GPS Radiosonde Trial at Camborne

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The Met Office performed a GPS radiosonde trial at Camborne, UK, from the 4th to the 15th of December 2000. The purpose of the trial was to evaluate different manufacturers' radiosonde GPS performance. The trial was also a preliminary test of the arrangements for the WMO GPS test to be held in Brazil in May 2001.

Professional test arrangements

The trial was organized by the Met Office, and headed by Mr. John Elms. Other members of the Met Office involved were Mr. Richard Smout, Mr. Darren Lyth, Mr. Julian Buss and the operational staff from Camborne radiosonde station.

The Vaisala team involved included Mr. Mike Brettle (Sales Manager, Vaisala Newmarket), Mr. Veijo Antikainen (Product Manager), Mr. Markku Markkanen (Systems Engineer) and Mr. Ilkka Rekikoski (Sensor Design Engineer).

A total of five types of GPS radiosondes from four companies participated in the trial. From Vaisala both RS80-15G and RS90-AG were flown.

During the trial 19 flights were launched, 16 of them with a specially designed flight rig carrying three or four radiosondes. Four of the rig flights were made with RS90-AG and all others with RS80-15G.

A 1200-g balloon provided lift to reach pressures up to 7 hPa. The launch schedule included three flights per day, at 11:15, 14:15 and 17:15 local time.

The Camborne test facilities are well equipped and professional. The station is one of the Met Office's operational sounding stations. It is located on a relatively open and treeless area. The wind during the trial was up to 23 m/s, so the conditions were challenging enough!

UK Meteorological Office's operational sounding station at Camborne.

Vaisala performed well

Vaisala started the development of utilization GPS navigation for upper air wind finding in 1993. In September 1997 when the Omega navigation system was phased out, this unique Vaisala GPS solution replaced the phased out Omega solution.

Since the introduction of GPS wind finding, a continuous improvement and development effort has taken place. The most recent improvements were introduced in Vaisala News 155/2001. The results of these improvements can be

The flight rig and balloon ready for launch at Camborne, UK.

A total of five radiosondes participated in the comparison. The radiosondes are being prepared for a launch.

seen in this latest Camborne data.

Vaisala's GPS sondes generally performed very well using this rig configuration. On 15 of the 19 soundings more than 99 percent of raw wind levels were calculated and the average number of tracked satellites was 7. Fifteen Vaisala ascents obtained winds immediately above the surface. Three soundings suffered from interference from a nearby wind-finding radar operating at Camborne which caused all RS80-15G winds to be missed for the remainder of these flights. During later flights the radar was not switched on until after launch.

Weather conditions in Camborne were demanding. The wind was often very strong and ground level humidity was often between 90 and 100 % RH. The conditions were also suitable for humidity sensor testing. Both RS80 and RS90 humidity sensor performance was good.

In five flights where the RS80s went through low and medium level cloud the average RS80 raw humidity measurement was 105 %. In two flights where the RS90s went through cloud, the average raw humidity was 104 %. These measurements are consistent with RS80 humidities observed operationally in the UK Network during wet conditions.

Whilst the variations in relative humidity in the vertical were usually similar in all the participating radiosondes, there was poor agreement in the absolute values of relative humidity reported in medium level cloud. Further analyses of wind, height and (in particular) humidity will be obtained in Brazil when dewpoint hygrometer radiosondes will provide an independent reference.

A complete analysis of the trial results will be made by the Met Office. ■

Mr. John Elms with the specially designed flight rig carrying radiosondes to be tested.

The authors from the left: Ilkka Rekikoski, Veijo Antikainen, and Markku Markkanen.