Analysis of Relative Humidity on the Pacific Ocean

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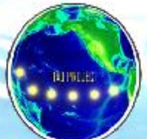

Figure 1: Location of the TAO/TRITON Project

I. INTRODUCTION

Relative humidity is only a relation of vapor water present on the atmosphere, and could be expressed as a percentage of the fraction between saturation vapor pressure or the equilibrium vapor pressure over a plane of water e_s, and the actual water vapor pressure e_a (Lawrence, 2005).

Discrete probability functions will be shown, calculated adapting the matlab function ('hist'), where we only need to data by bins and make an addition according to:

$$\text{Frenquency density} = \frac{\text{frenquency}}{\text{class width}} \qquad \text{Equation 1}$$

Discrete probability functions presented here are in a scale smaller than 1.

These frequencies are expresed in relative terms, because no data set have the same length (March, 2008), it means that there are some large data sets and there are some short data sets.

II. TIME SERIES

Relative humidity on the North of the Pacific Ocean presents time series with a marked range around 68% and 92%, with some slightly remarked peaks several times such the year 1997, under this range, and others, like between the years 2000 and 2001, above this range, as indicated in figure 2.

As we draw away to the south or west, as much as possible, we see that the amplitude of the time series do not vary notoriously. It could be possible that relative humidity on the west side of the Pacific Ocean fluctuates according to the El Niño Southern Oscilation (ENSO), increasing their time series values when a cool event is riding up or decreasing when a warm event does.

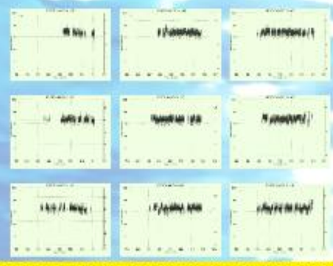

Figure 2: Relative humidity time series of buoys in the northeast of the Pacific Ocean:

(Up)	8N 137E	8N 156E	8N 165E
(In the middle)	5N 137E	5N 156E	5N 165E
(Bottom)	2N 137E	2N 156E	2N 165E

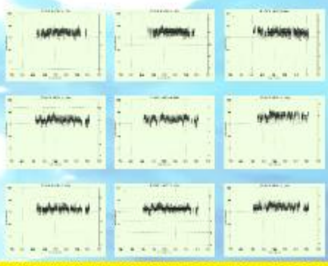

Figure 3: Relative humidity time series of buoys in the northeast of the Pacific Ocean:

(Up)	8N 170W	8N 155W	8N 110W
(In the middle)	0N 170W	0N 155W	0N 110W
(Bottom)	5S 170W	5S 155W	5S 110W

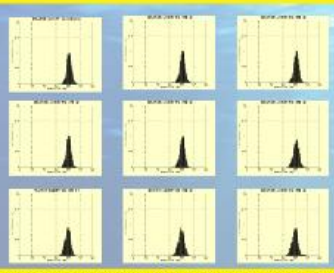

Figure 4: Relative humidity Discrete Distribution functions of buoys in the northeast of the Pacific Ocean:

(Up)	8N 137E	8N 156E	8N 165E
(In the middle)	5N 137E	5N 156E	5N 165E
(Bottom)	2N 137E	2N 156E	2N 165E

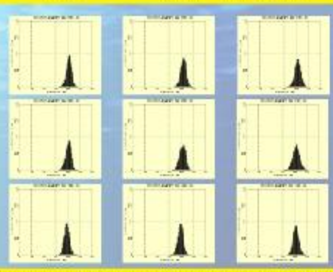

Figure 5: Relative humidity Discrete Distribution functions of buoys in the west of the Pacific Ocean:

(Up)	8N 170W	8N 155W	8N 110W
(In the middle)	0N 170W	0N 155W	0N 110W
(Bottom)	5S 170W	5S 155W	5S 110W

III. DISCRETE DISTRIBUTION FUNKSTION

We have seen that it is very probably that there is a dependence for relative humidity expected values with the ENSO. Now we will see how varies probabilities of finding an expected value according to the position in the Pacific Ocean.

Buoys at northeast of this Ocean present shapes with a slightly trend to be skew left. Observing these histograms, we can prove that mean values oscillates around 80%, for every position; and extreme values do not exceed 60% neither 100%, even the scale parameter are not similar for every discrete distribution function if it were normalized, as it can be seen in figure 4.

Nevertheless, receding from northeast buoys, we will look histograms where mean value exceed 80%, and some get close to 90%. What suggest that western Pacific Ocean are more humid than eastern; due to the shapes that vary somewhat changing their form to Gaussians, see figure 5.

IV. DISCUSSION

According to periodical oscillations of time series, could it be that oscillations depends on the El Niño Southern Oscillation, it means that, if there is a period of warming phase, relative humidity trends to diminish; or if there is a cooling phase the relative humidity trends to heighten

V. CONCLUSIONS

When there is an ENSO event approaching, relative humidity on the west side of the Pacific Ocean trends to increase or decrease depending if this event is cooled or warmed.