

CLIMATOLOGICAL ANALYSIS OF THE CARIBBEAN LOW LEVEL JET –CLLJ AND THE WESTERN COLOMBIAN JET (WCJ, CHOCÓ JET) OVER THE CESAR RIVER VALLEY, COLOMBIA.

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Focusing in the north of Colombia between the mountains of Perijá and the sierra of Santa Marta, there is the valley of the Cesar river. All the weather events in this area are of great interest because actually is the largest opencast mining area in Colombia. In this moment seven opencast coal mining projects are operating, which are impacting greatly the air quality of this región. Surface wind currents that arise in this area are highly influenced by the CLLJ and the WCJ.

The Climate of the Colombia country is strongly influenced by two air streams having highest running speeds between 900 and 1000 hPa, these are the Jet Streams of Chocó and the Caribbean Low Level Jet. Although these streams move in opposite directions, their meet cause a series of atmospheric phenomena that determine the weather of much of this country. (Poveda & Mesa 1999).

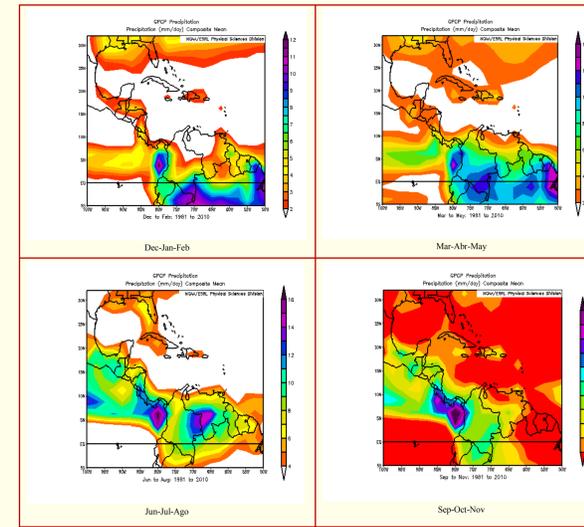
In the present study are implemented the climate reanalysis NCEP/NCAR data for to know the climate of the stream low level jet of Central America (Caribbean Low Level Jet - CLLJ) and the jet stream of Choco (Western Colombian Jet - WCJ) in the period 1981-2010; taking into account the climatic variables that reveal the annual evolution of both jets. This job evaluated the variation of the factors that influence in the intensity of the CLLJ and the WCJ over the Cesar River Valley.

Methodology

The graphs were obtained through climate reanalysis of NCEP / NCAR for the period 1981-2010. The following variables were analyzed:

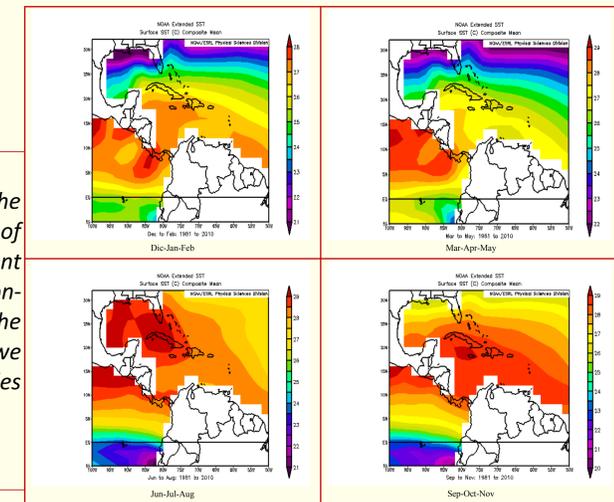
- Surface temperature of the sea.
- Surface temperature of the continent.
- Pressure at sea level.
- Vectors winds to 925 hPa.
- Geopotential height at 925 hPa.
- Speeds of 500 hPa pressure.
- Precipitation.

Taking into account as periods of study seasons in the northern hemisphere. Dec-Jan-Feb winter; Mar-Apr-May, spring; Jun-Jul-Aug summer and Sep-Oct-Nov autumn.

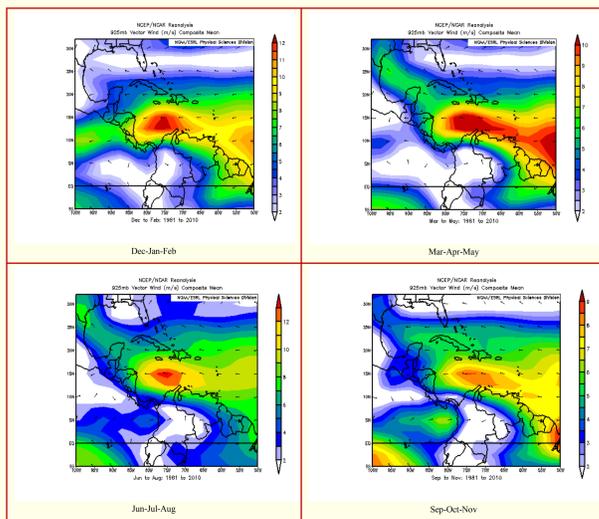


Precipitation

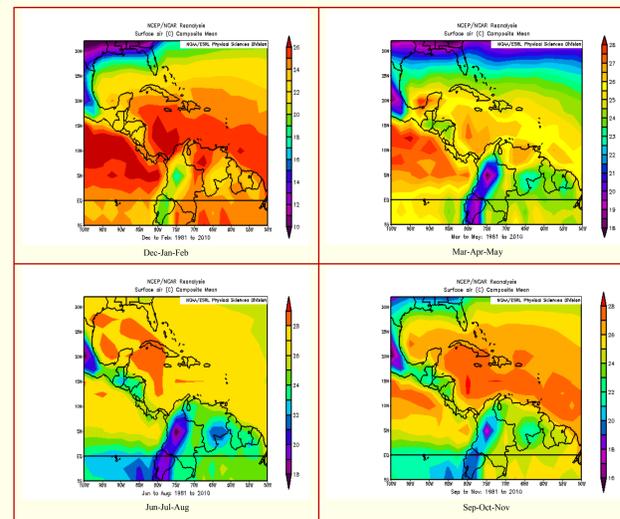
In this graphs we observed for the period of DJF that there is not precipitation in the Cesar river valley area and in the period of SON occur the highest precipitation. In the periods of MAM and JJA the precipitation is low. All this behavior of the precipitation is very important for to study the pollutants dispersion produced for the opencast minning projects.



Surface temperature of the sea



Vectors winds to 925 hPa.



Surface temperature of the continent.

We could see in these graphs how the the temperature of the sea change in the periods of study, It was observed a decrease in sea temperature below the line of Ecuador in stations JJA and SON, which increases the temperature gradient between water Colombian Pacific Ocean and the waters from the south of the continent. Studies say that are these sea temperatures with the winds that give the property to CHOCO jet being cold and wet. While if you look at the Caribbean we can see that for the MAM season temperatures decrease a bit and this coincides with decreasing intensity CLLJ.

The winds in the Cesar river valley are highly influenced for the CLLJ in the periods of DJF and MAM, allowing winds in the northeast direction with velocities of 5-8 m/s. The WCJ is stronger in the period of SON allowing winds in the southeast direction with velocities of 2-4 m/s.

Higher temperatures in both oceans and in the continent are presented to the DEF station, where the winds of CLLJ are more intense and CHOCO jet don't find a gradient to move more strongly to the región of Chocó in Colombia. The lower temperature gradient occurs in the Pacific in JJA and SON stations, which allow the increase the intensity of the CHOCO jet.

Conclusion

With this climatological analisis was posible knowing the behavior of the Weather variables that are determinants in the study of the pollutants dispersion that are emitted for the opencast coal minning projects over the Cesar river valley. The dry period DJF was the period with the greater susceptibility of air contamination in the study area. For future works is important focus in this period.

References:

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