

# **Irkutsk Incoherent scatter radar upgrading. New techniques and hardware.**

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The incoherent scatter technique has been used for ionospheric research more than four decades. Nevertheless, Incoherent scatter radars (ISR) capabilities are far from exhaustion. The further ISR contributions to the space science will be the result of the development of innovative experimental technologies. Irkutsk Incoherent scatter radar is working as a part of the global ISR network more than ten years. The results of the recent work (2003-2005) for the Irkutsk Incoherent scatter radar upgrading are reported. During the modernization process full replacement of systems of the transmitter waveform, receiving, data acquisition and processing was completed. The transmitter waveform system makes possible to use multi-pulse, multi-frequency and phase coding techniques. New multi-channel receiver having wide lineal operating range (more than 70 dB) is able to measure the strong coherent echo against the background of weak scattered signal. Data acquisition and processing system provides the sampling, real-time processing and storage of the large volume of information (more than 17 Mbytes per minute). The Irkutsk ISR has sectoral horn antenna system consisting of two semi-horn with independent feeders. The antenna makes possible the pulse-to-pulse electronic steering in the meridional plane. Using the new multi-channel receiver and data processing system we have got possibilities to control antenna beam in the zonal plane and to carry out the interferometric measurements. Some results of observations during September 2005 World Day campaign using the new techniques and hardware are presented.