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Mauritius WMO Radiosonde Intercomparison

On February 7-25 of this year, the WMO conducted an intercomparison of high quality radiosonde systems on the island of Mauritius. The intercomparison took place at the headquarters of the Mauritius Meteorological Services, Vacoas.

The location and timing of the test offered good conditions for radiosonde humidity and temperature testing, stated as important objectives of the intercomparison, along with GPS wind measurement.

The test was supervised by the Vice-president of WMO/CIMO, Dr. John Nash, while practical arrangements at the site were conducted by Mauritius Meteorological Services' Deputy Director / Intercomparison Project Manager Dr. Beenay Pathack.

Radiosondes and ground

systems from six manufacturers were tested. Vaisala participated with the Vaisala Radiosonde RS92-SGP and Vaisala DigiCORA® Sounding System MW31, featuring the new Vaisala Sounding Processing Subsystem SPS311 with built-in software defined radio technology. Additional instrumentation, such as the Vaisala Ceilometer CT75, a cloud radar, and a GPS met system, was also used to collect data for further scientific analysis.

Soundings day and night

Due to the large number of com-

pared instruments, test flights needed to be divided into two groups. Four multiple sonde rigs were flown daily. Two of the flights were nighttime soundings at 7 pm and 10 pm local time. Daytime soundings were performed at 9 am and 2 pm. The flights were scheduled from Mondays to Saturdays. Vaisala was the only manufacturer to participate in all test flights.

The weather during the campaign was hot and humid. In the first week, rain showers occurred daily, ground level temperature varied between 24-28°C and humidity between 70-95% RH. Fig-

ure 1 shows an example of atmospheric temperature and humidity profile from the first week of the test. February is in the middle of the cyclone season in Mauritius. Before the test it was thought possible that some of the flights might need to be postponed because of high ground winds and rain. During the test, however, the wind speeds were relatively low.

One important task of the Mauritius Meteorological Services is to forecast possible cyclone development and issue appropriate warnings. During the test Vaisala also provided sounding

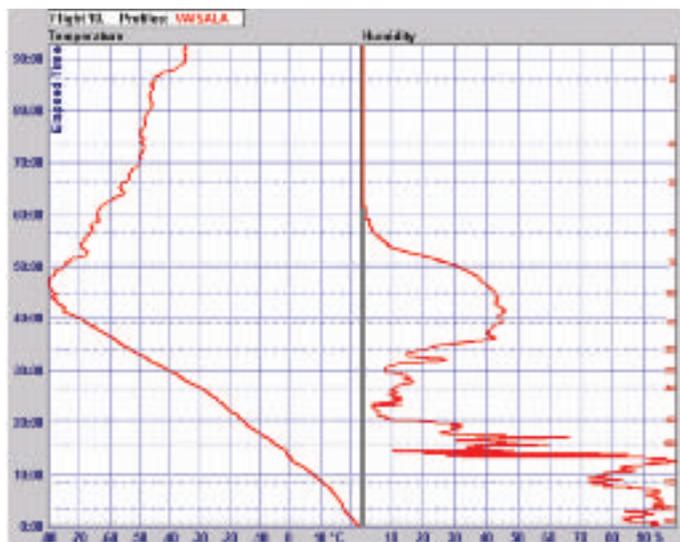


Figure 1: Typical temperature and humidity profiles.

data from Vaisala radiosondes for the station's meteorological needs.

10 out of 10 for arrangements

The arrangements by the WMO and Mauritius Meteorological Services set a good basis for a successful test campaign. Before the test, the manufacturers and the personnel of the Vacoas Meteorological Station built up the sounding systems and the required infrastructure. During the campaign, big 2000 gram balloons were used to lift up bamboo rigs, typically reaching 35 km altitude and 6 hPa pressure level. Rigs were equipped with 3 to 4 test radiosondes, according to a predetermined sounding plan.

In the second daytime sounding a fifth sonde, the Vaisala Radiosonde RS80-15G, was also attached to the rig to carry out the station's routine synoptic sounding. The launch of big rig systems is always a challenging task. During the test period, the station personnel took care of the sounding launches. Experience and practice from previous radiosonde intercomparisons was brought in by the WMO supervisors. The rig launches were very successful despite the varying wind conditions.

Vaisala telemetry link performance

A full report on the intercomparison will be published by the WMO in due course. Preliminary results of the test will be presented at TECO-2005 in May. Due to the agreed schedule, the manufacturers are not permitted to publish data accuracy analysis before this. However, some information on the Vaisala system's performance and reliability can be revealed now.

A combination of the Vaisala Radiosonde RS92-SGP and Vaisala DigiCORA® Sounding System MW31, with the new Vaisala Sounding Processing Subsystem SPS311 with software defined radio, was used in Mauritius. The signal transmission of the system is built on a fully digital telemetry link. When compared to conventional analog RF receiver technology, the new digital telemetry technology offers significant advantages, including accurate and flexible digital signal processing, software-configurable digital filters and efficient error detection and correction methods. The result is improved bandwidth efficiency, reliable data transmission, improved diagnostics, and more consistent unit-to-unit operation.

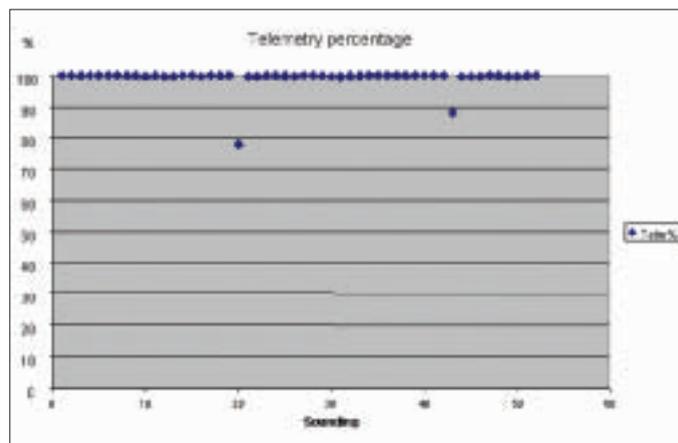


Figure 2: Telemetry performance of the RS92-SGP / SPS311 with software defined radio in Mauritius. Percentage of received frames / expected frames, average 99.2% and median 99.9%.

Figure 2 outlines the percentage of received frames from the Mauritius soundings. The reliability of the data transmission was very high - the average of received frames / expected frames being 99.2%. In practice, the data received is subject to further validation.

GPS wind data availability

The GPS wind data availability of the RS92-SGP radiosonde was also evaluated. One useful measure is the number of tracked GPS satellites by the radiosonde 12 channel receiver. The number of tracked satellites in the

test was 11 on average. The GPS wind calculation requires at least four satellites to be tracked and this was the case in 99.95% of the received GPS frames.

This figure describes the sonde GPS-receiver performance and does not include operation of the telemetry link between sonde and ground equipment. When this figure is combined with the telemetry performance, it can be seen that the RS92-SGP offered very good wind data availability in the Mauritius WMO Radiosonde Intercomparison. ●

Further information:
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Average tracked satellites.

