14.4 TIME-SERIES BASED APPROACH TO IDENTIFY AND PROCESS BIOLOGICAL TARGETS IN RADAR WIND PROFILER DATA FOR CROSS DISCIPLINARY PURPOSES

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Operational radar wind profilers used in meteorology have been known to register biological targets, such as birds. Migrating birds seriously affect the quality of meteorological data, i.e. wind measurements. Existing signal processing approaches have contributed to improved data quality, in particular the Gabor frame based clutter filtering, so that the data products are suitable for operational meteorological purposes. However, there is still a potential for further refinement. The non-meteorological data content and its potential use in related areas, such as biology or even risk assessment studies, is still poorly understood. These radars accumulate a great treasure of data based on their continuous operation mode and widespread use in networks worldwide. In regard to today's budget constraints, it would be reasonable to make use of the large data pool and share its information with other disciplines.

Previous analyses have shown that time series data (and derived Gabor spectrograms) is the only appropriate level to deal with biological data content, both for meteorological and biological purposes, as it is the only level permitting unambiguous separation of atmospheric vs. non-atmospheric targets. In order to verify the utility of the developed manual methodology, data from three additional radar wind profilers (different specifications, different manufacturers etc.) were studied in regard to signal characteristics and system specifications.

The current results show that the methodology to identify biological targets is applicable to radar wind profilers with different system specifications. Biological echoes can be distinguished from atmospheric ones, and migration intensity and height distribution could be calculated for data from RWPs with different system specifications and of different manufacturers.

Even though the approach had originally an ornithological motivation, the findings are also valuable for the meteorological community, as the information on the biological signal characteristics provides novel insights potentially valuable for the improvement of wind data quality and related services. It also helps understand the interactions between meteorology and biology as well as the effect and limitations of filter mechanisms and their impact on the data output. Additionally, as the methodology allows the calculation of the height distribution and intensity of bird migration, radar wind profiler data offers a valuable source for flight safety and collision hazard evaluation in impact assessments, e.g. for wind parks.