

An assessment of sea level trends in Greek waters during the last three decades.

G. Alexandrakis and S. E. Poulos

Faculty of Geology and Geoenvironment, Department of Geography and Climatology, National and Kapodistrian University of Athens, University Campus Zografou, 15784, Athens, Greece

Data and methodology

Monthly values of sea level data, from 6 tide gauge stations (figure 1) of the Hydrographic Service of the Hellenic Navy for the period 1979-2007, have been used in the analysis concerning the interannual variability of sea level in the Greek Seas. The analysis was made by plotting the data and assuming that no substantial vertical displacement of the tide gauges have been taken place (either by local tectonic activity and/or human interference). Average annual values for each station are presented in table 1 and figure 2.

Table 1: Mean Annual values for the sea level in the examined stations

Year	Siros	Lefkada	Alexandroupoli	Thessaloniki	Katakolo	Heraklion
1979	0,65	0,49	0,68	0,84	0,54	0,35
1980	0,64	0,61	0,73	-	0,51	0,30
1981	0,70	0,45	0,70	0,91	0,53	0,43
1982	0,65	0,38	0,67	0,88	0,51	0,35
1983	0,62	0,36	0,65	0,84	0,49	0,29
1984	0,66	0,37	0,68	0,85	0,47	0,39
1985	0,62	0,40	0,57	0,79	0,50	0,41
1986	0,64	0,43	0,67	0,83	0,47	0,44
1987	0,65	0,44	0,69	0,85	0,49	0,34
1988	0,64	0,42	0,69	0,84	0,52	0,43
1989	0,62	0,42	-	0,81	0,49	0,43
1990	0,62	0,42	0,62	0,85	0,46	0,50
1991	0,57	0,44	0,66	0,86	-	0,47
1992	0,56	0,42	0,67	0,84	0,43	0,52
1993	0,48	0,43	0,71	0,83	0,44	-
1994	0,53	0,47	0,65	0,89	0,49	-
1995	0,54	0,45	0,67	0,92	0,50	-
1996	0,56	0,43	0,69	0,90	0,55	0,48
1997	0,54	0,44	0,69	0,90	0,53	0,51
1998	0,57	0,45	0,71	0,93	0,53	0,51
1999	0,63	0,47	0,72	0,97	0,54	0,48
2000	0,60	0,47	0,69	0,91	0,51	0,52
2001	0,61	0,50	0,72	0,92	0,57	0,49
2002	0,60	0,53	0,78	0,93	0,54	0,48
2003	0,57	0,56	0,76	0,93	0,57	0,56
2004	0,56	0,62	0,75	0,93	0,57	0,50
2005	0,57	0,61	0,75	0,94	0,58	0,52
2006	0,57	0,47	0,70	0,94	0,56	0,49
2007	0,55	0,44	0,68	0,92	0,53	0,48
Average	0,60	0,46	0,69	0,87	0,50	0,42

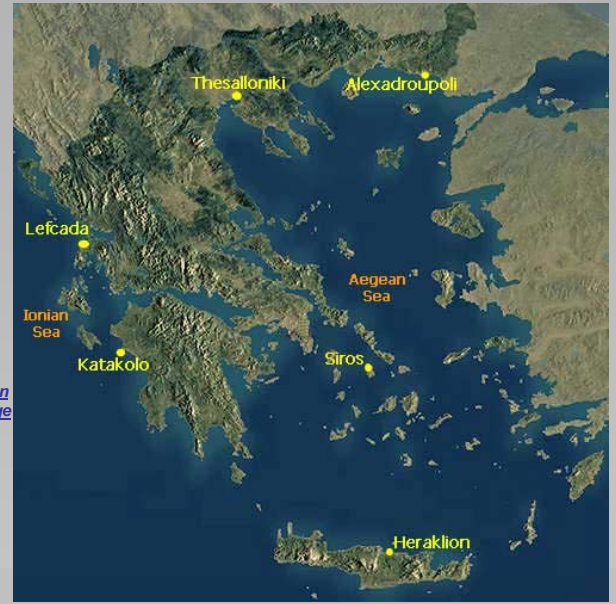


Figure 1: Location of the 6 tide gauge stations

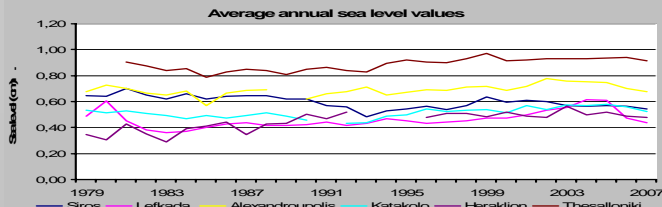


Figure 2: Average annual values for the sea level in the examined stations

Results and Discussion

A constant rising trend of sea level was found in all stations, with magnitudes up to 12 cm. Katakolo presents the smallest value (5cm), Alexandroupoli and Thessaloniki show the same rise of 8cm, while Heraklion and Lefkada present a rise of 12cm and 11cm, respectively. Sea level at the gauge station of Siros seems to be stable until 1992, while for the following period, from 1992 to 2007, shows a rise of 6cm (figure 3).

The gauge stations in the Aegean present a mean rate of sea level rise of 2,2mm/year and those in the Ionian Sea of 1,7mm/year. This difference may be explained by the morphological differences between the "semi enclosed" Aegean Sea compared to the open Ionian Sea, the water influx (riverine inputs and the Black Sea waters) and the overall offshore circulation pattern. Furthermore, the observed increasing annual rates, being higher than the -1mm/year which has been estimated by Lambeck's glacio-hydro-isostatic model for the past 18,000 years in the case of the Aegean Sea (Lambeck,1995 & 1996), could be attributed partially to climatic change.

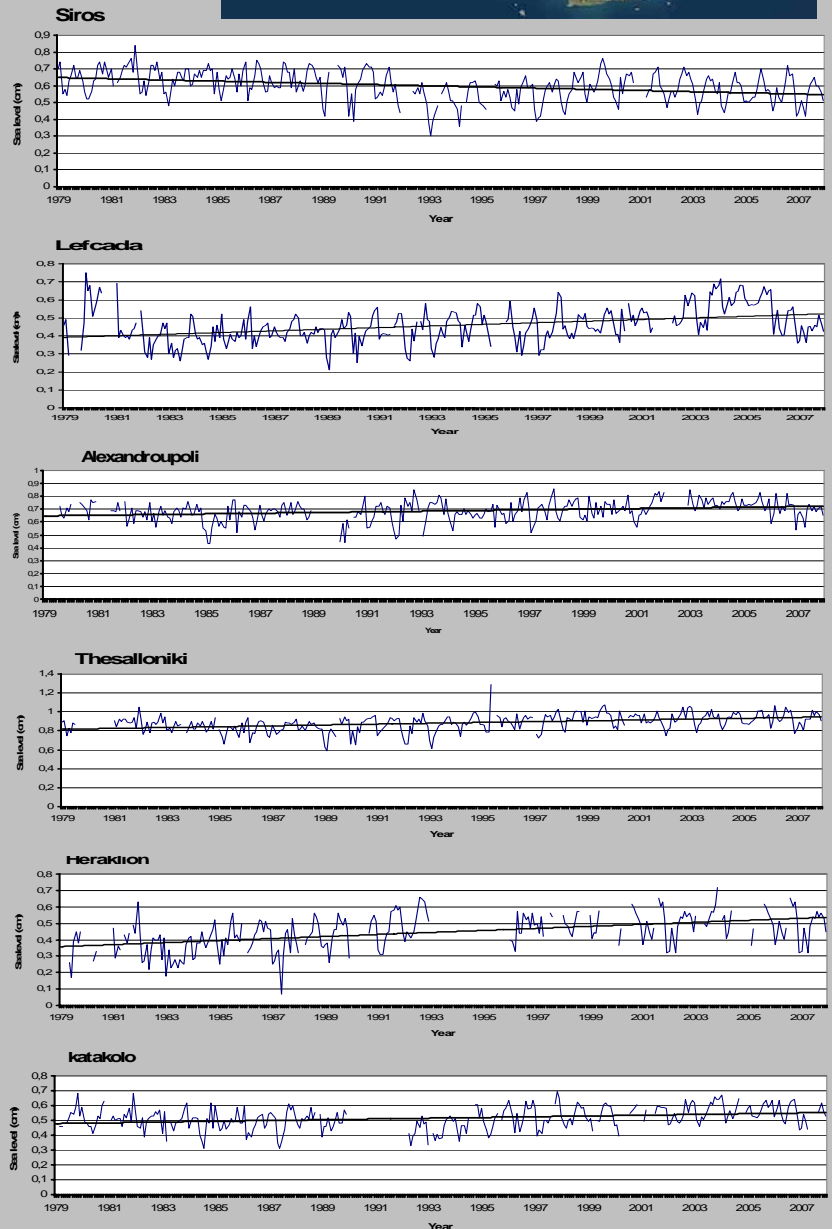


Figure 3: Monthly sea level values for the period 1979-2007