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Causes of systematic errors in forecasts of near-surface weather parameters and prospects for reducing them

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Near-surface forecast biases are the result of a complex interplay between processes parametrized in the atmospheric and surface columns of a model, leading to locally generated errors, and advection processes, which constitute a non-local source of errors. Understanding the leading causes of such errors is necessary to address and reduce near-surface biases in a way that improves the physics of the model. This requires disentangling the role of individual processes by using a range of diagnostics for stratifying and attributing errors. The ECMWF-internal USURF project, which was initiated in 2017, has coordinated efforts in this area, and its main results as well as the necessary model developments to reduce systematic biases in near-surface weather parameters are summarized here.

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