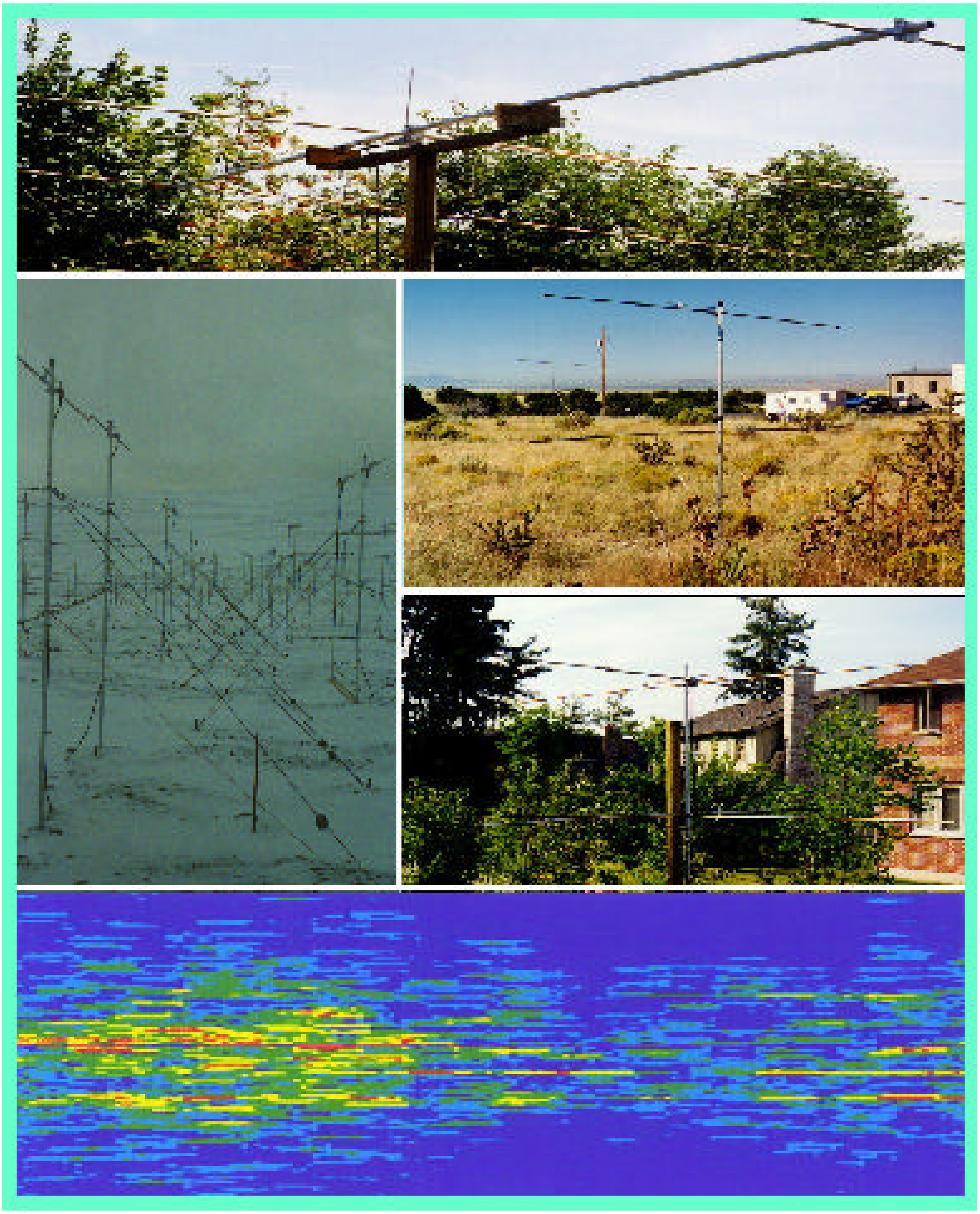
MARDOC Inc.



MARDOC Inc.

MODULAR ANTENNA RADAR DESIGNS OF CANADA

Telephone: 519-657-7822 *Facsimile*: 19-657-7822

MARDOC BROCHURE

Drs. W.K. & A. HOCKING

MARDOC Inc.

MARDOC Inc.

MARDOC (Modular Antenna Radar Designs Of Canada) Inc. is a company which specializes in development and deployment of radars with scientific applications. We specialize particularly in atmospheric and meteor radars. Our current interests include development of an all-sky meteor system called SKiYMET. This is a collaborative project with Genesis Software Pty. Ltd. Of Australia, and has resulted in radar deployment in Canada, Brazil, Australia, Europe and the U.S.A.

We particularly specialize in scientific software development and antenna construction. Our software works under a variety of environments including UNIX, Windows and DOS. Our Website is: **www.members.home.net/mardoc-inc/home.htm** and we can be contacted by email at: **mardoc-inc@home.com**

Our managing director, Dr. Wayne K. Hocking, is also a scientist, with an extensive publication list, and is therefore very familiar with the many scientific and research-oriented problems associated with new radar deployment. We also have experience at deployment in all kinds of environments and have erected antennas at places like the northern arctic (Resolute Bay, Canada) as well as more "palatable" sites.

The following pages show an overview of our latest project, the SKiYMET meteor radar.

Dr. Anna Hocking, M.Sc., Ph.D.
(President and C.E.O.)

This is a typical transmitter antenna (left) and a close-up of one possible support mechanism (right). Simple supports like this are especially useful when the radar is to be moved on a regular basis.

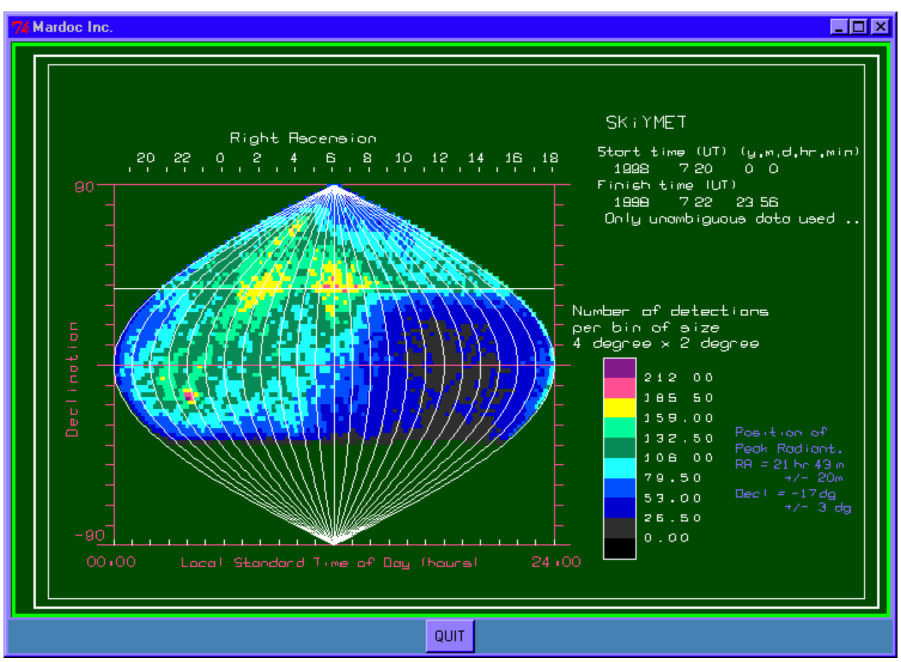
MARDOC Inc.

The SKiYMET Meteor Radar

The SKiYMET meteor radar uses pulsed radio waves transmitted from a broad-beamed antenna, to detect meteor trails in the upper atmosphere (80–100km altitude). The radio pulses reflect from the trails back to 5 receiver antennas. The antennas are arranged in the form of a cross.

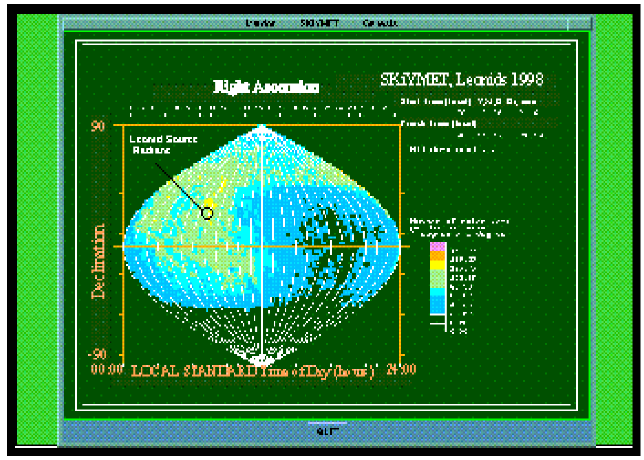
By comparing the relative phases of the signals received on these 5 receivers, the position of each meteor in the sky can be determined.

The signal on each receiver is digitized in real-time (typically 2144 points/second), and recorded by a real-time digitizing system. The digitizer is provided by Genesis Software Pty. Ltd., and the transmitter is provided by Tomco as a subcontractor to Genesis Software Pty. Ltd. and MARDOC Inc.. The digitized signal is then analysed, using MARDOC Inc. software, to determine parameters relating to the meteor trail, including meteor entrance speeds, drift speed (winds), and decay time. MARDOC's role in this system is to provide the antennas, and the post-data-acquisition software. Samples of our antennas, and the software displays of some of our graphics utilities are presented on the following pages.



MARDOC Inc.

Figure 1: This graph illustrates source radiant determination. In this case, the major source was the Leonids stream. Graphs like this can be produced in a matter of minutes with a simple click of the mouse.



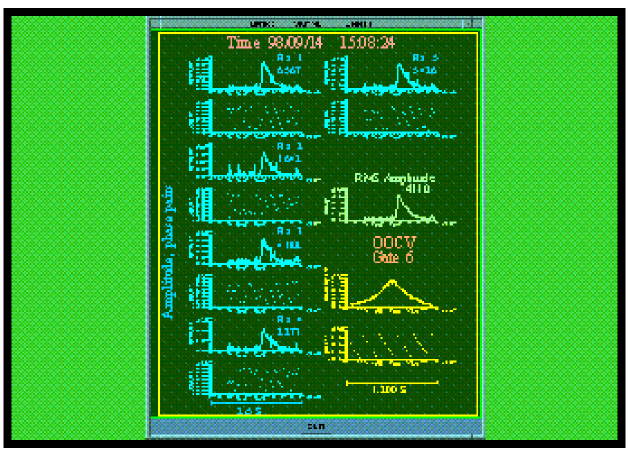
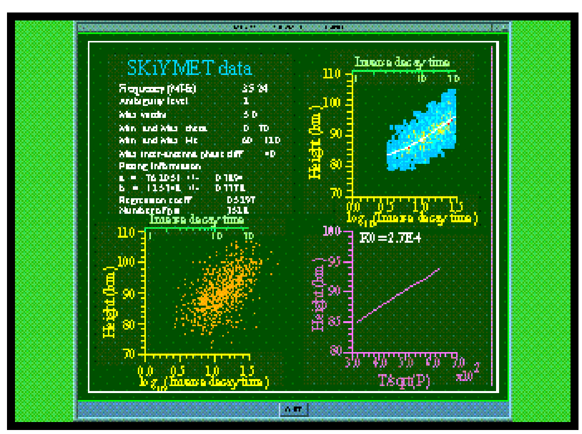


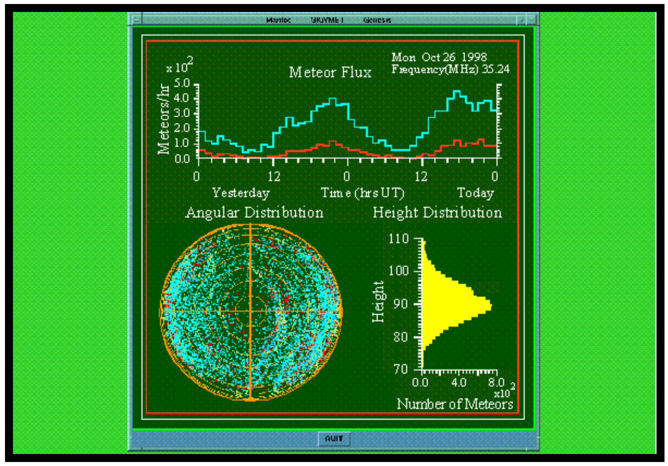
Figure 2: Typical plots of received amplitude and phase for 5 receivers, as well as the incoherently averaged amplitude (green) and the cross-correlation amplitude and phase (yellow). Graphs like this are produced and updated as new meteors appear. The user can allow the system to update automatically every 10 seconds or so, or prompt the system for new displays. It is also possible to go back and study earlier meteors which may be of particular interest. This, and all graphs, can be easily resized by the user.

Figure 3: Sample real-time graphics of inverse decay times vs. height. These graphs may be used to determine atmospheric temperatures and diffusion related parameters. The graph can be produced in real-time on the SKiYMET system with just a few clicks of the mouse.



MARDOC Inc.

Figure 4: Real-time display of meteor count rates as function of time, angle and height. The plot shows the fluxes for all of the previous day ("yesterday") and up to the current time of the day during which the plot is investigated.



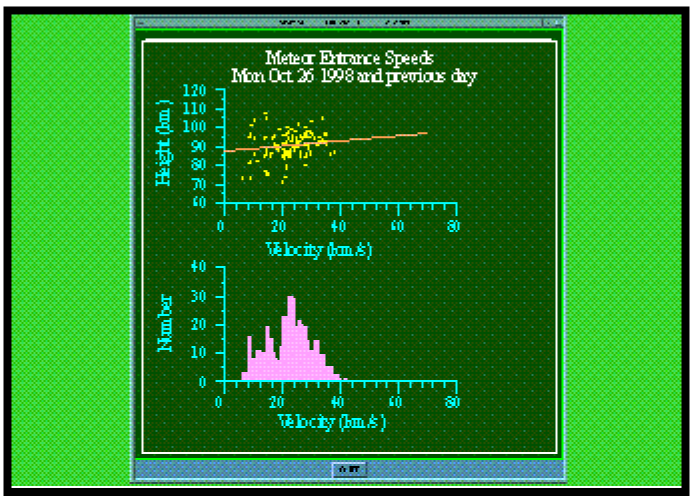
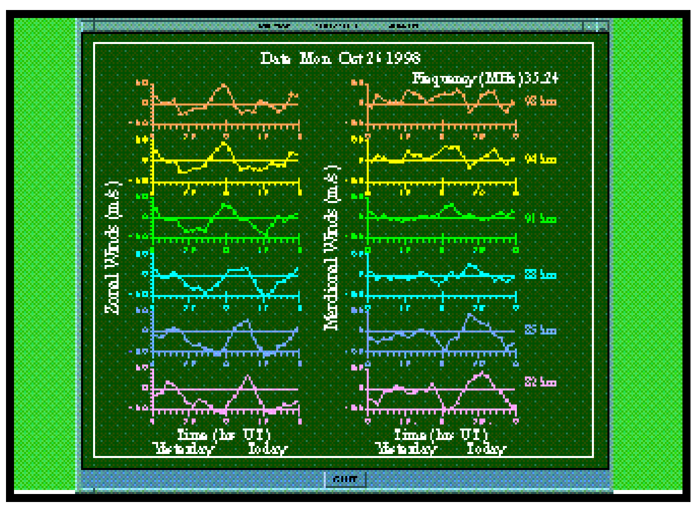


Figure 5: Graphs of the distributions of the speeds at which meteors enter the atmosphere. The upper graph shows a scatter plot of speeds vs. height, and the lower one shows a histogram of the frequency of occurrence of various speeds. Again, this graph is easily produced by a simple clickof a button.

Figure 6: Graphs of the upper level atmospheric winds determined from meteor data. Winds are shown at 82, 85, 88, 91, 94 and 98 km. In this case, a clear diurnal tide is present. Normally all the winds for the previous day, and for the interval up to the current time, are shown.



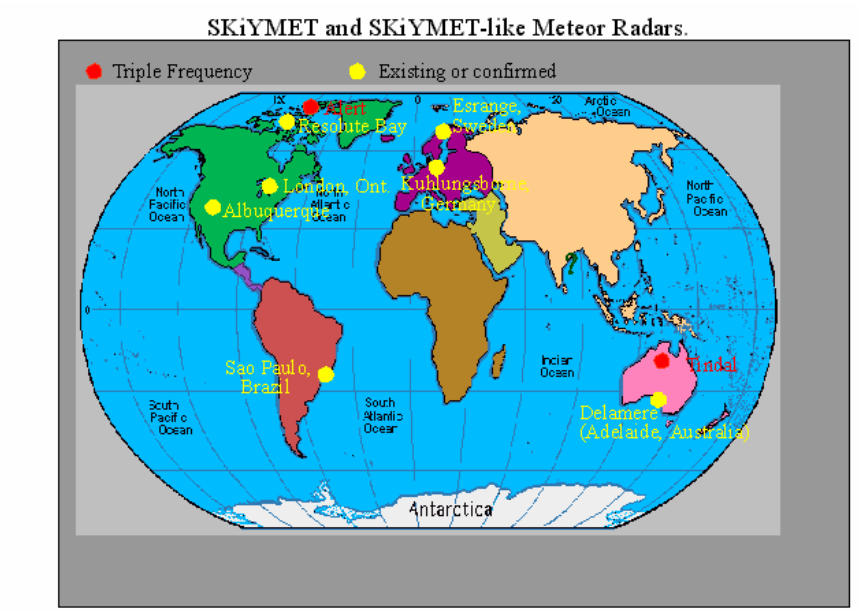


Figure 7: Distribution of SKiYMET, and SKiYMET-like systems, world wide.

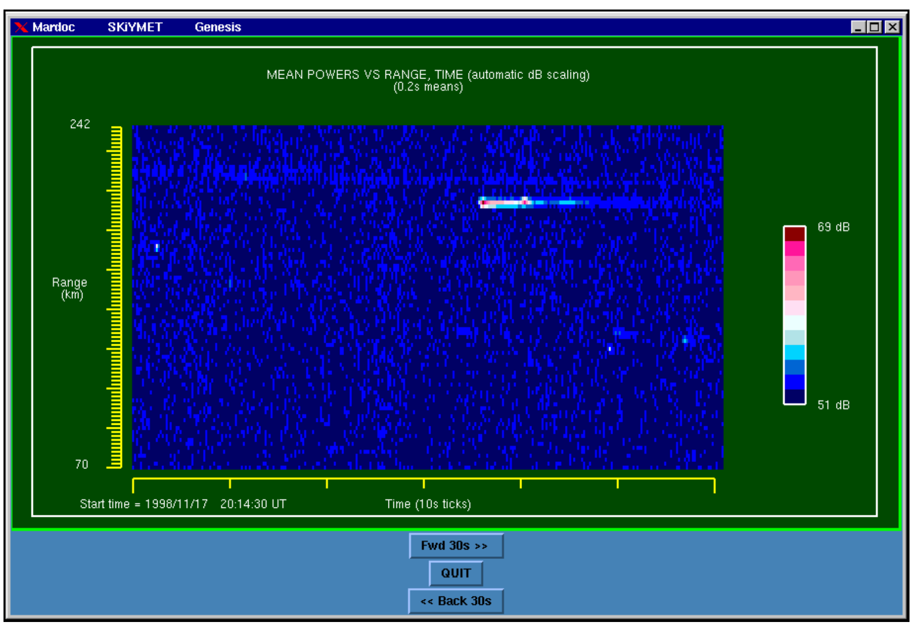


Figure 8: This diagram shows a so-called range-time interval plot (RTI) of a meteor. In this case the meteor is an "overdense" one, and lasts for ~10 seconds. Graphs like this are usually produced after the user has acquired real-time data, which are streamed directly to hard disk.

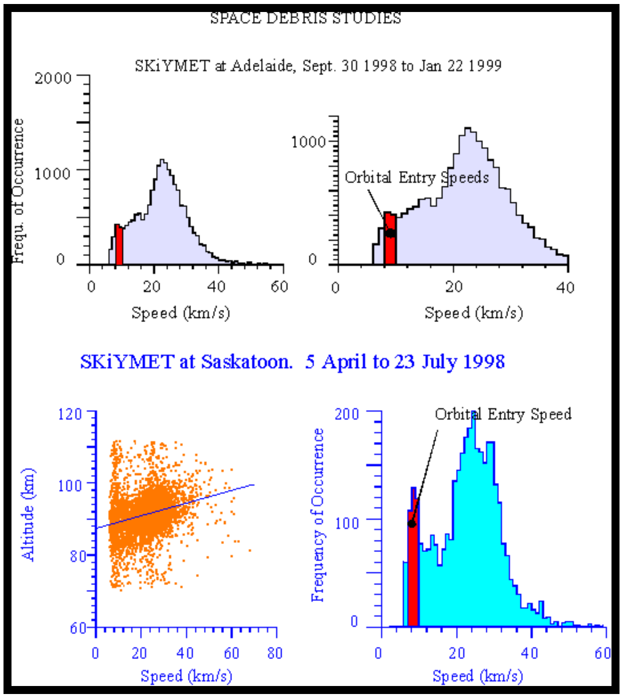


Figure 9: This graph shows a sample distribution of meteor entrance speeds. In this case the graphs were produced using off-line software. Note that in the 4th graph, there is a peak at ~7-8 km/s. It is possible that this is due to particles entering the atmosphere which were formally in Earth orbit (e.g., space debris).

Figure 10: This graph shows successive histograms of meteor entrance speeds for 2 sites (Saskatoon and Adelaide). Note the frequent peaks at ~7-8 km/s. It is possible this is due to space debris entering the Earth's atmosphere.