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The Modern Digital Ionosonde of INGV

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The AIS-INGV digital ionosonde developed at the Istituto Nazionale di Geofisica e Vulcanologia (INGV) is presented. As other recent ionosondes it exploits the most advanced radar techniques and PC resources for on-line processing of the echo signal. This ionosonde employs a 16 bit phase complementary code with 180 degrees phase modulation in order to obtain 15 dB gain after the correlation process. It also performs a programmable phase coherent integration to obtain an average gain of about 10 dB. These two main on-line processing operations give an overall gain that allows to reduce the emitted power up to 200-250 W. The last two operations, together with some digital filtering processes that are dependent on the particular site, are directly implemented on a Digital Signal Processing (DSP) board. The major hardware characteristics and some design details as well as the mathematical process will be briefly discussed. The ionosonde is equipped with a computer program (called Autoscala) for the automatic interpretation of foF2, MUF(3000)F2, and foEs. Autoscala is designed to scale ionograms without using information on polarisation and can be applied to both single antenna and crossed antenna systems. Particular attention has been paid to the cases in which the ionograms have a truncated F2 trace. The problem of the rejection of bad quality ionograms is also considered. Results of comparisons between automatically and manually scaled data are shown. Preliminary results on the automatic scaling of F1 layer are also presented.