Open-source code for correction of dual-PRF velocity dealiasing errors

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The (batch-mode) dual-PRF scanning technique allows to extend the maximum unambiguous velocity measurable by Doppler weather radars. This technique has been historically employed in weather radar networks around the globe and is still operative for many networks, predominantly in Europe. However, weather radar radial velocity images obtained using the technique present characteristic continuity outliers that result from the violation of the assumptions involved in the dual-PRF dealiasing procedure.

Several correction methods have been proposed in the literature. All of them require spatial continuity by comparison of the gate velocity with a reference estimated from the velocities in the surrounding gates. In this work, we present and exemplify an open-source implementation of all the correction procedures in a single function. The function is developed in Python language and builds upon the Py-ART package, as it takes a Py-ART radar object as input. The radar object provides a common framework for the application of the function to the wide range of data formats used by the growing community of Py-ART users.

The dual-PRF dealiasing errors constitute a serious handicap for the global dealiasing of the radial velocity field and for derived applications such as wind field estimation and meteorological signature detection. Therefore, we have made the correction function openly available for the weather radar community in a GitHub repository. The function allows the user to tailor the dual-PRF error correction by specifying the neighbor kernel and selecting the statistic used for the estimation of the reference velocity. The correction procedures proposed in the literature may be reproduced through the particular selection of these statistics: the mean velocity (Joe and May, 2003), the median velocity (Holleman and Beekhuis, 2003), the circular mean of the PRF-scaled phase (Altube et al., 2017) and the circular mean of the phase (Hengstebeck et al., 2018).

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