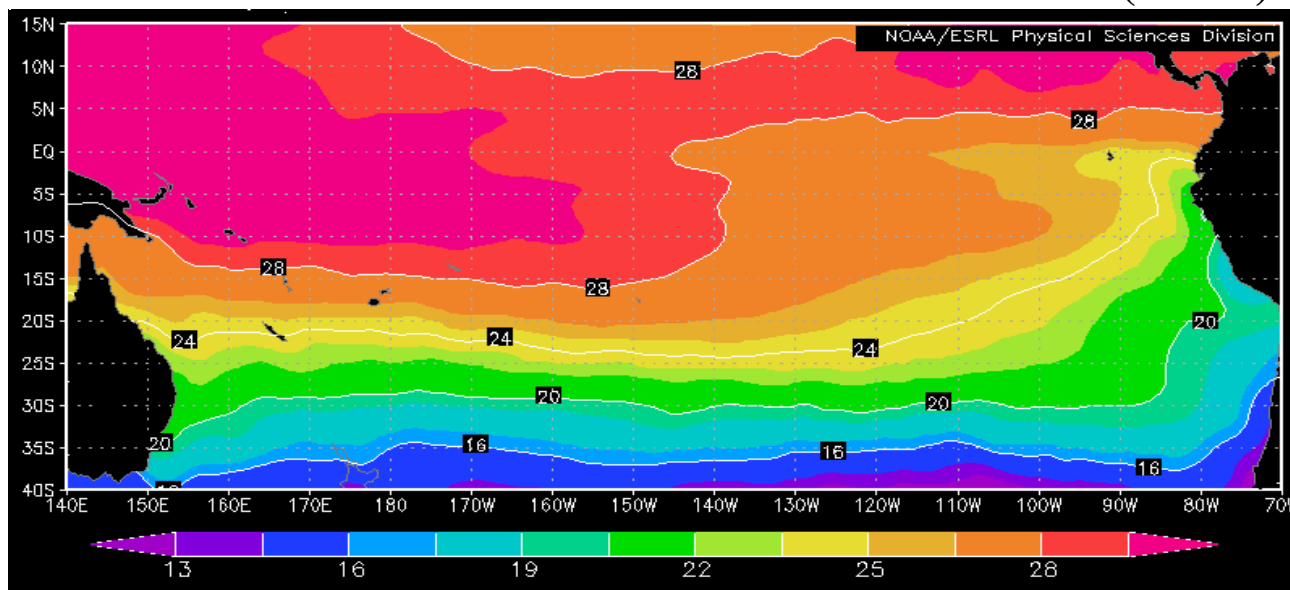


COMISIÓN PERMANENTE DEL PACÍFICO SUR (CPPS)



Sea Surface Temperature, June 2009, NOAA-CIRES/Climate Diagnostic Center

JUNE 2009

BAC N° 225

ERFEN

(Estudio Regional del Fenómeno El Niño)

BOLETÍN DE ALERTA CLIMÁTICO *CLIMATE ALERT BULLETIN*



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COMISIÓN PERMANENTE DEL PACÍFICO SUR
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GUAYAQUIL, ECUADOR



The Boletín de Alerta Climático (BAC) is a monthly publication of the CPPS in which the oceanic and atmospheric conditions of the region of the Southeastern Pacific within the Regional Study of El Niño (ERFEN) are analyzed. The digital version of the BAC is available from the 15 of every month in the pages Web of the CPPS: <http://www.cpps-int.org> and of the INOCAR: <http://www.inocar.mil.ec>

The suggestions, commentaries or scientific information will be welcome to the electronic mails: dircient@cpps-int.org; nino@inocar.mil.ec, (Group BAC ECUADOR), or by means of written communication directed to the seat of the Permanent Commission for the South Pacific, General Secretariat, Complex Albán Borja, Building CLASSIC, 2nd floor, Guayaquil-Ecuador, FAX: (593)4-2221201.

Figure 1.- Shore stations locations in the Southeast Pacific region.

EXECUTIVE SUMMARY

June was characterized to maintain the increase of the Sea Surface Temperature of the Sea throughout the Equatorial Pacific, showing in this occasion anomalies of 1 to 2°C. In the area of the South east Pacific next to the coast of Colombia, Ecuador and Peru increasing of the positive anomalies was observed whereas Chile even reports negative values.

The anomaly of the Sea Surface Temperature in the El Niño regions during the last week of June presented the following values; in the region of the Western Pacific (El Niño Region 4) it was of 0. 7°C; in the Central Pacific (El Niño Region 3.4) the anomaly was of 0. 9°C and; in the region of the Eastern Pacific (El Niño Region 1+2) it was of 0. 8°C.

At subsurface level between 80 and 200 ms of depth the presence of positive thermal anomalies stayed (until 3°C), that approximately from 120°W towards the east, they have reached the Sea Surface. One stays in the Eastern Edge of the Pacific, the small water cell with negative anomaly (- 0. 5°C) located to about 60 ms of depth.

The Mean Sea Level in the South east Pacific presented tendency towards values by on its normal patterns during the month, the anomalies in the North and Central zones of the Peruvian coast were superiors to the 10 cm; whereas in Chile, the Sea Level presented negative anomalies in all the stations of monitoring.

The Index of Oscillation of the South continued in the negative phase by second consecutive month, reaching a value of -0. 3.

The Intertropical Convergence Zone stayed during most of the month between 6 and 8°N with strong convective activity, on the North of Colombia and Centro America.

In the region of the South East Pacific the surface winds appeared of the South and South East; with respect to the speed, positive and negative anomalies of ±1. 6 m/s appeared.

Taking into account the present thermal behaviour from the Equatorial Pacific Ocean, as well as the more important models of numerical simulation are anticipated for the next month, stay the heating of waters of the Tropical Pacific Ocean; while in the Eastern edge of the Pacific Ocean, the tendency still will be to present values around its normal condition.

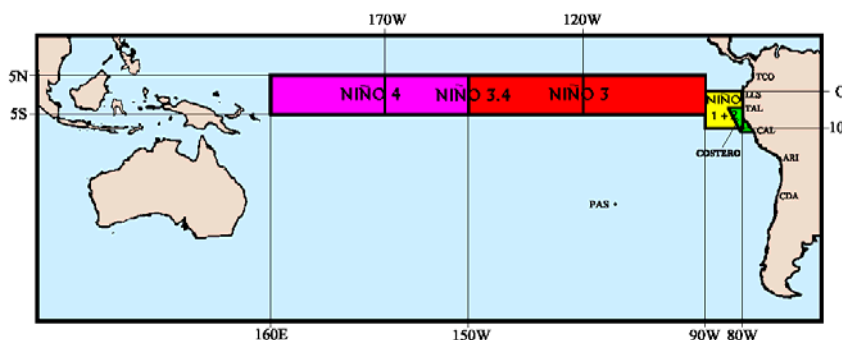


Figure 2.- Map indicating locations and codes of series. Rectangles show the average area of Sea Surface Temperature (SST °C)

INSTITUCIÓN	Dirección electrónica
CCCP - Centro Control de Contaminación del Pacífico (Colombia);	cccp@cccp.org.co
IDEAM - Instituto de Estudios Ambientales (Colombia);	meteorologia@ideam.gov.co
INOCAR - Instituto Oceanográfico de la Armada (Ecuador);	nino@inocar.mil.ec
DHN - Dirección de Hidrografía y Navegación (Perú);	oceanografia@dhn.mil.pe
SHOA - Servicio Hidrográfico y Oceanográfico de la Armada (Chile)	shoa@shoa.cl
DMCh - Dirección de Meteorología (Chile)	metapli@meteochile.cl
NOAA - AOML Miami (USA)	JHARRIS@aoml.noaa.gov

CLIMATE ALERT BULLETIN
BAC N° 225, JUNE 2009**I. GLOBAL AND REGIONAL IMAGE**

In June the increase of the Sea Surface Temperature (TSM - SST) in the Tropical Pacific Ocean became general, presenting anomalies between 1 to 2°C. The monthly anomaly of the SST in the El Niño regions during June continued on its climatologic values, being greater in the Eastern region of the Pacific; in the region of the Western and Central Pacific (El Niño Regions 4 and El Niño 3. 4) changed of 0. 3°C to 0. 6°C; in the region of the Eastern Pacific (El Niño Region 1+2) the anomalies changed of 0. 5°C to 0. 7°C.

An wide subsurface warm band, located in the Equatorial Pacific Ocean between 80 and 250 ms of depth, that reaches the surface from 150°W towards the coastal edge of South America appears with positive anomalies of until 3, 0°C.

The Mean Sea Level (NMM -MSL) in the South East Pacific continued with the tendency to present values by on its normal patterns. Throughout the Peruvian coast the positive anomalies prevailed, the minimum anomaly appeared in the station of San Juan (+6. 0 cm) and the maximum anomaly in the station of Lobos de Afuera (+17. 0 cm). In Chile the Sea Level presented negative anomalies in all the stations of monitoring; only Caldera and Valparaiso registered values near the historical average.

The Index of Oscillation of South (IOS) like the previous month presented negative values, being this time -0. 3.

The central axis of the Intertropical Convergence Zone (ZCIT - ITCZ) in the Eastern sector of the Pacific stayed between 6° and 8°N with strong convective activity, as a result of the interaction with a system of low pressure that appeared in the centre of the Caribbean Sea which induced own atmospheric circulations for the rain generation.

As far as surface winds in the region of the South East Pacific the winds with South and south-east direction predominated, with speeds that fluctuated between 1.6 m/s to -1.6 m/s.

II. NATIONAL IMAGE**A. CONDITIONS IN THE COLOMBIAN COAST**

The Institute of Hydrology, Meteorology and Environmental Studies (IDEAM) informs that in Colombia since the end of May and first days of June, an unfavourable atmospheric circulation to the convective processes predominated. The systems of high pressure in surface of the Atlantic were intense and in high layers there was little divergence on Colombia. However, during almost all the month systems of low pressure stayed on the North West of the national territory which intensified with the arrival of tropical waves of the East.

There was low frequency (LF) of tropical waves in comparison with previous years for the same month, nevertheless the four that registered caused cloudiness in the north and centre of the country, especially at the end of the first decade and beginnings of the second decade of June due to the strong interaction

with the ITCZ (ZCIT) and with a system of low pressure in height (“vaguada”) that appeared in the centre of the Caribbean Sea which induced own atmospheric circulations for the rain generation (inverted “vaguada”) on the country. In opposition to the anticipated, to a large extent of the Colombian territory excessive amounts of rain were registered, although in valleys of the main rivers of the country (Magdalena and Cauca), generally dry time predominated.

The ITCZ stayed most of the month between 6 and 8° of North latitude. Associated with the intense activity of the ITCZ when interacting with the system of low pressure already described “parked” on the North West of the country, some emergencies associated to sudden crescents and slidings were registered.

The Pollution Control Center for the Pacific (CCCP) declares that during the monitoring of June of 2009, realised by the Area of Operational Oceanography of the CCCP to the fixed station coastal N° 5 located to 10 miles of the bay of Tumaco between the coordinates 78, 51° W and 2° N, could be observed that the registry of the SST for the month was of 27. 4°C; arriving at a positive anomaly at surface from 0.13°C with respect to the historical average.

The historical profile of the isotherm of 20°C shows an evident deepening from the month of May, being located below the 60 ms of depth, which indicates the influence of a wave Kelvin that could be associated to the appearance of ENOS warm conditions in the Colombian Pacific Ocean.

The surface value of salinity for the first fortnight of June was of 33. 24. A positive anomaly of 1. 65 at surface level in relation to the historical average appeared.

The historical profile of the salinity shows to the increase of the salinity in the surface layer between May and June, nevertheless the isohalina of 34 ups shows a deepening starting in May, coincident with the deepening of the isotherm of 20°C.

B. CONDITIONS IN THE ECUADORIAN COAST

The Oceanographic Institute of the Navy of Ecuador (INOCAR) reports that during June throughout the Equatorial Pacific the presence of positive anomalies of the SST stayed. In the Ecuadorian coasts like for the previous month the SST for the North and South regions presented positive anomalies of 0, 8°C; whereas in the central region the SST presented 0. 7°C below the normal average.

The Air Surface Temperature (AT) in the coastal zone has stayed of 0. 4°C to 0. 7°C on the normal values for the date; taking into account that during these months appears the dry station in the Ecuadorian coast, the precipitations waited for this period were registered below the normal levels.

La Libertad (coastal station) registries a positive anomaly of 14. 0 cm like MSL average of the month (positive anomaly). Winds (Predominant) oscillated between West and Southwest with speeds slightly below for the waited normal value.

The ITCZ in the continental part was located to around 8°N with little influences on the North coast of Ecuador.

Considering the present behaviour of the ocean-atmospheric conditions against the coasts of Ecuador and that at the moment the Ecuadorian coast is at the dry time; it is anticipated that in the following month the climatic conditions are stable and concordant with the hoped for the time; declared in a reduction in the rain levels and that as much the SST as the AT will stay fluctuating around their climatologic values of the month.

C. CONDITIONS IN THE PERUVIAN COAST

The Direction of Hydrography and Navigation of Peru (DHN) declares that throughout the Peruvian coast an increase around 0.8°C in the anomalies of the SST was registered, with respect to the previous month. The positive anomalies predominated; with the exception of the stations of Talara and Mollendo; Talara presented behaviour similar to its normal and Mollendo presented slight negative anomaly of -0.2°C. The positive anomalies of the SST fluctuated between 0.1°C (San Juan) and 0.6°C (Chimbote).

The Mean Sea Level throughout the Peruvian coast registered a slight reduction average of 2.0 cm, with respect to the previous month. The anomalies in the North and Central zones were superiors to the 10 cm; whereas, in the South zone they were inferiors to this value and in this South zone was where the most significant changes took place. The minimum positive anomaly appeared in the station of San Juan (+6 cm) and the maximum anomaly in the station of Lobos de Afuera (+17 cm).

Throughout the Peruvian coast the Air Temperature has registered a variation average of +/-0.9°C, with respect to the previous month. The positive anomalies prevailed; with the exception of the stations of Callao and San Juan that presented anomalies of -0.1°C and Mollendo that presented a behaviour similar to its normal of the month.

During the second and fourth weeks of the month, drizzles isolated in our coast appeared. It was registered accumulated precipitations of 4.3 mm in Talara and Paita, 0.8 mm in Lobos de Afuera, 2.1 mm in Chimbote and 0.3 mm in Mollendo and ILO, respectively; whereas in Callao and San Juan plans were registered.

Throughout the Peruvian coast winds of South and South-east direction appeared. In relation to the wind speed, the positive anomalies predominated that fluctuated between 0.2 to 1.6 m/s; with the exception of the stations of Paita and Callao with negative anomalies of -1.6 and -0.1 m/s respectively.

D. CONDITIONS IN THE CHILEAN COAST

The Hydrographic and Oceanographic Service of the Navy of Chile (SHOA) maintains throughout the coast a network of stations of Sea Level to monitor a series of oceanic and atmospheric variables. A description of the Sea Surface Temperature and Sea Level between Arica (18°29'S) and Talcahuano (36°41'S) for June 2009 is:

With respect to the SST the negative anomalies in all the stations of monitoring stay, being these very near to the climatologic average, especially in the center-south zone, between Caldera and Talcahuano, with values that fluctuate between the -0.6 and -0.3°C. It is possible to emphasize that the station of Antofagasta was that presented the greater negative anomaly of SST with a value of -1.1°C.

On the other hand, the Sea Level (NM - SL) also presented negative anomalies in all the stations of monitoring, but only in Caldera and Valparaiso registered values near the historical average, being of -0.9 cm and -2.6 cm respectively. In the stations of Coquimbo and Talcahuano significant negative anomalies of the order of the -10 cm were observed.

It is possible to emphasize that the data of SST and SL described previously for the coast of the North zone and the Center-south of Chile still reflect conditions of neutrality, not being observed until the moment no type of heating of the surface of the sea.

The Meteorological Direction of Chile (DMC) declares that the average temperature of the air during June appeared with positive anomalies the regions of the end north and austral of the country, with positive anomalies of +0.8 and +1.7°C, besides Santiago with +0.9°C. The Central and South zone dominated slight cooling with negative anomalies between -0.1 and -1.0°C.

The average maximum temperature of the air between Antofagasta and Puerto Montt was characterized by the presence of slightly negative anomalies, whose maximum cooling were associated to a reduction of the temperature in more of 1. 0°C with respect to the climatologic values of the month in Curicó, Chillán and Valdivia. Contrary, heatings were observed with positive anomalies between 1.0 and 2.0°C between Coyhaique and Punta Arenas, besides Santiago.

The minimum temperature average presented a heating in the zones of the North end (Arica) and austral (Punta Arenas) of the country, with positive anomalies between 1 and 2 °C. In rest of the Central and South zone, it maintained slight negative anomalies around -0. 5°C, with the exception of Santiago and Curicó that respectively registered positive anomalies of +0. 4 and +0. 8°C.

A change in the anomalies of pressure at Sea Level appears from half of this month in the Subtropical Oceanic region of the South Pacific, characterizing an anticyclone of the South Pacific debilitated with the principles negative anomalies that reached to - 3. 4 hPa in Island of Pascua and - 1.6 hPa in Juan Fernandez. Another region affected by negative anomalies of the pressure at Sea Level was the Austral sector of continental Chile, to the south of 50°S, due to the high frequency of frontal systems and passage of centres of low pressure. Punta Arenas registered anomaly of -4 hPa.

A well-known change of the circulation in the average and high troposphere on the South Pacific favoured the development of greater activity and frequency of frontal systems that affected the Central zone of Chile, as of the second fortnight of June. Localities like Valparaiso, Santiago and Curicó that accumulated a rain deficit by on 90% until May 2009, reverted it during June, arriving to reach in the month a surplus that surpassed between 30 and 60 mm their climatologic average values. On the contrary, the South and Austral region between Puerto Montt and Balmaceda had a reduction of the precipitation presenting slight negative anomalies between 30 and 50 mm.

III. PERSPECTIVE

A. GLOBAL

Taking into account the predictions from several numerical models, as well as the behaviour of the main oceanic and atmospheric indicators, it is esteemed that during the next month in the Equatorial Pacific will continue present positive anomalies of the SST, staying the tendency to the increase. At subsurface level the heating will persist that at the moment covers the entire Equatorial Pacific region.

The oceanographic conditions present in the Tropical Pacific indicate the end of the ENSO-neutral conditions, being necessary to maintain a careful pursuit of the evolution and its future repercussions on the climate of the South East Pacific region and the west of South America.

B. REGIONAL

In agreement with the pursuit of the ocean-atmospheric conditions in the South East Pacific Ocean, executed by Program ERFEN (integrated by National Committees ERFEN of Colombia, Chile, Ecuador and Peru) and coordinated by the CPPS, it is anticipated for July 2009 that in the sector of the South East Pacific will appear a slight increase of the anomalies of the Sea Surface Temperature and Air Surface Temperature.

TABLE 1

LARGE SCALE DATA: From left to right, monthly median for the last three months of the zonal wind component at lower levels (U3, U2, U1 in the Equatorial Pacific central western, central and central eastern, respectively in m/s with positive values from East to West). SST (T4,T3.4,T3,T1+2,Tc corresponding to the Equatorial Pacific central western, central and central eastern, close to the coast and the coastal area, Talara-Callao, respectively: in °C), atmospheric pressures in Tahiti (Tht) and Darwin (Dwn), expressed in an excess over 1000 Hpa and South Oscillation Index (SOI).

MONTH	ZONAL WIND			NIÑO REGION SST					ATMOSPHERIC PRESSURE		
	WEST.	CENT.	EAST.	T4	T3.4	T3	T1+2	Tc	Tht	Dwn	IOS
APR 09	4.3	8.8	7.8	28.4	27.5	27.4	26.0	23.8	12.7	9.3	0.7
MAY 09	3.8	7.7	7.2	28.9	28.0	27.4	24.9	22.7	11.6	10.6	-0.4
JUNE 09	3.2	6.6	6.0	29.2	28.1	27.1	23.7	21.6	13.6	12.7	-0.3

Source: NCEP/NWS/NOAA/USA.

TABLE 2

COASTAL OCEAN DATA OF THE ERFEN REGION: Monthly medians of the last three Months for Sea Surface Temperatures (SST) in degrees °C. Stations: Tumaco (TCO), La Libertad-Salinas (LLS), Callao (CAL), Arica (ARI), Antofagasta (ANT), Caldera (CDA), Coquimbo (COQ) and Valparaíso (VAL).

Sea Surface Temperature (SST)									
MONTH	TCO	LLS	CAL	ARI	ANT	CDA	COQ	VAL	
APR 09	27.6	25.3	16.0	18.5	17.6	***	16.0	14.0	
MAY 09	27.6	24.9	16.2	16.5	15.8	15.2	14.6	12.9	
JUNE 09	27.4	23.9	17.0	16.1	14.9	14.2	13.3	12.4	

Source: CCCP (Colombia), INOCAR (Ecuador), DHN (Perú), SHOA (Chile).

TABLE 3

COASTAL OCEAN DATA OF THE ERFEN REGION: Monthly medians of the last three Months for the Mean Sea Level (MSL) in mm. Stations: Tumaco (TCO), La Libertad-Salinas (LLS), Callao (CAL), Arica (ARI), Caldera (CDA), Coquimbo (COQ) and Valparaíso (VAL).

Mean Sea Level (MSL)									
MONTH	TCO	LLS	CAL	ARI	ANT	CDA	COQ	VAL	
APR 09	***	2740	1150	***	***	1277	845	703	
MAY 09	***	2806	1200	***	***	1293	873	732	
JUNE 09	***	2774	1180	***	***	1231	815	704	

Source: CCCP (Colombia), INOCAR (Ecuador), DHN (Perú), SHOA (Chile).

TABLE 4

COAST OCEANIC DATA OF THE ERFEN REGION: Five-day averages (Pentads) of SST (°C) and MSL (mm)

PENTADS	Sea Surface Temperature (SST)			Mean Sea Level (MSL)		
	BALTRA	TALARA	CALLAO	BALTRA	LLS (INOCAR)	CALLAO
MAY 03	***	18.2	16.2	***	273.2	118.0
08	***	19.4	15.2	***	283.4	117.2
13	***	18.8	16.8	***	284.4	121.7
18	***	20.2	16.7	***	284.3	122.4
23	***	20.6	15.8	***	279.3	125.1
28	***	19.4	16.6	***	280.2	116.9
JUNE 02	***	19.0	16.8	***	275.1	113.3
07	***	18.9	16.2	***	276.3	115.3
12	***	18.9	16.9	***	277.1	118.1
17	***	19.5	16.8	***	276.1	120.9
22	***	18.5	17.3	***	278.8	120.2
27	***	18.3	17.8	***	281.2	121.2

Source: NOAA/Atlantic Oceanographic and Meteorological Laboratory – Miami.

Note.

* Values revised

***. Information not received

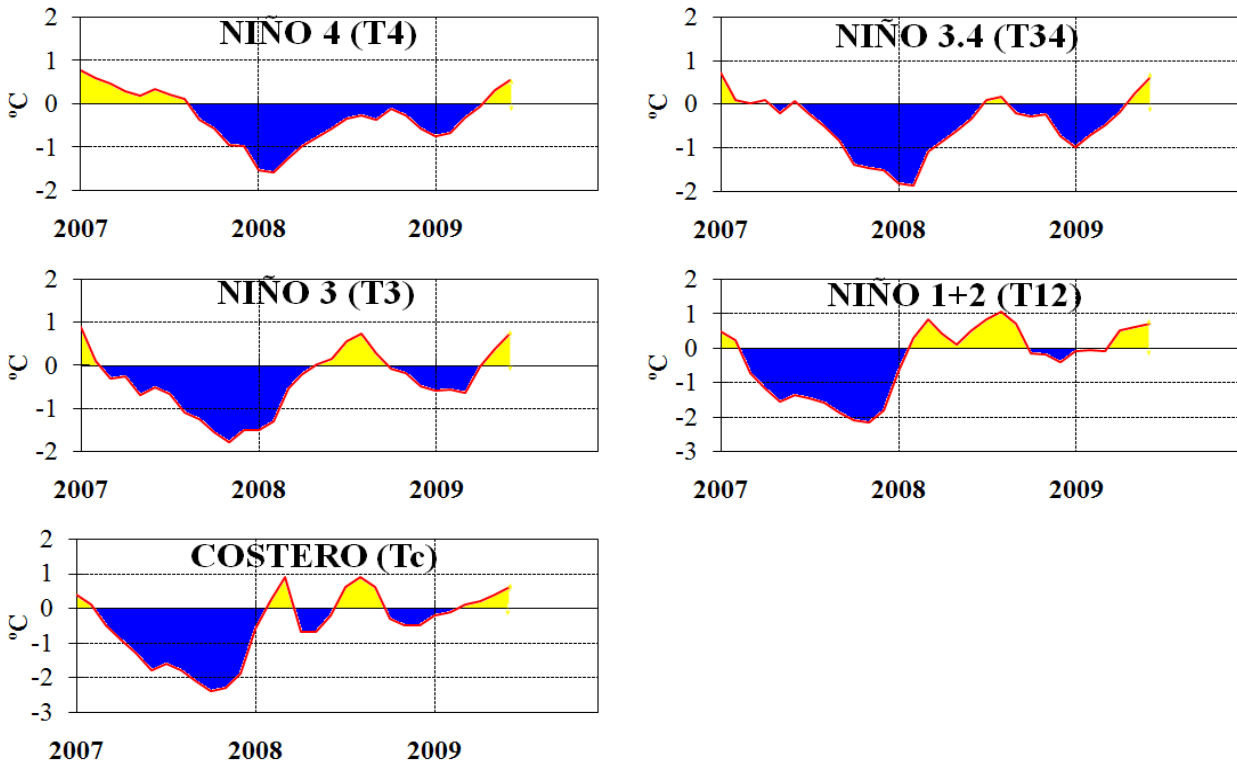


Figure 3.- Oceanic anomalies indices (Niño 4, Niño 3.4, Niño 3, Niño 1+2 and Tc). The location of the oceanic indices appears in figure 2. (Source: NCEP/NWS/NOAA/USA).

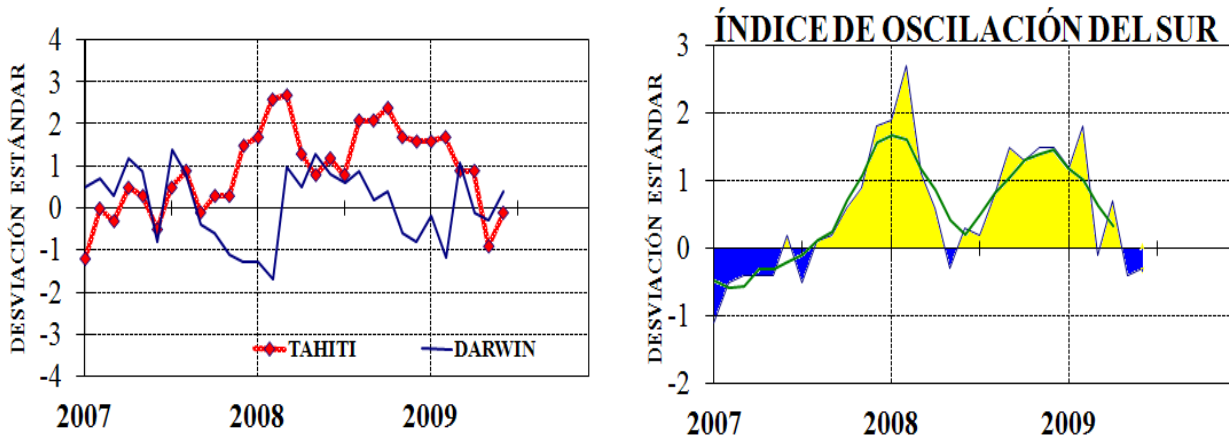


Figure 4.- Left Panel: Five-months running mean for atmospheric pressure anomalies in Tahiti and Darwin (mb). Right Panel: Southern Oscillation Index. (SOI) with monthly values and five-months running mean graphed as a green line. The SOI is based on the difference between standardized pressure values: Tahiti minus Darwin. The differences are also standardized for standard deviation of yearly values. (Source: NCEP/NWS/NOAA/USA).

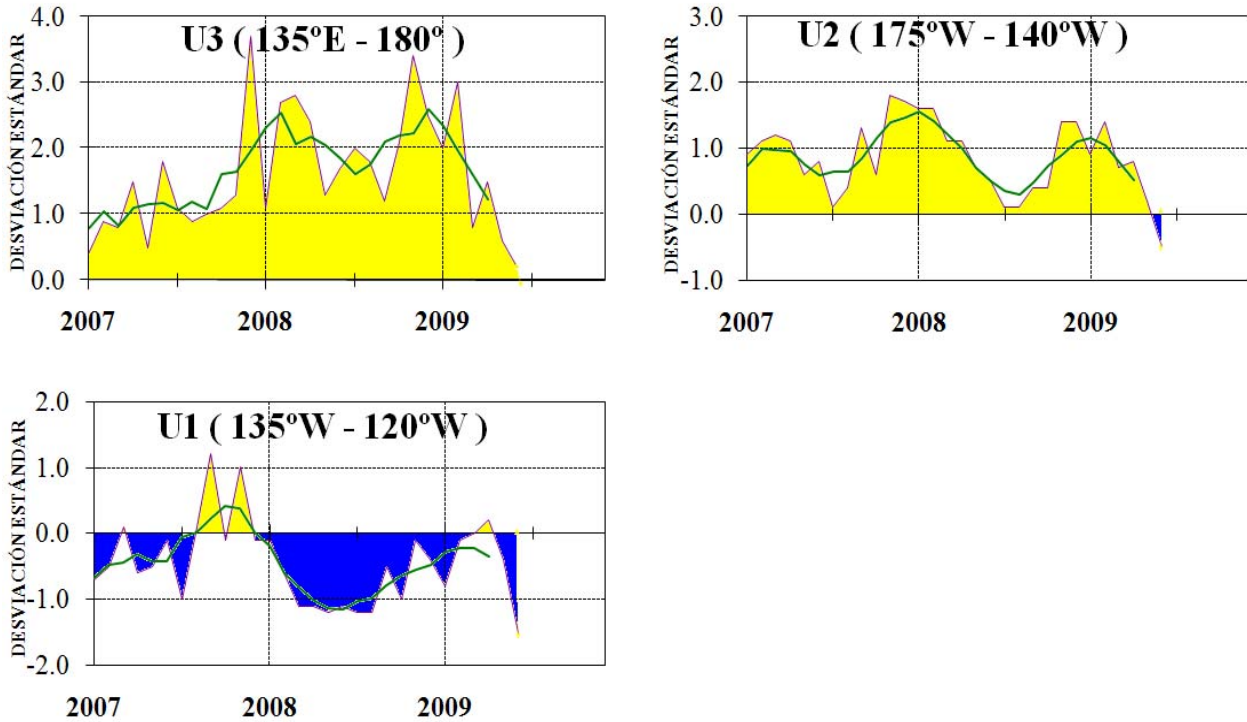


Figure 5.- Series and moving averages of five months of zonal wind standardized anomalies (m/s) averaged between 5°N and 5°S for three Equatorial zones: western (U3), central (U2) and eastern (U1). (Source: NCEP/NWS/NOAA/USA).

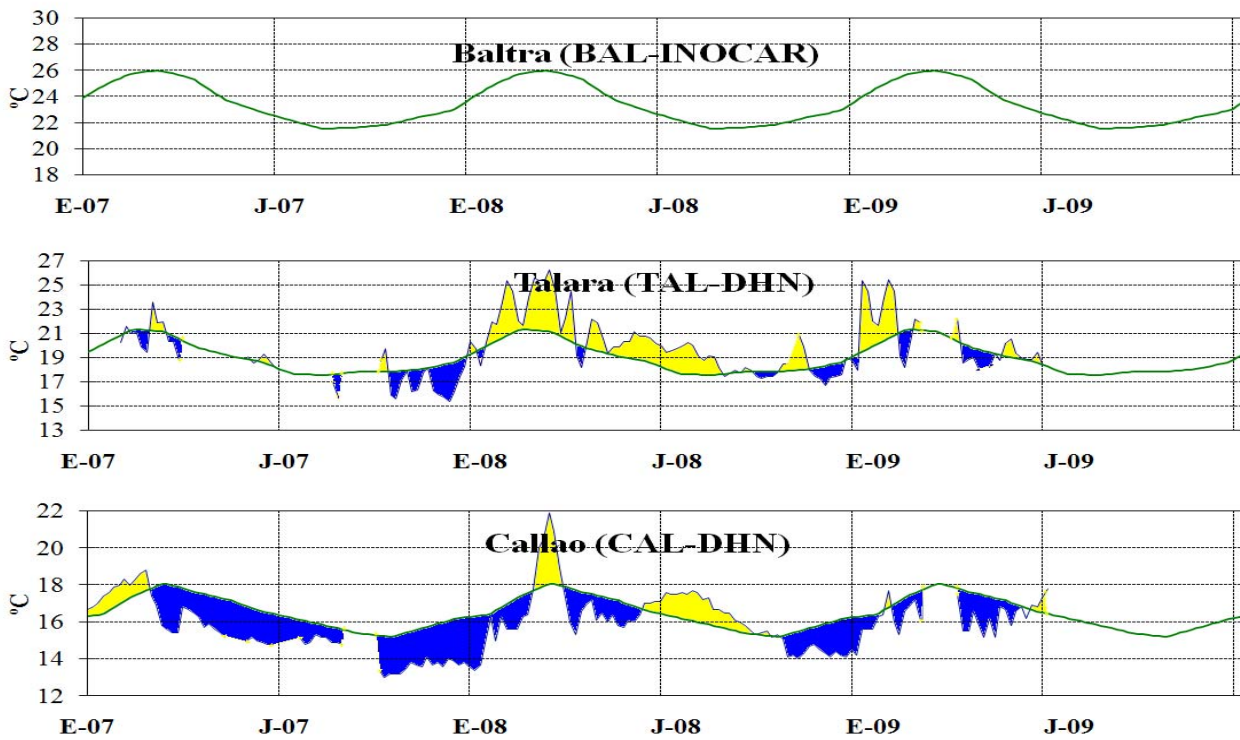


Figure 6.- Five day averages (pentads) of SST (°C) in Ports of Peru and Ecuador. The green curve indicates climatology. The location of oceanic indices appears in figure 1. (Source: NOAA/Atlantic Oceanographic and Meteorological Laboratory – Miami.)

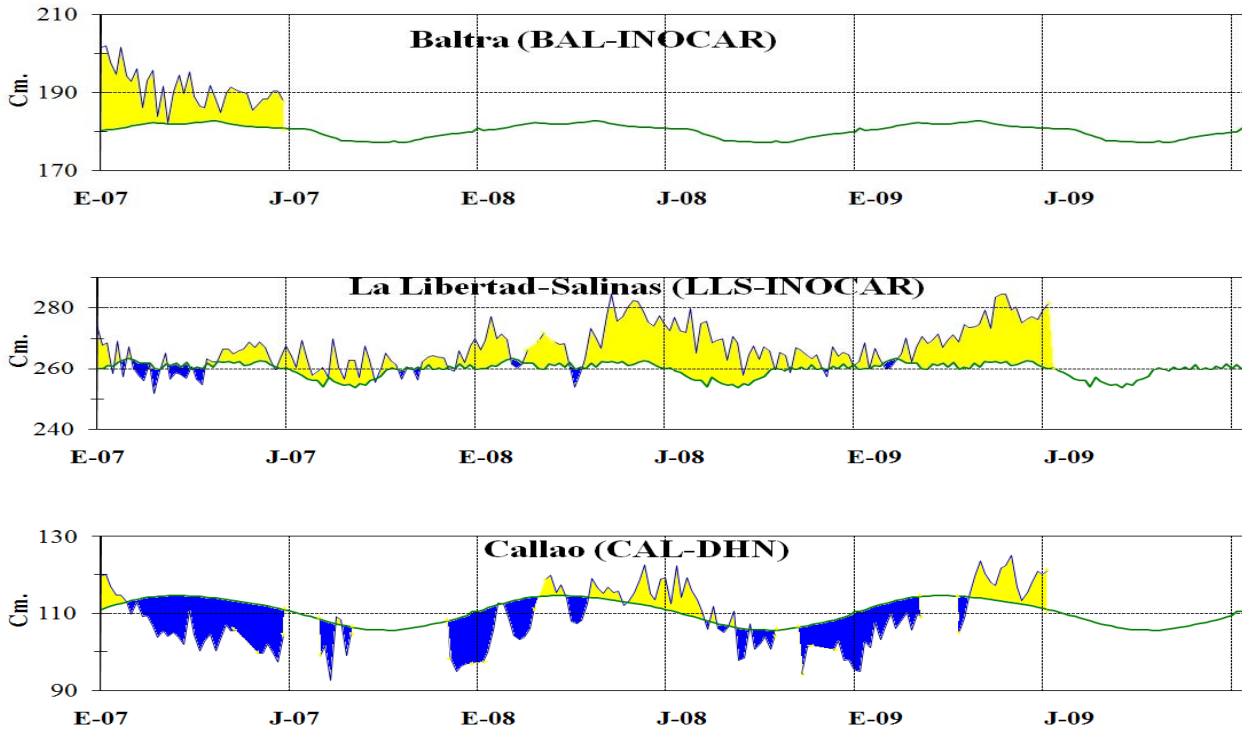


Figure 7.- Five-day running mean (pentads) of MSL (cm) in Ports of Peru and Ecuador. The green curve indicates climatology. The location of oceanic indices appears in figure 1. (Sources: NOAA/Atlantic Oceanographic and Meteorological Laboratory – Miami, e INOCAR).

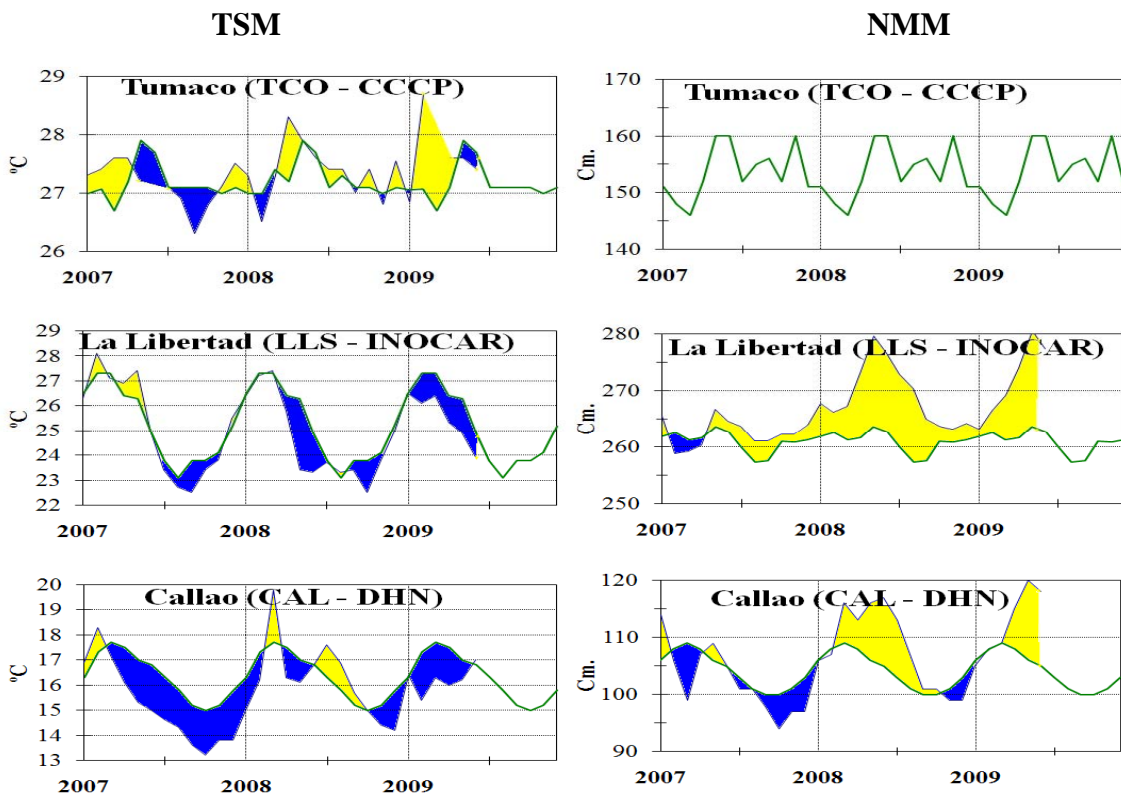


Figure 8a.- Monthly means of the SST (°C) and MSL (cm) in five stations of the ERFEN region. Green curve indicates historic monthly mean. The location of the stations appears in Figure 1. (Sources: CCCP, INOCAR y DHN).

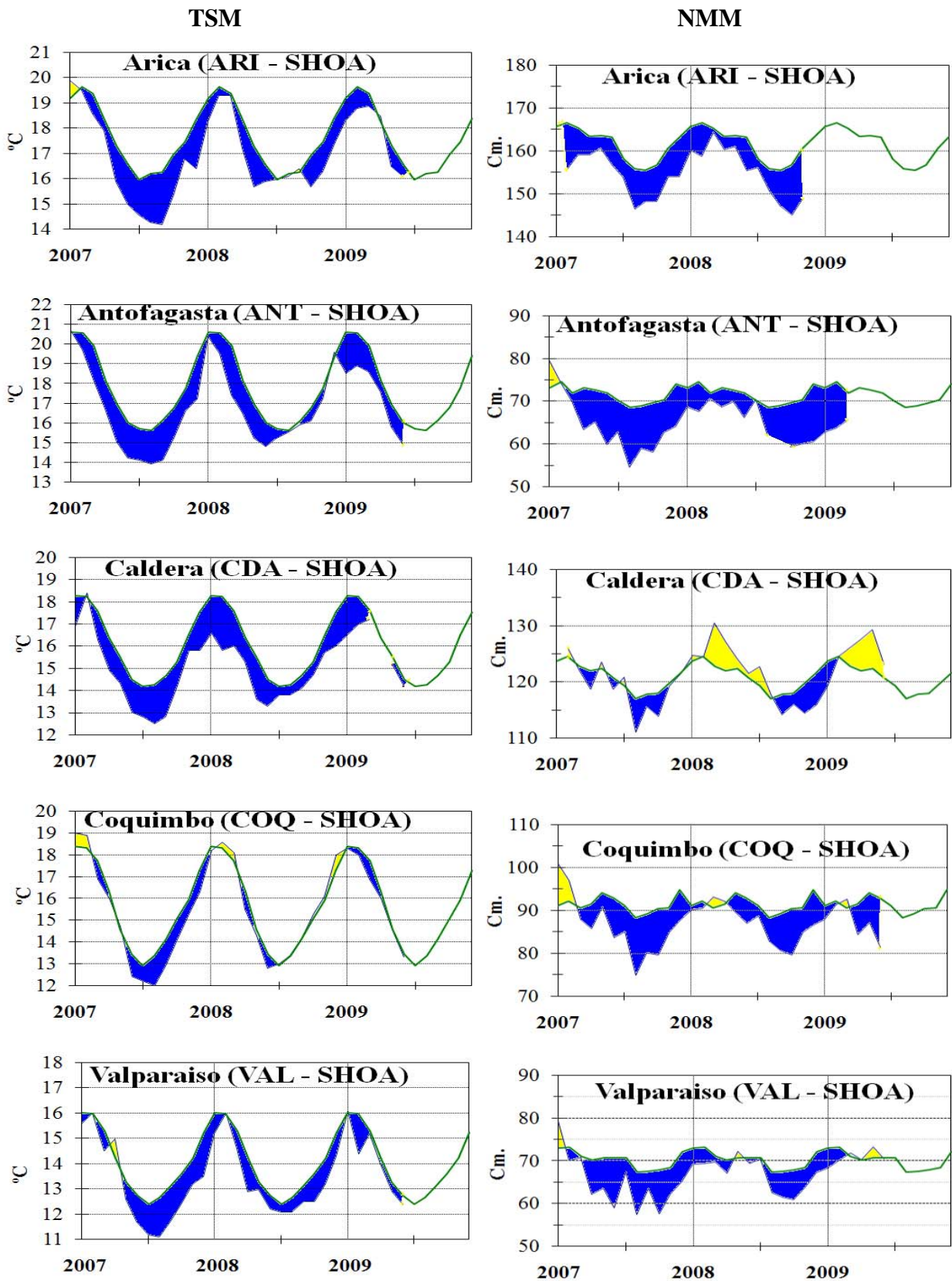


Figure 8b.- Monthly means of the SST (°C) and MSL (cm) in five stations of the ERFEN region. Green curve indicates historic monthly mean. The location of the stations appears in Figure 1. (Source: SHOA).

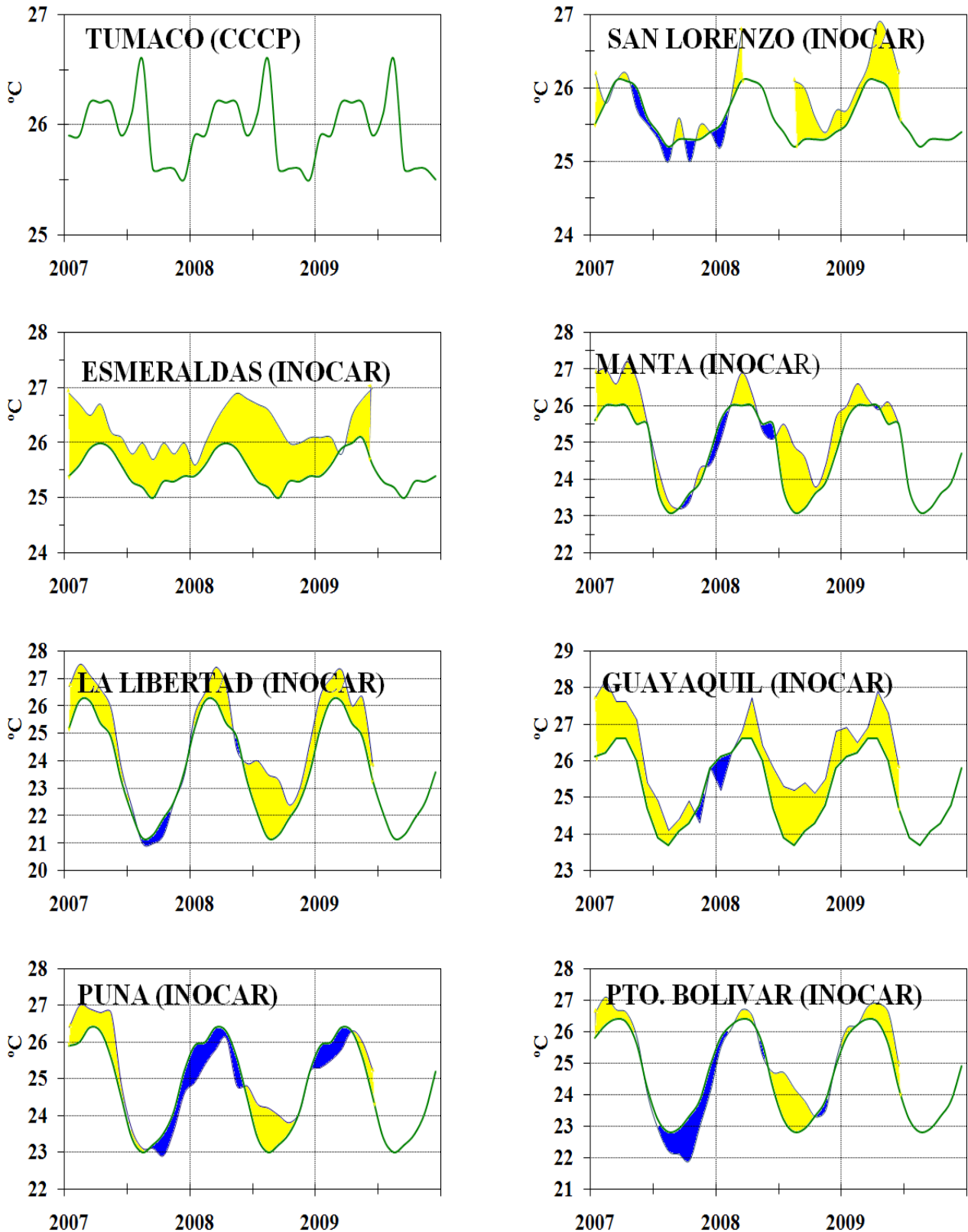


Figure 9a.- Monthly means of the air temperature (°C) in 8 stations of the ERFEN region. Green curve indicates historic monthly mean. The location of the stations appears in Figure 1. (Sources: CCCP & INOCAR).

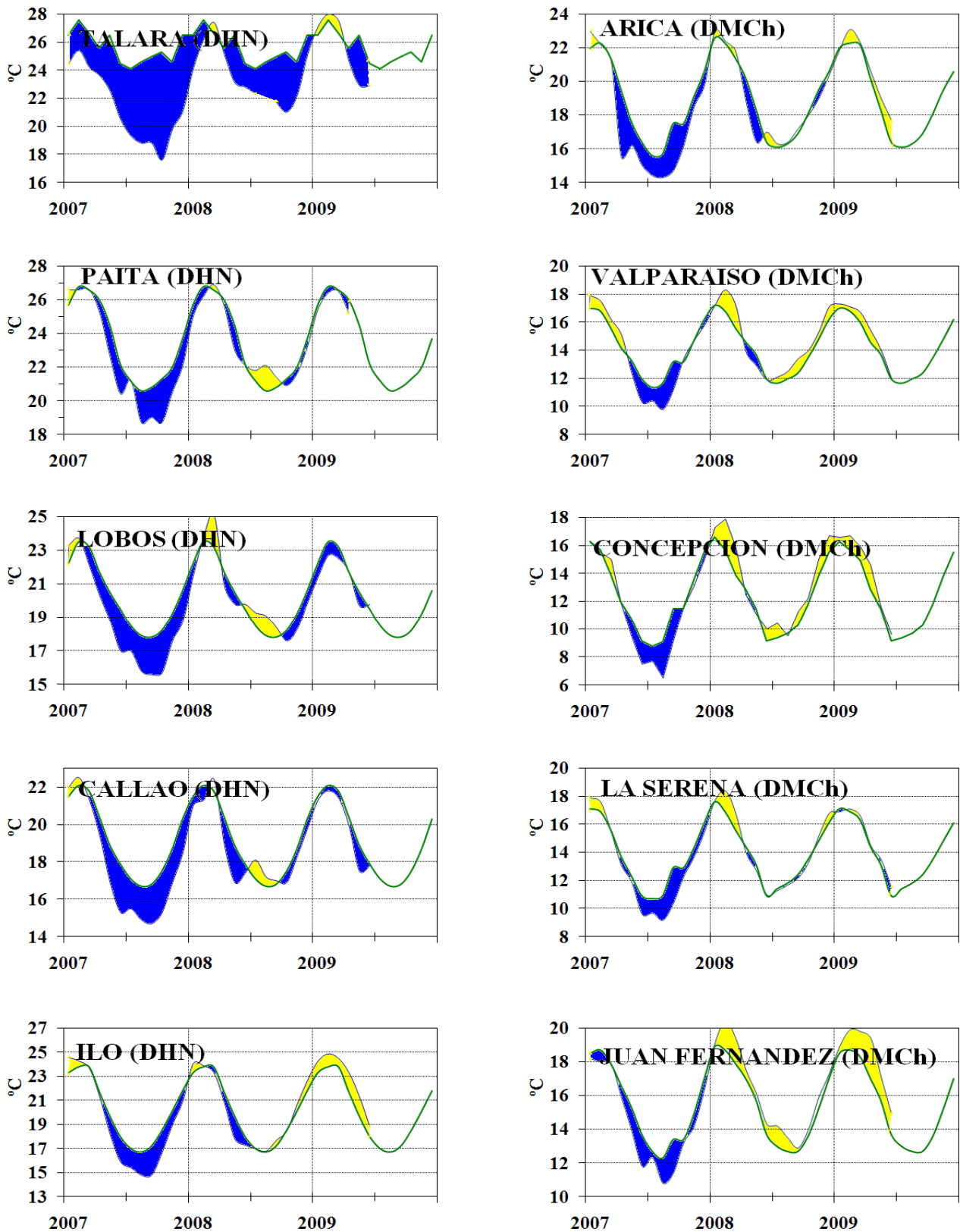


Figure 9b.- Monthly means of the AT (°C) in 10 stations of the ERFEN region. Green curve indicates historic monthly mean. The location of the stations appears in Figure 1. (Sources: DHN & DMCh).

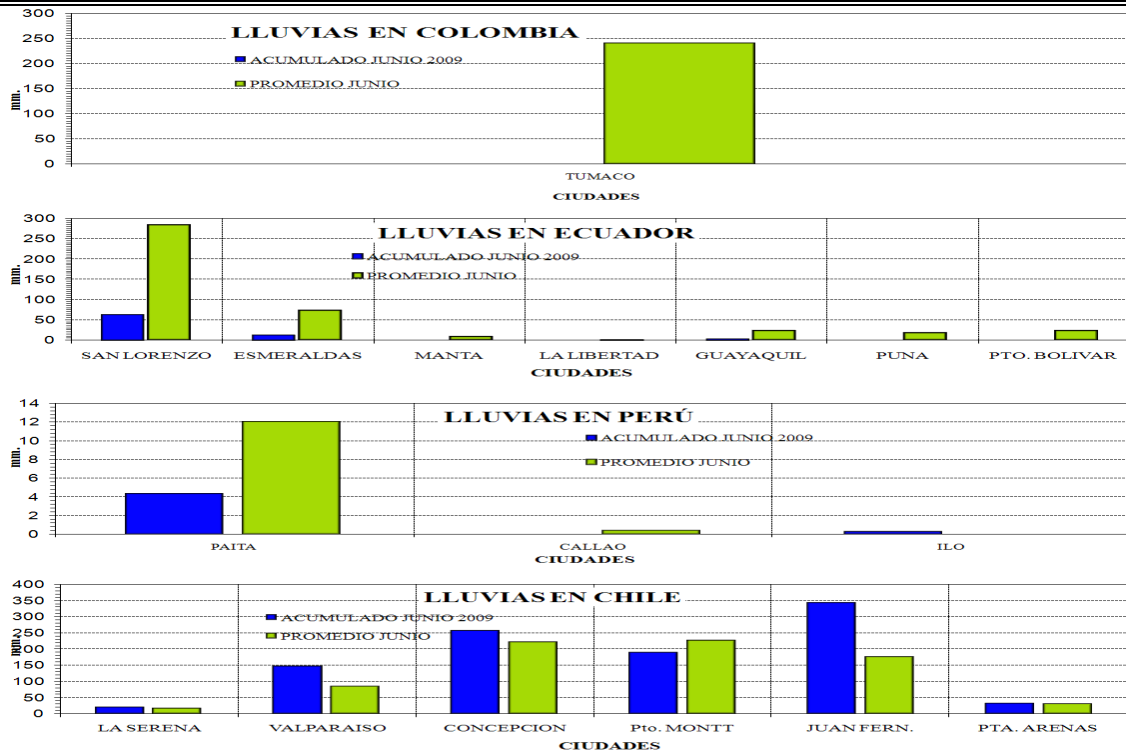
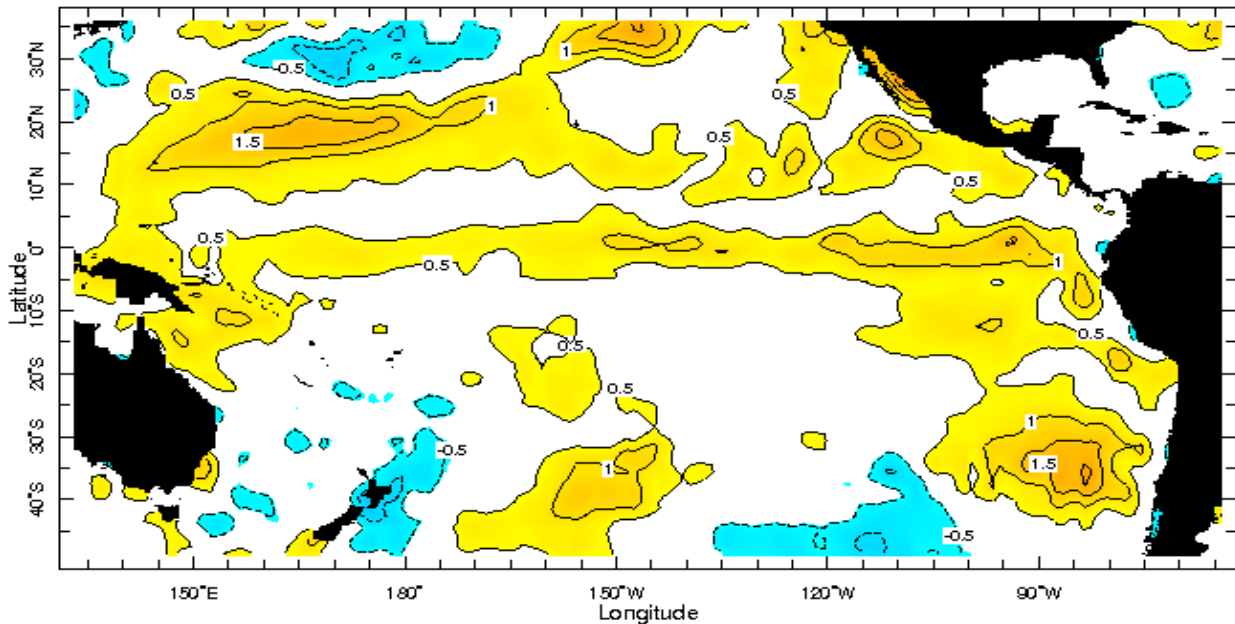


Figure 10.- Rains during June in the coastal stations of Colombia, Ecuador, Peru and Chile. Location of the stations appears in Figure 1.

Anomalia de la Temperatura Superficial del Mar (°C) Junio de 2009



Jun 2009

(Sources: CCCP, INOCAR, DHN & DMCh).

Figure 11.- Sea Surface Temperature Anomalies (°C) June 2009.

(Source: International Research Institute for Climate and Society)

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Av. 25 de julio. Base Naval Sur. Guayaquil, Ecuador.
P.O. Box 5940. Fax (593)4-2485166. Tel: (593)4-2481300.

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