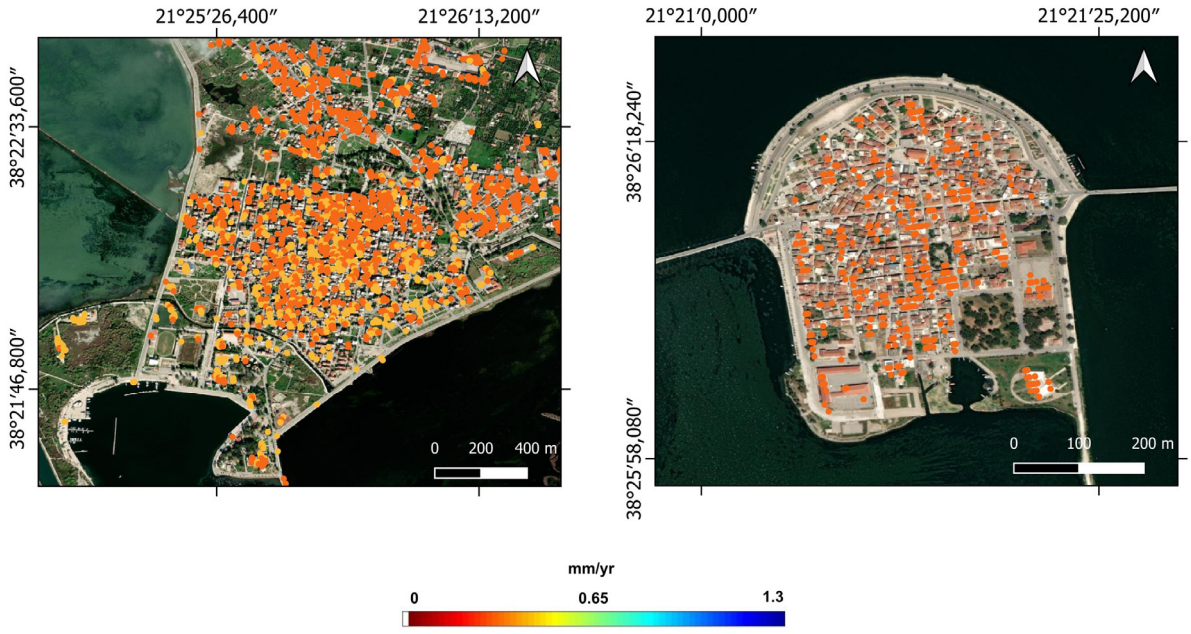


Figure S4. Patra's tidal gauge timeseries.



(a)



(b)

Figure S5. Standard deviation values for the (a) descending & (b) ascending track.

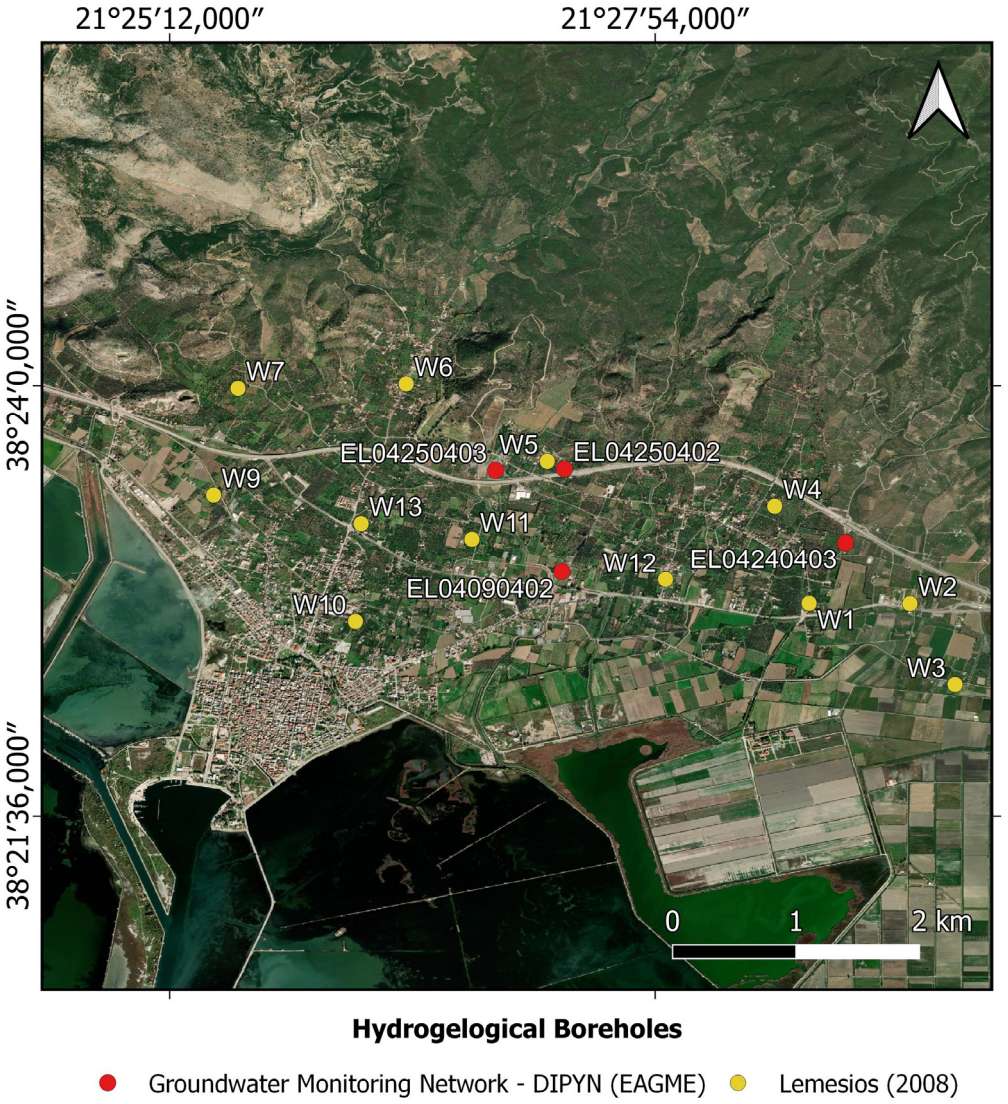
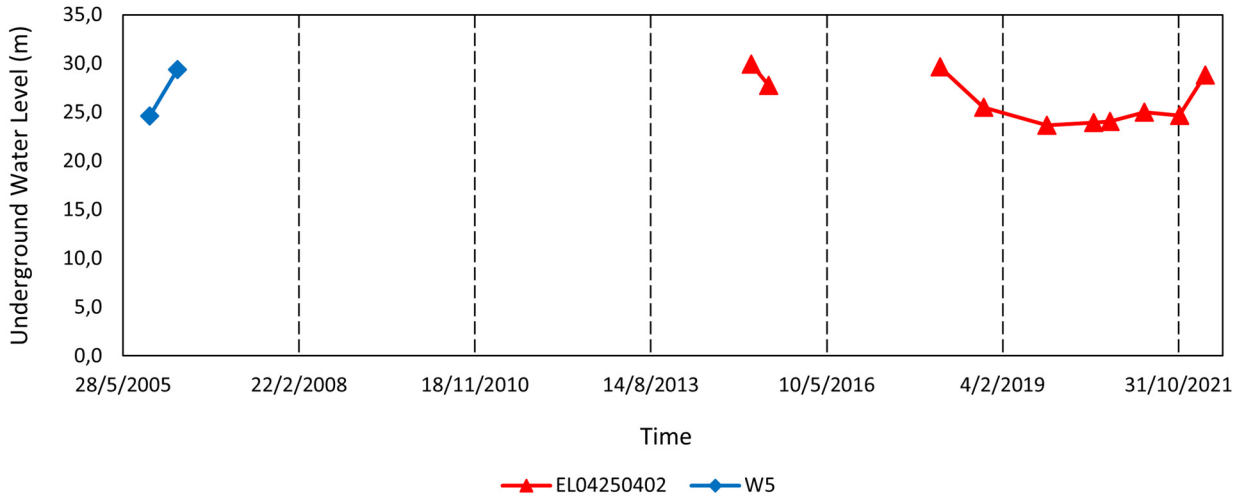
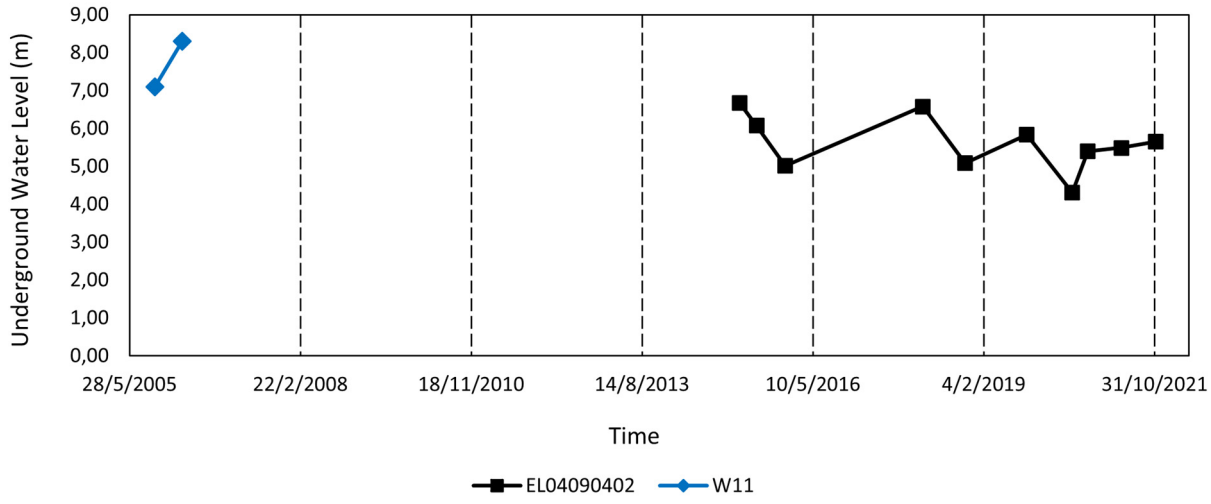


Figure S6. The location of the boreholes used by Lemesios (2006) [42] at 2005-2006 (yellow dots) and since 2015 by HSGME (red dots) [72].



(**a**)



(**b**)

Figure S7. (a) Ground water level for boreholes EL04250402 and W5 (b) Ground water level for boreholes EL04090402 and W11.

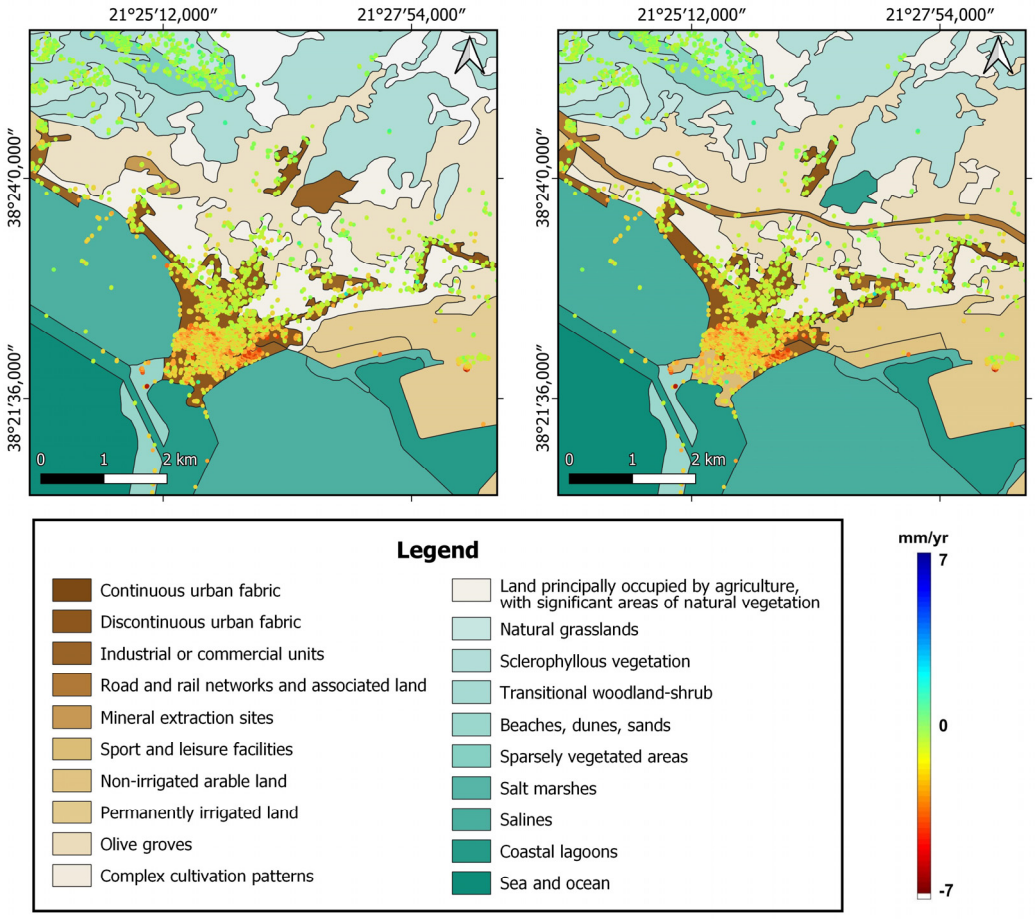


Figure S8. (a) Land use for the greater area of Messolonghi in 2006 and descending track LOS displacements (b) Land use for the greater area of Messolonghi in 2018 and descending track LOS displacements.

Table S1. Physical and mechanical properties of Silt and Silty Sand foundation formations of Messolonghi.

	Silt			**Silty Sand**		
	Unified Soil Classification System (USCS) classification					
	CL, ML					
	Min	Average	Max	Min	Average	Max
	Physical Parameters					
Liquid Limit, LL (%)	22.8	24.6	27.8	-	30.4	-
Plasticity Limit, PL (%)	5.6	14.7	16.4	-	18	-
Sat. unit weight, γ (kN/m^3)	20.3	20.7	21.4	-	20.3	-
	Mechanical Parameters					
Initial void ration, e	-	-	-	-	-	-
Compression index, C_c	-	-	-	0.16	0.334	0.467
	Shear Box Test					
Cohesion, c (kN/m^2)	-	-	-	-	-	-
Friction angle, φ	-	-	-	-	-	-
	Standard Penetration Test					
N_{SPT}	16	21	31	-	16	-

Table S2. Physical and mechanical properties of Silty Clay and Sandy Clay foundation formations of Messolonghi.

	Silty Clay			**Sandy Clay**		
	Unified Soil Classification System (USCS) classification					
	CL, ML					
	Min	Average	Max	Min	Average	Max
	Physical Parameters					
Liquid Limit, LL (%)	26	33.9	39	-	31.7	-
Plasticity Limit, PL (%)	17	17.8	19	-	15	-
Sat. unit weight, γ (kN/m^3)	18.5	19.5	20.3	-	-	-
	Mechanical Parameters					
Initial void ration, e	-	0.8	-	1	-	0.84
Compression index, C_c	0.286	0.318	0.373	0.328	-	0.187
UC Strength, q_u (kPa)	-	-	-	-	-	0.84
	Shear Box Test					
Cohesion, c (kN/m^2)	-	-	-	1.89	7.82	17.76
Friction angle, φ	-	-	-	3.7	13	22.1
	Standard Penetration Test					
N_{SPT}	-	-	-	-	17	-

Table S3. Hydrogeological boreholes data from HSGME and Lemesios (2006).

HSGME			Lemesios (2006)		
Date	**Borehole code**	**Water level (m)**	**Date**	**Borehole code**	**Water level (m)**
9/3/2015	EL04090402	6.68	24/10/2005	W5	24.6
15/6/2015	EL04090402	6.08	1/4/2006	W5	29.4
30/11/2015	EL04090402	5.01	24/10/2005	W11	7.1
12/2/2018	EL04090402	6.58	1/4/2006	W11	8.3
18/10/2018	EL04090402	5.09			
14/10/2019	EL04090402	5.84			
6/7/2020	EL04090402	4.31			
5/10/2020	EL04090402	5.40			
19/4/2021	EL04090402	5.49			
5/11/2021	EL04090402	5.65			
9/3/2015	EL04250402	29.9			
15/6/2015	EL04250402	27.7			
12/2/2018	EL04250402	29.6			
18/10/2018	EL04250402	25.5			
14/10/2019	EL04250402	23.6			
6/7/2020	EL04250402	23.9			
5/10/2020	EL04250402	24.0			
19/4/2021	EL04250402	25.0			
5/11/2021	EL04250402	24.7			
1/4/2022	EL04250402	28.8			

Table S4. Patras tidal gauge data for the 2017-2022 period [59].

Date	Monthly means (m)	Date	Monthly means (m)
1/2017	0.888	7/2019	0.911
2/2017	0.823	8/2019	0.907
3/2017	0.83	9/2019	0.911
4/2017	0.818	10/2019	0.927
5/2017	0.854	11/2019	0.982
6/2017	0.846	12/2019	0.932
7/2017	0.878	1/2020	0.85
8/2017	-	2/2020	0.856
9/2017	0.887	3/2020	0.865
10/2017	0.888	4/2020	0.859
11/2017	0.907	5/2020	0.866
12/2017	0.874	6/2020	0.904
1/2018	0.882	7/2020	0.897
2/2018	0.883	8/2020	0.93
3/2018	0.963	9/2020	0.928
4/2018	0.873	10/2020	0.91
5/2018	0.89	11/2020	0.88
6/2018	0.901	12/2020	0.929
7/2018	0.864	1/2021	0.922
8/2018	0.921	2/2021	0.895
9/2018	0.914	3/2021	0.822
10/2018	0.92	4/2021	0.845
11/2018	0.938	5/2021	0.858
12/2018	0.914	6/2021	0.876
1/2019	0.931	7/2021	0.894
2/2019	0.873	8/2021	0.918
3/2019	0.838	9/2021	0.911
4/2019	0.867	10/2021	0.911
5/2019	0.877	11/2021	0.938
6/2019	0.87	12/2021	0.956