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Validation of Satellite Meteorological data with automatic stations in astronomical potential sites of Sourther of Perú

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Abstract

In the context of preliminary researchs of Public Investment Project "Radio Astronomy Laboratory" (Lara PIP) of the National Commission on Aerospace research and development (Space Agency Perú), are searching to identify the best zone of national territory for installation of Astronomical Observatory.

For this purpose; meteorological data from the database Surface meteorology and Solar Energy (SEE) of the NASA has been compared with data from automatic weather stations of the National Service of Meteorology and Hydrology (SENAMHI) and the Peruvian Corporation of Airports and Commercial Aviation (CORPAC) located at south of the country. Averages monthly (2004-2008) for the relative humidity and air temperature were developed for four years of data from automatic weather stations. Thus, zones with potential good quality sky has been identified at the southern part of Perú. The present study notes that the data taken by ground meteorological stations follow the same seasonal pattern that satellite data of Surface meteorology and Solar Energy (SEE) from the NASA.

Introduction

Public Investment Project "Radio Astronomy Laboratory" (Lara PIP) aims to prevent and warn about the negative consequences in communication, navigation, and damage by exposure to the solar radiation in Perú. Wanted then, identify the best zones of the country to install an astronomical observatory, which can make a continuous observation of solar activity in all the electromagnetic spectrum. During 2004, a global study of Peruvian territory was made, from viewpoint of weather, using the database of Surface meteorology and Solar Energy (SSE) from the NASA; as a result of this study were selected some sites at the southern part of Perú for a more detailed study.

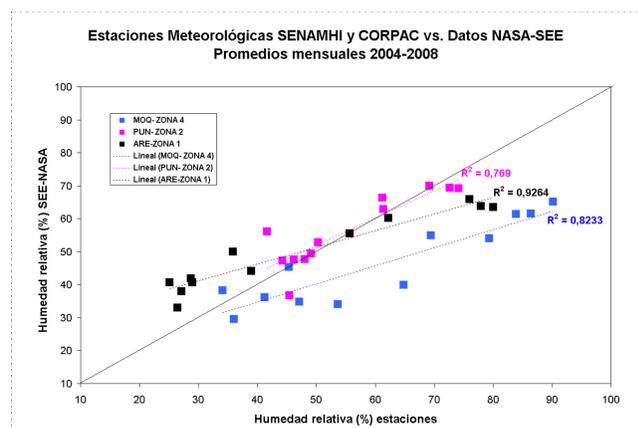
That same year began with the recording of data from automatic weather stations of the National Service of Meteorology and Hydrology (SENAMHI) and the Peruvian Corporation of Airports and Commercial Aviation (CORPAC), located at south of the country. With a database of four years (2004-2008) were produced monthly averages for the relative humidity and air temperature of three automatic weather stations in the south of the country: Moquegua, ENAFER (Puno) and Arequipa.

Data Analysis

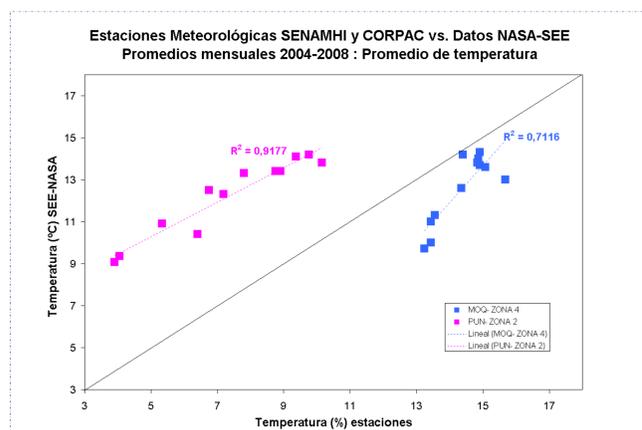
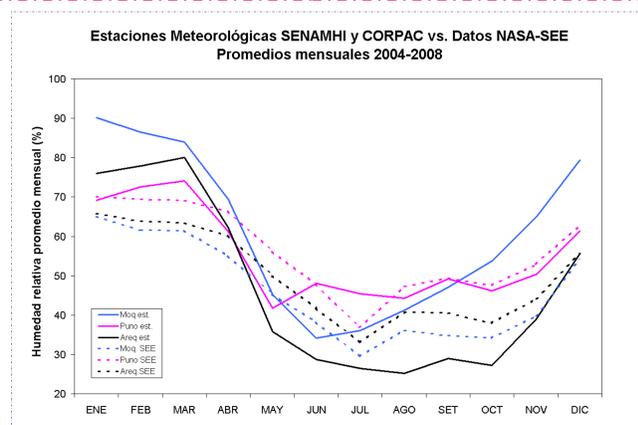
From the year 2004 began with the recording of data from automatic weather stations of the National Service of Meteorology and Hydrology (SENAMHI) (available at <http://www.senamhi.gob.pe/main.php?u=inter&p=0307>) and the Peruvian Corporation of Airports and Commercial Aviation (CORPAC) (available at <http://www.corpac.gob.pe/servicios/etm.asp>). Considering the results of the study of the database of satellite Surface Meteorology and Solar Energy (NASA), meteorological database of 10 years from 1983 to 1993, was elected a network of automatic weather stations located at southern Peru: Moquegua, Enafer (Puno), and the station Arequipa. Monthly averages were made from 2004 to 2008 for the relative humidity (%) and air temperature (°C).

The monthly averages 2004-2008 for the relative humidity (%) were compared with data from the SSE (NASA), making an adjustment linear factors are very good correlation between the two databases. The station Moquegua is a factor correlation of 0.82, the station Enafer (Puno) is a factor of 0.79 and the station Arequipa is a factor correlation of 0.93 (Fig. 1).

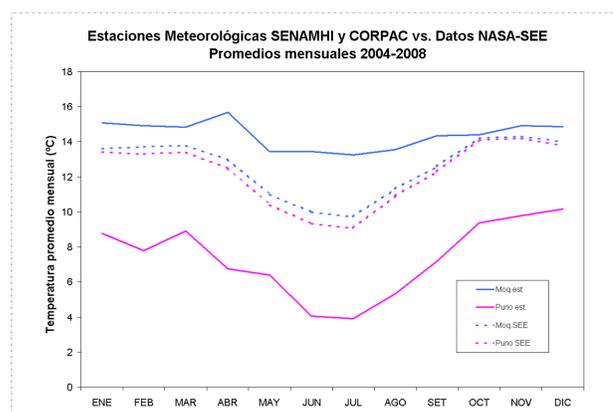
Another parameter analysed was the air temperature (°C); were made monthly averages from 2004 to 2008 for the automatic stations of Moquegua and Enafer (Puno), taking factors correlated with satellite data from SEE (NASA) of 0.71 and 0.92 respectively (Fig. 3).



In Fig. 2 shows the change in the monthly averages (2004-2008) for the relative humidity of the automatic weather stations from SENAMHI and CORPAC (thick lines) compared with the database from SEE (NASA) (dotted lines); can be seen in this chart that data taken ashore by the automatic stations follow the same seasonal pattern that satellite data of Surface Meteorology and Solar Energy.



A chart was made which compares the change in the monthly averages (2004-2008) for automatic stations (thick lines) with satellite data from SEE (NASA) (dotted lines), too can be seen in this chart that data taken ashore by the automatic stations follow the same seasonal pattern that satellite data of Surface Meteorology and Solar Energy (Fig 4).



Conclusions

The present study noted that the monthly variation of relative humidity and air temperature data taken ashore by the automatic stations from SENAMHI and CORPAC follow the same seasonal pattern that satellite data of Surface meteorology and Solar Energy (SSE) NASA, wich validates their satellite data

The factors correlation of ground-based data of automatic weather stations with satellite data from SEE (NASA), are on average: 0.84 for the relative humidity and 0.81 for the air temperature; therefore targeted sites are verified as potentially good sites for observation, with favorable conditions for the installation of an astronomical observatory.

Reference

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