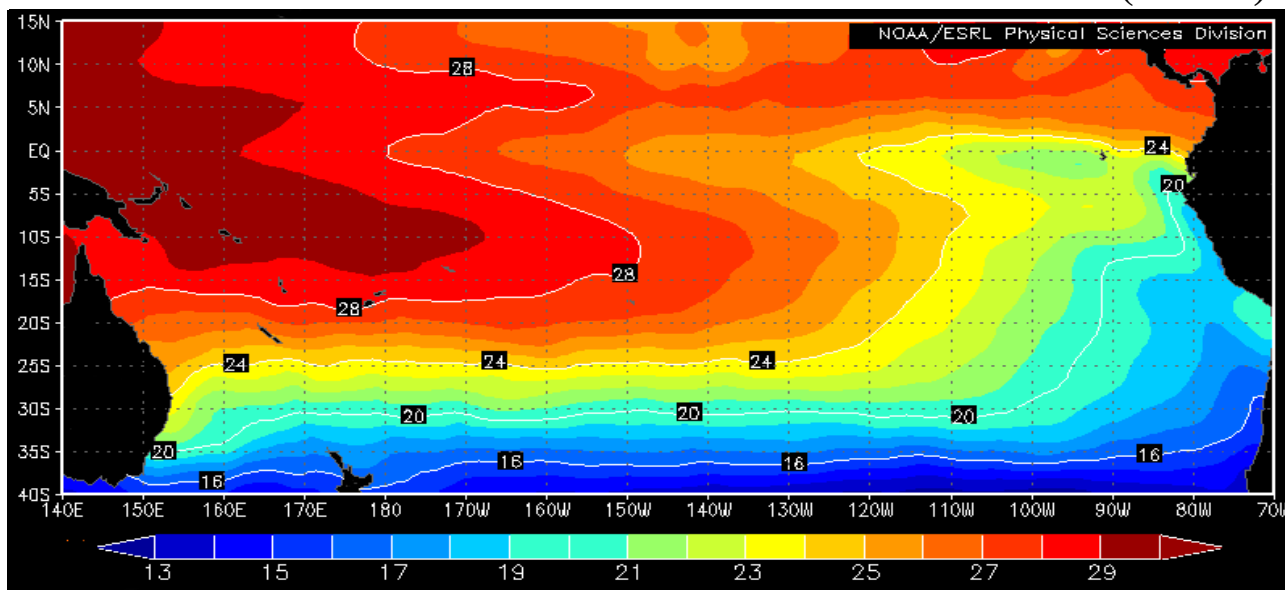


COMISIÓN PERMANENTE DEL PACÍFICO SUR (CPPS)



Sea Surface Temperature, November 2008, NOAA-CIRES/Climate Diagnostic Center

NOVEMBER 2008

BAC N° 218

ERFEN

(Estudio Regional del Fenómeno El Niño)

BOLETÍN DE ALERTA CLIMÁTICO *CLIMATE ALERT BULLETIN*



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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

November was characterized to present neutral conditions ENSO with one slight tendency to a cooling in the Equatorial Pacific Ocean, where the Sea Surface Temperature stayed slightly below its average value. In the Eastern Equatorial Pacific Ocean, the negative anomalies would stay at least in next 2 months.

During the last week of November, the Sea Surface Temperature anomaly in the “El Niño” regions presented the following values; in the region of the Western Pacific (“El Niño” Region 4) it was of -0, 4°C; in the Central Pacific (“El Niño” Region 3, 4) the anomaly was of -0, 4°C and; in the region of the Eastern Pacific (“El Niño” Region 1+2), it was of -0, 9°C.

At subsurface level, in the Central Equatorial Pacific Ocean, the thermal dipole continuous presents, in November; being located between 100 and 200 ms of depth; showing in this occasion significant changes in relation to size and magnitude of the thermal anomalies; thus the warm nucleus located to the west of the line of date presented a considerable downsizing and the anomalies were reduced to +2, 0°C; whereas the cold nucleus, located in the Eastern Pacific, presented an increase of size projecting towards the Western Pacific increasing its negative anomaly in -3, 0°C and occasionally until -4, 0°C, continuing with the tendency observed from the second fortnight of October.

The Mean Sea Level (MSL) in the South Eastern Pacific during this month presented tendency to values around its normal patterns. In the coast of Ecuador the MSL was slightly superior to the normal average of the month in 2, 0 cm; throughout the Peruvian coast it registered slight variations, with respect to the previous month, oscillating these values closely together of its normal patterns of the month; in front of Chile the majority of the stations still stays the negative anomalies between -8, 0 cm (Arica) and -10, 5 cm (Talcahuano).

The Index of Oscillation of the South continuous in the positive phase, although in this occasion had a new increase with respect to the previous month, being its value in this opportunity of 1, 5.

The Intertropical Convergence Zone maintained its average axis between 6 and 8°N, with convective activity towards the Eastern edge of the Pacific Ocean affecting the Eastern region of the Caribbean Sea, Colombia and occasionally the North coast of Ecuador.

In the region of the South eastern Pacific the surface winds appeared with South and South-east direction and in relation to the speed in this occasion the positive anomalies predominated between 0, 4 and 2, 0 m/s.

Taking into account the present thermal behaviour from the Equatorial Pacific Ocean, as well as several models of numerical simulation are anticipated that, during the next month Sea Surface Temperature in the Eastern sector of the Equatorial Pacific Ocean will continue slightly under its normal value.

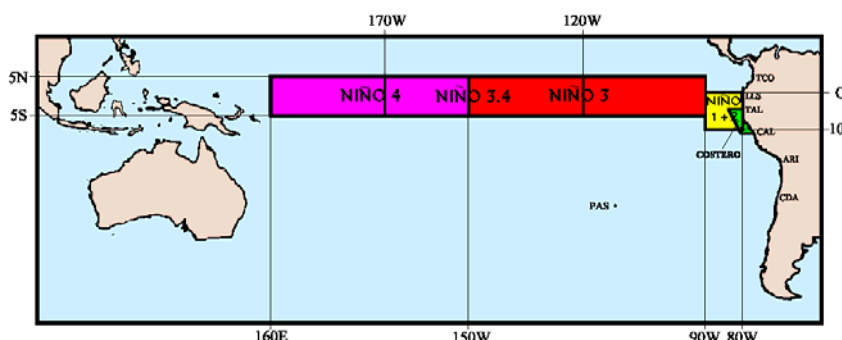


Figure 2.- Map indicating locations and codes of series. Rectangles show the average area of Sea Surface Temperature (SST °C)

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**CLIMATE ALERT BULLETIN
BAC Nº 218, NOVEMBER 2008****I. GLOBAL AND REGIONAL IMAGE**

During November Central Equatorial Pacific Ocean continued with tendency to diminish the Sea Surface Temperature (SST-TSM). The monthly anomaly of the SST for November in the “El Niño” regions, stayed in negative values: In the Western Pacific Region (“El Niño” Region 4) it happened of -0, 1°C to -0, 4°C, in the Central Pacific (“El Niño” Region 3, 4) the anomaly happened of -0, 3°C to -0, 4°C; in the Eastern Pacific Region (“El Niño” Region 1+2) anomalies happened of -0, 15°C to -0, 9°C.

At subsurface level Equatorial Pacific Ocean continued exhibiting a thermal dipole, with the warm nucleus of 2, 0°C located to the west of the line of date and the cold nucleus of until -4, 0°C located in the Eastern Central Equatorial Pacific, both nuclei are located around 150m of depth. During this month the reduction in size and value of the anomaly of the warm nucleus was evident, whereas the cold nucleus increased its area more to the east sector and value of the anomalies, condition that was demonstrated from the second fortnight of October.

The Mean Sea level (MSL - NMM) in the South eastern Pacific presented tendency to values very near its average values. In front of coasts of Ecuador MSL presented values around normal one of the month, with anomaly of 2, 0 cm; throughout Peruvian coast the MSL registered slight variations of +/- 3 cm, with respect to previous month; oscillating these values closely together of its normal patterns of the month, the minimum anomaly appeared in the station of Callao (- 2 cm), and the maximum anomaly in the station of Chimbote (+4 cm); whereas, Paita presented a behaviour similar to its normal one; in Chile in the majority of the stations still negative anomalies stay, those that fluctuated between -8, 0 cm (Arica) and -10, 5 cm (Talcahuano).

The Index of Oscillation of South (IOS) like in the previous month, it continued in its positive phase and in this occasion the value was 1, 5. The anomaly of the pressure standardized in Tahiti was of 1, 7 whereas in Darwin descended to a value of -0, 6.

The central axis of the Intertropical Convergence Zone (ZCIT) appeared in the Eastern sector of the Pacific between 6 and 8°N with variable convective activity with direct affectation to Central America, Colombia and occasionally the north coast of Ecuador.

As far as surface winds, in the region of the South eastern Pacific they appeared predominantly of the south and south-east, with speeds that were slightly on the average value between 0, 4 and 2, 0 m/s.

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

The Institute of Hydrology, Meteorology and Environmental Studies (IDEAM), informs that November was characterized by processes of strong atmospheric instability, especially by the influence of two cold fronts of the North hemisphere (one at the beginning of the month and another one when initiating the second fortnight), which “parked” in the western Caribbean Sea, favouring convective processes and very intense rains from beginnings of the month in Colombia; it is worth to emphasize, the incidence especially of the second of them, which permanently interacted with the

ITCZ and other systems like some tropical waves of the East, systems of low atmospheric pressure in the West of the Caribbean Sea and humidity coming from the north of Brazil.

The amounts of rain exceeded the averages in ample sectors of the Colombian territory; this situation was reflected especially in one season highly rainy in the centre and north of the country, where the volumes of precipitation, generally, exceeded in more a 50% the averages of the month. The previous thing, agrees with the information published by XM (company in charge of transactions in the market of wholesale energy), which indicates that the hydric contributions to the dams of the National Interconnected System, in power terms reached 148%, (percentage very over the historical averages). Product of an intense rainy season, manifolds slidings appeared in most part of mountain zones of the national territory; similarly, emergencies associated to floods were registered in the half and low parts of the two main river basins of the country (Magdalena and Cauca), as well as in other river basins of median extension.

The majority of days was rainy, except the included ones between November 6 and 12 where the atmospheric circulation associated to tropical storm "Dove", which formed in neighbourhoods of archipelago of "San Andres and Providencia", dragged part of the cloudiness towards the West of the country being the mid-eastern zone with more cleared skies.

With respect to conditions observed in the tropical Pacific Ocean, the analyses of the IDEAM indicate, that although neutral conditions in the most part of the river basin prevail, the Sea Surface Temperature in some sectors has become a little colder, disappearing warm water nuclei observed from past month of May on the mid-eastern zone. Concordant with the previous thing, in deep waters cold conditions of temperature prevail, whereas winds in levels near to surface, they prevail of the East over the centre-western zone, and slightly more intense than to end of October. The projections anticipated by the IDEAM and diverse models of climatic prediction in the international ambit, tend to show in their majority, neutral conditions until first trimester 2009.

The Pollution Control Center for the Pacific (CCCP) declares that during biweekly samplings realised to fixed station coastal located to 10 miles of the bay of Tumaco, in coordinates 78, 51 °W and 2 °N, that was realised during November 2008 by the Area of Operational Oceanography, it was observed that surface layer registered a SST average of 26, 78°C, also appears a negative anomaly at surface level of - 0, 22°C with respect to the monthly historical average of the lapse between 1999 and first trimester 2008.

In November, thermocline was positioned on the 35 meters, and for the second fortnight It was positioned on the 43 meters approximately.

As far as behaviour of the salinity, it registered a value monthly average of 33, 30, throwing a positive anomaly of 0, 07 at surface level, with respect to the monthly historical average included in lapse 1999 – 2008. The maximum salinity value of the month was of 34, 98 and it appeared to an approximated depth of 88 meters; a reduction of the halocline of approximately 20 meters in average was observed, with respect to October.

B. CONDITIONS IN THE ECUADORIAN COAST

The Oceanographic Institute of the Navy of Ecuador (INOCAR) reports that during November 2008 Air Temperature throughout Ecuadorian coast fluctuated between 23, 5°C (3°S Puerto Bolivar) and 26, 0°C (1°N Esmeraldas) what It mean anomalies of -0, 3°C for both localities. The SST presented values between 23, 8°C (2°S La Libertad) and 26, 3°C (Esmeraldas) with anomalies of -0, 3°C and 0, 5°C.

During this month, throughout north sector of the Ecuadorian coast (San Lorenzo), rains with a “monthly accumulated” of 97 mm appeared, which it means a positive anomaly of 10%. In the rest of the central and south Ecuadorian coast rains were deficit. During these months, rains in the Ecuadorian Coast are characterized for being minimum, except in the north end of the country that is influenced by loosening of convective nuclei originating from ITCZ.

As far as winds these appeared within waited rank of normal variability for the date and were of south south-east.

Considering present behaviour of the ocean-atmospheric conditions in front of Ecuador, it is anticipated that in December some precipitations appear indicating the beginning of humid station for Ecuadorian coast, which will be within normal amounts for the month. About Sea and Air Temperature in the Ecuadorian coast, esteem that will to appear around to their value average of the month.

C. CONDITIONS IN THE PERUVIAN COAST

The Direction of Hydrography and Navigation of Peru (DHN) declares that generally, throughout the Peruvian coast, a variation around +/- 0, 5°C was registered in the anomalies of the SST with respect to the previous month. The negative anomalies predominated, with exception of Talara, that presented an anomaly of +0, 3° C, and the station of ILO that presented a behaviour similar to its normal one. The negative anomalies fluctuated between -0,2°C (Mollendo) and -1,0°C (San Juan).

The Mean Sea Level (MSL) throughout Peruvian coast, registered slight variations of +/- 3 cm, with respect to the previous month; nevertheless, these values oscillated closely together of their normal patterns of the month. The minimum anomaly appeared in the station of Callao (- 2.0 cm), and the maximum anomaly in the station of Chimbote (+4.0 cm); whereas, Paita presented a behaviour similar to its normal one.

Throughout Peruvian coast, Air Temperature (AT) has registered an increase around 1,4°C, with respect to the previous month, prevailing positive anomalies and appearing the most significant changes in the zones center and south. The Air Temperature - AT (anomalies) fluctuated between +0,1°C (Lobos de Afuera) and +2,2°C (ILO).

During this month precipitations in all Peruvian coasts were not registered.

Throughout Peruvian coast winds of south and south-east direction appeared. In relation to wind speed, positive anomalies predominated, that fluctuated between 0,1 to 2,0 m/s; with the exception of Lobos de Afuera, Callao and San Juan, that presented anomalies of -0,7, -0,2 and -1,2 m/s, respectively.

D. CONDITIONS IN THE CHILEAN COAST

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

During this month, SST showed behaviour similar to observed one in October, with one condition colder than the normal thing to a large extent of the coast of Chile. It is possible to emphasize that stations that presented majors negative anomalies were Arica by the north (- 1,4°C) and Valparaiso and Talcahuano by the south (- 0,9 and -0,8°C, respectively). On the other hand, the zone north-

center presented values near to historical average, with anomalies of $-0,5^{\circ}\text{C}$ in the station of Antofagasta, $-0,3^{\circ}\text{C}$ in Caldera and $0,2^{\circ}\text{C}$ in Coquimbo.

The Sea Level was characterized to present one slight tendency to the increase that implied values of anomalies very near to historical average in the stations of Antofagasta (0,8 cm) and Coquimbo (- 1,4 cm), without, still stay negative anomalies of this variable in the majority of the stations, those that fluctuated between -8, 0 cm (Arica) and -10,5 cm (Talcahuano).

The Meteorological Direction of Chile (DMCh) indicates that during November, the Air Temperature average in surface, indicated a heating to a large extent of the continental country, being the majors positive anomalies present in the inner region of the central and South zone, with values of $+3,0^{\circ}\text{C}$ (Curicó), $+2,2^{\circ}\text{C}$ (Chillán) and $+1,5^{\circ}\text{C}$ (Osorno).

The maximum temperature of the air in surface reached the majors heatings in the inner region of the central and south zone, with positive anomalies that surpassed $+1.0^{\circ}\text{C}$ between Santiago and Osorno. The principles anomalies appeared with $+3.7^{\circ}\text{C}$ in Curicó and 2.7°C in Chillán. Contrary, the end of the North coast of the country, presented/displayed slight cooling, with -0.9°C in Arica.

The minimum temperature of the air in surface, showed heating, but of smaller magnitude to the observed ones by the maximum temperature. The central and South region, showed the majors positive anomalies with $+2,4$ in Curicó and $+1,8$ in Osorno. Only slight cooling, with anomalies that fluctuated between $-0,1$ and -0.3°C were observed in Arica and the south of Coyhaique.

The atmospheric circulation of the South Hemisphere was characterized to indicate positive anomalies of the pressure in the subtropical Pacific and average latitudes, the western South Atlantic and the Indian Ocean, with anomalies between 6 and 8 hPa over the climatologic value. The continental region Antarctica and the adjacent oceans until 50°S , were pronounced with negative anomalies, associate to intense frontal activity.

The precipitation in Chile, appeared with near deficit 20 mm below the climatologic average, in the central zone, between Curicó and Concepción, whereas the South and austral zone, between Valdivia and Punta Sands, the precipitations surpassed the climatologic values between 20 and 33 mm.

III. PERSPECTIVE

A. GLOBAL

Taking into account the predictions from several numerical models, as well as the behavior of the main oceanic indicators and atmospheric, esteem that during the next month to a large extent of the Equatorial Pacific, will continue present slight negative anomalies of the TSM. Of equal way at surface the permanence of the present thermal structure is expected, with predominance of cold the subsuperficial language throughout the Eastern Central Pacific.

B. REGIONAL

In agreement with the pursuit of the ocean-atmospheric conditions in the Southeastern Pacific Ocean, executed by Program ERFEN (integrated by National Committees ERFEN of Chile, Colombia, Ecuador and Peru), and coordinated by the CPPS, the occurrence of the Phenomenon discards the Boy in the Eastern Pacific for the first trimester of the 2009; for December prehorseradish tree majors changes in the superficial and subsuperficial thermal structure, not hoping that as much the temperature of the air as the one of the sea stay fluctuating around his average value.

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
SEP 08	5.2	9.0	6.9	28.1	26.4	25.1	21.2	19.2	16.4	11.7	1.5
OCT 08	5.6	8.3	6.2	28.3	26.3	24.8	20.8	18.6	16.1	11.0	1.3
NOV 08	6.1	10.3	8.7	28.1	26.3	24.8	21.4	19.5	13.6	8.1	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	
SEP 08	27.0	23.4	15.7	16.4	15.9	14.1	14.2	12.5	
OCT 08	27.4	22.5	15.0	15.7	16.1	14.7	15.3	12.5	
NOV 08	26.8	23.8	14.4	16.3	17.2	15.7	16.1	13.2	

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	
SEP 08	***	2650	1010	1472	***	1142	807	615	
OCT 08	***	2637	1010	1451	593	1160	798	609	
NOV 08	***	2632	990	1490	698	1145	906	639	

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
OCT 05	***	***	***	***	266.1	100.60
10	***	***	***	***	259.6	104.70
15	***	***	***	***	265.6	***
20	***	***	***	***	264.4	***
25	***	***	***	***	258.5	***
30	***	***	***	***	267.0	***
NOV 04	***	20.9	14.0	***	266.2	94.30
09	***	19.9	14.3	***	264.8	101.20
14	***	18.0	14.7	***	263.4	101.80
19	***	17.5	14.8	***	264.8	***
24	***	17.3	14.5	***	260.0	***
29	***	16.7	14.3	***	257.3	***

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

Note.

* Values revised

***. Information not received

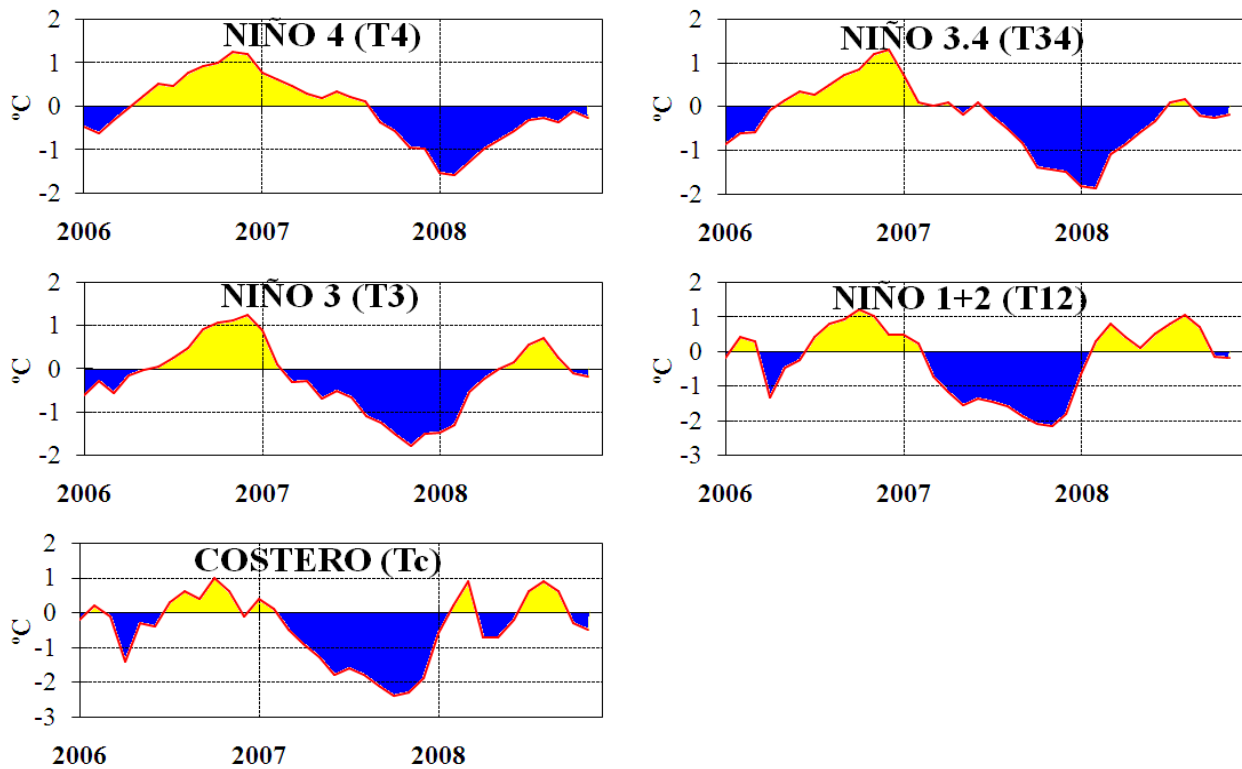


Figure 3.- Oceanic anomalies indices (Niño 4, Niño 3.4, Niño 3, Niño 1+2 and Tc). The location of the oceanic indices appears in figure 2. (Source: NCEP/NWS/NOAA/USA).

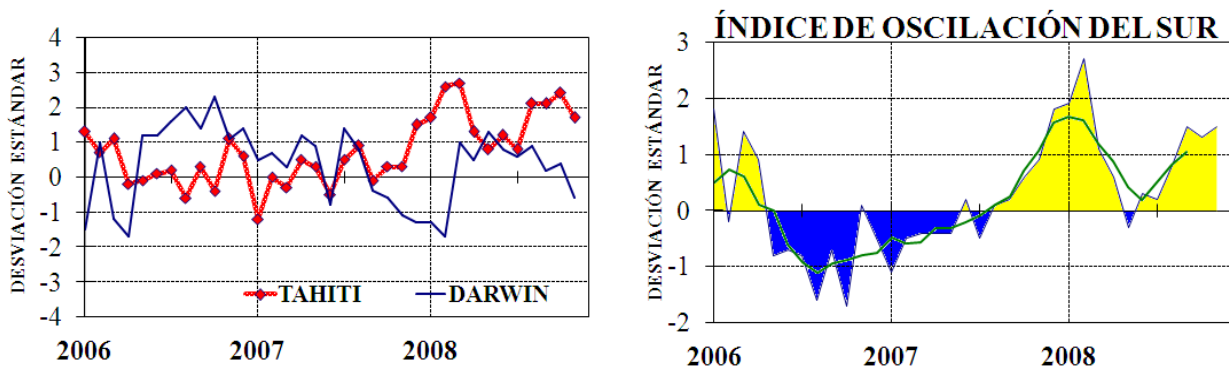


Figure 4.- Left Panel: Five-months running mean for atmospheric pressure anomalies in Tahiti and Darwin (mb). Right Panel: Southern Oscillation Index (SOI) with monthly values and five-months running mean graphed as a green line. The SOI is based on the difference between standardized pressure values: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

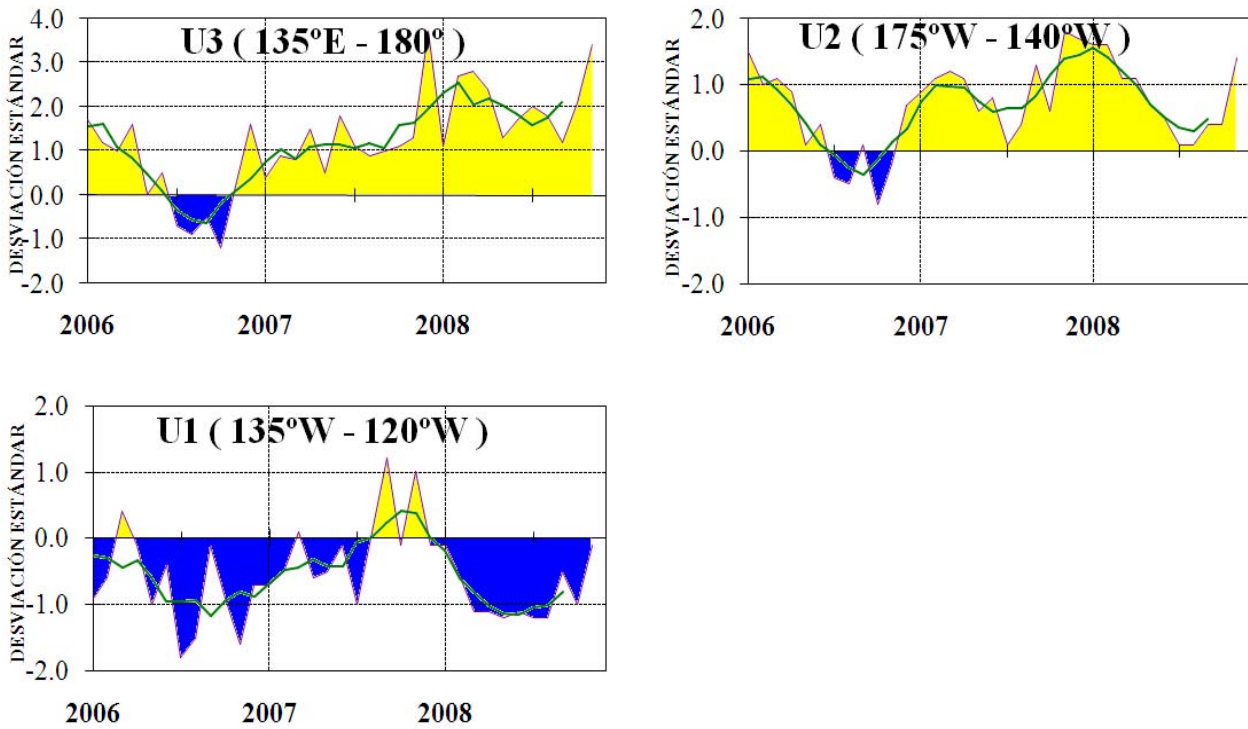


Figure 5.- Series and moving averages of five months of zonal wind standardized anomalies (m/s) averaged between 5°N and 5°S for three Equatorial zones: western (U3), central (U2) and eastern (U1). (Source: NCEP/NWS/NOAA/USA).

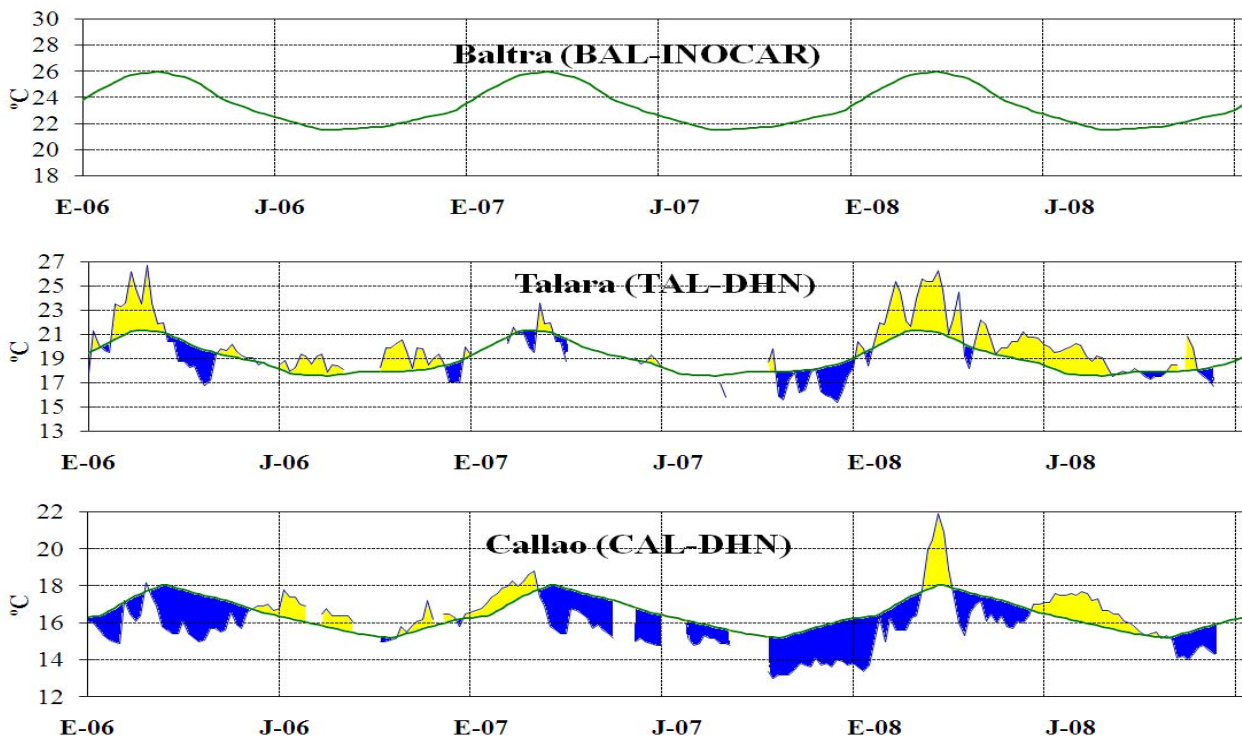


Figure 6.- Five day averages (pentads) of SST (°C) in Ports of Peru and Ecuador. The green curve indicates climatology. The location of oceanic indices appears in figure 1. (Source: NOAA/Atlantic Oceanographic and Meteorological Laboratory – Miami.)

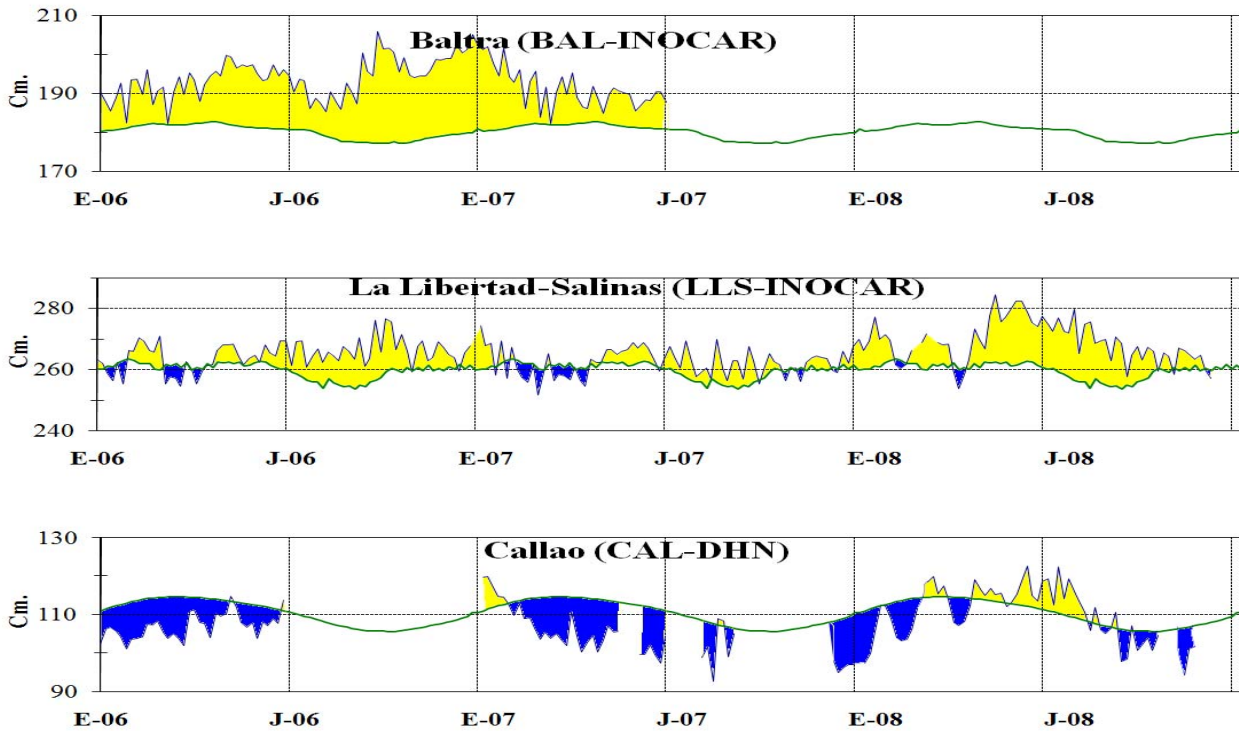


Figure 7.- Five-day running mean (pentads) of MSL (cm) in Ports of Peru and Ecuador. The green curve indicates climatology. The location of oceanic indices appears in figure 1. (Sources: NOAA/Atlantic Oceanographic and Meteorological Laboratory – Miami, e INOCAR).

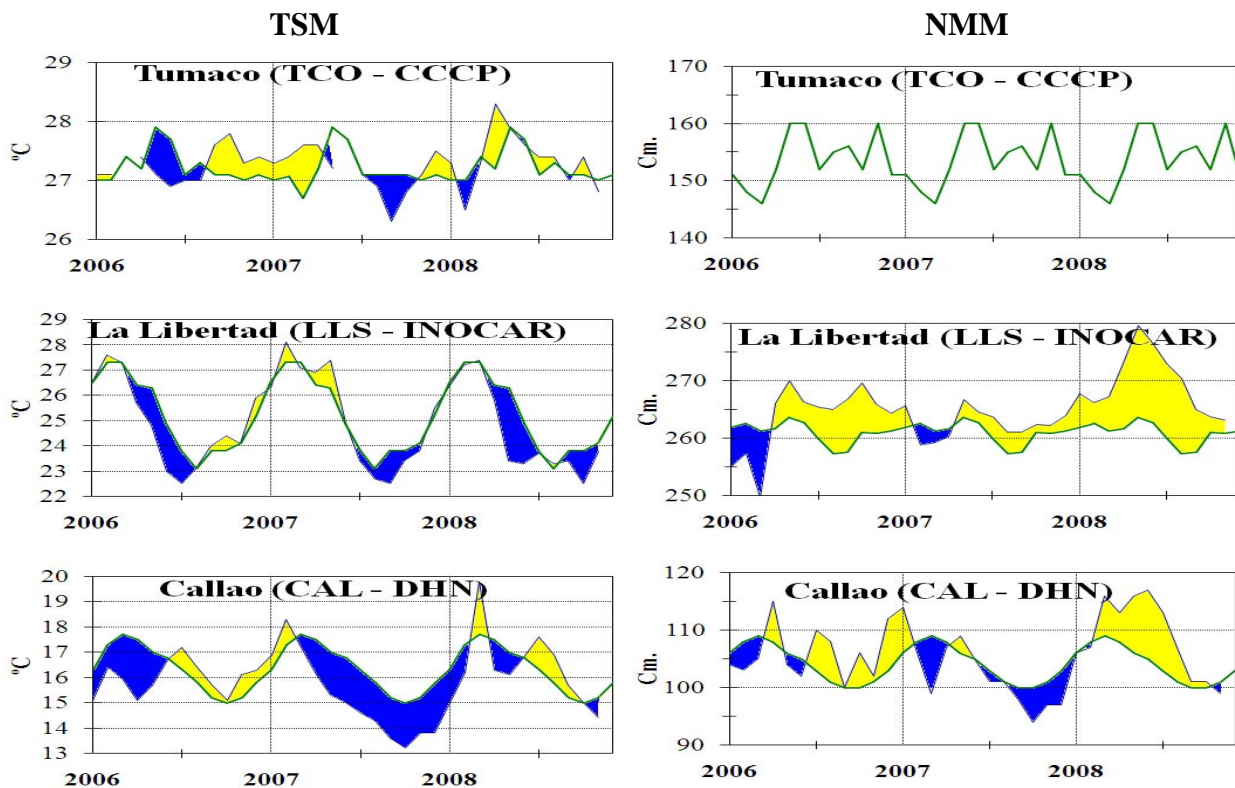


Figure 8a.- Monthly means of the SST (°C) and MSL (cm) in five stations of the ERFEN region. Green curve indicates historic monthly mean. The location of the stations appears in Figure 1. (Sources: CCCP, INOCAR y DHN).

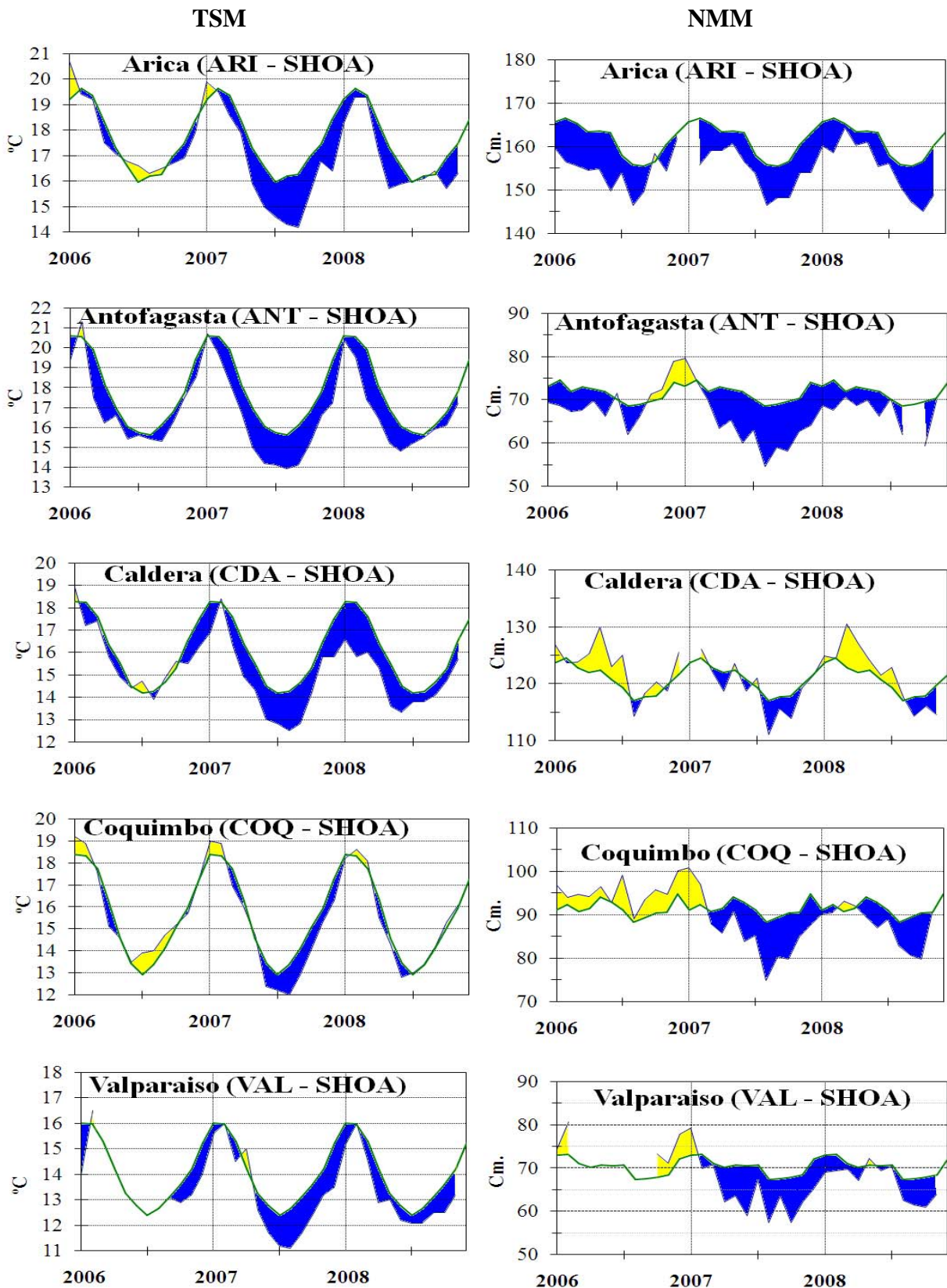


Figure 8b.- Monthly means of the SST (°C) and MSL (cm) in five stations of the ERFEN region. Green curve indicates historic monthly mean. The location of the stations appears in Figure 1. (Source: SHOA).

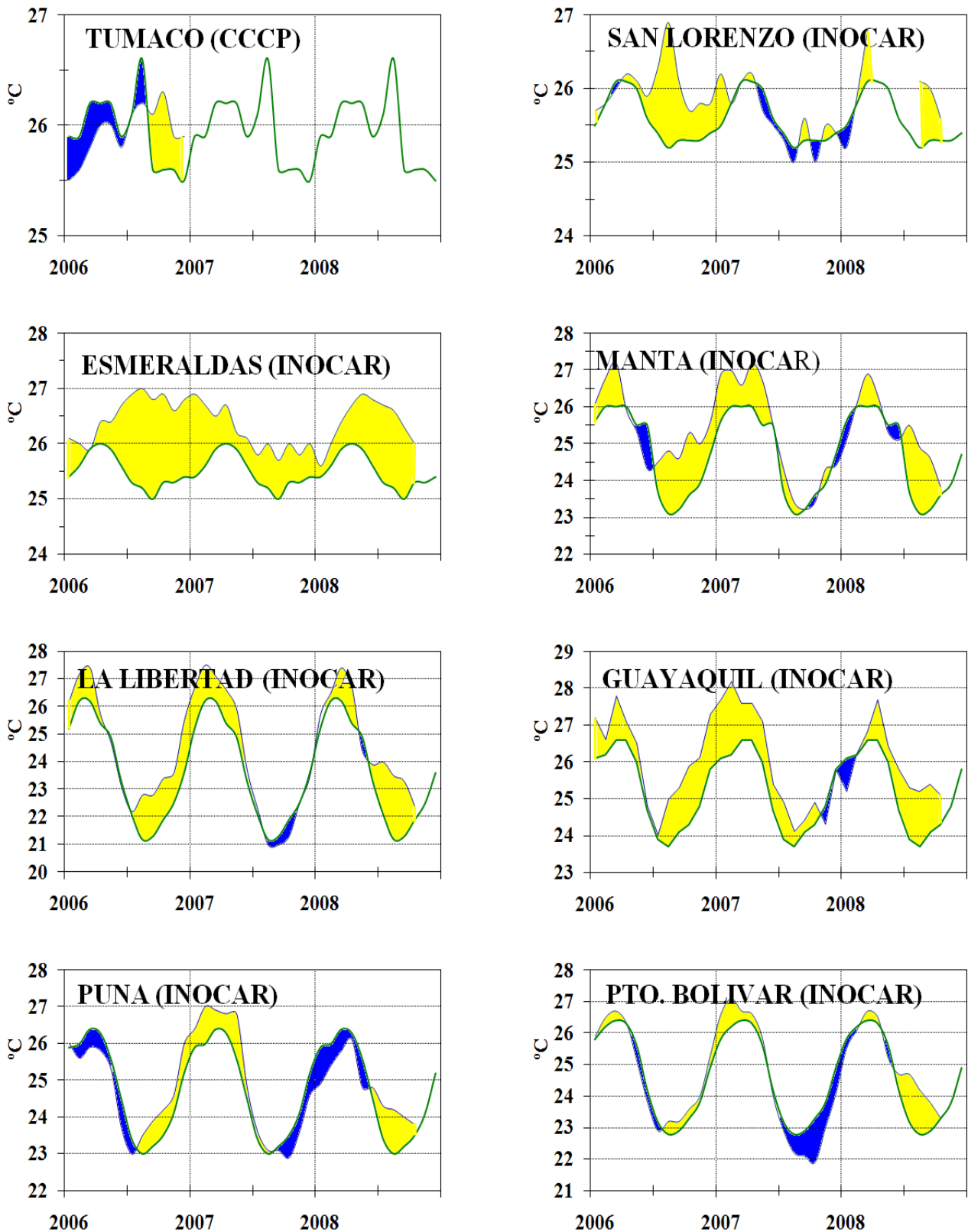


Figure 9a.- Monthly means of the air temperature (°C) in 8 stations of the ERFEN region. Green curve indicates historic monthly mean. The location of the stations appears in Figure 1. (Sources: CCCP & INOCAR).

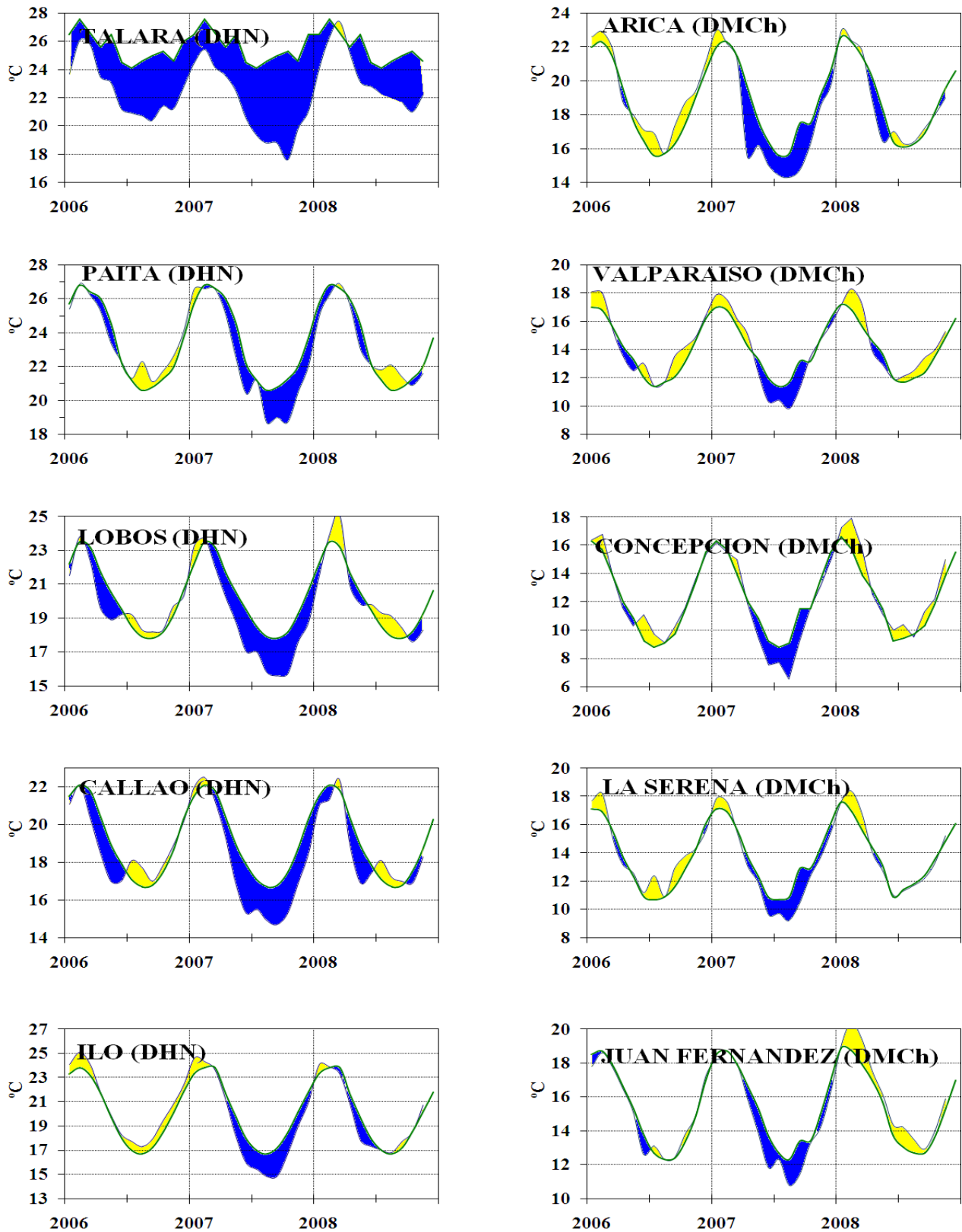


Figure 9b.- Monthly means of the AT (°C) in 10 stations of the ERFEN region. Green curve indicates historic monthly mean. The location of the stations appears in Figure 1. (Sources: DHN & DMCh).

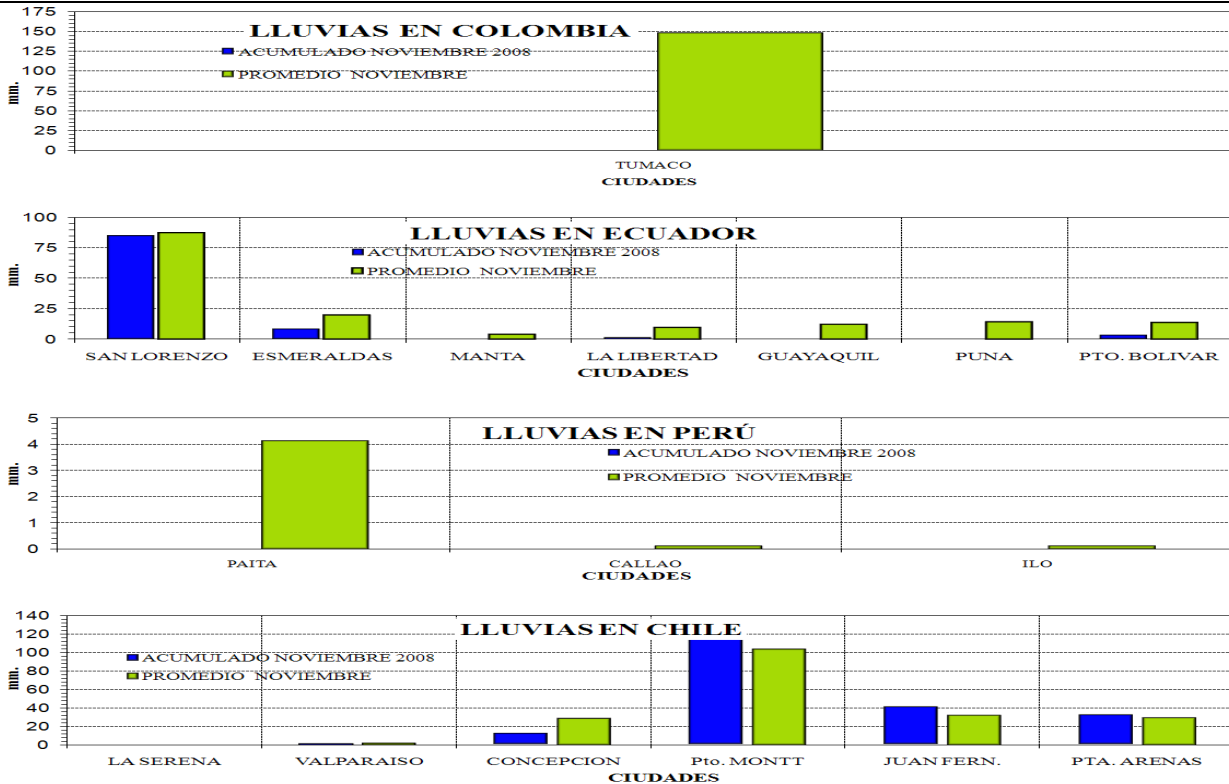


Figure 10.- Rains during November in the coastal stations of Colombia, Ecuador, Peru and Chile. Location of the stations appears in Figure 1. (Sources: CCCP, INOCAR, DHN & DMCh).

**Anomalia de la Temperatura superficial del Mar (°C)
Noviembre 2008**

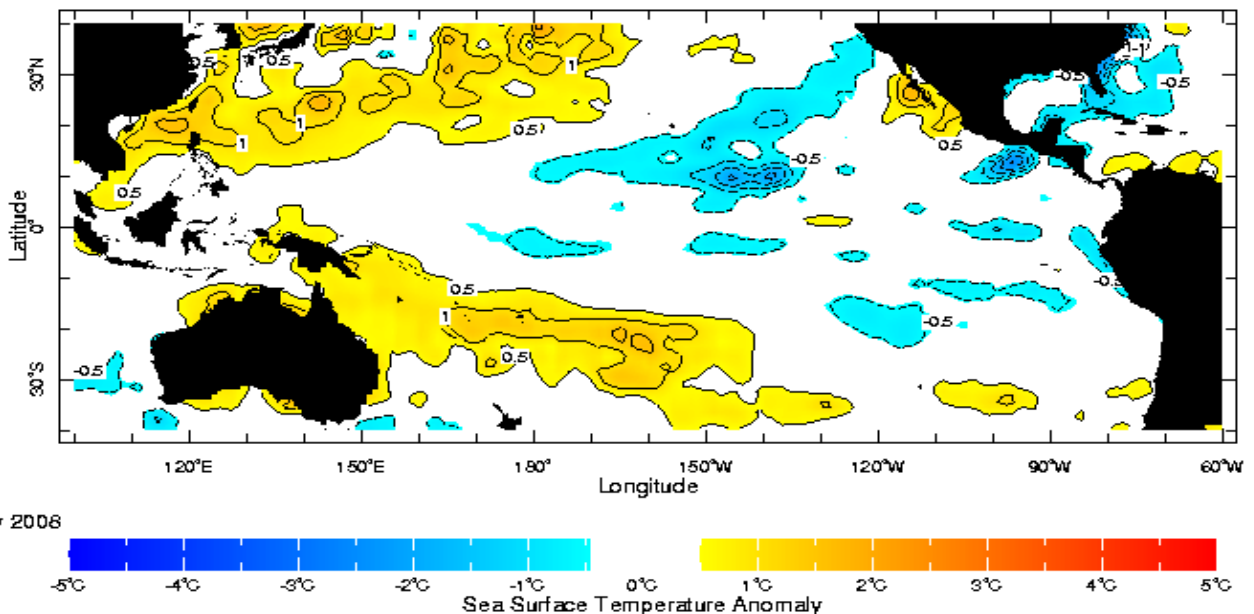


Figure 11.- Sea Surface Temperature Anomalies (°C) November 2008. (Source: International Research Institute for Climate and Society)

EDITED IN THE OCEANOGRAPHIC INSTITUTE OF THE NAVY OF ECUADOR

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