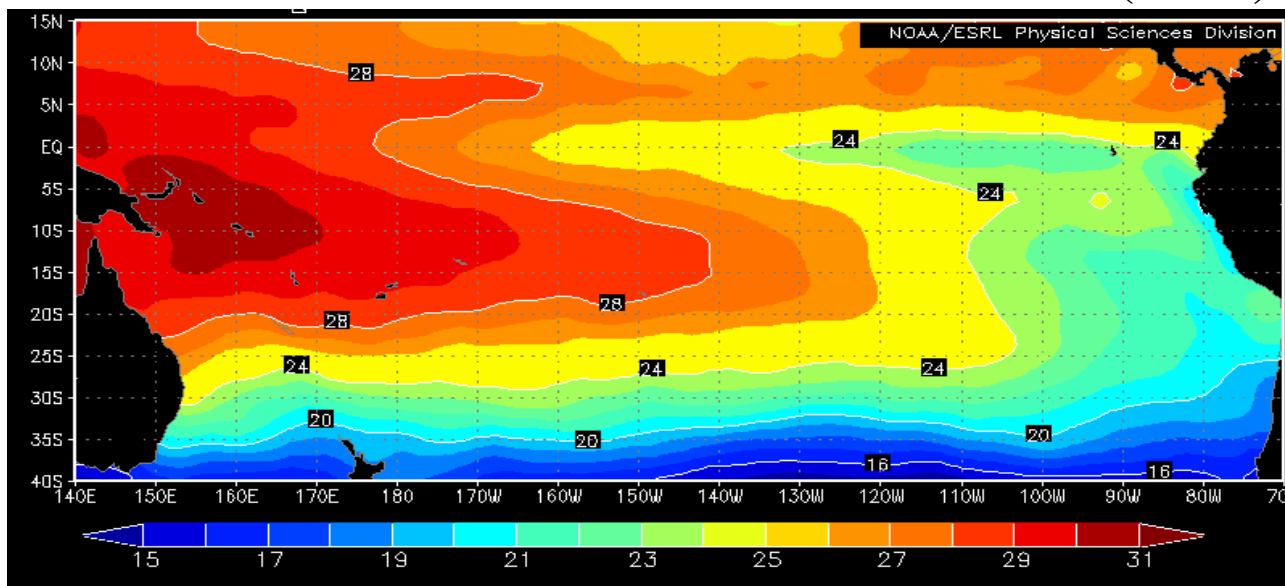


COMISIÓN PERMANENTE DEL PACÍFICO SUR (CPPS)



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

DECEMBER 2008

BAC N° 219

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

In December, Equatorial Pacific Ocean exhibited conditions still considered like of “ENSO – neutral conditions”, even though Sea Surface Temperature exhibited a generalized cooling in the Equatorial Pacific that could be in a rise “La Niña”, with anomalies between -0, 4 and -0, 7 °C. In certain areas of Central Equatorial Pacific was observed a greater cooling with respect to the previous month; It is esteemed that present behaviour of the Equatorial Pacific will continue more by some weeks.

During last week of December, anomaly of Sea Surface Temperature in “El Niño” regions presented the following values; in the region of 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 -1, 1°C and; in the region of the Eastern Pacific (“El Niño” Region 1+2), it was of -0.3°C.

At subsurface level in December Equatorial Pacific Ocean continued showing thermal dipole of anomalies, located between 100 and 200 ms of depth. In this occasion, an increase of thermal anomalies is seen, where the warm nucleus located to the west of the line of date presented anomalies of +3.0°C; whereas the cold nucleus, located in the Eastern Pacific, presented an increase of the negative anomaly of -4, 0°C and until -5.0°C occasionally, continuing with tendency observed in previous months. The Mean Sea Level in the South eastern Pacific during this month presented tendency to values slightly below to its normal patterns. In the coast of Ecuador, it was slightly superior to the normal one of this month in 3, 0 cm. In Peru, negative anomalies predominated, with exception of the northern station Talara that presented an anomaly of +1, 0 cm; in front of Chile majority of stations presented negative anomalies between -10.1 cm (Caldera) and -2.1 cm (Coquimbo). The Index of Oscillation of the South continue in the positive phase, in this occasion maintained by second consecutive month a value of +1.5. The central axis of the Intertropical Convergence Zone stayed between 6 and 8°N, with weak convective activity. In the region of the South eastern Pacific surface winds appeared with South South-east direction, and as far as speed, negative anomalies predominated, that fluctuated around -0.5 m/s.

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

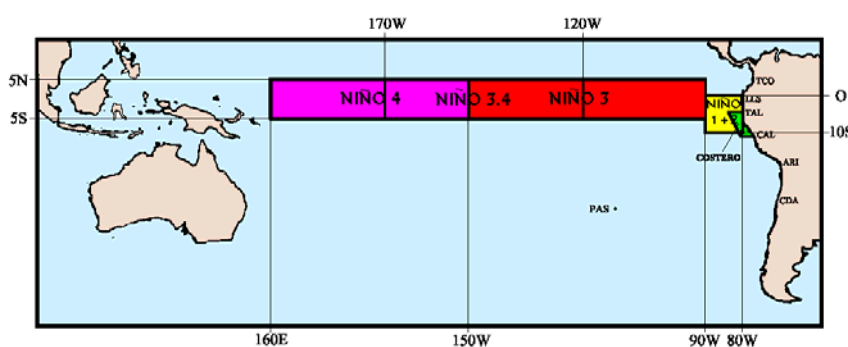


Figure 2.- Map indicating locations and codes of series. Rectangles show the average area of Sea Surface Temperature (SST °C)

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**CLIMATE ALERT BULLETIN
BAC N° 219, DECEMBER 2008****I. GLOBAL AND REGIONAL IMAGE**

In December Central Equatorial Pacific Ocean continued presenting low values of Sea Surface Temperature (SST - TSM). The monthly anomaly of the SST during this month in "El Niño" regions increased their negative values thus: in the region Western Pacific ("El Niño" Region 4) it happened of -0.3 to -0.5°C, in the Central Pacific ("El Niño" Region 3.4) the anomaly happened of -0.2 to -0.7°C; in the region Eastern Pacific ("El Niño" Region 1+2) the anomalies happened of -0.2°C to -0.4°C.

At subsurface level, between 100 and 200 ms of depth, the Equatorial Pacific Ocean maintains presence of a warm nucleus of 3.0°C located to the west of the line of date and a cold nucleus which has until -5.0°C located in the Eastern Central Equatorial Pacific; during this month fortification of both nuclei was well-known, especially the cold nucleus.

The Mean Sea Level (MSL - NMM) in the South eastern Pacific showed tendency values below its average values. In front of Ecuadorian coasts MSL presented values around the normal one of this month, with anomaly of 3, 0 cm. Throughout Peruvian coast MSL (NMM) registered a reduction average of 3, 0 cm, with respect to the previous month, predominating negative anomalies, with the exception of the northern station Talara, that presented an anomaly of +1, 0 cm, whereas negative anomalies fluctuated between -1, 0 cm (Paita) and -4, 0 cm (Lobos de Afuera, Chimbote and Callao). In Chile, MSL stayed below normal in the majority of the stations, presenting negative anomalies between north zone and centre-south of the country, those that fluctuated between -10.1 cm (Caldera) and -2.1 cm (Coquimbo).

The Index of Oscillation of South (IOS), like in the previous month, it continued in his positive phase and in this occasion the value was 1.5.

The Central Axis of the Intertropical Convergence Zone (ITCZ) appeared in the Eastern sector of the Pacific between 6 and 8°N with variable convective activity with direct affectation to Central America and Colombia.

The surface winds, in the region of the South eastern Pacific, they appeared predominantly of the south and south-east, with speeds that were slightly under average value between -0.4 and -1.0 m/s.

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

The Institute of Hydrology, Meteorology and Environmental Studies (IDEAM) informs that from beginnings of December, cold fronts advanced from east coast of the United States, reaching west of the Colombian Caribbean Sea. These atmospheric systems, did not allow began of dry season in the Caribbean region and the Orinoquia from mid November as is normal for the time, and also delayed the time of transition of rainy season to dry season in the Andean region.

The Intertropical Convergence Zone was located around 8° north latitude during the two first decades. At the beginning of the third decade an intensification of the system of high pressure of the Atlantic is observed, which favoured that ITCZ moved more to the south and cold fronts coming from the United States do not penetrate in the Colombian Caribbean Sea and the trade winds would intensify significantly.

It was very well-known during December, humidity entrance towards the Colombian Amazonia, associated with “belts” of low pressure in the north of Brazil.

Despite the described atmospheric conditions in December, a well-known diminution of precipitations in a large part of the country was registered, like an own condition of the time, especially in the Caribbean and Orinoquía regions, as well as in some sectors of the Andean region. Nevertheless, in some zones of centre and south of the country volumes of rain exceeded historical averages in more than 50% (it had anticipated), which continued repercussions on the levels of two more important rivers of the country (Magdalena and Cauca). These rivers were over the flood level during most part of the month, especially in their low basins; it is important also to indicate that had place many emergencies associated with slidings in some zones of the center of the Colombian territory.

The Pollution Control Center for the Pacific (CCCP) declares that during the monitoring of December 2008, realised by the Area of Operational Oceanography of the CCCP to fixed station coastal N° 5 located to 10 miles of the bay of Tumaco, between coordinates 78,51 °W and 2°N, it was observed that Sea Surface Temperature was of 27.55°C. A positive anomaly at surface level of 0.5°C appeared, with respect to historical average (December 1999 – December 2008), which is of 27.06 °C.

In December the thermocline was positioned on the 62 meters. The isotherm of 15°C does not become visible for this month.

As far as behaviour of the salinity, it registered at surface level a value of 29.33Ups. A positive anomaly of 2.03 appeared at surface level with respect to the historical average that is 31.36.

The maximum value of salinity of the month went of 35.02 to a depth of 67 meters approximately. The halocline was positioned approximately in the 60 meters. The isohaline of 34 and 35 were registered respectively to 59 and 75 meters.

B. CONDITIONS IN THE ECUADORIAN COAST

The Oceanographic Institute of the Navy of Ecuador (INOCAR) reports that during December 2008 Air Temperature (AT) throughout Ecuadorian coast fluctuated between 24.7°C (2°S La Libertad) and 26.8°C (2°16'S Guayaquil) what I means anomalies of 1.0°C for both localities. As far as SS, it presented values between 24.9°C (1°S Manta) and 26.0°C (1°N Esmeraldas) giving anomalies of -0.4 and 0.2°C, respectively.

During the month throughout Ecuadorian coast rains were deficit. In the North coast (1°N Esmeraldas); rains light appeared giving a monthly accumulated of 13, 0 mm, which it means a negative anomaly of 65%; in the rest of the Ecuadorian coast deficit reach 100%.

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

Considering present behaviour of the ocean-atmospheric conditions in front of Ecuador, it is anticipated that in January precipitations appear, according to humid station for the Ecuadorian coast. These precipitations will be in amounts next to normal ones of the month. As far as Sea and Air Temperature in the Ecuadorian coast, it has esteemed that they will appear around 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 Peruvian coast, an average reduction of 0, 6°C was registered in the anomalies of SST, with respect to previous month. In the present month negative anomalies predominated, whose values fluctuated between -0, 3°C (Mollendo) and -1, 6°C (Callao).

The Mean Sea Level throughout Peruvian coast registered a reduction average of 3, 0 cm, with respect to the previous month. The negative anomalies predominated, with exception of the northern station Talara that presented an anomaly of +1, 0 cm. The negative anomalies fluctuated between -1, 0 cm (Paita) and -4, 0 cm (Lobos de Afuera, Chimbote and Callao).

Throughout Peruvian coast, Air Temperature registered a variation average of +/-0, 2°C with respect to the previous month. The negative anomalies prevailed; with exception of the southern station of ILO, that presented an anomaly of +0, 9° C. The Air Temperatures anomalies fluctuated between -0, 1°C (San Juan) and -0, 7°C (Lobos de Afuera).

During December days 6, 20 and 26 registered slight precipitations, 20 and 26, in the north and south zones of Peruvian coast, with accumulated precipitations of 0, 3 and 0, 4 mm, respectively.

Throughout Peruvian coast winds of South and South-east direction appeared. In relation to wind speed, negative anomalies predominated, that fluctuated between -0, 4 to -1, 0 m/s; with the exception of Mollendo and ILO that presented positive anomalies of +0, 2 and +1, 6 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 serie 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 December 2008 is:

In the case of Sea Surface Temperature, this one did not register a noticeable tendency of values of positive and negative anomalies throughout coast of Chile, these oscillated between -1, 5 and 0, 4°C. The major negative anomalies appeared in the north zone of the country, reporting values of -1, 5°C in Arica and -1, 2°C in Caldera. Whereas in the center-south zone (Coquimbo and Talcahuano) registered positive anomalies of 0, 7°C.

With respect to behaviour of Sea Level, it is observed that still stays below the normal thing in the majority of the stations, having presented negative values of anomalies between north zone and center-south of the country, those that fluctuated between -10, 1 cm (Caldera) and -2, 1 cm (Coquimbo).

The Meteorological Direction of Chile (DMCh) declares that during December, average Air Temperature in surface continued registering a heating to a large extent of the continental country,

mainly to the south of 40°S, with anomalies of until +3, 1°C in Coyhaique and Balmaceda, both stations located in 45°S.

The maximum temperature of the air in surface reached the majors heatings in the south zone, with principles anomalies of +4, 6°C in Coyhaique and +4, 4°C in Balmaceda. On the other hand, the coastal region of the north of Chile, registered negative anomalies with exception of Iquique that registered a heating of +1, 3°C.

The minimum temperature of the air in surface, showed a heating, mainly in the central zone, showing major positive anomalies in Curicó with +2, 5 °C and Chillán with +1, 9°C.

The atmospheric circulation of the South Hemisphere was characterized to indicate a center of positive anomalies on the Eastern South Pacific, associated to a displacement towards major latitudes, with positive anomalies of up to 7 hPa by on the climatologic value. This condition favoured increase of the principles temperatures and the important deficit in precipitations observed in the South zone of Chile.

The precipitation appeared with deficit to a large extent of the country, under 20 mm below climatologic average, between Chillán and Concepción, in as much, in the south zone deficit reached values majors that 40 mm, being the most deficit Puerto Montt, with a deficit of 73 mm and Coyhaique with 62 mm.

III. PERSPECTIVE

A. GLOBAL

Taking into account predictions from several numerical models, as well as behaviour of the main oceanic and atmospheric indicators, it is esteemed that during next month to a large extent of Equatorial Pacific, will stay negative anomalies of SST associated to oceanic cooling, that according to some models of prognosis, could intensify predicting (even) a return of “La Niña”. In the same way, at subsurface level the permanence of present thermal structure is expected.

B. REGIONAL

In agreement with pursuit of the ocean-atmospheric conditions in the South eastern Pacific Ocean, executed by Program ERFEN (integrated by National Committees ERFEN of Chile, Colombia, Ecuador and Peru), and coordinated by the CPPS, are anticipated that negative anomalies of SST stay; for January is not expected substantial changes in the superficial and subsuperficial thermal structure for the sector of the Eastern Pacific, hoping in addition that temperature of the air in front of the coast of the South Eastern Pacific appears slightly on its 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
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	19.6*	13.6	8.1	1.5
DEC 08	3.6	11.0	9.6	27.2	25.7	24.6	22.4	21.2	12.6	6.5	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	
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	
DEC 08	27.6	25.0	14.2	17.4	19.6	16.0	18.0	14.3	

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	
OCT 08	***	2637	1010	1451	593	1160	798	609	
NOV 08	***	2632	990	1490	698	1145	906	639	
DEC 08	***	2642	990	***	707	1159	819	473	

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
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	***
DEC 04	***	17.4	14.1	***	267.2	100.5
09	***	17.5	14.4	***	264.2	103.0
14	***	17.6	14.2	***	265.6	97.8
19	***	19.0	14.1	***	264.6	98.0
24	***	18.8	14.5	***	261.2	95.3
29	***	18.0	14.2	***	262.3	94.9

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

Note.

* Values revised

***. Information not received

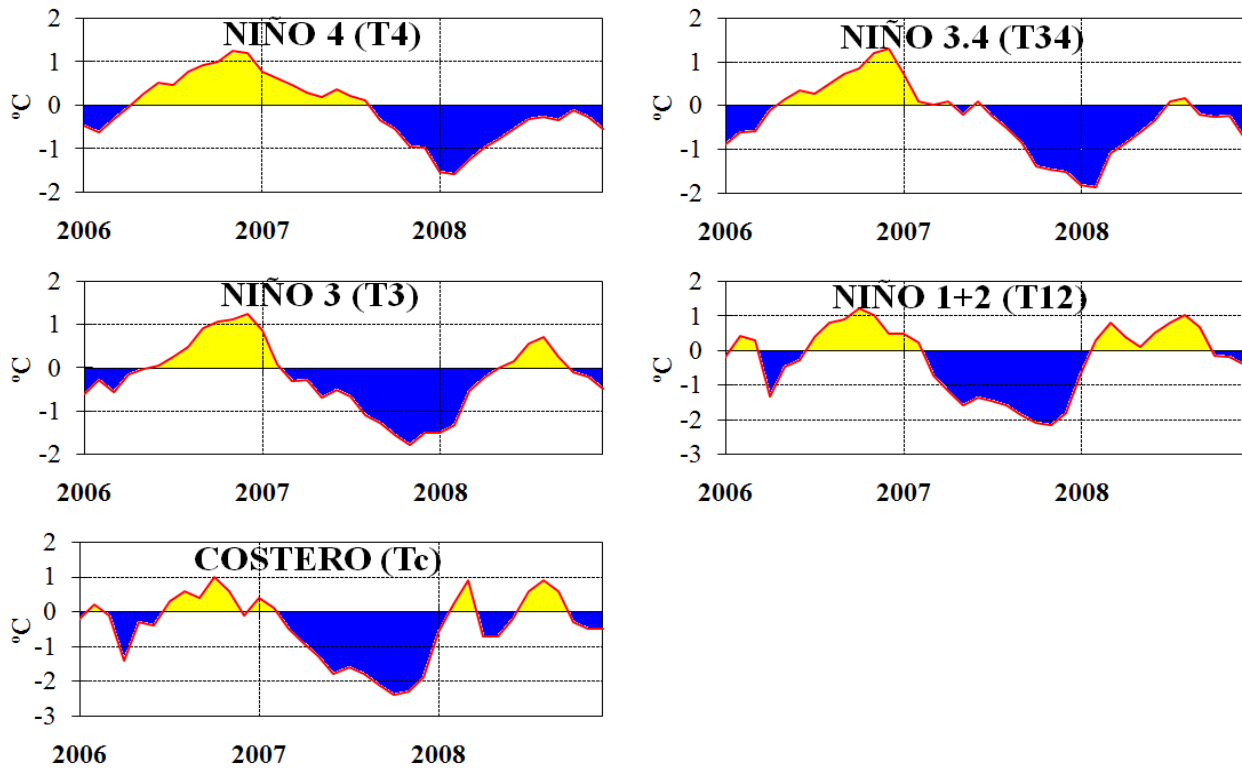


Figure 3.- Oceanic anomalies indices (Niño 4, Niño 3.4, Niño 3, Niño 1+2 and Tc). The location of the oceanic indices appears in figure 2. (Source: NCEP/NWS/NOAA/USA).

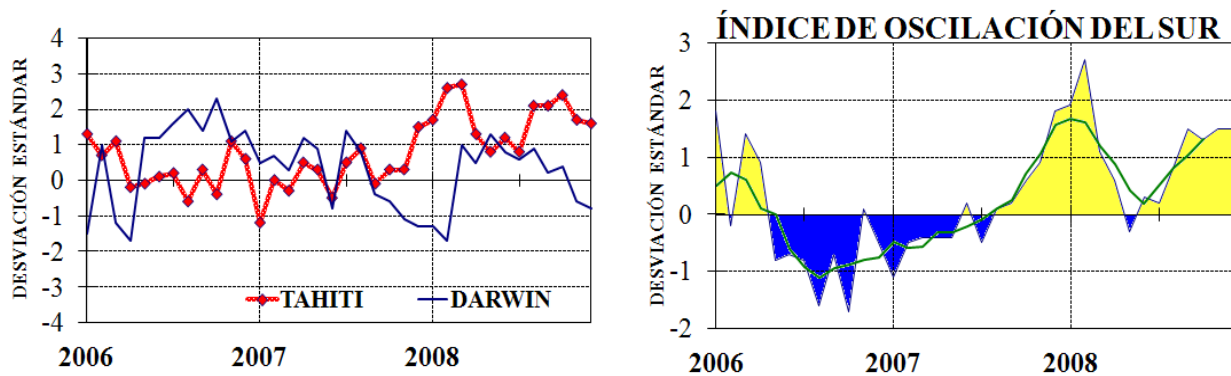


Figure 4.- Left Panel: Five-months running mean for atmospheric pressure anomalies in Tahiti and Darwin (mb). Right Panel: Southern Oscillation Index. (SOI) with monthly values and five-months running mean graphed as a green line. The SOI is based on the difference between standardized pressure values: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

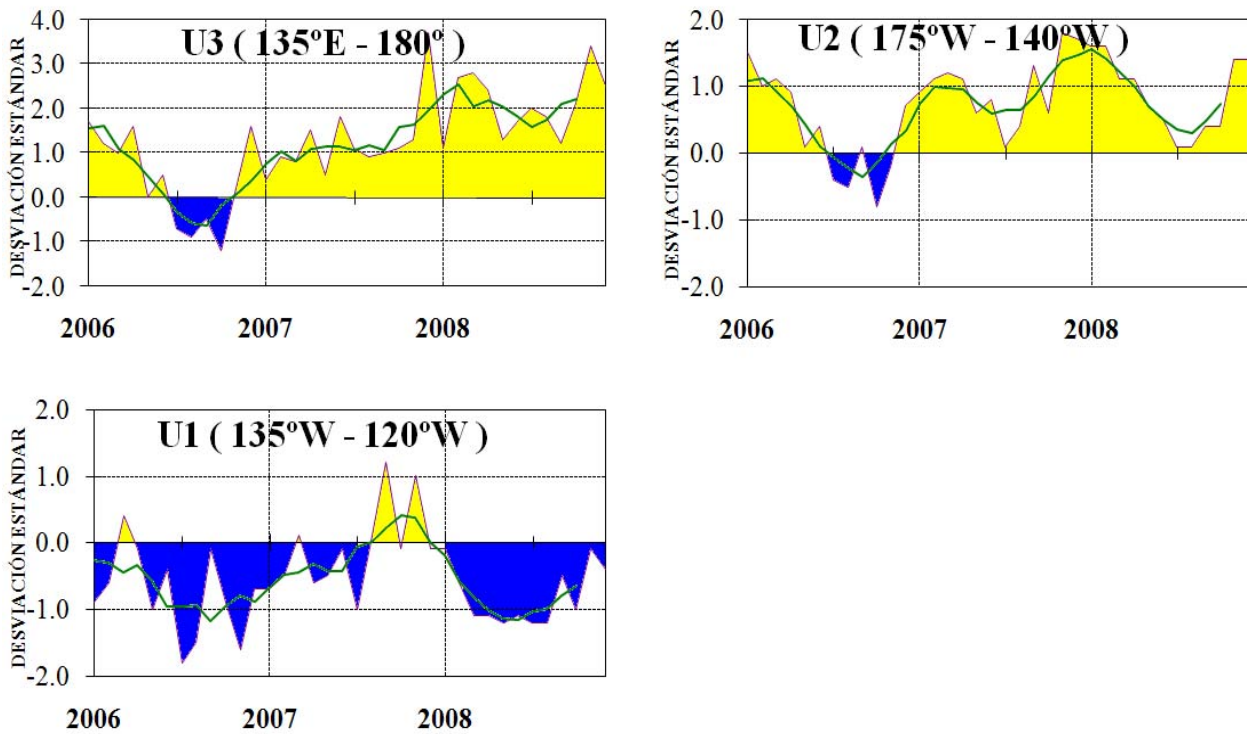


Figure 5.- Series and moving averages of five months of zonal wind standardized anomalies (m/s) averaged between 5°N and 5°S for three Equatorial zones: western (U3), central (U2) and eastern (U1). (Source: NCEP/NWS/NOAA/USA).

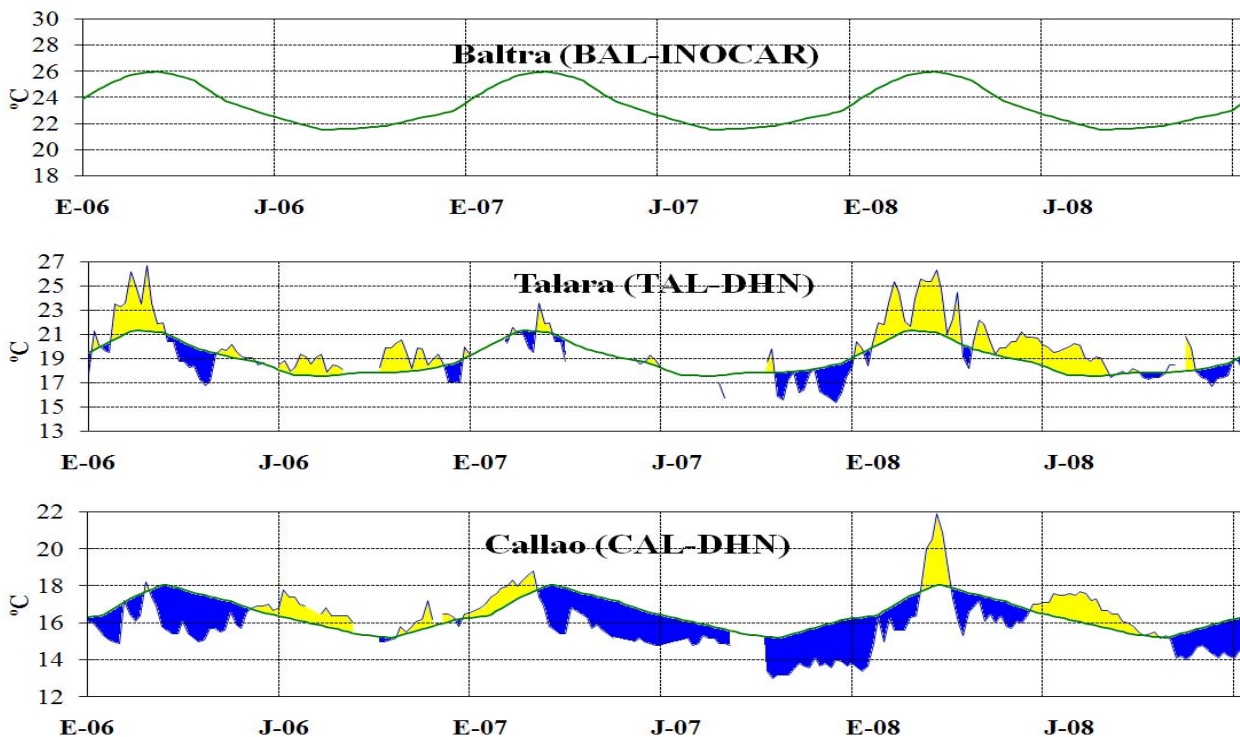


Figure 6.- Five day averages (pentads) of SST (°C) in Ports of Peru and Ecuador. The green curve indicates climatology. The location of oceanic indices appears in figure 1. (Source: NOAA/Atlantic Oceanographic and Meteorological Laboratory – Miami.)

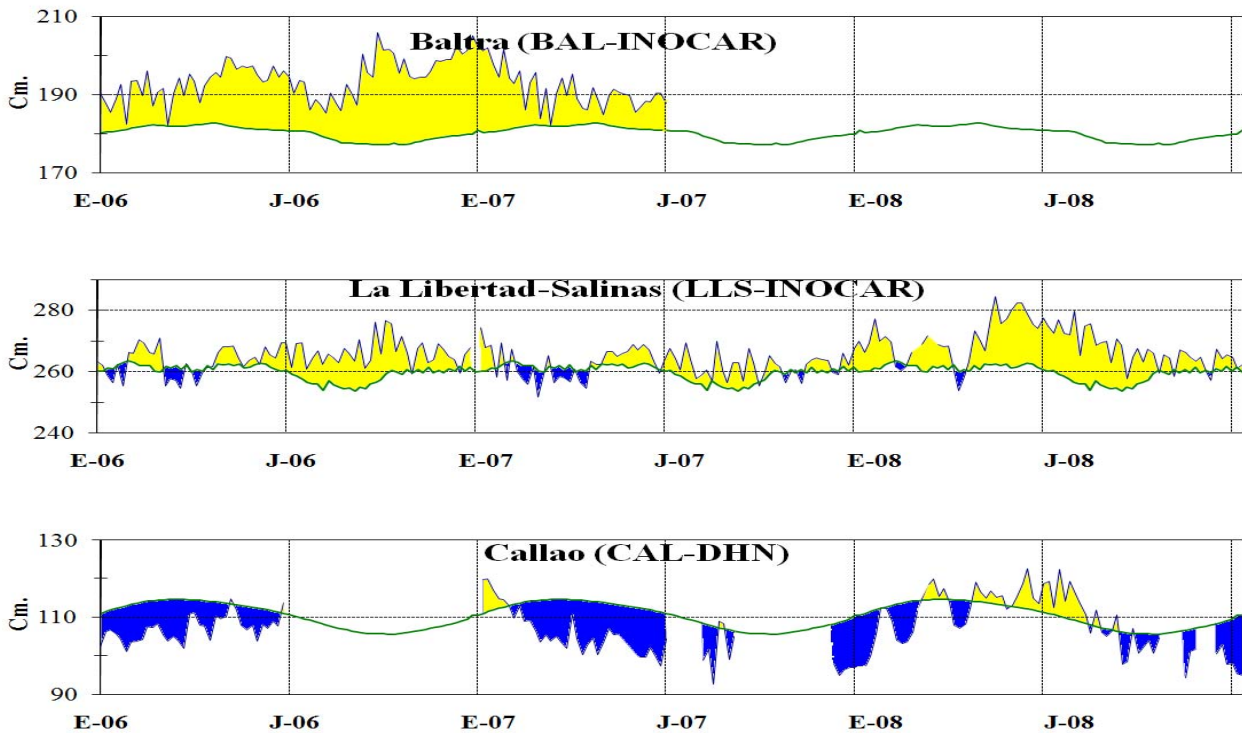


Figure 7.- Five-day running mean (pentads) of MSL (cm) in Ports of Peru and Ecuador. The green curve indicates climatology. The location of oceanic indices appears in figure 1. (Sources: NOAA/Atlantic Oceanographic and Meteorological Laboratory – Miami, e INOCAR).

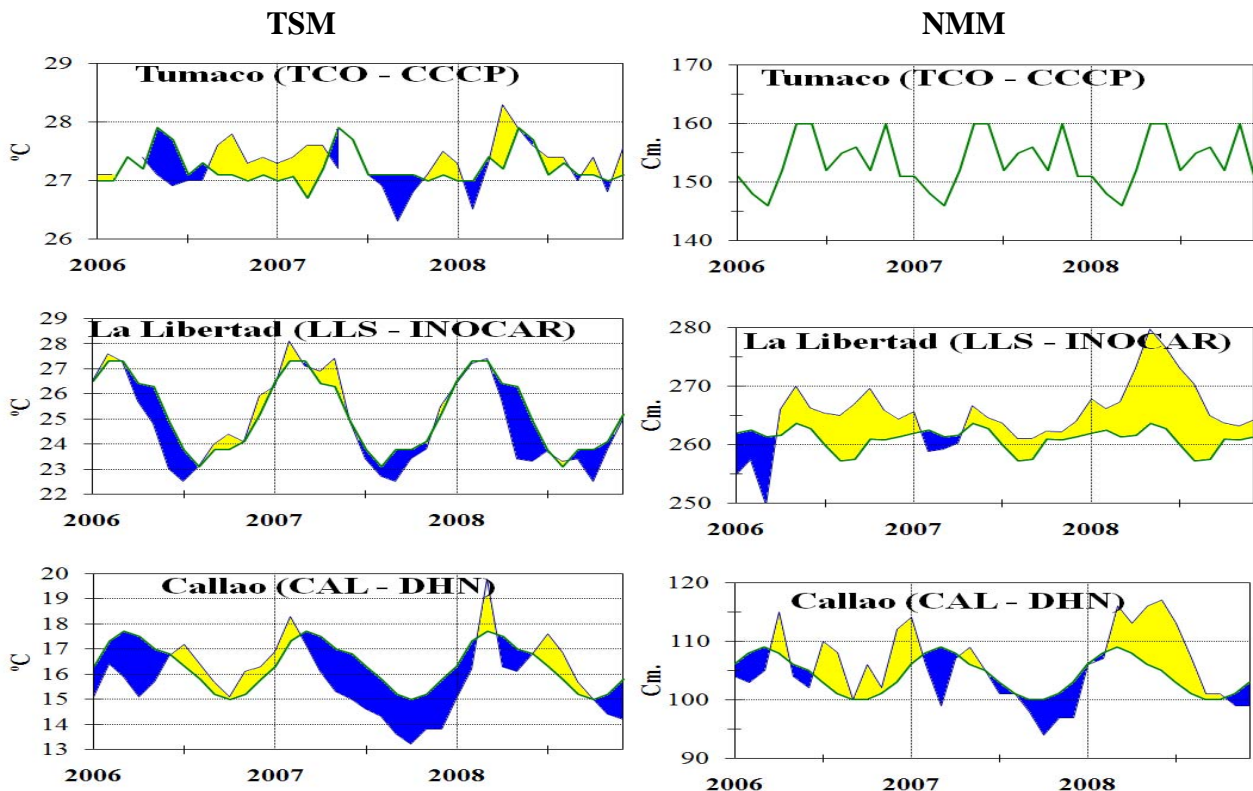


Figure 8a.- Monthly means of the SST (°C) and MSL (cm) in five stations of the ERFEN region. Green curve indicates historic monthly mean. The location of the stations appears in Figure 1. (Sources: CCCP, INOCAR y DHN).

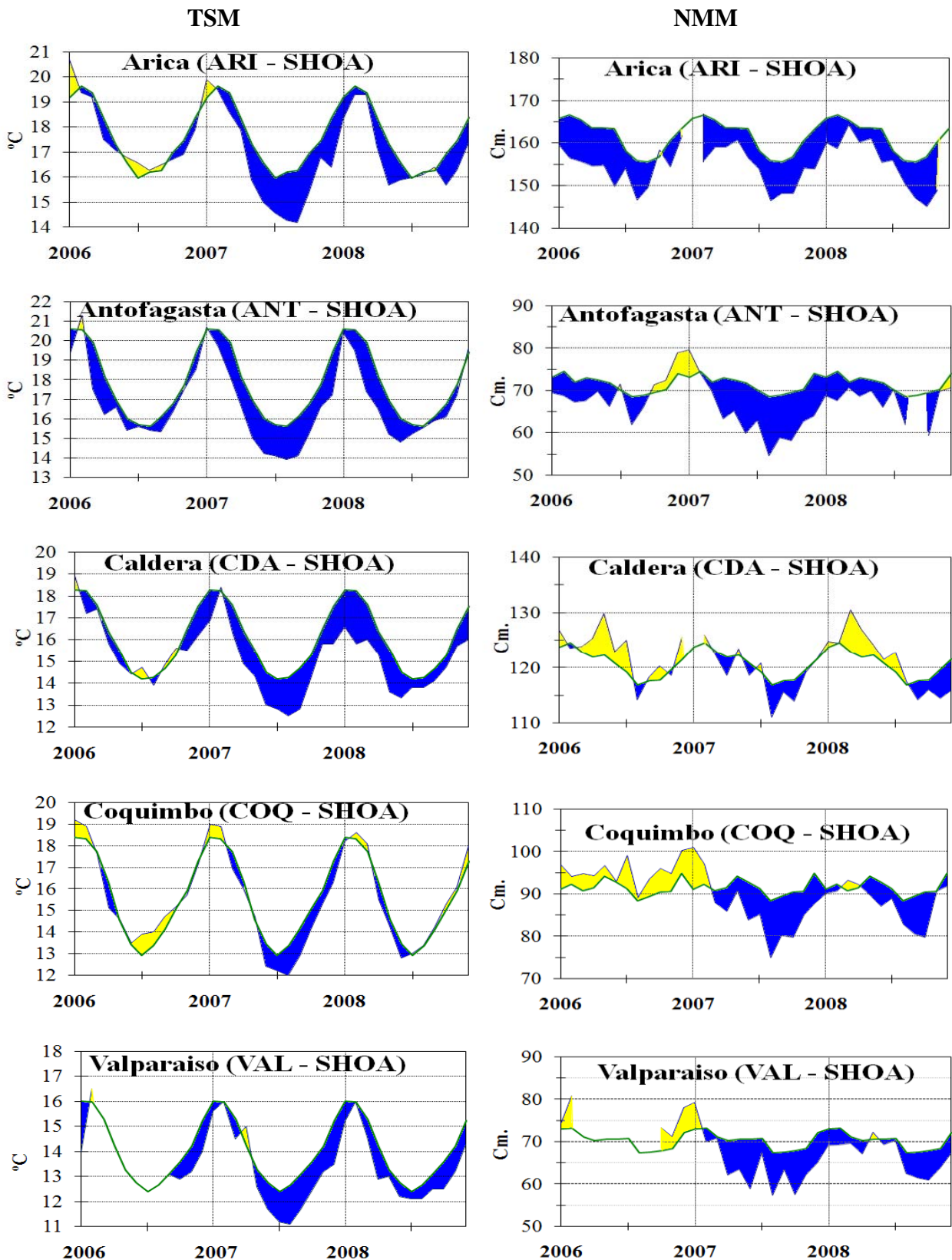


Figure 8b.- Monthly means of the SST (°C) and MSL (cm) in five stations of the ERFEN region. Green curve indicates historic monthly mean. The location of the stations appears in Figure 1. (Source: SHOA).

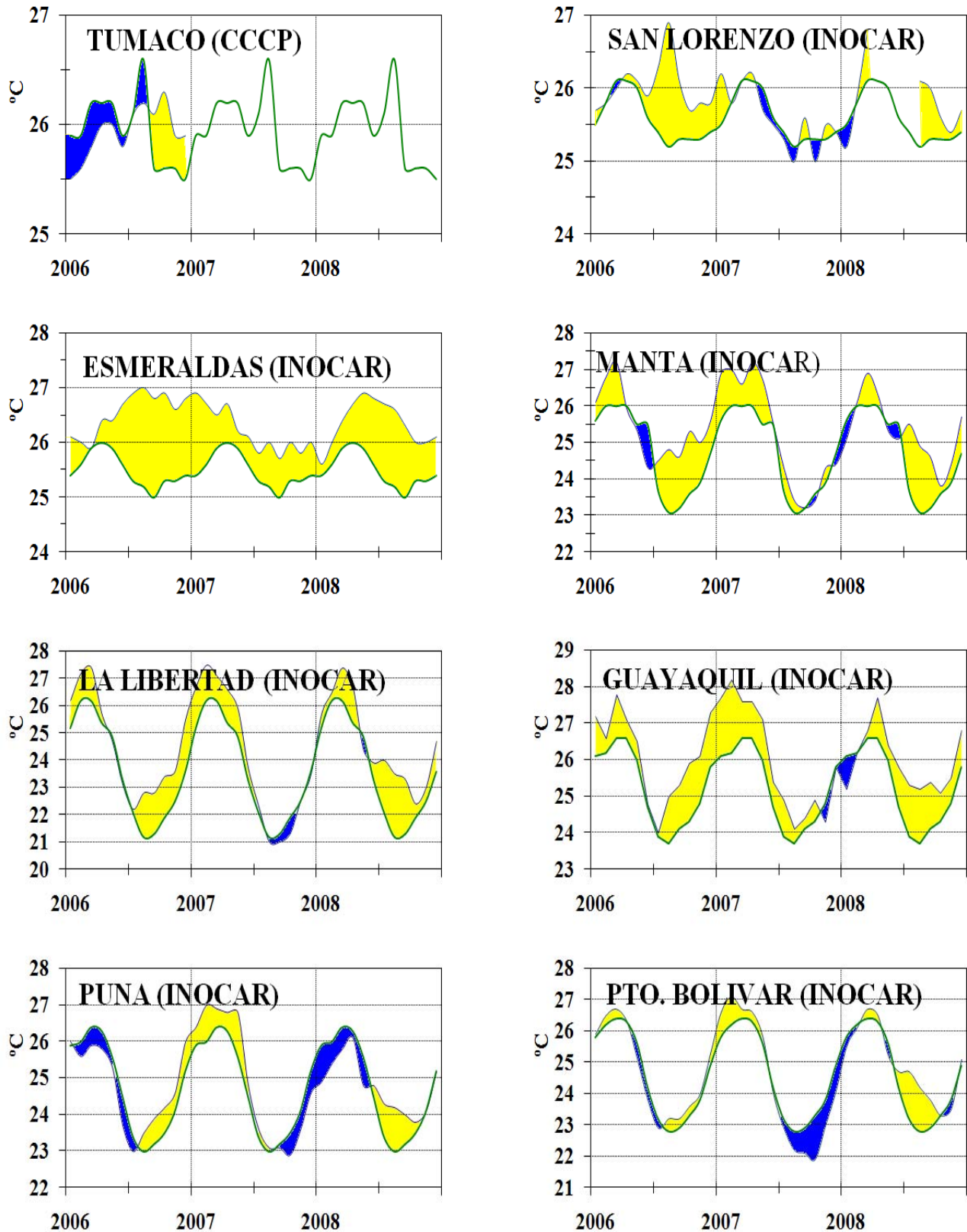


Figure 9a.- Monthly means of the air temperature (°C) in 8 stations of the ERFEN region. Green curve indicates historic monthly mean. The location of the stations appears in Figure 1. (Sources: CCCP & INOCAR).

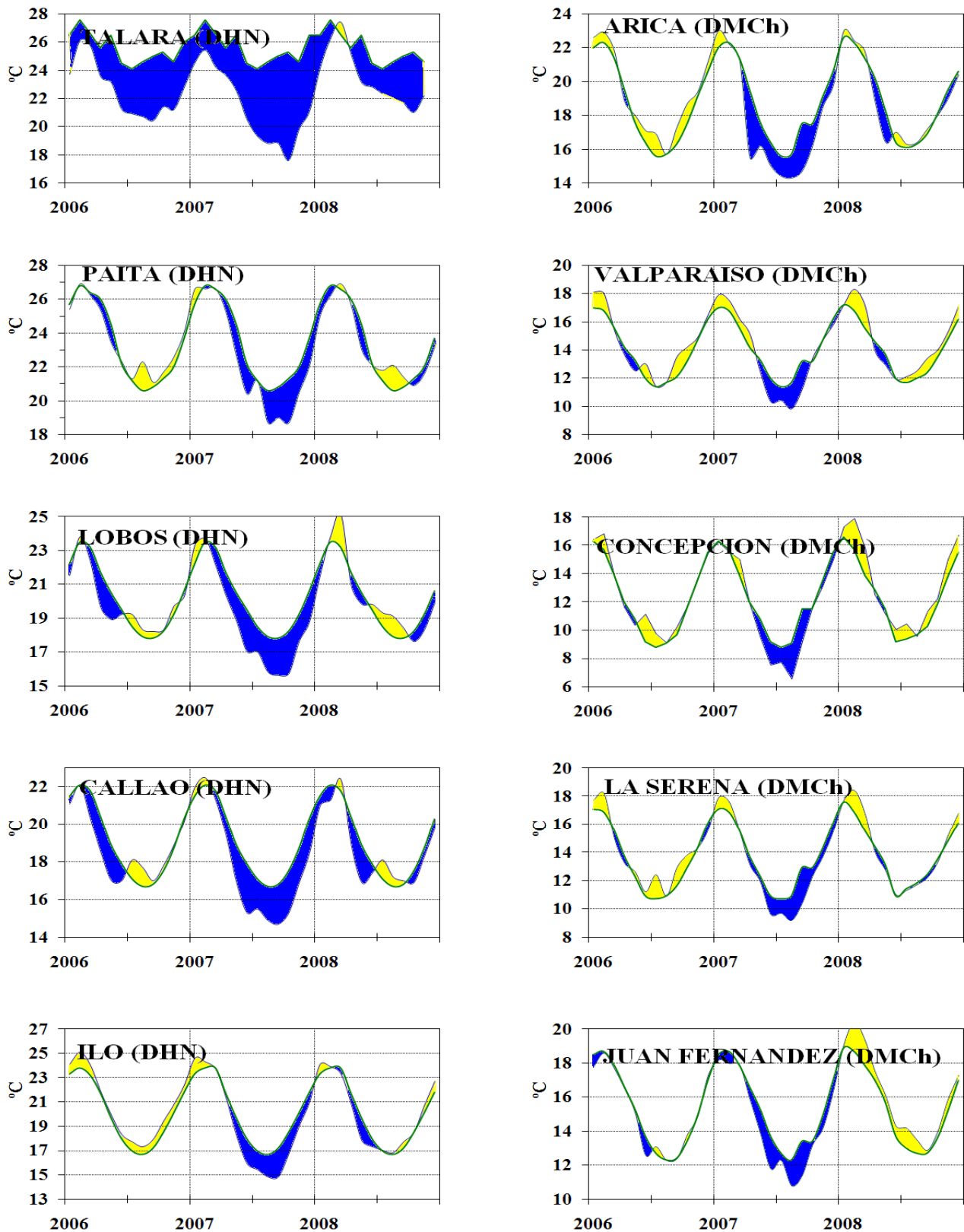


Figure 9b.- Monthly means of the AT (°C) in 10 stations of the ERFEN region. Green curve indicates historic monthly mean. The location of the stations appears in Figure 1. (Sources: DHN & DMCh).

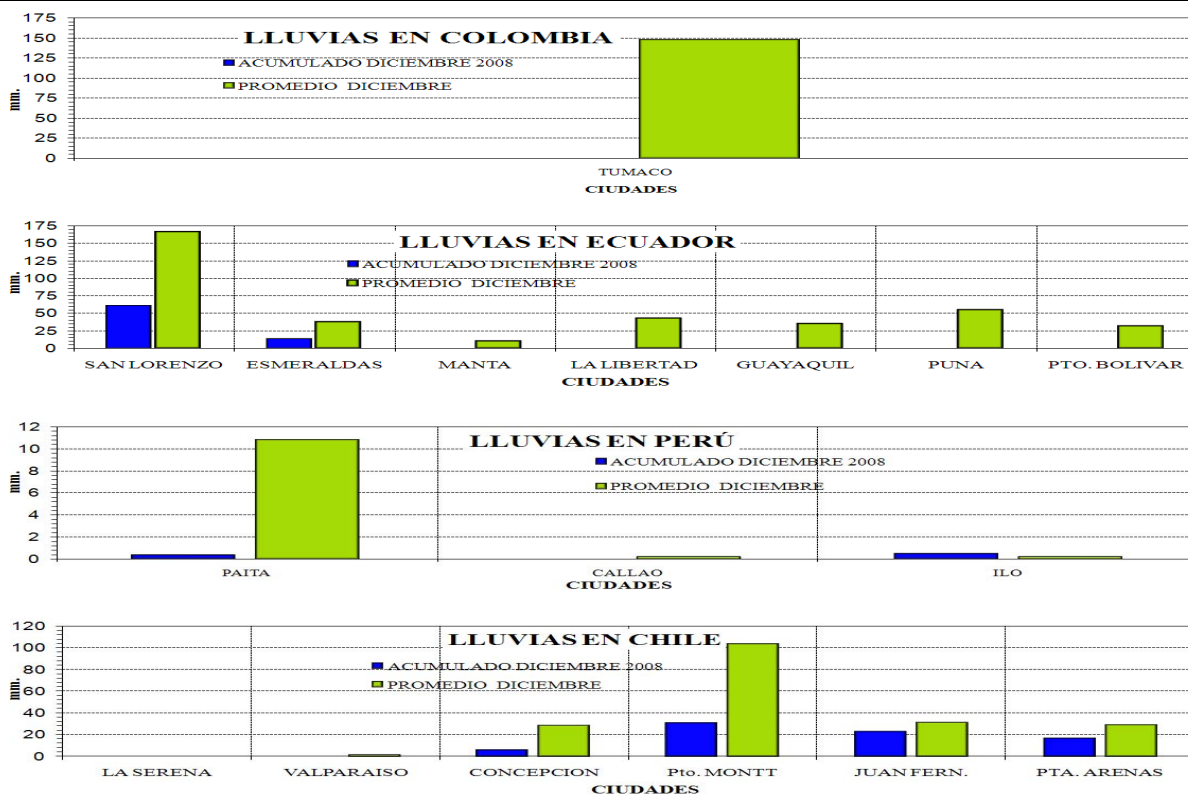


Figure 10.- Rains during December in the coastal stations of Colombia, Ecuador, Peru and Chile. Location of the stations appears in Figure 1. (Sources: CCCP, INOCAR, DHN & DMCh).

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

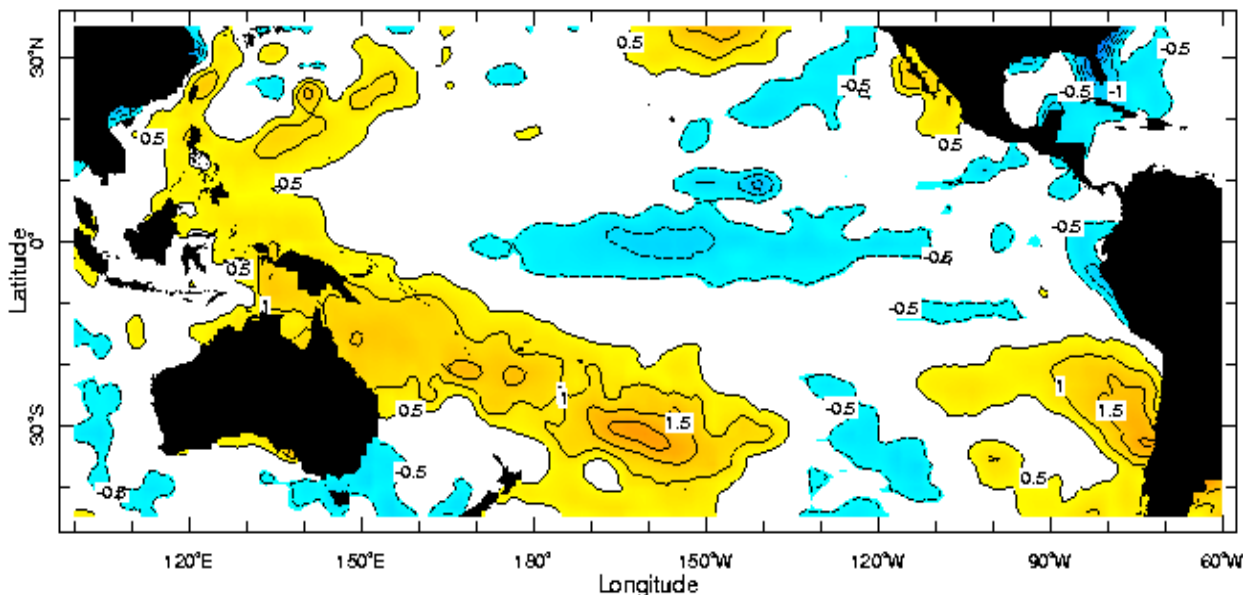


Figure 11.- Sea Surface Temperature Anomalies (°C) December 2008. (Source: International Research Institute for Climate and Society)

EDITED IN THE OCEANOGRAPHIC INSTITUTE OF THE NAVY OF ECUADOR

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