WINDFIELD RECONSTRUCTION OVER CONVECTIVE STORMS BY USING ALONG-TRACK TECHNIQUE

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I. INTRODUCTION

Accurate windfield information is important for computational study on weather models. However, most windfield data from direct measurements have their own problems. For example, measurements from weather balloons are supposed to be the most accurate, but point measurements cannot give a good representation of overall windfield over a large area. In this case, radar Doppler wind measurements provide a good description of the windfield over a large area, and at the same time provide fine spatial resolution that cannot be achieved by satellite data. The main drawback of radar measurements is that they only give the radial component.

To overcome this problem, many have proposed techniques to construct the three dimensional windfield by either making ad hoc assumption, such as VAD (Lhermitte and Atlas 1961), or by requiring additional input, such as dual Doppler wind retrieval (Lhermitte 1970; Dowell and Shapiro 2003). In this paper, we will present a simple technique to allow fast construction of windfield from a region covered by three overlapping Doppler radars.

II. ALONG TRACK CALCULATION OF WINDFIELD

Here, we present a simple calculation to extract windfield information from three Italian Doppler radars. The three radars are located at Gattatico, GAT (44°47'30" N, 11°30'30" E), San Pietro Capofiume, SPC (44°39'17" N, 11°37'25" E), and Teolo, TEO (45°21'46" N, 11°40'25" E). The first two radars are belong to ARPA-EMR, the Civil Defend Agency of Emilia-Romagna region, and the last radar is belongs to ARPA-Veneto, the Civil Defend Agency of Veneto region.

Our strategy to construct the windfield is first we calculate the two horizontal along-track components of the windfield by considering two radars at a time. By *along-track*, we mean the component that parallels to the line joining the radars. Then the two along-track components will be transformed into a orthogonal coordinate system. Finally, the vertical component will be constructed by integrating the equation of continuity. A similar technique has been used by the authors to verify windfield retrieved by using dual-Doppler method (Goh 2006).

One of the advantages of this techniques is the algorithm is relatively simple to implement. It does not need to invoke any theory in order to obtain the horizontal windfield, and it does not have the problem that dual-Doppler wind retrieval has, where the regions around the straight lines connecting the radars are 'blind spots' of the retrieval. By using the along-track technique, it is possible to extract the wind components around this region.

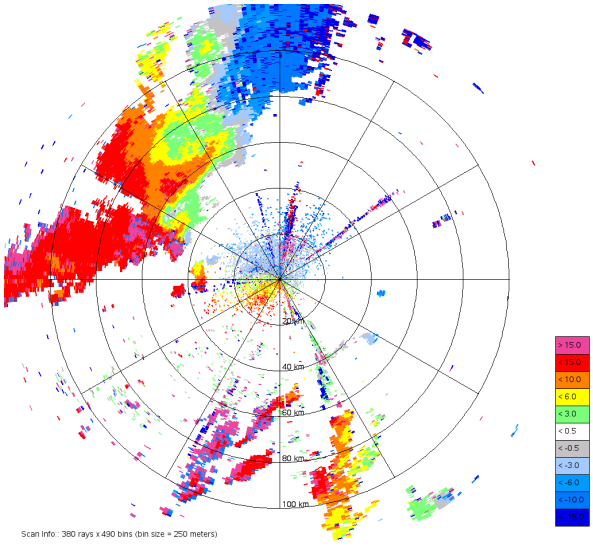

FIG. 1: Doppler velocity PPI picture from SPC radar on 3 August 2006, 1230UTC. Strong Doppler wind on the 40 km to 80km North-west region from the radar.

III. RESULTS AND CONCLUSIONS

We have identified an interesting convective storm event on 3 August 2006 (1100 UTC – 1400 UTC, Figure 1). We will present the windfields retrieve on these hours and compare with the windfields retrieved from dual-Doppler technique.

V. REFERENCES

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