



## Software Defined Radio based Open Source Ionosonde

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We present an implementation and first results of an ionosonde that is aimed for making advances in studies of mesoscale ionospheric phenomena. This ionosonde is relatively small form factor, and well suited for operation in a network of transmit and receiver sites that are operated cooperatively in order to measure vertical and oblique paths between multiple transmitters and receivers in the network. We describe the design and implementation of a coded continuous wave ionosonde, which utilizes long pseudo-random transmit waveforms. Such radar waveforms have several advantages: they can be used at low peak power, multiple transmitters can be operated simultaneously on the same frequency, they can be used to measure range-Doppler overspread targets, they are relatively robust against external interference, and they produce relatively low interference to other users that share the same portion of the electromagnetic spectrum. The technical design relies on the software defined radio paradigm and the hardware design is based on commercially available inexpensive hardware.

The open source implementation is available here: <https://github.com/jvierine/ionosonde>