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COMMISSION FOR INSTRUMENTS AND METHODS OF OBSERVATION
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JOINT MEETING

CIMO EXPERT TEAM ON UPPER-AIR SYSTEMS INTERCOMPARISONS
First Session

AND
INTERNATIONAL ORGANIZING COMMITTEE (IOC) ON UPPER-AIR SYSTEMS INTERCOMPARISONS
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NATIONAL PROGRESS REPORTS ON TESTING QUALITY OF NEW RADIOSONDES

Current National Upper-Air Activities in India

(Submitted by Sai Krishnan, India)

Summary and purpose of document

This document provides information on current national upper-air activities in India

Action proposed

The meeting is invited to take into account information presented in this document when discussing issues related to a testing quality of new radiosondes.

Current National Upper-Air Activities in India

1. India Meteorological Department, Govt. of India is having a network of 38 upper air radiosonde stations in India. In southern peninsular region tracking is done by radars, at 16 stations and the rest use radiotheodolites. IMD supports three stations in the Himalayan Mountain Region for study of Meteorology in the Mountains. IMD has in-house production facility for radiosonde and maintenance of radiotheodolites / radars.

2. IMD is undergoing modernization and has adopted a strategy to replace the obsolete radiotheodolites with the latest equipments and upgrade existing stations with auto computation system using the new IMD – MKIV radiosonde. For ten stations new 1680 MHz radiotheodolites have been installed and are now functional. The radiotheodolite is used with new IMD–MK-IV radiosonde and is also compatible with other international radiosondes.

3. At 32 RS/RW stations throughout the country a new automatic computation system is being installed. The system was jointly designed by IMD and SAMEER (Autonomous organization under Govt. of India). The system uses existing antenna and receiver and connects to the computer using a data acquisition system. Installation at 15 stations has been completed. In the first phase ten stations of the southern India were installed. By end of March 2004 another 10 stations will be completed. The change over to new radiosonde would be over by middle of 2004 for all the IMD stations.

4. The new IMD – MKIV radiosonde uses time division multiplexing for getting PTU data in place of sensor switching by the pressure sensor (As in IMD-MK-III radiosonde). The IMD-MK-IV sonde provides one full data (PTU) set at 2-second intervals. The Met data frequency range is from 35 to 1200 Hz. Existing aneroid in the baroswitch (Mechanical pressure sensor) is being used as a pressure sensor. For temperature rod thermistor continues to be used. Lithium Chloride hygristor has been replaced by carbon hygristor. The sondes are developed and manufactured at IMD facility in New Delhi.

5. The processing software has capability of on line plots of PTU data, generation of T-Phi gram, TEMP message, Climate TEMP, Monthly registers etc. The processed data is available for about every 10 meters height at 0.15 deg temperature intervals. The software has provision for thorough check up of radiosonde at site, which include finding out characteristics for conversion of sensor resistance to tones (frequency) over the complete range and generation of new constants specific for the sonde. It can use calibration constants of the individual temperature and humidity sensor. Software has rigorous quality checks, for checking the correct contact numbers, identification of bad / noisy data, deletion / correction of the data, filling of missing data through its horizontal and vertical consistency checks.

6. As future plan IMD is to start one more station at Jaipur shortly and upgrade its one station from RS to RS/RW. IMD is in the process of replacing 14 radiotheodolites with the latest state of art equipment operating in the 1680 MHz band in the year 2005. Along with the radiotheodolites it is planned to upgrade the radiosonde from MK-IV to a higher version with digital functions.

7. IMD is upgrading radiosonde to a compact, lightweight, highly stable, repeatable, accurate radiosonde using the latest Silicon pressure sensor. This will include MEMS based Pressure, Temperature and Humidity sensors. Whole system will be ASIC based. Necessary expertise available in the country is being used for the development. It shall be possible to modify the existing software for acquisition and processing of data from the new sonde coming up in the future. IMD is currently using 401 MHz as well as 1680 MHz bands and plans to change over to 1680 MHz completely. All the new Radiotheodolites are to be operated on this frequency band. IMD is also in process of change over to a new highly stable 1680 MHz chip transmitter for the radiosonde, which has synthesized frequency generators. Prototype of transmitter is under test. An optional GPS enabled radiosonde is planned for the new Radiosonde.