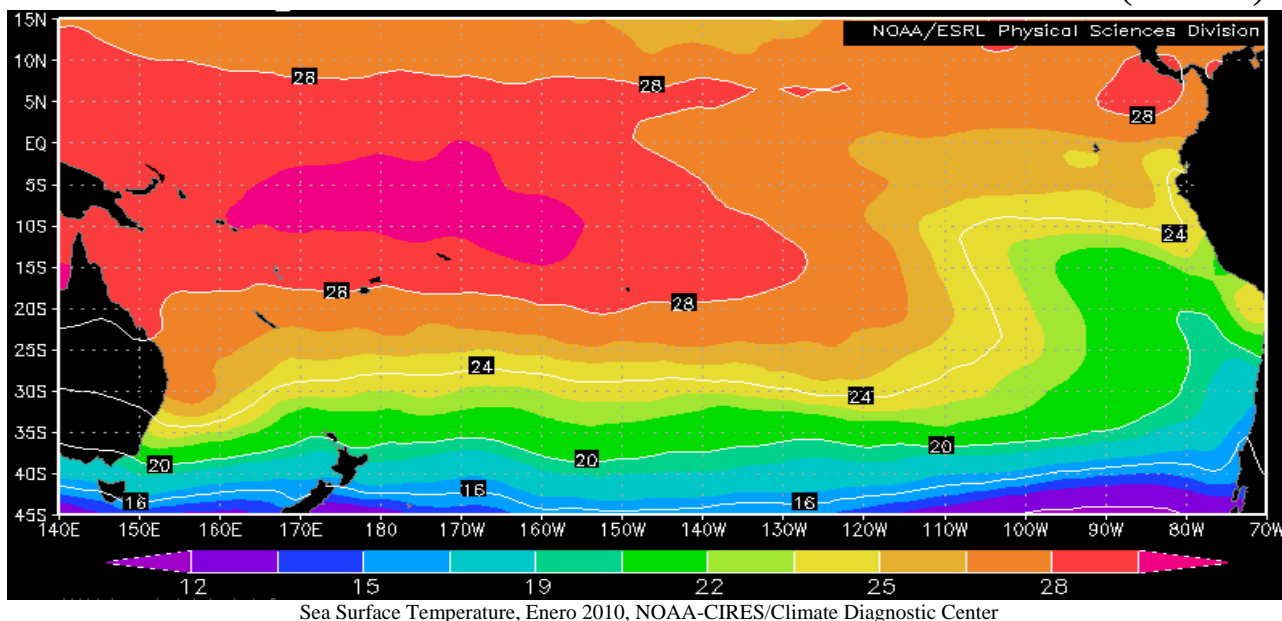


COMISIÓN PERMANENTE DEL PACÍFICO SUR (CPPS)



JANUARY 2010

BAC No 232

ERFEN

(Estudio Regional del Fenómeno El Niño)

BOLETÍN DE ALERTA CLIMÁTICO *CLIMATE ALERT BULLETIN*



OMM



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COMISIÓN PERMANENTE DEL PACÍFICO SUR
SECRETARÍA GENERAL
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

In January the Surface Sea Temperature Anomaly (SSTA) presented positive anomalies within the range of 1, 0 and 3, 0°C, as a result of the development of a weak “El Niño” event in our region. In the western coast of South America warm conditions of air and sea temperature were recorded, but with weaker intensity than the previous month. The mean sea level anomaly was positive, especially in the Central Pacific, which propagated to the western zone of the Pacific where positive anomalies of the level of the sea were also observed. The sea surface temperature anomalies corresponding to the four monitoring areas of “El Niño” presented the following values of positive temperature anomalies, in the Western Pacific (“El Niño” Region 4), 1, 3°C; in the Central Pacific (“El Niño” Regions 3.4 and 3), of 1, 5 and 0, 8° C respectively, and in the Eastern Pacific (“El Niño” Region 1+2) 0, 3°C. The subsurface positive sea temperature anomalies are still present. The warm nucleus of anomalies appeared towards the Eastern edge of the Pacific, with positive values up to 5,0 °C, between depths of 50 to 100 m.

The mean sea level maintained the positive anomalies slightly smaller than the previous month in the Southeastern Pacific. In the Sea Level stations of Peru the positive anomalies oscillated between 10 cm and 24 cm and in front of Ecuador presented around 12 cm of increase.

The Southern Oscillation Index (SOI) for the month maintained its negative phase with a value of 1, 5. The Intertropical Convergence Zone (ICZ) appeared as a dispersed band over the Central Pacific all the way to the Eastern Pacific with its central averaged axis located at 5° N. In the region of the South east Pacific the surface winds had a South and South-east component; with respect to the speed the anomalies were positive between 0, 5 and 2, 0 m/s.

Considering the thermal behavior of the Equatorial Pacific and the results of some numerical models, it is anticipated that the SST positive anomalies of will persist in February, especially in the Eastern and Central Pacific Ocean. The numerical model simulations indicate the presence of a warm event (El Niño) of moderate to weak intensity, which will continue during the next months of 2010, approaching at the end of the period to neutral values. The present conditions in the region of the Southeastern Pacific are associated with the occurrence of a warm event (El Niño). In Colombia and Chile the SST presented values near their historical averages, whereas in Ecuador and Peru, the positive anomalies of SST decreased and in most of the stations they approached to its historical averages. As far as the level of the sea, this variable maintains its increase but in smaller magnitude than the previous month.

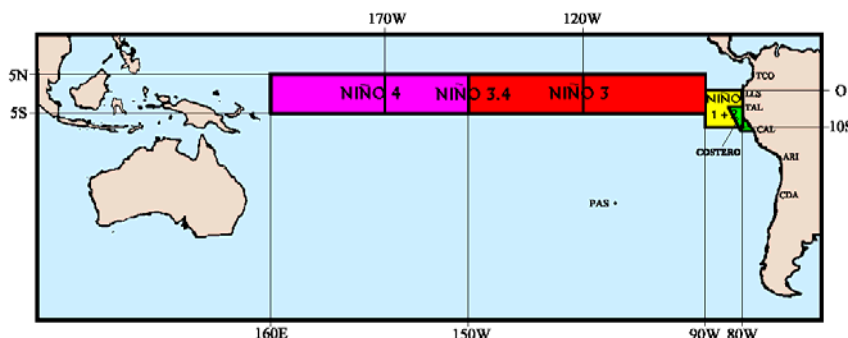


Figure 2.- Map indicating locations and codes of series. Rectangles show the average area of Sea Surface Temperature (SST °C)

INSTITUCIÓN	Dirección electrónica
CCCP - Centro Control de Contaminación del Pacífico (Colombia);	cccpc@cccpc.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@dhm.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 Nº 229, OCTOBER 2009**I. GLOBAL AND REGIONAL IMAGE**

The equatorial Pacific during January continued presenting high temperature of the sea, especially in the western and central part, where the largest anomalies, with maximum values of +3 °C, were found, with the nucleus of anomaly located around 180°W. The Eastern zone of the Pacific, between 100°W and the coastal edge of South America presented variable conditions; with positive anomalies, smaller than one degree, in the coastal strip of Colombia, Peru and Chile; conditions of neutrality in front of Ecuador and even a big water patch with negative anomalies in the Eastern side of the Pacific, between 10 and 20°S.

The anomalies of the sea surface temperature in the geographic zones of monitoring of “El Niño” presented positive values, mainly in the western and Eastern part of the Pacific. In “El Niño” region 4, located in the Western Pacific, an anomaly of +1, 3°C appeared; in “El Niño” regions 3.4 and 3, at the Central Pacific, anomalies of +1,5 and +0, 8° C were registered respectively; and in “El Niño” region 1+2, at the Eastern Pacific, the anomaly was of +0,3°C.

At subsurface level the values of temperature were majors in the western part of the Pacific with positive anomalies in all the equatorial region, from 160°E to the continental edge of South America and until a depth of 200m, the nucleus of anomalies was placed in the Eastern side of the Pacific (around 100°W, with positive values of until +5, 0°C, between 50 and 100 ms of depth.

The mean sea level in the South east Pacific stayed on its values averages during January, with increase of 12, 0 cm against the coasts of Ecuador, whereas, throughout the Peruvian coast appeared positive anomalies between 10 and 24 cm in the stations of Callao and Paita.

In this month the value of the Index of Oscillation of South (IOS) was of -1, 5.

The Intertropical convergence zone appeared as a dispersed band from the Central Pacific to the Eastern Pacific during January, with cells of weak convective activity; its central axis average was located in 5° of North latitude.

In the region of the South east Pacific the surface winds stayed with a South and South-east direction with positive anomalies between 0, 5 and 2, 0 m/s.

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

The Institute of Hydrology, Meteorology and Environmental Studies (IDEAM), reports that in January, deficit volumes of precipitation appeared in most of the country associated mainly to the climatic effect of the present phenomenon of “El Niño”. In the north of the national territory predominated light deficits; in most of “Llanos Orientales” they were moderate, standing out some areas of piedemont, where deficit amounts of rain appeared superiors to 70%, in relation to the averages of the time; in the Andean and Pacific regions, moderate deficits also predominated, although in ample sectors of these region, the deficits surpassed 70%, and including in some precise zones they came near to the 100%. The situation before described, added to the high temperatures registered in ample sectors of the Caribbean, Andean and Orinoquía regions, as well as the increase

in the wind speed throughout the country, those were determining factors to increase significantly the probability of fire of the vegetal cover. In addition, it is important to emphasize that since had projected during some days of the first month of the year propitious conditions for the occurrence of frosts in the center of the Colombian territory appeared.

At synoptic level, the high pressure of the Atlantic Ocean intensified in January, being an additional factor so that the dry conditions already described were registered. Nevertheless, and although the cold fronts of the North hemisphere did not descend much in terms of latitude, it is important to indicate that the passage of some of them temporarily increased precipitations in the West of the Colombian Caribbean Sea, including the environs of the "Archipelago of San Andres and Providence"; it is possible to emphasize in addition, that the passage of a cold front produced swell in national Caribbean coast.

The Intertropical Confluence Zone tended to stay in the center and the south of the country between 4°N - 6°N. The systems of low pressure of the Brazilian North west registered several days convective activity, contributing important volumes of humidity to the Colombian Amazonia.

The Pollution Control Center for the Pacific (CCCP) reports that during the monitoring of January 2010 realized 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 in the coordinates 78.51° W and 2° N, the registry of sea surface temperature (SST) for December 2009 were of 27, 65 °C and 26, 99 °C during the first and second fortnight respectively. At surface level a positive anomaly of 0, 4 °C with respect to the historical average appeared.

The thermocline during January presented a reduction of 11 meters with respect to the last registry of December of 2009, being located to 53 meters of depth. During the second fortnight the thermocline descended 11 meters, being located to 64 meters of depth.

B. CONDITIONS IN THE ECUADORIAN COAST

The Oceanographic Institute of the Navy of Ecuador (INOCAR) informs that during January the Central Equatorial Pacific showed positive anomalies of the SST in a rank of 1,0 and 3,0°C. The event "El Niño" that until the previous month was considered between weak to moderate, decayed in its intensity, and at the moment it does not exert important influence in the Ecuadorian coast.

The SST maintained positive anomalies in the monitoring stations: Emerald with 1, 6°C, Puná with 1, 4°, San Lorenzo and Puerto Bolivar with 0, 6°C and Manta with 0, 2°C, in La Libertad the anomaly was negative (- 0, 6°C).

With respect to the level of the sea, the positive anomalies stay but the tendency went to fall with respect to the previous month. In the station of La Libertad was found a positive anomaly around 12 cm.

In most of the Ecuadorian coast, the Temperature of the Air presented positive anomalies, with the greater value in Emeralds (1, 9°C). Temperatures around the historical average appeared in Puná and Guayaquil, with anomalies of -0,2°C and 0, 3°C respectively.

The present wind pattern on the Ecuadorian coast appeared variable; in the coastal stations of the south, Puerto Bolivar and Puná and in the one of the north, San Lorenzo, prevail winds of the west; in Guayaquil, La Libertad and Manta prevail winds of the southwest, and in Emeralds of the south. The anomalies of speed of wind in the predominant direction of the month vary being positive in Puerto Bolivar (0, 1 m/s), Puná (0, 7 m/s) and Emeralds (0, 5 m/s) and negative in Guayaquil (- 0, 2), La Libertad (- 0, 6 m/s), Manta (- 0, 6 m/s) and San Lorenzo (1, 0 m/s).

The precipitations have diminished in volume with respect to their historical averages in all the stations, with deficits of 80% in La Libertad and Manta; deficits greater than 50% in Port Bolivar and Puná and upper than 10% in Esmeraldas, San Lorenzo and Guayaquil.

Throughout January waves of swell have prevailed in the Ecuadorian coast, originating of the north-western Pacific, which when agreeing with the spring high tides have increased their energy and action on the coastal edge.

C. CONDITIONS IN THE PERUVIAN COAST

The Direction of Hydrography and Navigation of Peru (DHN) indicates that in the Peruvian coast predominated sea surface temperatures (SST) with positive anomalies; with the exception of Ilo that presented a behavior similar to its normal. These anomalies fluctuated between 0, 5° C (Mollendo) and 3, 0° C (Callao). In the North zone of the coast, the anomalies of the SST diminished in average 0, 6° C with respect to the previous month; whereas, the anomalies were increased around 1, 4° C in the Central and South zones.

The mean sea level in the Peruvian coast continued with positive anomalies of consideration; however, it decreases around 4 cm with respect at the previous month values. The minimum anomaly appeared in the station of El Callao (10 cm) and the maximum anomaly in the station of Paita (24 cm).

In the Peruvian coast, the temperature of the air in surface has registered an increase average of 1,1° C with respect to the previous month, prevailing the positive anomalies with the exception of the southern stations of San Juan (- 0, 4° C) and Mollendo (- 0, 2° C). The positive anomalies fluctuated between 0, 6° C (Callao) and 1, 5° C (Chimbote).

Slight intermittent precipitations appeared during days 3, 5, 8, 11 and 27 January; registering in Talara, Lobos de Afuera and Chimbote accumulated values of 0, 7, 1, 6 and 4, 2 mm; whereas in Callao and Ilo values of 0, 1 mm.

In the Peruvian coast winds of South direction prevailed; nevertheless, in the stations of San Juan and Ilo prevailed of the South-east. In relation to the wind speed, the anomalies were variable, fluctuating between +2,2 m/s (Ilo) and -1,9 m/s (Wolves of Outside).

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 level of the sea to monitor a series of oceanic and atmospheric variables. Then It is described the sea surface temperature (SST) and level of the sea (SL) between Arica (18°29'S) and Talcahuano (36°41'S) for of January of the 2010.

With respect to the SST like the observed thing in December of 2009, the negative anomalies in all the stations of monitoring stay. On the other hand, Arica and Coquimbo presented values of SST near the historical average with anomalies of -0, 7 and -0, 5°C respectively. The station of Antofagasta presented the greater negative anomaly with a value of -2,2°C.

For the case of the sea level, to the equal than it happens to variable SST, stay the negative anomalies in the North and the Center-south zone of the country, being Valparaiso the station that presented the value nearest the historical average with -6 cm. It is possible to emphasize that in the stations of Arica and Caldera significant negative anomalies of the order of -9 cm were observed.

In the coast of Chile, the data of SST and SL described previously for the North and center-south zone of Chile still reflect conditions of neutrality, not being observed until the moment no type of heating of the surface of the sea related to event ENSO.

The Meteorological Direction of Chile (DMC) shows that the average temperature of the air during January was characterized by the presence of a cooling in the South and Austral zone, and North coast of Chile, with negative anomalies maximum (cooling) in Temuco and Coyhaique of $-1, 1^{\circ}\text{C}$ and Iquique of $-0, 8^{\circ}\text{C}$. The Central region between Valparaiso and Chillán reached the maximum heating with anomalies between $+0, 3$ and $+0, 7^{\circ}\text{C}$.

The average maximum temperature of the air during January presented the biggest cooling in the North coast between Arica and La Serena, with a maximum negative anomaly of -2°C in Iquique. The South and Austral region was dominated by cold conditions, whose negative anomalies were present between Temuco and Punta Arenas, being the most extreme values in Coyhaique and Balmaceda with $-2, 1^{\circ}\text{C}$. Only the Central region of the country, between Valparaiso and Santiago, indicated a moderate heating with anomalies between $+0, 9$ and $+1, 1^{\circ}\text{C}$.

The minimum temperature average of the air (in January) indicated a slight cooling in regions of Concepcion-Temuco and Valparaiso, whereas the rest of the country was under conditions between normal to warm, with the maximum positive anomalies in Curicó with $1, 4^{\circ}\text{C}$.

The atmospheric circulation on the South Pacific during January was dominated by positive anomalies of the pressure at level of the sea that affected the region of the subtropical Pacific, between the coasts of Chile and Island of Pascua with positive anomalies between $+1, 4$ and $+1, 9$ hPa. To the south of the latitude 45°S a persistent frontal activity and displacement of systems of low pressures caused a fall of pressure of $-5, 9$ hPa Sands and -8 hPa on the Paso Drake.

The precipitation marked an increase of the precipitations in the area between Puerto Montt and Punta Arenas in January, that surpassed the average values of the month in the South and Austral region of the country, being the rainiest Coyhaique with the maximum deviation of rain, $+58$ mm and totalizing 12 days of precipitation in the month.

III. PERSPECTIVE

A. GLOBAL

Taking into account the predictions from several numerical models, as well as the behavior of the main oceanic and atmospheric indicators, it is anticipated that continue the oceanic and atmospheric conditions in the Tropical Pacific ocean, own of the development of a weak warm event (El Niño), which would reach its maximum development in the first trimester of the present year. Consequently the positive anomalies of the SST will be present and of equal way at subsurface level the heating of the sea will persist; being highly recommendable to maintain a careful pursuit of the evolution as well as its future repercussions on the climate of the region of the South east Pacific.

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 that during the next months, in the sector of the South eastern Pacific, the values as much of the sea surface temperature as of the air continue being increased in agreement with the seasonality and that the positive anomalies fall and they approach to values of neutrality.

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
NOV 09	1.6	6.8	7.1	29.9	28.2	26.2	22.1	20.1	10.8	8.9	-0.8
DEC 09	-0.6	5.7	7.1	29.9*	28.3	26.7	23.1	21.6	10.0	7.9	-1.0
JAN 10	0.9	8.9	9.7	29.5	28.1	26.6	24.7	23.8	8.2	5.9	-1.5

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	
NOV 09	27.4	23.6	16.1	17.6	16.4	15.5	15.8	12.4	
DEC 09	27.1	24.1	16.4	18.2	17.1	15.6	16.3	13.3	
JAN 10	27.3	25.9	19.3	19.4	18.3	16.9	17.9	14.4	

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	
NOV 09	***	2766*	1110	***	744	1188	839	***	
DEC 09	***	278.9	114.0	***	***	123.3	89.8	***	
JAN 10	***	278.4	116.0	157.4	***	118.8	85.9	69.7	

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		Temperatura Superficial del Mar (TSM)			Nivel Medio del Mar (NMM)		
		BALTRA	TALARA	CALLAO	BALTRA	LLS (INOCAR)	CALLAO
DEC	04	***	20.4	15.4	***	293.3	117.0
	09	***	21.5	15.9	***	290.9	113.8
	14	***	21.2	16.0	***	284.2	117.2
	19	***	21.0	16.2	***	285.3	115.6
	24	***	21.3	17.3	***	282.5	119.7
	29	***	21.3	18.6	***	277.9	118.9
JAN	03	***	20.4	15.4	***	293.3	117.0
	08	***	21.5	15.9	***	290.9	113.8
	13	***	21.2	16.0	***	284.2	117.2
	18	***	21.0	16.2	***	285.3	115.6
	23	***	21.3	17.3	***	282.5	119.7
	28	***	21.3	18.6	***	277.9	118.9

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

Note.

* Values revised

***. Information not received

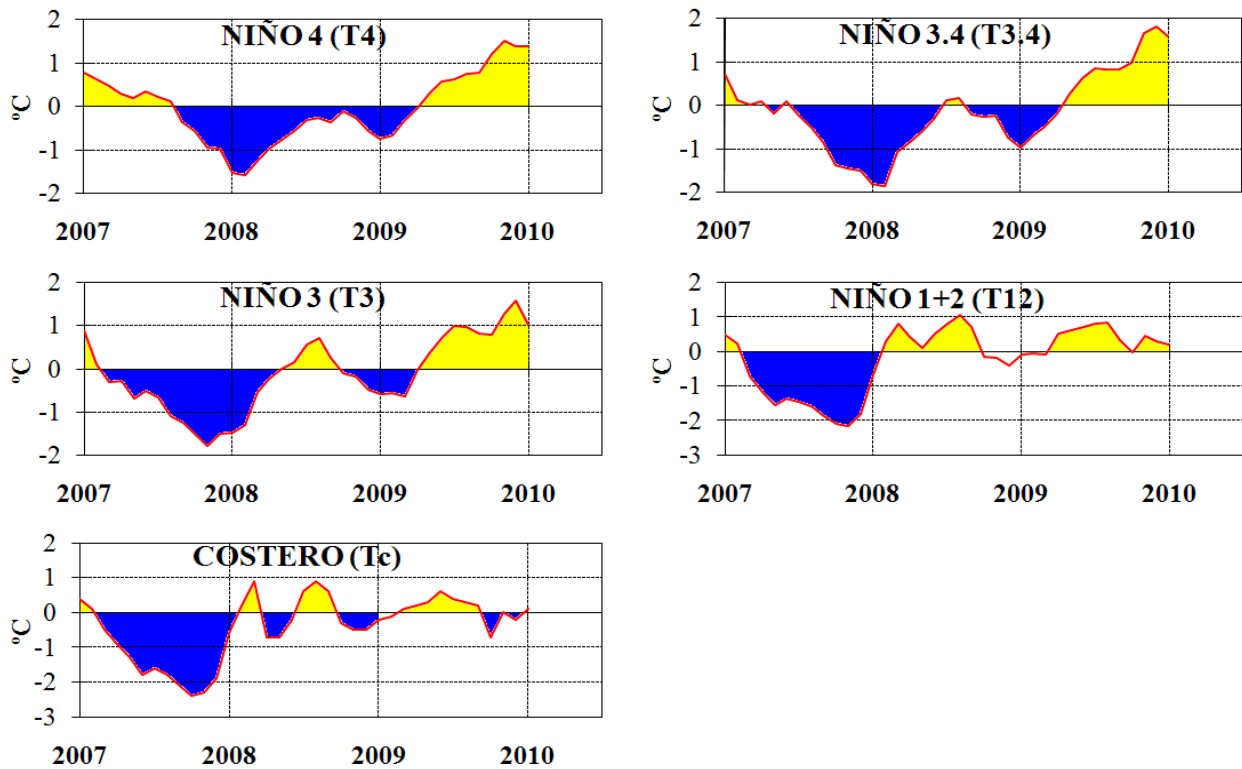


Figure 3.- Oceanic anomalies indices (Niño 4, Niño 3.4, Niño 3, Niño 1+2 and Tc). The location of the oceanic indices appears in figure 2. (Source: NCEP/NWS/NOAA/USA).

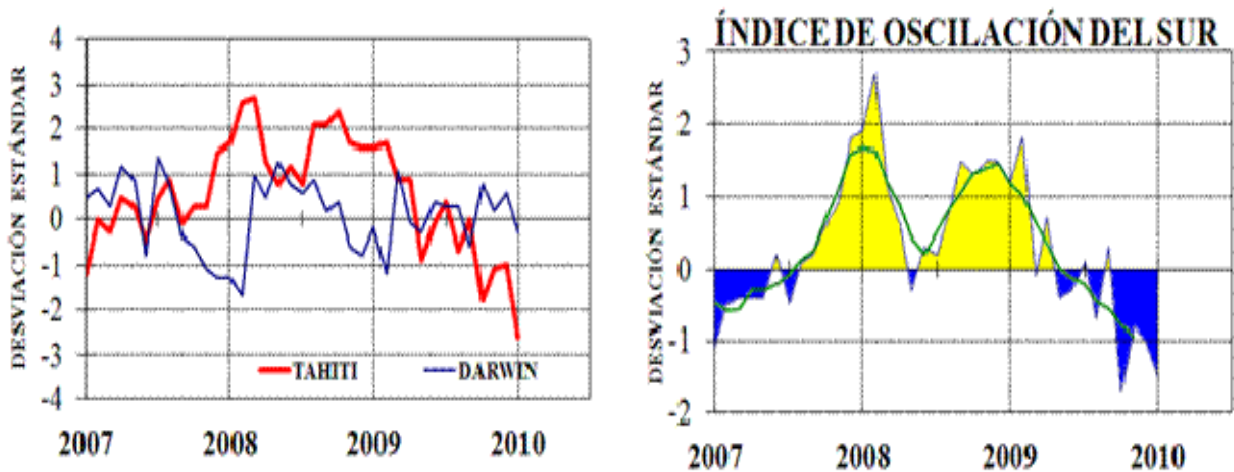


Figure 4.- Left Panel: Five-months running mean for atmospheric pressure anomalies in Tahiti and Darwin (mb). Right Panel: Southern Oscillation Index. (SOI) with monthly values and five-months running mean graphed as a green line. The SOI is based on the difference between standardized pressure values: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

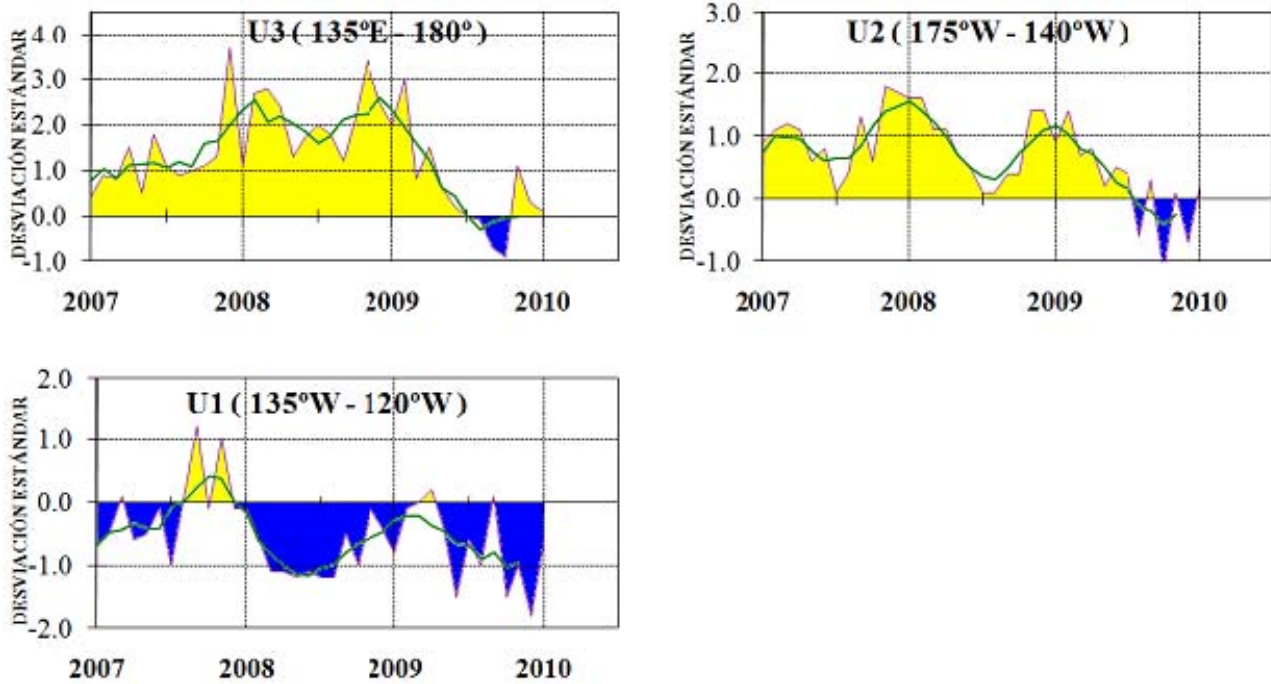


Figure 5.- Series and moving averages of five months of zonal wind standardized anomalies (m/s) averaged between 5°N and 5°S for three Equatorial zones: western (U3), central (U2) and eastern (U1). (Source: NCEP/NWS/NOAA/USA).

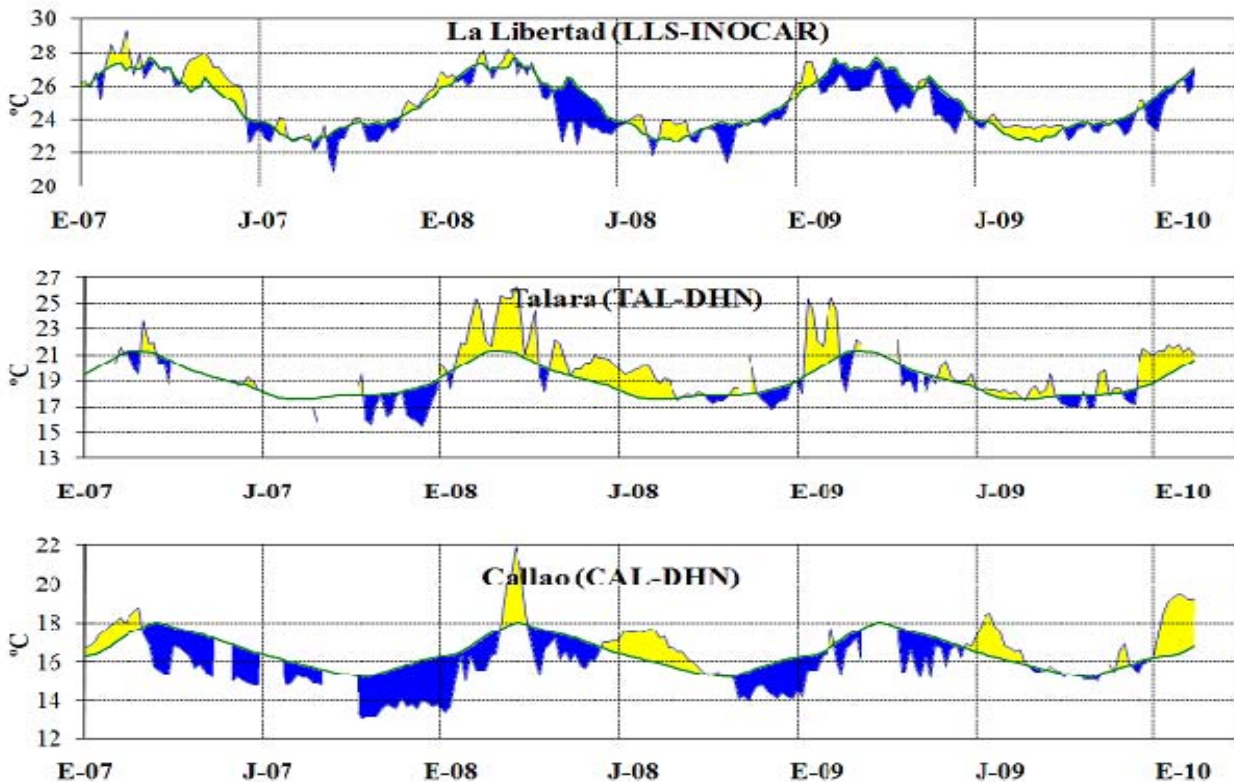


Figure 6.- Five day averages (pentads) of SST (°C) in Ports of Peru and Ecuador. The green curve indicates climatology. The location of oceanic indices appears in figure 1. (Source: NOAA/Atlantic Oceanographic and Meteorological Laboratory – Miami.)

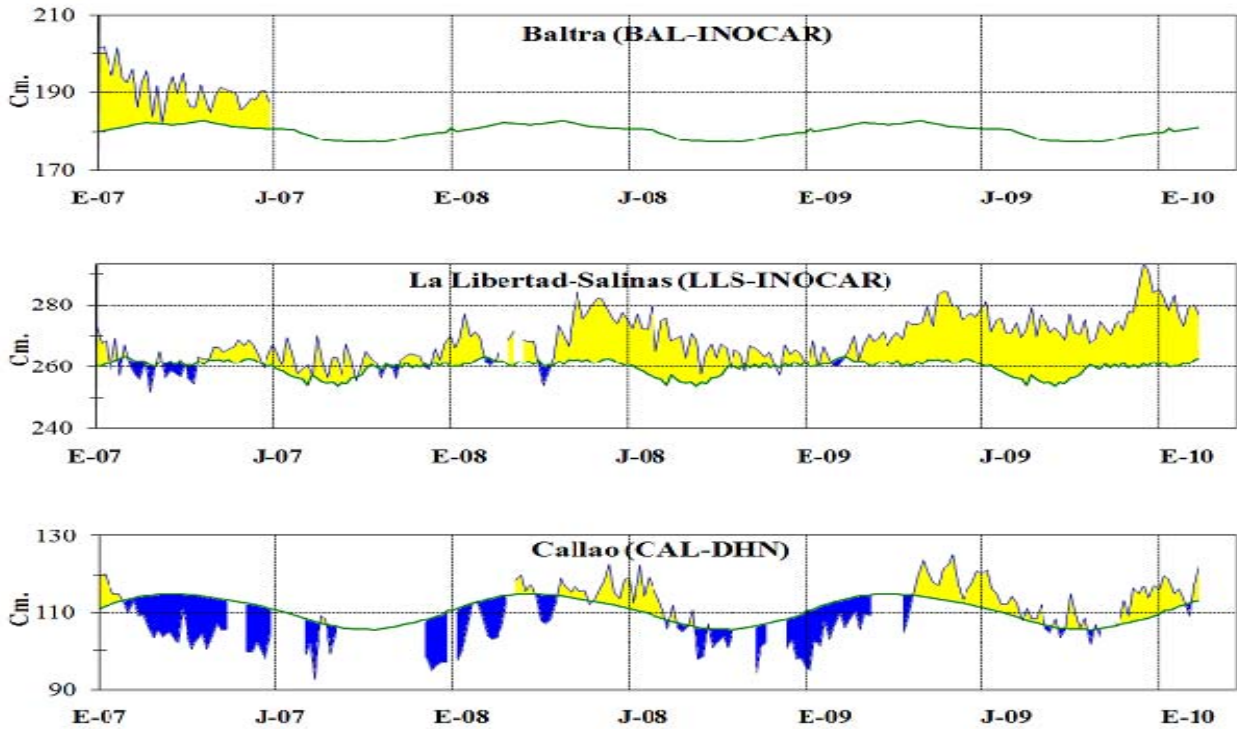


Figure 7.- Five-day running mean (pentads) of MSL (cm) in Ports of Peru and Ecuador. The green curve indicates climatology. The location of oceanic indices appears in figure 1. (Sources: NOAA/Atlantic Oceanographic and Meteorological Laboratory – Miami, e INOCAR).

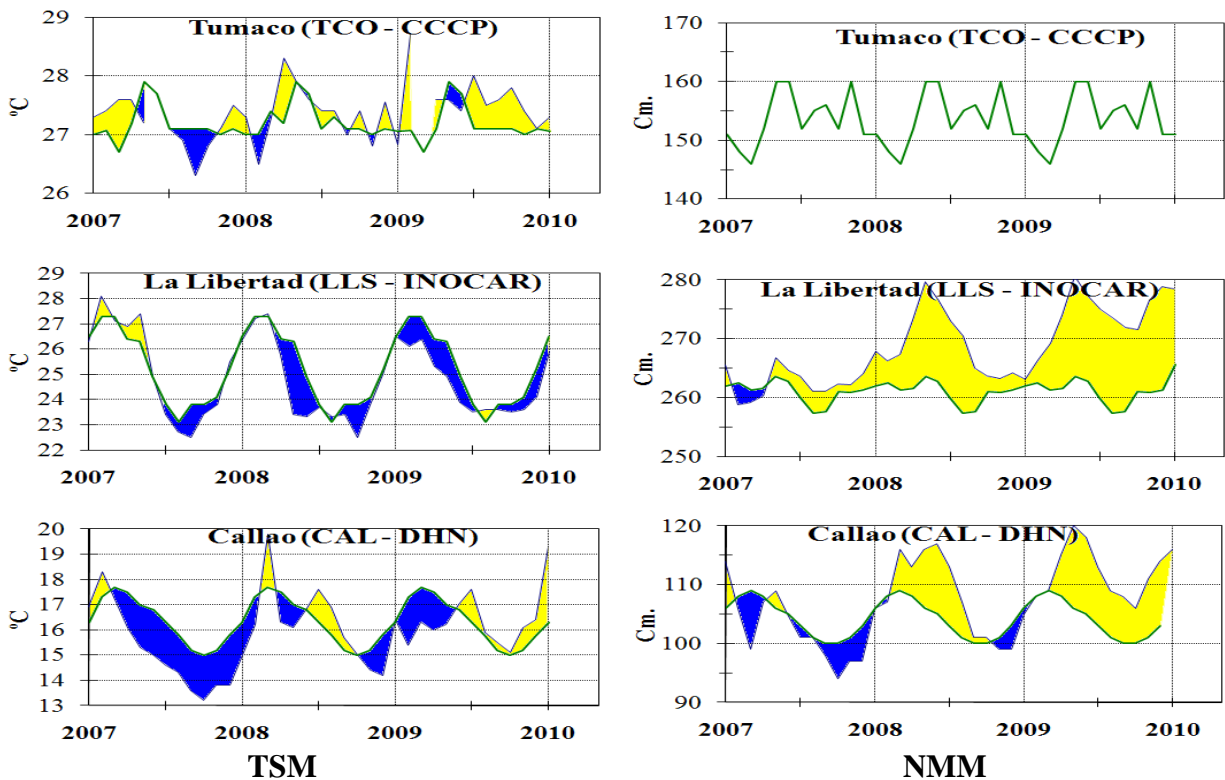


Figure 8a.- Monthly means of the SST (°C) and MSL (cm) in five stations of the ERFEN region. Green curve indicates historic monthly mean. The location of the stations appears in Figure 1. (Sources: CCCP, INOCAR y DHN).

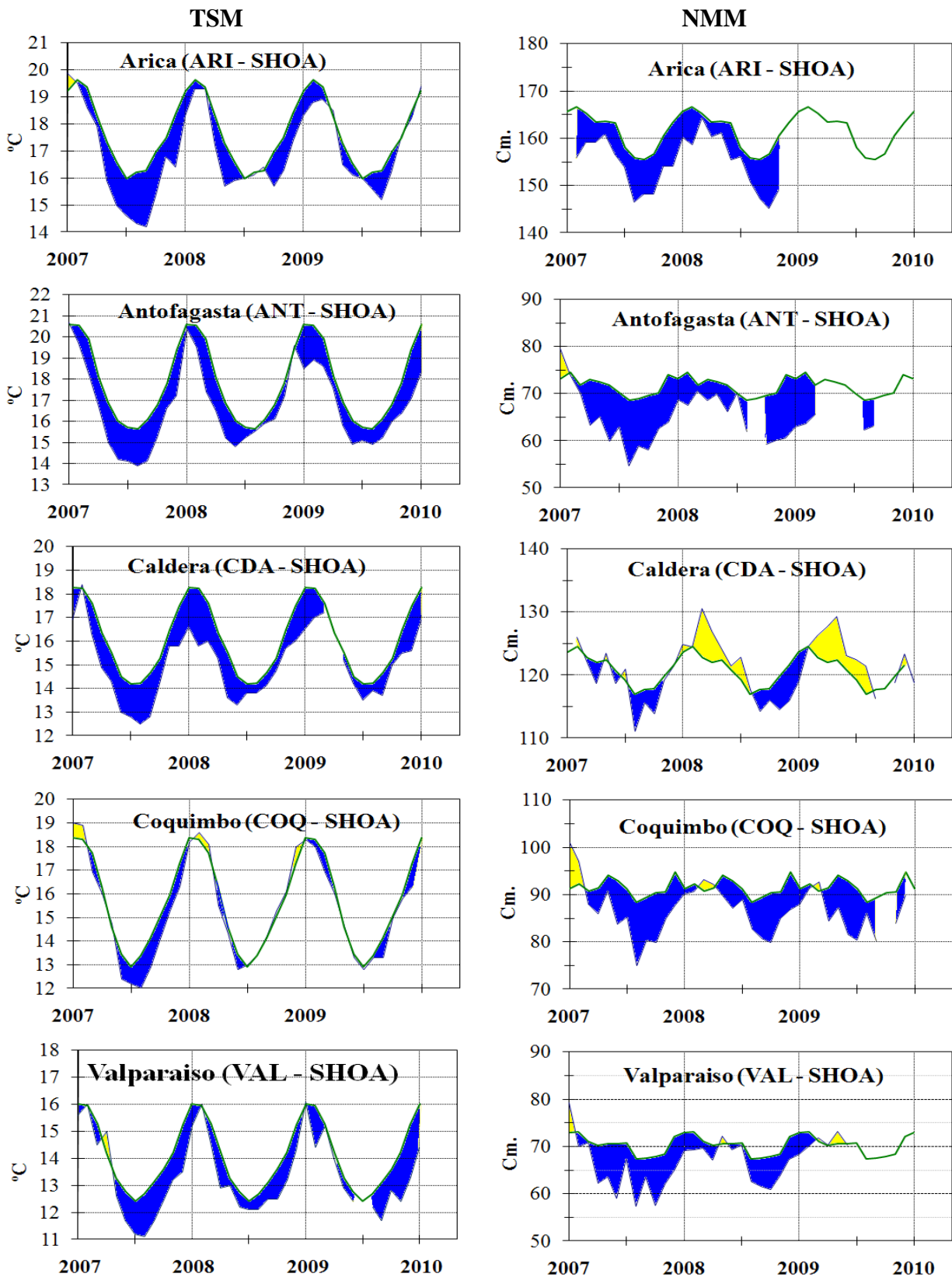


figure 8b.- Monthly means of the SST (°C) and MSL (cm) in five stations of the ERFEN region. Green curve indicates historic monthly mean. The location of the stations appears in Figure 1. (Source: SHOA).

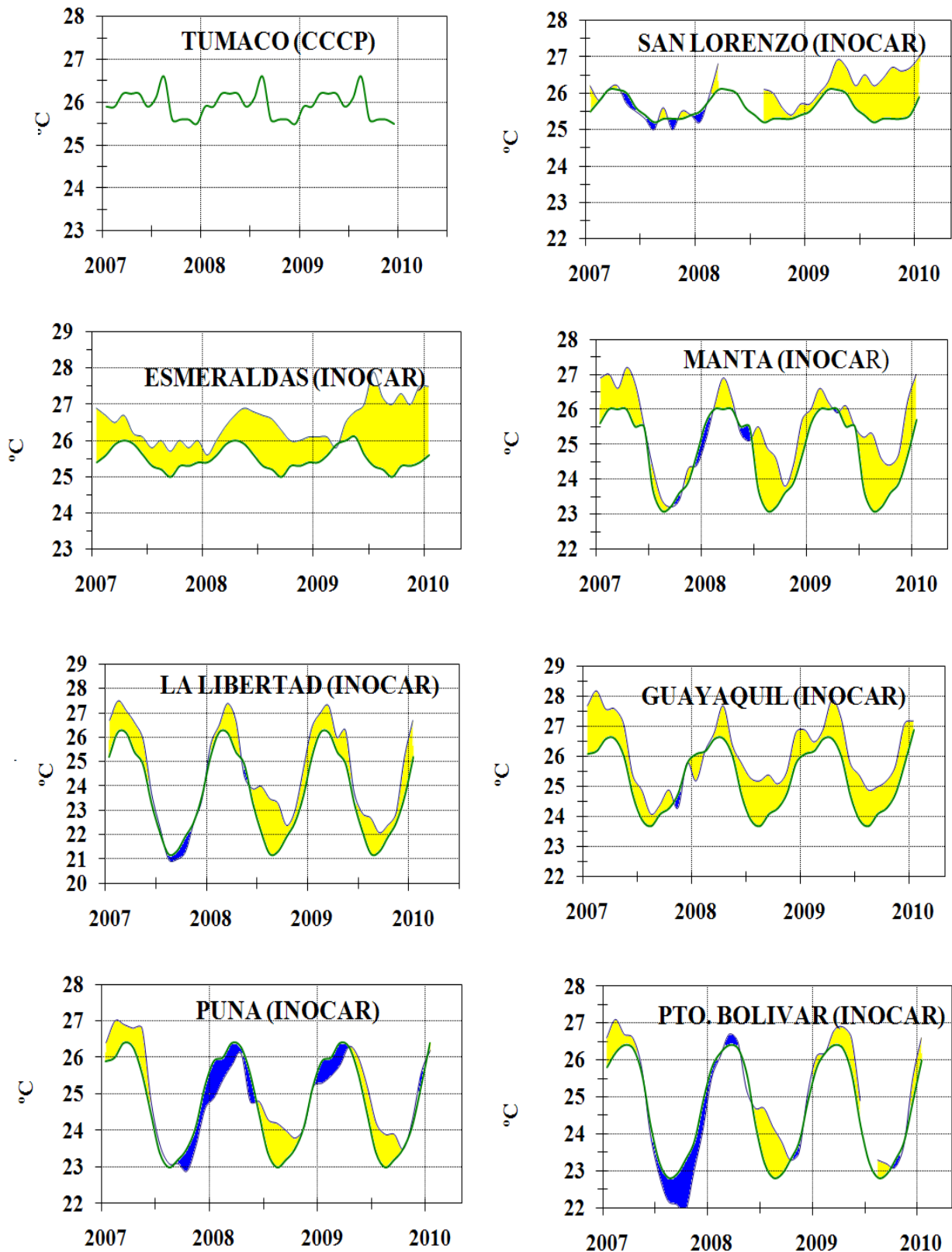


Figure 9a.- Monthly means of the air temperature (°C) in 8 stations of the ERFEN region. Green curve indicates historic monthly mean. The location of the stations appears in Figure 1. (Sources: CCCP & INOCAR).

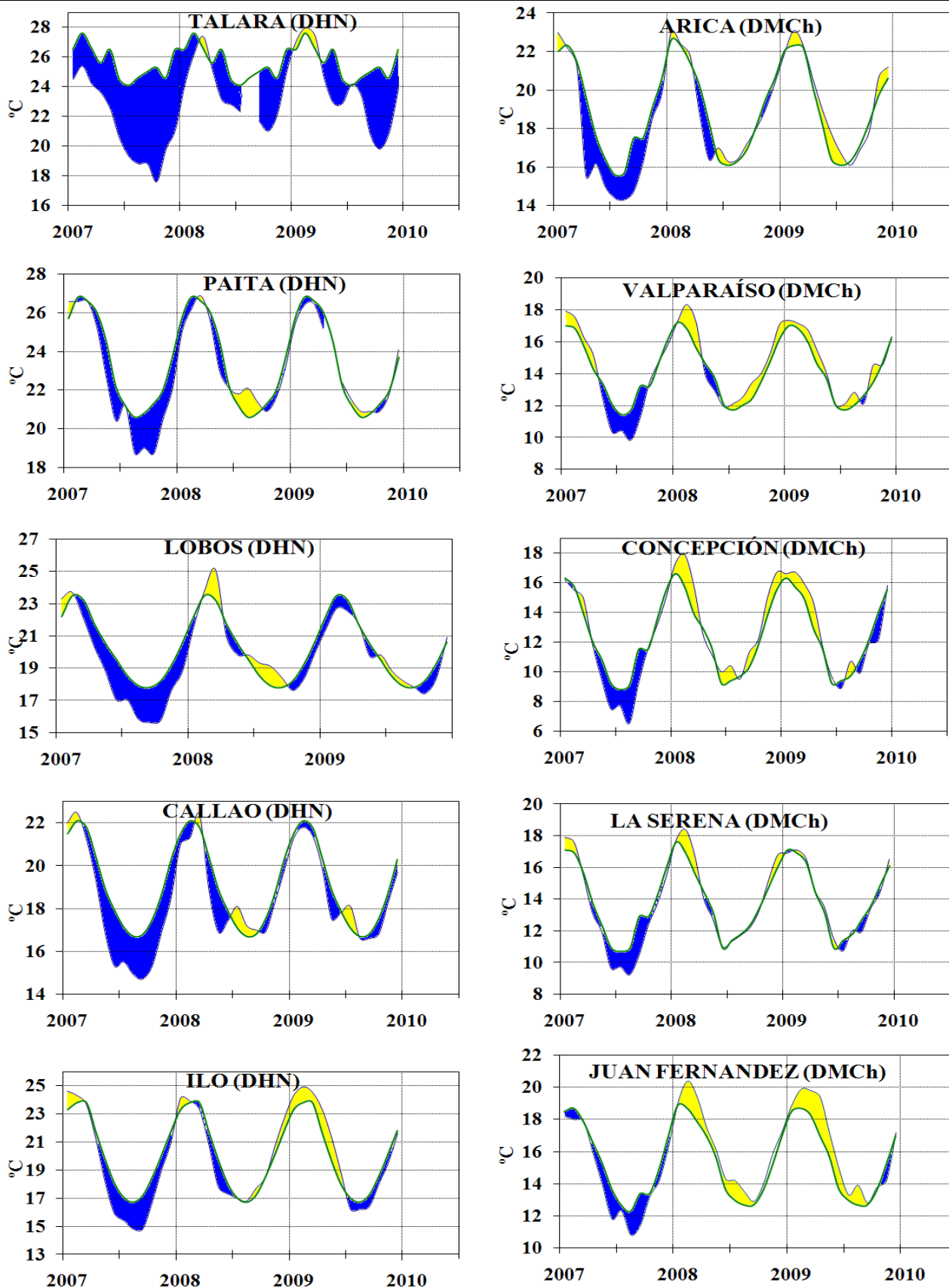


Figure 9b.- Monthly means of the AT (°C) in 10 stations of the ERFEN region. Green curve indicates historic monthly mean. The location of the stations appears in Figure 1. (Sources: DHN & DMCh).

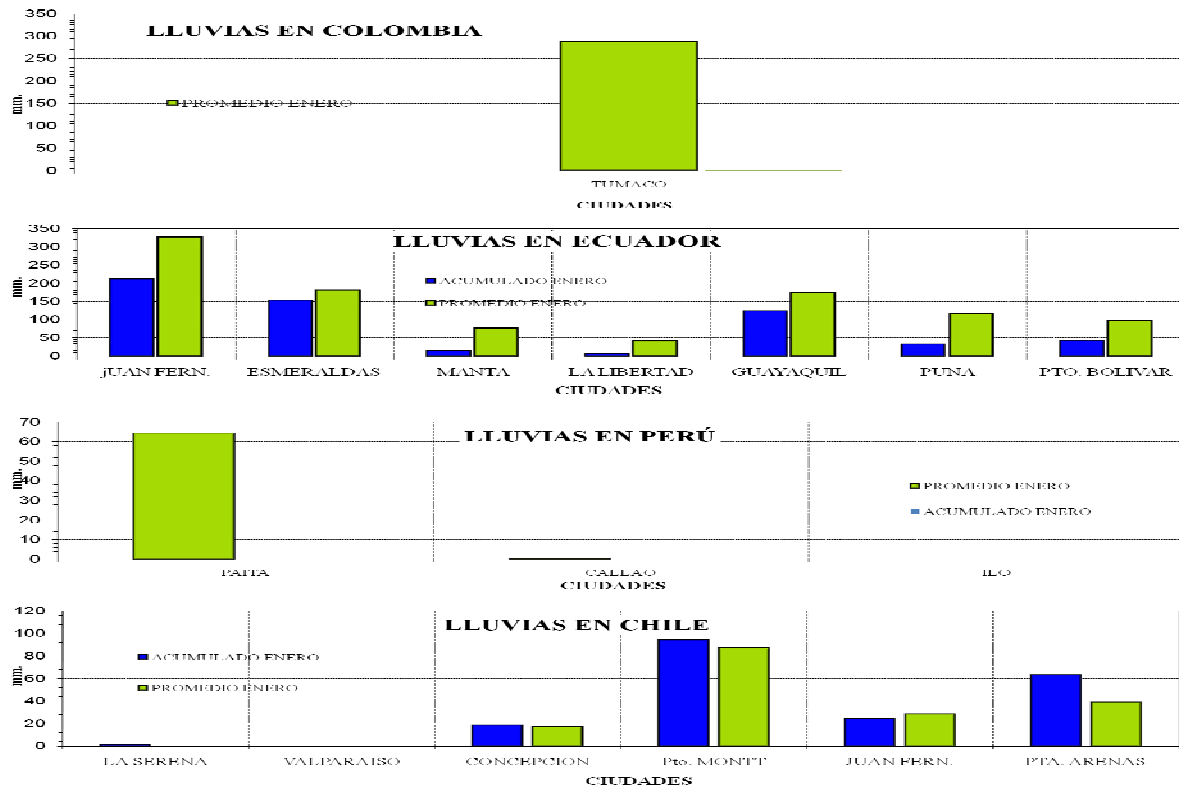
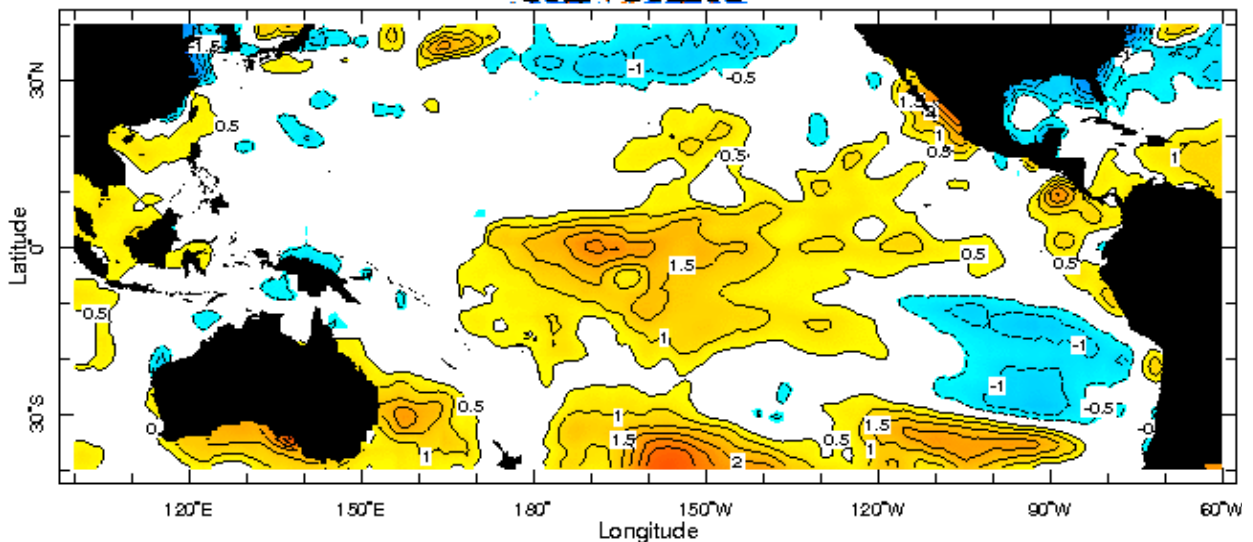


Figure 10.- Rains during October in the coastal stations of Colombia, Ecuador, Peru and Chile. Location of the stations appears in Figure 1. (Sources: CCCP, INOCAR, DHN & DMCh).

SEA SURFACE TEMPERATURE ANOMALY (°C) JANUARY



24-30 Jan 2010
 Figure 11.- Sea Surface Temperature Anomalies (°C) January 2010.
 (Source: International Research Institute for Climate and Society)

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OCEANOGRAPHIC INSTITUTE OF THE NAVY OF ECUADOR
 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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