# Quality of clear-air radar radial velocity data: Do insects matter?

Ronald Hannesen
Selex ES GmbH, Germany
Kauczok, Sebastian (Selex ES GmbH, Germany)
Weipert, André (Selex ES GmbH, Germany)

*E-mail: R.Hannesen@gematronik.com*

Weather radar usually provides measurements of the radial velocity. This data is widely used for various applications, such as wind profile calculations with VAD or VVP methods, wind shear detection, or NWP assimilation. Whereas precipitation can normally be used as tracer of the horizontal air flow, this is questionable for clear air radar returns from non-stationary targets, in particular from insects. Such echoes are common in European radar data during daytime of the summer season.

Clear air returns, in particular from insects, are investigated using data of two X-band polarimetric radars at the German airports in Frankfurt and Munich. Each instrument isoperated together with a co-located 1.6 µm scanning Doppler lidar. Thus vertical profiles of the horizontal wind are avaialble for both radar and lidar at high update rates ofa few minutes. Additionally, wind profiles from radiosonde launches are available twice per day.

In case of clear air returns, differences between radar derived wind profiles and radiosonde measurements are often larger than differences between lidar derived results and radiosonde data. Also, a significant difference of wind speed and direction can often be found between the wind profiles from radar and lidar data, with absolute wind vector differences of several meters per second. The wind vector difference is compared with signatures of the radar differential reflectivity. Both results indicate that insects often have non-random heading directions. Methods to correct for the insect movement are tested.

The study shows that radar clear air returns may not be used for wind measurements. Polarimetric radar is essential to identify and to correct or remove insect returns in radial velocity measurements prior to wind retrieval applications.