



ADVANCE IN

DIURNAL PHASE VARIATION OF VLF RADIO WAVES

Jorge Gonzales ^{1,3}, Walter Guevara D. ^{1,3}, Raulin Jean-Pierre ²

¹Comision Nacional de investigacion y desarrollo Aeroespacial (CONIDA), Lima – Perú

²Universidad Presbiteriana Mackenzie, Centro de Radioastronomia e Astrofísica Mackenzie – CRAAM/EE

³ Universidad Nacional Mayor de San Marcos (UNMSM), Lima-Perú

ABSTRACT

Here is given a preliminary report on the results of phase variation between the day and night for the months of May and June of 2007, measurement of NAA-24 KHz signal made at SAVNET station at Punta Lobos (12° 30' S, 76° 47' W), Lima-Peru. The VLF phase data were recorded by means of the SoftPal (Software Phase and Amplitude Logger) in CONIDA, Lima, Peru.

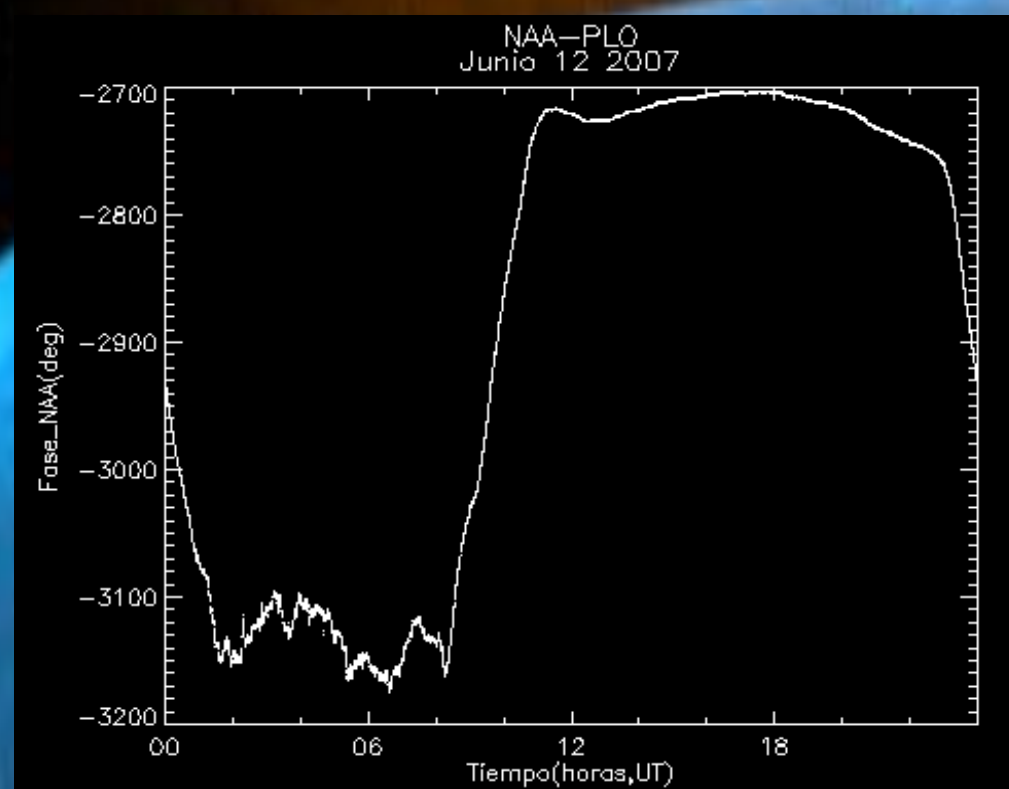


Figure 1

This plot shows the variation in the speed phase of the VLF wave for 24 hours, taken at Punta Lobos 12° 30' S 76° 47' W.

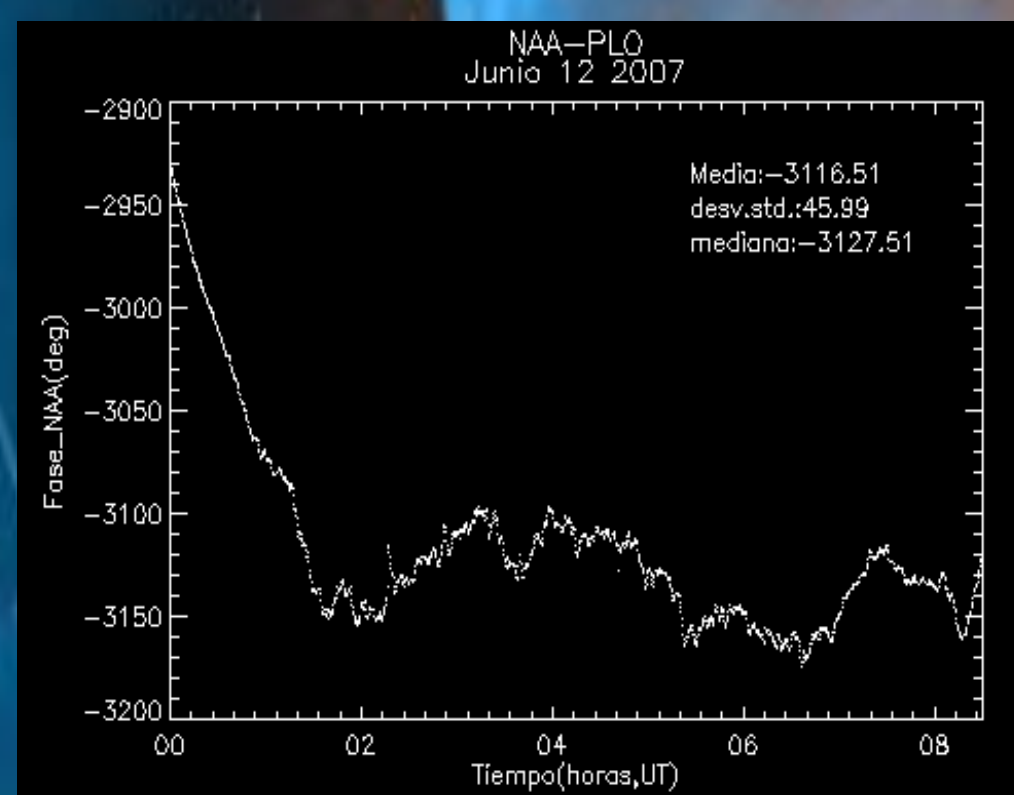


Figure 2

This chart shows the change in phase at night.

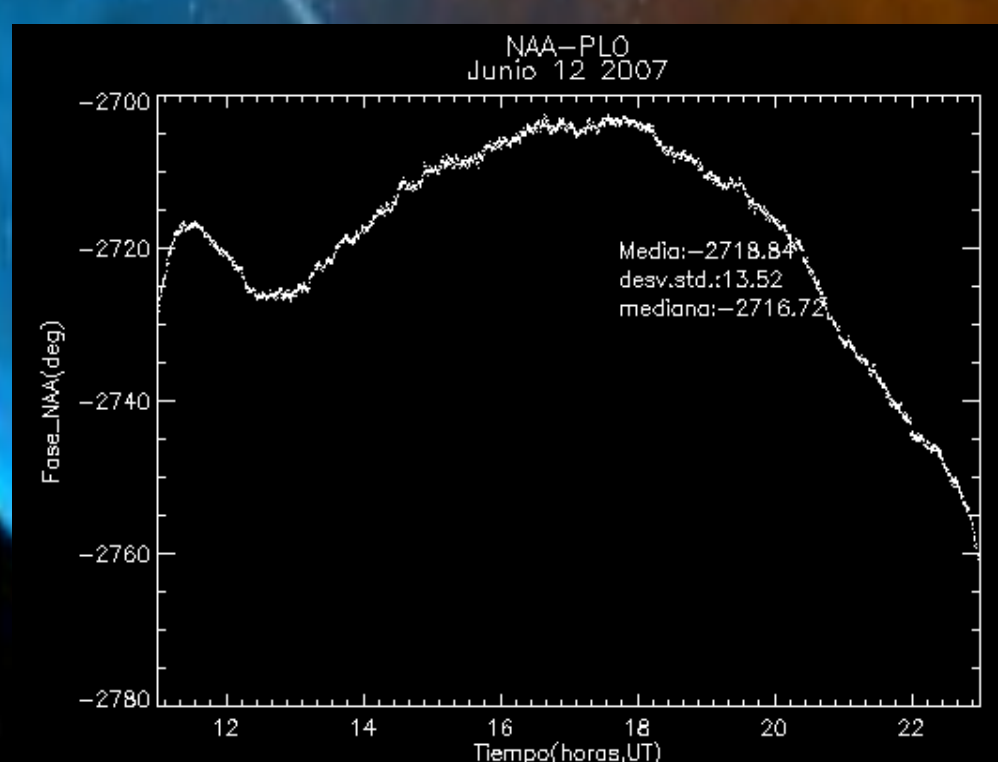


Figure 2

This chart shows the change in phase at day.

RESULTS, MEASURES AND THEIR REDUCTION

In advance of this work is carried out using IDL v7.0 (Interactive Data Language), also calculations of the averages was used the routine in IDL called *MOMENT*, which calculates the average as the standard deviation.

The calculation of the phase variation, is due to the formation of the D-layer ionospheric in the day and his absence at night as shown in Figure 1. A full day of 24 hours, is divided into two; night takes from 00 hours UT (*Universal Time*) until 08:30 UT as shown in Figure 2. For the day is taken from 11:00 UT hours to 23:30 UT as shown in Figure 3. In both cases it takes the average. Subtracting both phases averages we get the phase variation between day and night. Initial estimates were made between May 16 and June 30, 2007 as shown in Figure 4.

The data analyzed are shown in the table 1, the first column shows the day starting the 16 May until 30 June, from 21 to 25 May no data to Punta Lobos, as also for the first of June until 11 June and 18 to 28 June. The second and the third column shows the average phase day and night and the fourth column the difference between them.

The data collected by the SoftPal until last year consisted of a wide array of sixteen columns and one numbers of rows that could vary according to the days that one could stop taking data. Instead the new SoftPal data stored per day.

For the reduction of data build four routines, the first call *ceros.pro*, whom found the zeros within the matrix, another call *submatriz.pro* who cuts the original matrix per day, the third routine *plotear.pro* who plotea the whole day, and the fourth *ploteo_dia_noche.pro* graphic that both the day as night.

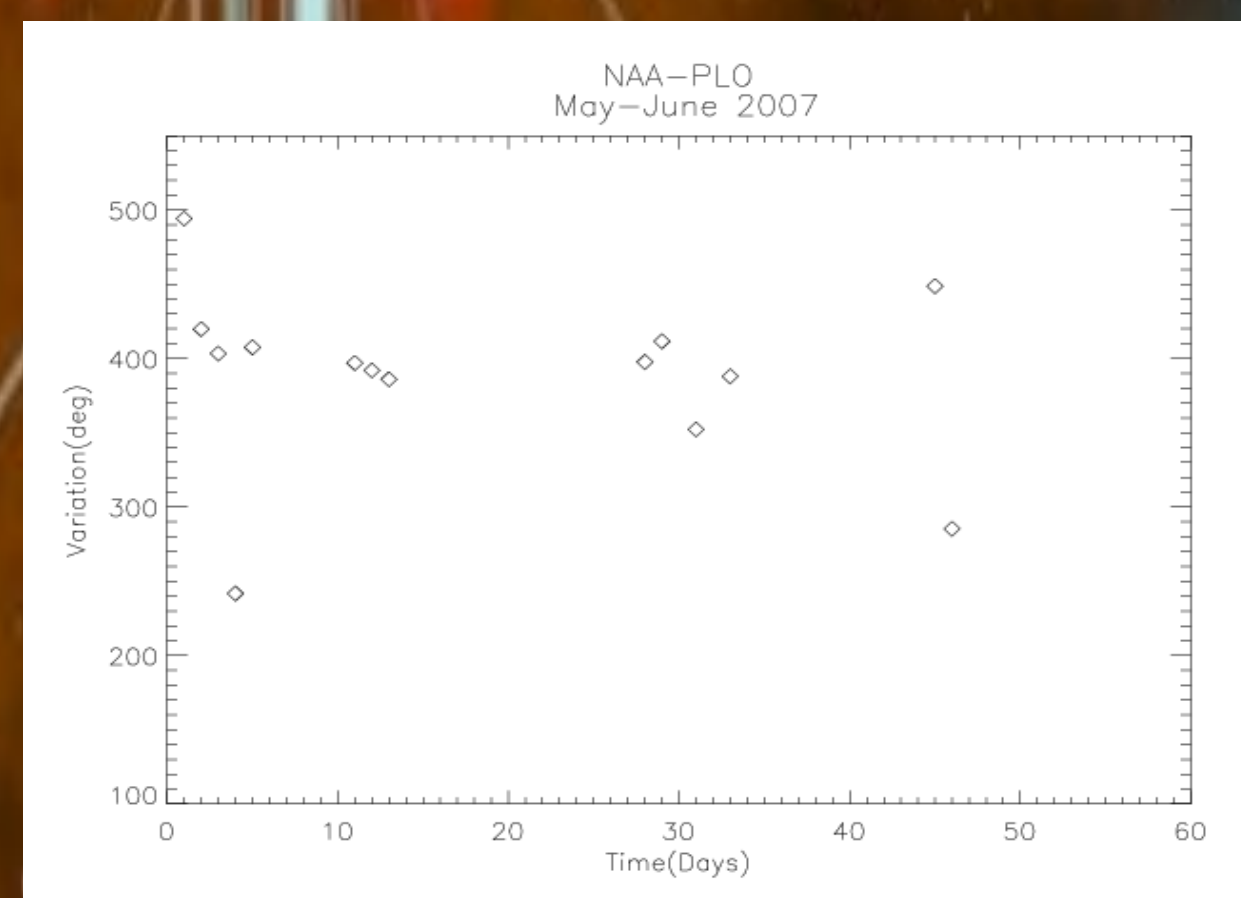


Figure 4

Phase variation between day and night

Acknowledgements

The authors would like to thank CONIDA for its support and the SAVNET project for providing the data used in this work. I personally thank Jorge Samanes and Carlos Lopez.