

shows downward intrusion of some strong upper level turbulence in August 2009.

Fig. 8 shows another special capability of the radar - namely its ability to monitor a proxy for the tropopause height. This is routinely displayed with these radars, but in this case, it is also used to demonstrate that rapid tropopause height-excursions can be associated with intrusions of ozone from the stratosphere into the troposphere, as reported by [3].

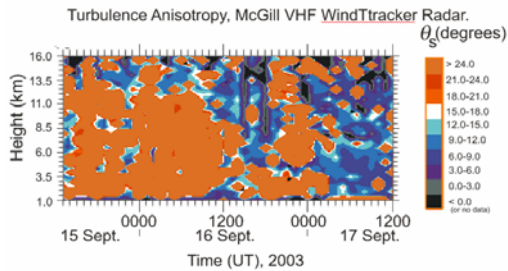


Figure 9. The anisotropy parameter θ_s plotted as a function of height and time, recorded with the McGill VHF radar (from [4]).

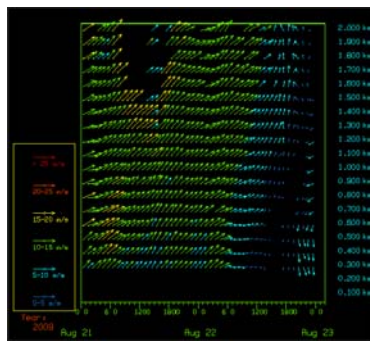


Figure 10. Boundary layer winds measured with a UHF radar at the Egbert radar site.

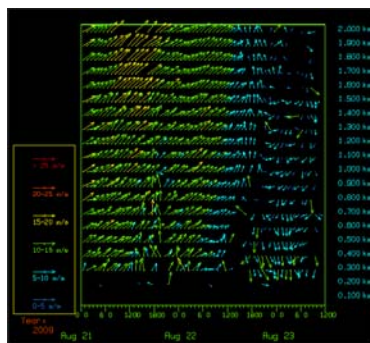


Figure 11. Boundary Layer winds measured with a VHF radar of the O-QNet at the Egbert site, for the same height coverage, and similar time coverage to fig. 10. Note that the time axis extends 12 hours beyond that of fig. 10.

Another important parameter relates to scatterer isotropy/anisotropy. The ratio of powers on the off-vertical and vertical beams can be converted to a parameter denoted as θ_s , which in turn relates to the average

length-to-depth ratio of a “typical” scattering eddy. Large values of θ_s correspond to scatterers which are closer to isotropic, while small values correspond to scatterers which are stretched out horizontally relative to their vertical depth. Fig. 9 shows plots of θ_s as a function of time (from [4]). For the McGill radar, it has been found that when θ_s becomes large, it is indicative of convectively generated turbulence, and that this is often associated with precipitation. Indeed the onset of large values of θ_s often precedes the occurrence of rain in non-winter months, so that the anisotropy parameter can even be used as a forecast diagnostic for rain.

The capability of measuring winds down to 300-400m was also discussed earlier. Figs. 10 and 11 show simultaneous low level winds recorded with a UHF and a VHF profiler at the Egbert site. Note that the time axes do not quite coincide - the VHF data extends for an extra 12 hours. The radars are located within 400m of each other. The VHF data tend to be noisier since they are only recorded every 20 minutes (with the rest of the time devoted to upper level winds), while the UHF system runs continuously in low level mode. The VHF system presents raw hourly averaged data: the UHF system uses a consensus averaging strategy to smooth the data, and so rapid changes in wind speed and or direction can at times be smeared out, while the VHF system catches rapid changes more accurately. In general, however, agreement is good.

6. CONCLUSIONS

The O-QNet is over half finished. System capabilities and important results to date have been reported, including some new parameters not traditionally reported with most radars. Websites for the current radars can be found at <http://www.yorku.ca/oqnet/XXX/>, where XXX is the name of the radar (Walsingham, Harrow, NegroCreek, Egbert or Wilberforce). All radars operate 24/7, and data are updated hourly.

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