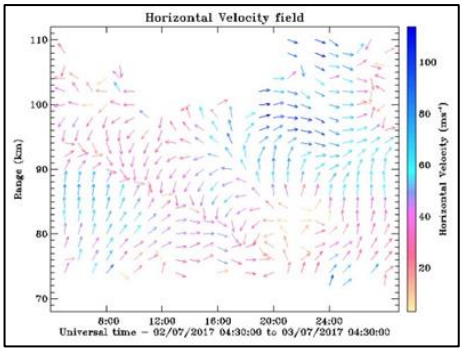
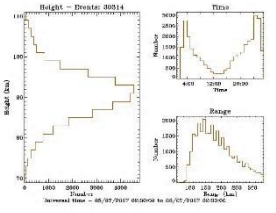
HF/VHF ENHANCED METEOR RADAR 25 to 65 MHz

ATRAD has an extraordinary level of experience in the development and refinement of Meteor Radars. This is backed by an extensive research record that has contributed to the superior performance of ATRAD radars over many years. The EMDR Enhanced Meteor Detection Radar is the successor to the highly successful MDR-5 and combines ATRAD's scientific expertise, professional engineering and commercial operational experience to produce a sophisticated, flexible, modular and highly reliable scientific instrument. More than 25 have been installed from the Arctic, to the Tropics, to the Antarctic.

(Above) 40 kW EMDR radar with 6-channel digital transceiver. The power amplifier is the ATRAD 4 kW transmitter module. There are several hundred of these in operation. The receiving system is based on the ATRAD digital transceiver. There are several tens of these in operation.



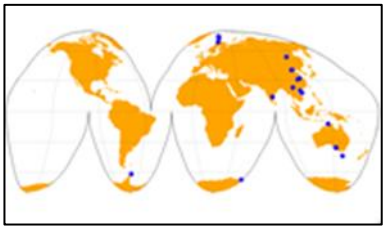


(Above) Typical wind results from one day of operation of a low-latitude 30 MHz, 40 kW, five channel VHF radar operating in meteor mode. Note that winds are recovered between 75 and 110 km depending on time of day. This radar detects over 40,000 meteors per day depending on time of year and season. (Above Left) Meteor height and time distributions for one day.

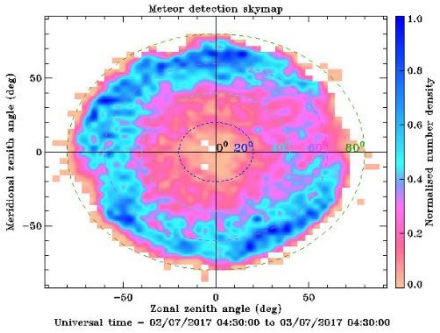
KEY FEATURES

- Real-time Wind Profiles
- All sky meteor operation
- Monostatic, bistatic, and receive only options available
- Remote monitoring and control
- Based on extremely reliable ATRAD hardware
- Large installed base
- Low operating costs
- Fully automated / Unattended operation
- Superior performance
- **5-year warranty on the power amplifiers (shown below)**

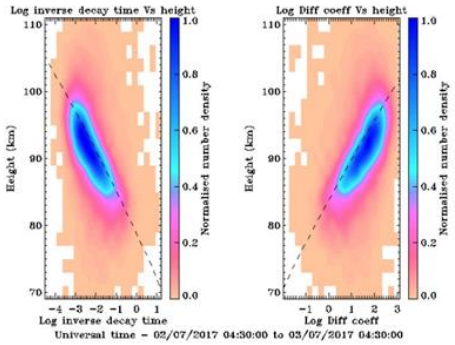
ATRAD's EMDR comprises a system based on a modular and scalable architecture.



(Above) selected ATRAD Meteor radars.



(Above) sky map of one day of (31,000) meteor detections



(Above) Meteor decay time and diffusion coefficient measured over a 24-h period

APPLICATIONS

- Wind measurements in the 75 to 110 km height region
- Temperature measurements in the 80 to 90 km height region
- Neutral density measurements in the 80 to 90 km height region
- Meteor astronomy
- Space situational awareness

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Transceiver

(Above) 16-Bit Digital Transceiver incorporating six receivers, exciter and GPSDO option. The GPS module is located to the right of the transceiver.

Transmitter

(Below) 20 kW EMDR showing transmitter in lower section

Antenna Array

(Above) Receiving antenna with transmit antenna in background

General Description

Modular, expandable in three receiver increments, **up to 12-receivers**

Solid-state, modular transmitter, expandable in 4 kW increments. 10% duty cycle Gaussian pulse, 15% square

All-Sky Interferometer

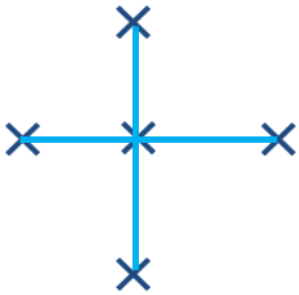
Specifications

Receiver: 6-Channel, 16-bit
Exciter: Single Channel, 16-bit
Pulse Repetition Frequency: 5 kHz (max)
Observation Range: 70-220 km; 110 km @ 80°
Range Resolution: 100 – 4,000 m (software selectable)
Range Gates: Up to 6,000
Analysis Mode: Meteor
Primary Data products: Wind field, meteor velocity, meteor decay time, meteor radiants
Secondary Data products: Diffusion coefficient, neutral temperature, neutral density, momentum flux
Data Output Formats: ADF, user defined
Remote Control: Remote monitoring and control via internet, ethernet, 3G/4G or dialup

Transmitter Power: 8/12/20/40 kW
Combiner Method: Transmitter module outputs combined and then split (EMDR20, EMDR40); allows for graceful degradation in the event of transmitter module failure.
AC Mains Power: 220-240V AC or 110-120V AC, Single phase up to 20 kW, 3-Phase thereafter

(Above) GPS frequency and time control module for bistatic and remote receiver operation

Antenna Array Configuration: 5 or 6 antenna Interferometer. Single transmit antenna, 5 or 6 linearly polarized crossed-dipoles for reception
Antenna Array Footprint
Frequency dependent and depends on whether pentagon, cross, 'L' or 'T' arrangement used. It is 4.5 x 4.5 λ for a cross

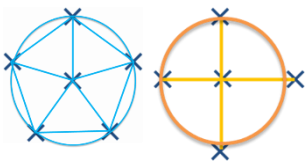


(Above) Standard 5-channel interferometer used for meteor work. The antenna spacings are 2 and 2.5 λ

Options

GPS Reference
GPS disciplined oscillator (GPSDO) / GPS locked time and frequency

Advanced 6-antenna receiving array making use of all six receiver channels.



(Left) Advanced 6-antenna arrangement (far left), together with the standard 5-antenna receive system (right)

Antenna Guying
For high-wind locations (> 20 m/s)

Ionospheric radar operation
Remote meteor system
With suitable antennas and beam steering option

(Left) Remote 6-channel receiving system. This is a complete receive system for remote meteor operation. It is also suitable for remote ionospheric operation (with an appropriate antenna system)

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