



## **Real-time acoustic imaging of atmospheric BL flows**

**S. Bradley**

Department of Physics, University of Auckland, Auckland, New Zealand,  
(s.bradley@auckland.ac.nz / +64 3737599)

An instrumentation system, AVIARS (Aircraft Vortex Imaging using Acoustic Remote Sensing) has been designed to provide real-time images specifically for this vortex atmospheric flow field. We discuss this system and its potential to be used in more general tomography of atmospheric boundary layer flows. AVIARS comprises a linear array of 16 interconnected small acoustic profilers (SODARs) to be placed symmetrically across the end of runways at major airports. The SODARs simultaneously transmit acoustic pulses vertically into the air in the flight path, using separated frequencies so as to avoid cross-talk between array elements. Reflections are obtained from turbulent scattering and Doppler analysis gives profiles of the wind speed perturbation due to the aircraft wingtip vortices during landing or takeoff. The result is measurements every 2 s on a 16x10 spatial grid of 10 m horizontally by 10 m vertically. Fitting of a simple vortex model to each of these wind-field images gives vortex position and intensity in real time every 2 s. In practice this system has the potential for much wider use, such as in the study of drainage flows or rotors in the vicinity of hills.