Anthony Austin Internship Report

Name: Anthony Austin

Present Status: Beginning D. Phil studies in numerical analysis at the University of Oxford.

Where I Worked: Met Office Radar Observations Group, Exeter

Supervisors: Dr. Malcolm Kitchen, Dr. Jacqueline Sugier, Mr. Timothy Darlington

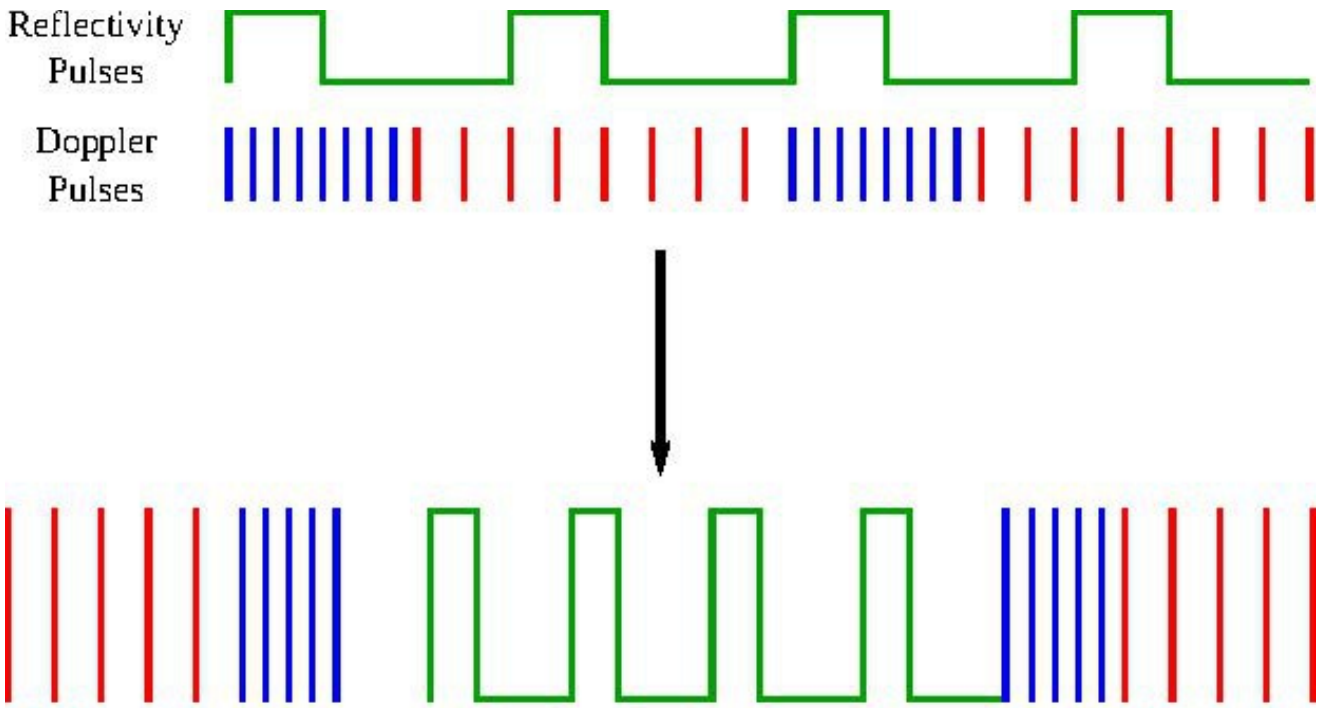
Summary of Work: Doppler weather radar works by firing a sequence of electromagnetic pulses at a region of the atmosphere and then analyzing any reflections of these pulses to determine if a storm is present and, if so, how far away it is and how rapidly it is moving. The fraction of power the storm reflects back at the radar is called the storm's reflectivity and can be used to determine the storm's rainfall rate. The storm's velocity can be measured by considering the phases of the reflected pulses via the Doppler effect.

Presently, the radars in the Met Office network are programmed to perform reflectivity and velocity measurements separately, so that two full rotations of a radar's dish are required to collect all the needed data for a single scan elevation. Recently, improvements to the network's transmitters have offered the hope of being able to make these measurements simultaneously within a single rotation by changing the way the radar pulses are transmitted. These "interleaved" scans could require considerably less time than the present ones, enabling faster data collection. This would be extremely useful for improving forecasts in situations in which conditions change rapidly, such as in urban flooding scenarios.

My project involved investigating the potential for carrying out such interleaved scans and identifying the major engineering challenges associated with doing so, including:

- how to choose the new pulse patterns,
- how to carry out the scans while respecting the transmitters' power limits,
- how the new scans would impact the quality of the measurement data, and
- how to process the received data to remove unwanted information from non-weather targets.

The results of our investigation were promising, and we believe that, with a little more effort, such a scheme can be made to work.



Interleaved Pulse Pattern