

Poster 8.9 The Mount Gambier Prototype Operational Wind Profiler

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The Mt Gambier Profiler is located at Mt
Gambier, approximately equidistant from
Adelaide and Melbourne

The Mt Gambier Profiler is essentially
identical to the ESRAD and ALWIN VHF
Radars (see other talks at this conference).

- It is being trialed in a joint project with the
Australian Bureau of Meteorology to determine
the system parameters most suitable for
applications in operational meteorology
- The final “turn-key” system will be somewhat
different

The radar is designed to operate in both
Spaced Antenna and Doppler Beam Steering
Modes.

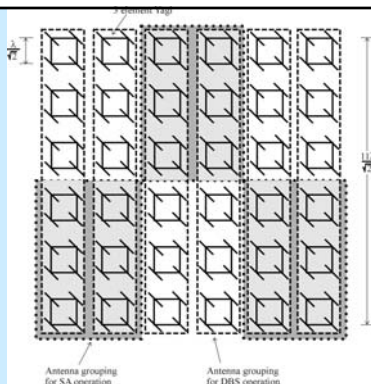
Peak Power: 36 kW

Duty Cycle: 5%

Antenna: 144 three-element Yagis

Receivers: 6 receive channels

The array is operated as six rows or columns
for Doppler work, and six groups for SA
work



A plan view of the antenna array showing possible antenna
groupings



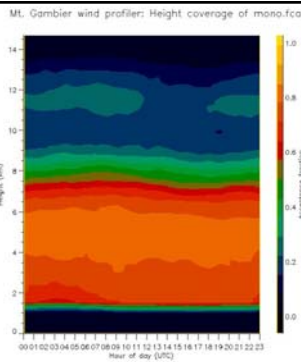
A view of antenna array looking back
towards the Mt Gambier
Meterological Office.



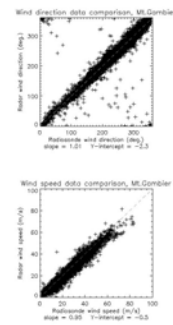
Another view of the antenna array.
The radar hardware is housed in the
white building

Two year SA acceptance rates

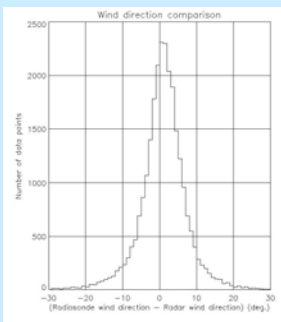
- In Spaced Antenna mode, data acceptance rates generally fall off with height, with acceptance rates of about 50% at 8.5 km. Rates recover somewhat near the tropopause. These features are shown in the following diagram.



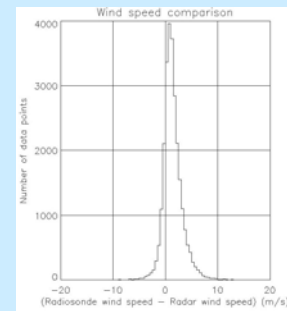
Average hourly data acceptance rates for 1998
and 1999 for Spaced Antenna Mode



Scatterplot of radar versus sonde wind speed and
direction for 1998 and 1999 (around 2100 ascents)



Histogram of sonde and radar wind direction differences
for 1998 and 1999



Histogram of sonde and radar wind speed differences for 1998 and
1999

RASS Operation

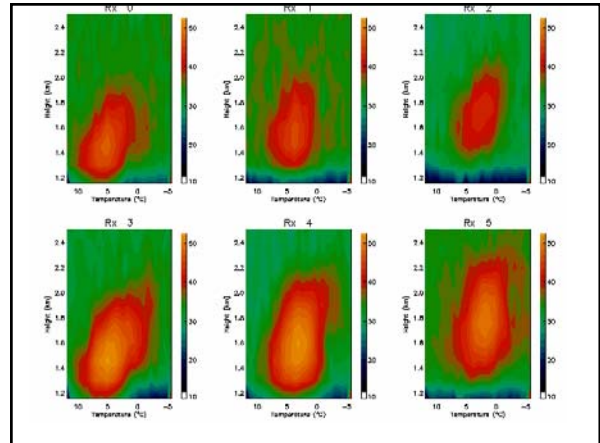
- It is intended to operate RASS routinely with this system. A brief trial was conducted in December 1999 in anticipation of this mode of operation.
- The following slide shows the single acoustic source used in this trial. In an operational mode, it is expected that two of these sources will be used.



RASS Acoustic Source

December 1999 RASS Trial

- The following slide shows Height Temperature Intensity plots for each of the six SA sub-sections of the array during a brief pre-trial run. The six sub-sections of the array are used to determine a height profile.

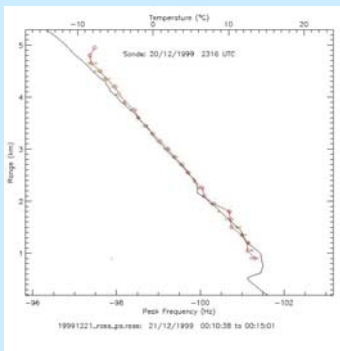


December 1999 RASS Trial

- The RASS was operated for 5 minutes each hour. While the acoustic source was sounding 10 acquisitions were obtained.
- The 10 acquisitions were each analyzed separately giving for each height and time a maximum of 6 potential peaks within the acoustic range.
- The next slide shows a typical comparison of the 5 minute RASS derived temperature profile with a sonde ascent.

December 1999 RASS Trial

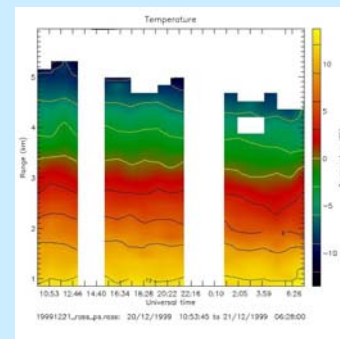
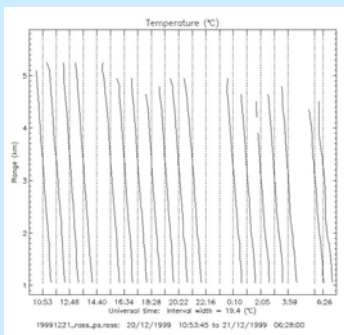
- Radar Parameters
 - prf: 8000 Hz
 - data points: 2048
 - coherent int: 32
 - tx pulse: 300 m
 - resolution: 150 m
 - range: 8000 m
- Nyquist freq: 125 Hz
- Freq res.: .122 Hz
- Acoustic Parameters
 - Start Freq 94 Hz (-26 degC)
 - End Freq 102 Hz (17 degC)
 - Number of steps 99
 - Dwell time 83 ms



Comparison of 5 minute RASS profile with sonde temperatures

December 1999 RASS Trial

- The following two plots show typical profiles obtained over a longer interval as profiles and a contour plot, respectively. Coverage to heights of around 5 km was found to typical.



Conclusion

- The Mount Gambier profiler has operated continuously for over two years in Spaced Antenna mode.
- Comparison with over 2100 sonde ascents from the same site suggests a small bias in the SA winds.
- Preliminary RASS results suggest temperature profiles can be readily and routinely derived to heights of around 5 km.