PACS-SONET: The final 3 year's activity and thoughts for the future

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Introduction

The Pan American Climate Studies – Sounding Network (PACS-SONET) completed **9 years of operation** this April. More than 45,000 pilot balloon observations were made at more than **60 sites in the Americas**. This network was funded to improve wind sounding coverage in areas perceived to be important scientifically for describing atmospheric circulation variability at time scales ranging from synoptic through interannual. This poster highlights the most important activities during the last three years.

Considerations

Although formal funding for the PACS-SONET has ended, a number of stations in different countries continue to make observations. Efforts are being made to determine the best selection of sites that can be maintained as part of a global climate monitoring effort, blending highest scientific priority with operational needs and economic considerations.

WEB:

http://www.nssl.noaa.gov/projects/pacs/

Acknowledgements

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Tropospheric measurements in Arequipa - Peru

An initiative by the Peruvian National Weather Service in Arequipa (SENAMHI-Arequipa) obtained funds to carry out a study of air pollution at Peru's second largest city, Arequipa. PACS-SONET personnel were approached to help provide support for this activity. In addition to capacity building among the Arequipa participants, routine SONET pilot balloon observations have been, and will continue as part of this project over the next year, which will expand the data set available for climate and weather studies in the region.

The field experiment was designed to describe the diurnal cycle of the winds about Arequipa and between the western slopes of the Andes and the coast. The observations show the diurnal cycle with 2-hourly time resolution and will be useful for VOCALS planning.

Observations were made every 2 hours and every 3.5 hrs at night. mostly limited by the available balloons, gas, and lights for tracking balloons.

Fig. 2 Station network map. The pilot balloon stations are indicated with white dots, which formed a triangle of approximately 70km between stations. The backgound contains the orography in mASL

Fig. 1 Pollution in Arequipa, the second largest city in southern Peru. The Arequipa station had made pilot balloon observations since late 2002, first as part of the SALLJEX and then continued as part of the PACS-SONET.

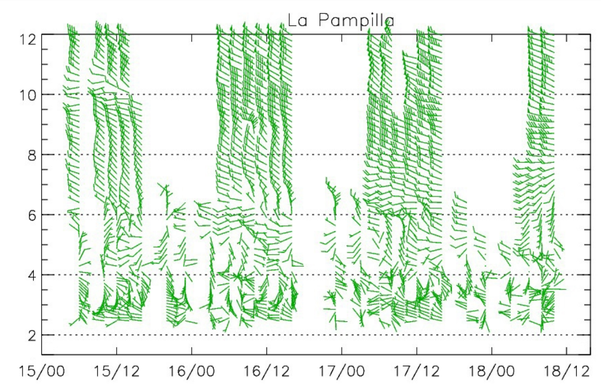


Fig. 3 Time series of wind profile for La Pampilla, which is also a tethersonde station.

The temperature and moisture profiles were obtained through 3 radiosonde launches and numerous 900m-deep soundings carried out with a tethersonde.

Venezuelan llanos low-level jet meteorological experiment

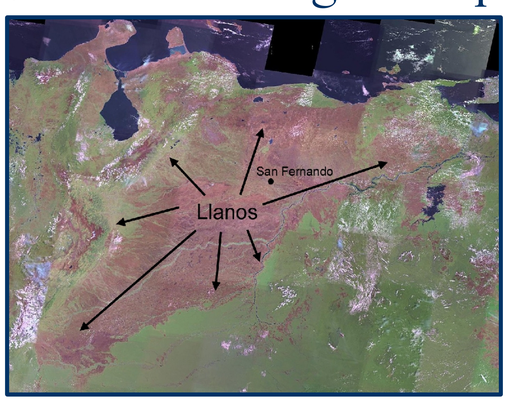


Fig. 4 The geographical region in northern South America know as the llanos encompasses the flat region of Venezuela and Colombia that lies along the tributaries of the Orinoco River and is a savanna-type vegetation (brownish in this dry-season LANDSAT composite image), except along rivers where forest is found.

In March 2001 a pilot balloon station was established at San Fernando de Apure in the Venezuelan llanos (**Fig. 4**) as part of the PACS-SONET. No other wind soundings were being made at the time in this region (**Fig. 5**). During the past four years it have shown the nearly constant presence of a low-level jet in the once-daily morning soundings during the dry season (Nov–Apr). Afternoon observations were requested and began in Feb2005 in San Fernando, and an intensive Field Campaign was carried out in April, referred as LLANOJET.

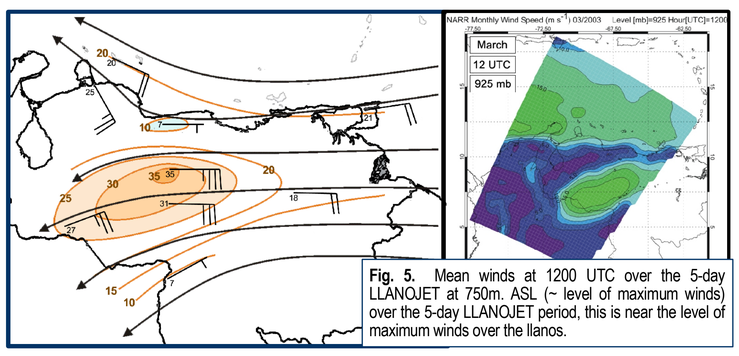
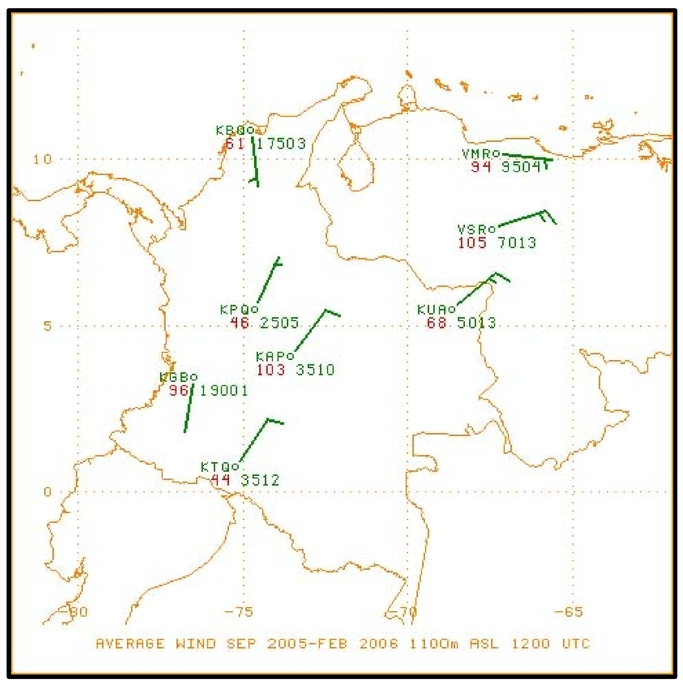


Fig. 5. Mean winds at 1200 UTC over the 5-day LLANOJET at 750m. ASL (~ level of maximum winds) over the 5-day LLANOJET period, this is near the level of maximum winds over the llanos.

The LLANOJET activity successfully described the diurnal variability of winds over the llanos during a dry season period, and the additional measurements at other sites showed that the San Fernando site is representative of conditions over a wide area of the llanos. The LLANOJET campaign showed that some other sites, such as the PACS-SONET site at Maracay, are representative of only a small area. Thus, the general procedure for evaluating the representativeness of a particular sounding site – via a short period of intensive measurements at multiple sites, seems worthwhile. This can help, if systematically applied, to determine the relative value of different sounding sites for climate monitoring purposes.

Expansion of Colombian network



COLOMBIA

In December 2004, the Colombian Air Force requested support from SONET to establish 6 pilot balloon sites. The stations that started operations in September 2005 now help depict the low level flow East of the Andes, along with existing pibal stations in Venezuela.

The Future

The PACS-SONET activity has shown that it is possible to selectively increase the density of wind soundings in a relatively affordable manner. However, to have a chance of becoming a sustainable observing system, the pilot balloon activities must involve more than just making the observations. Many countries could not sustain the observations, however inexpensive, due to varying factors. Fundamental to success is convincing meteorological services that the observations are valuable for ***their own*** purposes. This requires not only a detailed understanding of the available options for measuring the atmosphere (*and their detailed costs*) but also an understanding of modern data assimilation into mesoscal models, an educated forecasting staff, and a research branch that understands the role of observations in developing forecasting tools for the tropics. These requirements are met in few, *if any*, meteorological services in Latin America. This lack of infrastructure is a result of the meteorological community in each country being unable to effectively argue the case for better weather and climate prediction, and to understand what is required to do so.

Without major educational efforts at the international level, especially within the institutions involved in operational meteorology (not the traditional receiver of advanced education), any climate monitoring network is likely to encounter difficulties.