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Scanning bistatic sodar: a new technology for wind energy assessment

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A new ground-based wind profiling technology, a scanned bistatic sodar, is described. The motivation for this design is to obtain a 'mast-like' wind vector profile in a single atmospheric column extending from the ground to heights of more than 200 m. The need for this columnar profiling arises from difficulties experienced by all existing lidars and sodars in the presence of non-horizontally-uniform wind fields, such as found generically in complex terrain. Other advantages are described, including improved signal strength from turbulent velocity fluctuations, improved data availability in neutral atmospheric temperature profiles, improved rejection of rain echoes, and improved rejection of echoes from fixed (non-atmospheric) objects. Field tests demonstrate that the scattered intensity profile agrees with theoretical expectations, while comparison between bistatic sodar winds and winds from standard mast-mounted instruments agree to within expected experimental uncertainties. The new technology has been designed to be an add-on feature for a weel-established sodar model, thereby allowing for a self-testing mode of operation.