Manually adjusting a numerical weather analysis using three-dimensional variational data-assimilation

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A method is presented to manually adjust the analysis of a numerical weather forecasting model and study the impact of the adjustment on the ensuing forecast. The potential vorticity of the analysis is adjusted by means of a graphical interface. Water vapour satellite images give clues as to where adjustments are appropriate. The resulting modified potential vorticity field is treated as information to be incorporated into the modified analysis, using three-dimensional variational data-assimilation. In the cost function of the variational data-assimilation the observation term is replaced by a potential vorticity term which, in analogy with the observation term, measures the difference between the modified potential vorticity and the potential vorticity of the model state. An example is given of a modified analysis and its effect on a 24 hours forecast, using a limited area weather forecasting model.