General answer to reviewer 3.

We thank Reviewer 3 for her/his comments on our manuscript. Here below are our replies to her/his major concerns (see items 1 to 5 below) and the description of the added material that we have produced for properly addressing them. Some of these concerns/suggestions are shared by reviewer 1, particularly on the need of more explanations describing a) the role of the wind and b) the link to anticyclones. In fact, we present here some new material to address these two issues, which is also present in our answers to reviewer 1:

1) **The reviewer is concerned on the motivation for the selection of 100 samples, their representativeness and the possibility of splitting the overall sampling in different subsets.**
We admit that *"The selection of 100 hundred events is a subjective decision. Considering that hindcast covers 22 years, this corresponds to an approximate average of 5 events per year. In the case of Venice this is close to the 80th percentile of the surge events (Lionello et al, 2012*). Empirical tests have shown that results do not appreciably change using a smaller sample."*
This sentence has to be added to the data and methods section.
Splitting the samples in subsets using statistical techniques such as PCA or clustering is certainly a possibility. However, in our study *"the internal variability of the sample is explored considering the analysis of the cyclogenesis, which allow to distinguish the different evolutions of cyclones. We have adopted this process-oriented approach. In our opinion, it is very plausible that PCA or clustering of the trajectories would have produced very similar outcomes. We admit that this approach might hide some aspects of the internal variability of the sample related to different synoptic patterns at the time of the SLAs, which might be worth to explore in a future studies for those stations where this issue would eventually result significant."* This paragraph will be added to the "Discussion and conclusion" section

*Lionello P, Cavaleri L, Nissen KM, Pino C, Raicich F, Ulbrich U (2012) Severe marine storms in the Northern Adriatic: Characteristics and trends. *Phys Chem Earth*, 40-41:93-105, doi:10.1016/j.pce.2010.10.002

2) We confirm that the composites of Figures 4 & 5 show (for each station) average values of MSLP fields from all events. Analogously, composites in Figures 11 and 12 show the average value of the anomaly and its components (Inverse barometer effect and residual). A further column has been added with the composites of the wind fields.

3) Reviewer suggests to add more details about the cyclone characteristics because it is unclear what is the largest MSLP that can be associated to a cyclone center, or what the differences between shallow and depth cyclones are.
Indeed, the adopted tracking algorithm provides further information that it is useful to add. We have prepared four tables (Tables SuM1-SuM4, see below) that show for each cyclogenesis area the mean values of the central SLP minimum and of the depth of the cyclone with the respective standard deviations. We mean to add them a supplementary material. The results show that cyclones generated over the Atlantic are deeper and with a lower central SLP minimum than those generated in other areas.

4) The reviewer asks for analyzing the link of negative SLAS with high pressure systems
A new figure (see below figure new1) has been produced that describes the role of anticyclones and a new table (see table new1 below) have been produced. "*Figure new1 shows the centers of anticyclones at the time of negative SLAs. It is made following the same procedure that has been used for figure 6, which refers to cyclones. It reveals the location of centers of anticyclones in the areas where figure 5 shows high pressure systems. Anticyclones are actually concentrated around the stations, with the exception of Gabes and, to a lesser degree, Trieste, where the wind effect is much larger than the inverse barometer effect and anticyclones play a minor role. Therefore, negative SLAs are linked to the presence of a high pressure around the station. This is necessarily true for most stations, because of the inverse barometer effect. However (see table new1), the probability to find an anticyclone at a distance lower than 10 degrees from the reference position* at the time of negative SLAs is significantly larger than the climatological value only for three stations (Toulon, Thessaloniki, Iskenderun). On the contrary, in Gabes, the absence of an anticyclone is linked to negative SLAs (and this is justified by the dominant role of the wind at this station). The link with the presence of a cyclone*

in the part of the basin opposite to the station (table 3) is stronger than what shown in table new1 for anticyclones." This explanation will be added to the manuscript at the end of section 3.4.

Further, we will extend the sentence at lines 5-8 of the abstract as it follows: *"The inverse barometer effect produces a positive anomaly at the coast near the cyclone pressure minimum and a negative anomaly at the opposite side of the Mediterranean Sea, because a cross-basin mean sea level pressure gradient is associated to the presence of a cyclone. This often coincides with the presence of an anticyclone above the station, which causes local negative inverse barometer effect"*

We clarify that we are not denying that high pressure leads to a negative sea level because of the inverse barometer effect and our study clearly supports its importance. The fifth paragraph at the beginning of this answers has to be added to the conclusions to clarify this.

*: *The reference position is defined as the center of the 5deg wide lat-lon cell where the density of anticyclone centers (blue square in figure new1) has a maximum (same procedure that was adopted for table 2).*

5**) The reviewer asks for adding material to document the effect of the wind.** This is indeed a useful suggestion and two columns with the wind composites at the time when SLAs are largest have been added (see figures 11 and 12 below).

"*The action of the wind is evident in the fourth column of figures 11and 12, which show the composites of the wind fields at the time of the largest anomaly. In these maps, the presence of a strong wind blowing towards the coast (fig.11, positive SLAs) or offshore (fig.12, negative SLAs) is consistent with the large residuals at Trieste, Tripoli and Gabes. For positive SLAs is also present in correspondence with the residuals (which smaller than in the previous stations) at Alexandria, Iskenderun and Thessaloniki."* These sentences will be added at the end of section 3.6.

Station	P_{SLA+}	P_{CLIM+}	P_{SLA+}
ALICANTE	38	40	62
TOULON	**56**	**40**	44
TRIESTE	44	37	54
DUBROVNIK	42	37	58
THESSALONIKI	**62**	**41**	38
ISKENDERUN	**51**	**31**	49
ALEXANDRIA	43	39	57
GABES	**33**	**44**	67
TRIPOLI	40	48	60

Table new1. Statistics of cyclones producing the 100 largest negative sea level anomalies in each considered station. The two columns labelled "P_{SLA+}" and "P_{clim-}", report the probability (%) to find an anticyclone within a 10degs search radius from the reference point (denoted with a yellow square in figure new1) at the time of the event and the corresponding climatological mean value, respectively. Bold values denote differences between the "PSLA+" and "Pclim-" that are statistically significant at the 95% level. The last column reports the number of events in the period 1979-2001 that were not assigned to any anticyclone

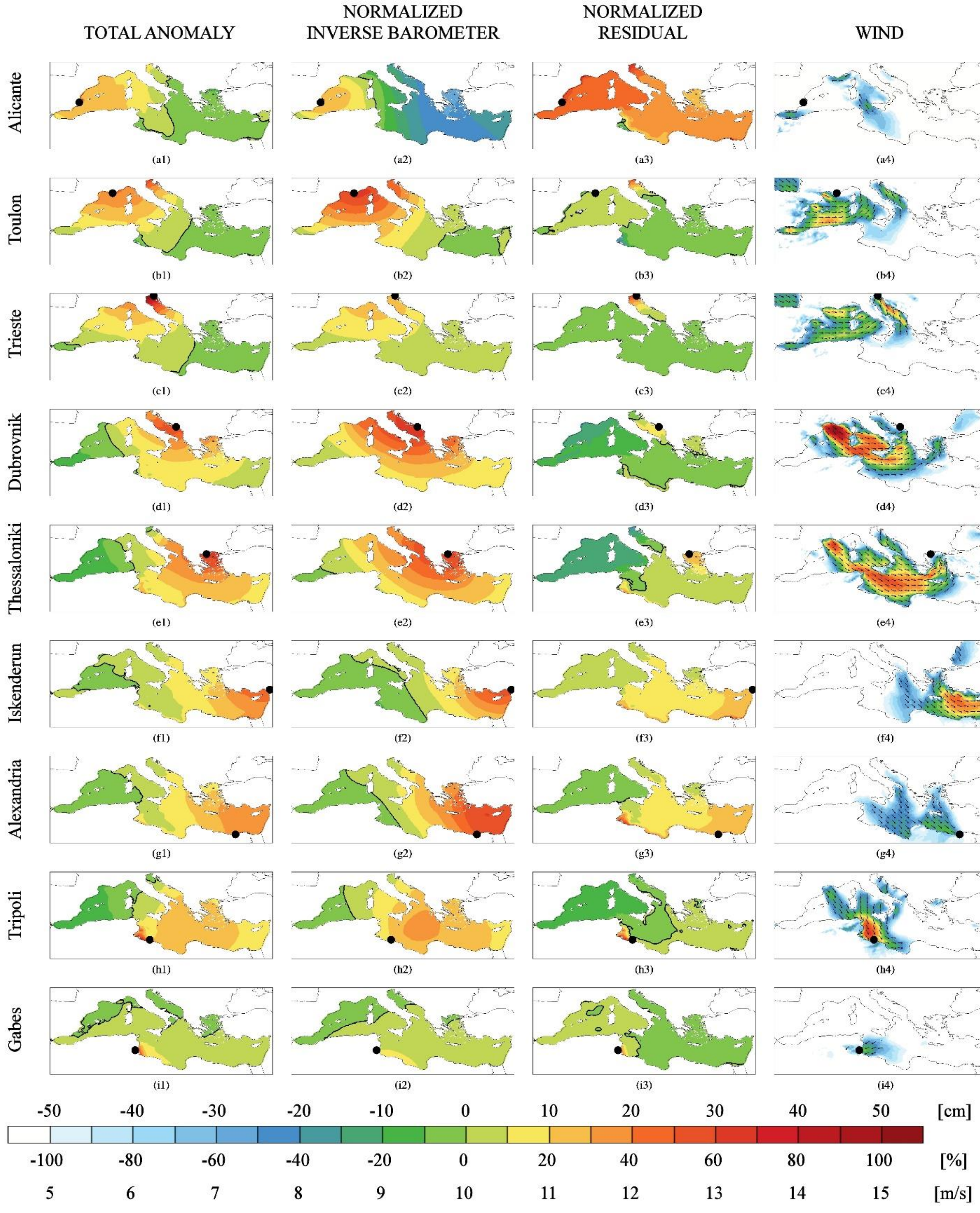

Figure 11. First three columns show the composites of sea level anomaly (cm) at the time of positive SLAs at the 9 stations considered in this study: Alicante, Toulon, Trieste, Dubrovnik, Thessaloniki, Iskenderun, Alexandria, Tripoli, Gabes (from top to bottom in this order). The left column reports the total anomaly (cm, upper annotation along the color bar), the central column the contribution due to the inverse barometer effect, the right column the residual. Values in the central and right columns are normalized with the maxima of the total SLA in the left column (%, lower annotation along the color bar). The thick black line denotes the zero level contour. The fourth column reports the wind speed (m/s bottom annotation below the color bar)and direction arrows. Arrows are plotted every degree and only where the wind speed exceeds 5m/s.

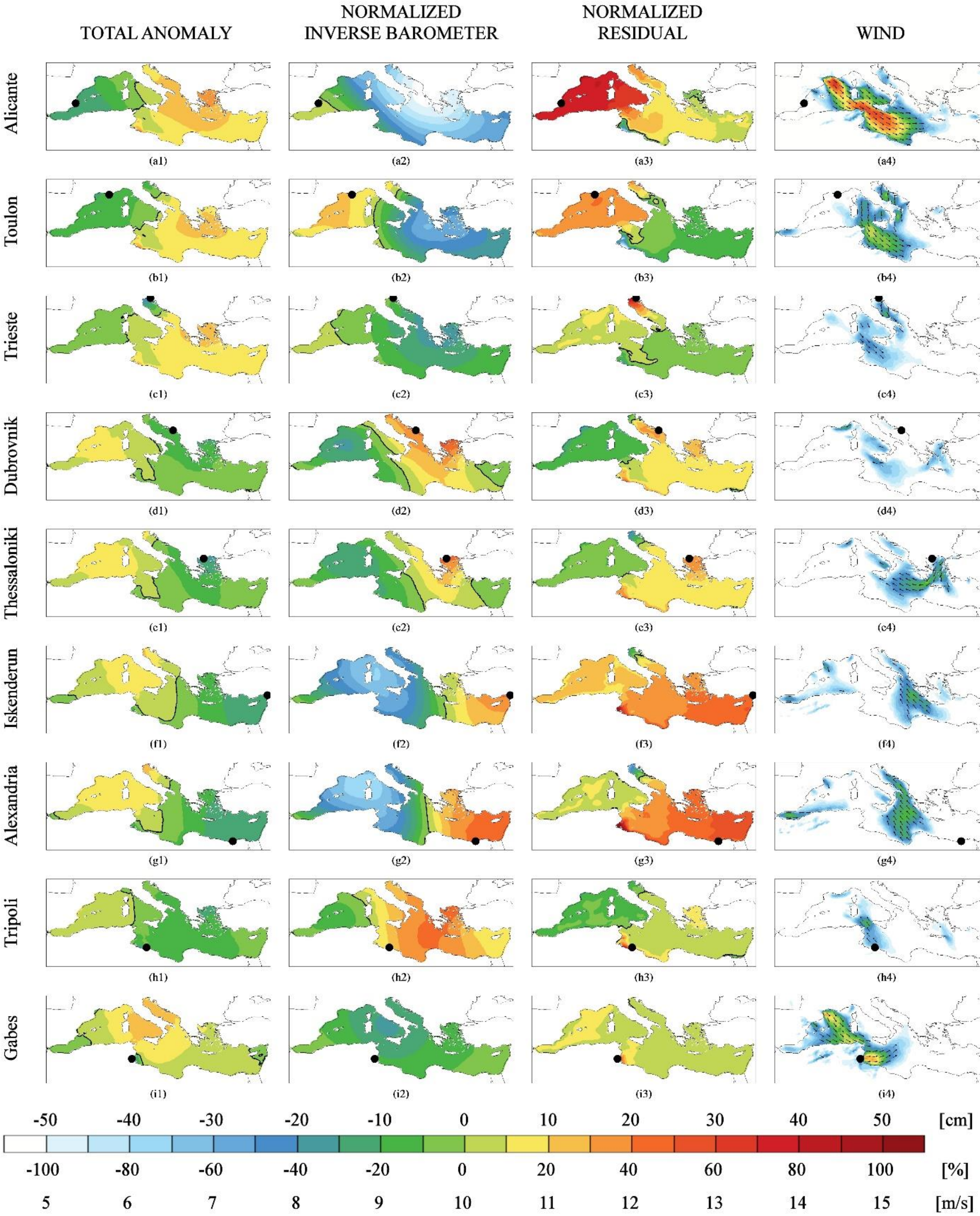

Figure 12. Same as figure 11 except negative sea level anomaly events are considered (in this case the minima of the SLA total in the left column are used for producing normalized values in the central and right column).

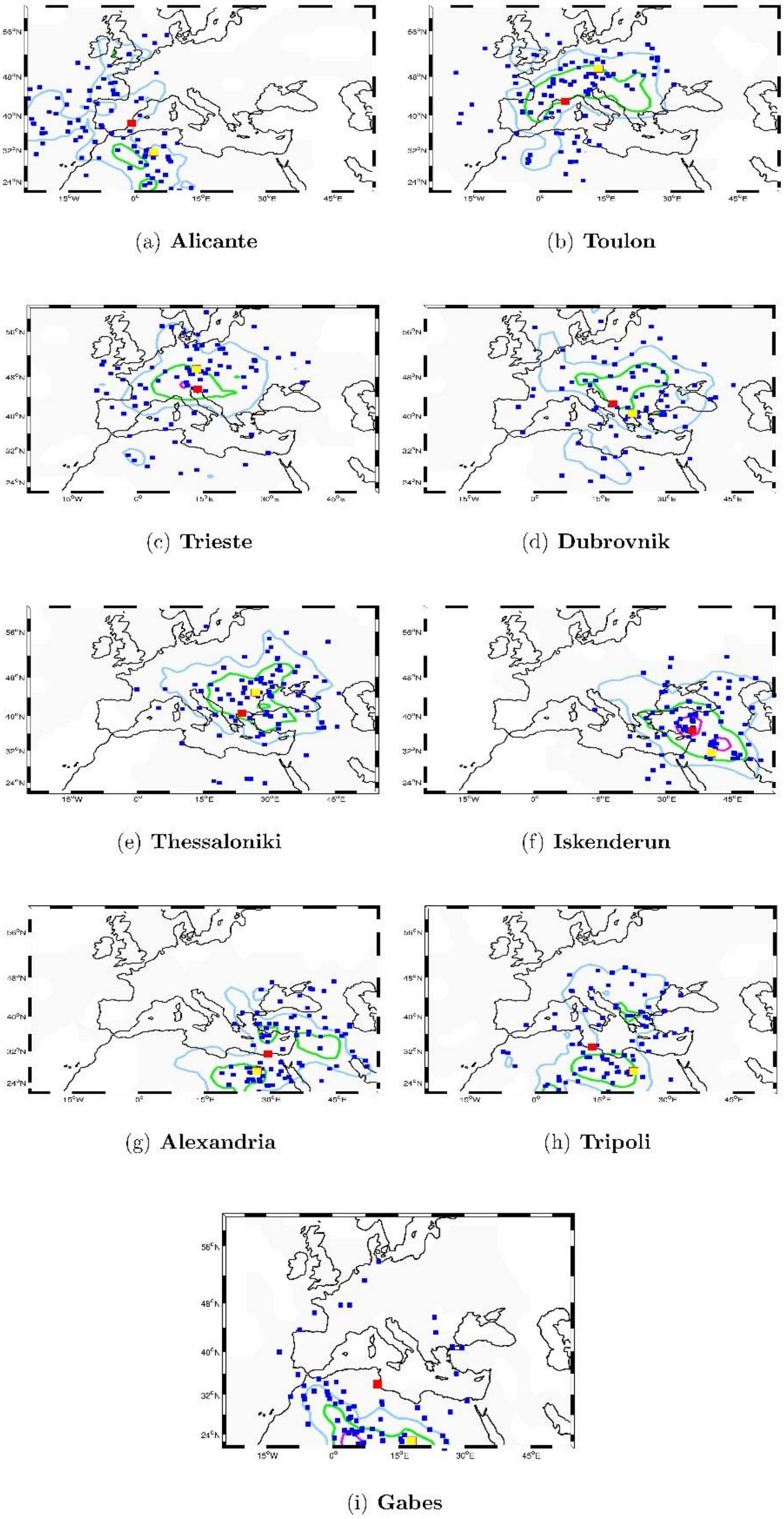

Figure new1. Track density of cyclones producing large sea level anomalies at Alicante (a), Toulon (b), Trieste (c), Dubrovnik (d), Thessaloniki (e), Iskenderun (f), Alexandria (g), Tripoli (h), Gabes (h) (locations are denoted with a red square). Blue squares show the position of the cyclone centers at the peak of the sea level anomaly. The yellow square denotes the reference position used in table new1 and subsection 3.4. A smoothing radius of 5degrees is applied to the data original resolution (1.5degrees). Contour lines are drawn at the .25· 10^{-7} (green line), 1·10^{-7} (magenta line) levels. Units are probability per square kilometer (blue line), 0.5· 10^{-7}-7

Station (SLA+)	$MSLP_{ATL}$	$MSLP_{AFR}$	$MSLP_{WM}$	$MSLP_{EM}$	$MSLP_{AsEU}$
ALICANTE	998±6	1005±6	1005±5		
TOULON	997±5	1003±5	1003±6		
TRIESTE	992±8	999±6	1002±5		
DUBROVNIK	996±7	997±4	1001±5	1004	1010
THESSALONIKI	999±3	1001±3	1002±5	1004±6	999±8
ISKENDERUN	999±3	1004±3	1001±4	1005±4	1002±9
ALEXANDRIA	999±2	1004±4	1004±4	1006±4	1006±5
GABES	1000±5	1006±4	1007±7		
TRIPOLI	1002±3	1005±5	1005±6	1006±4	1012

Table SuM1: This table considers positive sea level anomalies and show the mean values (with standard deviation) of the central pressure minimum considering for each station (rows) the different cyclogenesis areas (columns). Values are in hPa. Blank cells denote absence of cyclones originated from the corresponding area. Obviously, the standard deviation is not provided when only one cyclone is present. The areas (Atl, Afr, WM, EM, AsEu) are shown in figure 1

Station (SLA+)	$Depth_{ATL}$	$Depth_{AFR}$	$Depth_{WM}$	$Depth_{EM}$	DepthAsEU
ALICANTE	2090±509	1447±477	1534±523		
TOULON	2284±541	1472±756	1750±475		
TRIESTE	2563±756	1858±494	1819±542		
DUBROVNIK	2385±639	1882±318	1911±517	1578	2504
THESSALONIKI	2178±355	1714±283	1929±450	1709±473	2192±914
ISKENDERUN	2189±500	1438±420	1914±324	1570±329	1593±600
ALEXANDRIA	2162±290	1390±481	1650±350	1463±407	1804±1000
GABES	1894±497	1191±358	1478±511		
TRIPOLI	1937±255	1471±392	1690±452	1476±322	856

Table SuM2: Same as table SuM1, except it refers to the depth of the cyclones. Values are in Pa

Station (SLA-)	$MSLP_{ATL}$	$MSLP_{AFR}$	$MSLP_{WM}$	$MSLP_{EM}$	MSLPAsEU
ALICANTE	1000±4	1002±3	1003±5	1005±7	997±7
TOULON	1000±3	1003±3	1006±5	1009±1	1012
TRIESTE	1000±5	1002±5	1003±6	1007±6	1005±8
DUBROVNIK	999±7	1004±4	1004±4		
THESSALONIKI	1001±6	1005±5	1003±6		
ISKENDERUN	1001±6	1004±5	1004±5	1008	1006
ALEXANDRIA	1000±4	1004±5	1001±5	1008	
GABES	1000±4	1003±5	1003±5	1003	986
TRIPOLI	1000±8	1006±4	1008±7		

Table SuM3: Same as table SuM1, except it refers to negative sea level anomalies (Values in hPa)

Station (SLA-)	$Depth_{ATL}$	$Depth_{AFR}$	$Depth_{WM}$	$Depth_{EM}$	DepthAsEU
ALICANTE	1998±425	1596±242	1709±475	1544±420	2282±794
TOULON	1894±357	1353±364	1706±441	1026±335	856
TRIESTE	1973±597	1628±511	1815±547	1473±455	1424±361
DUBROVNIK	2034±688	1368±404	1486±376		
THESSALONIKI	2039±604	1300±502	1761±490		
ISKENDERUN	1969±358	1387±541	1660±403	1065	1386±201
ALEXANDRIA	1942±459	1457±419	1794±577	1065	
GABES	2045±412	1597±419	1851±337	1541	2994
TRIPOLI	2088±473	1293±256	1280±574		

Table SuM4: Same as table SuM1, except it refers to negative sea level anomalies and to the depth of the cyclones (Values in Pa)