Highlights of the data assimilation practical session

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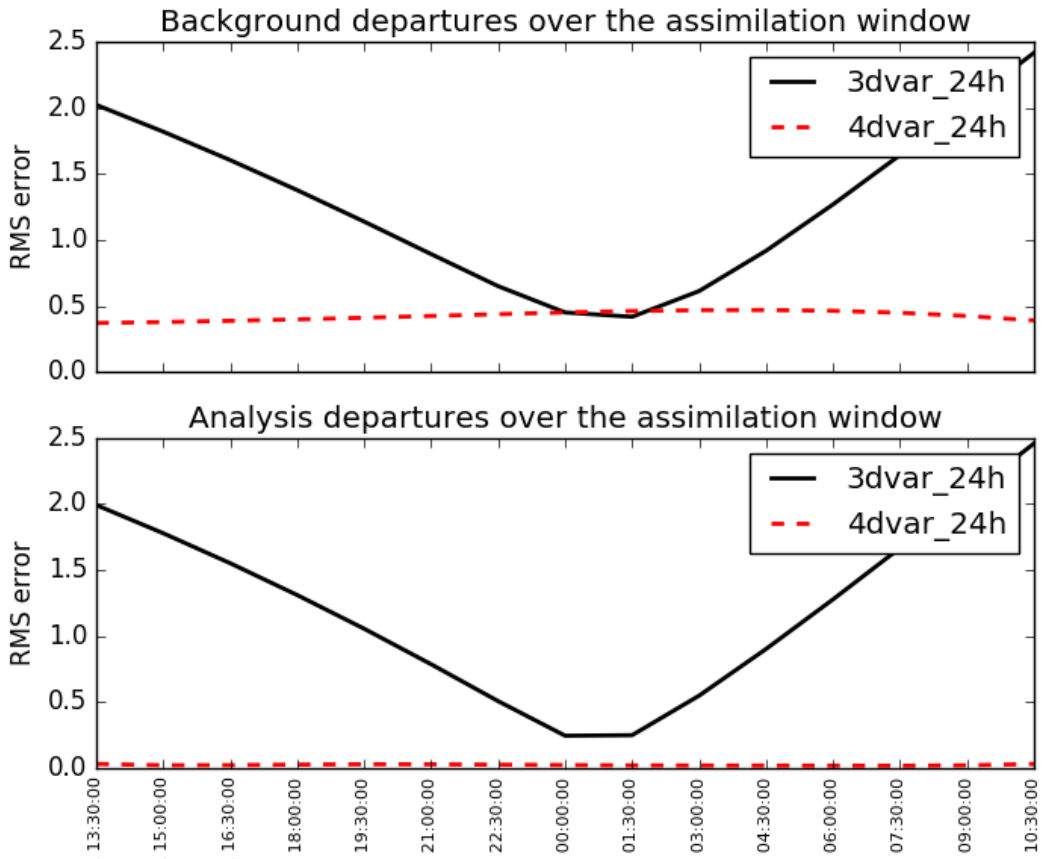
4D-Var with 24-hour assimilation window



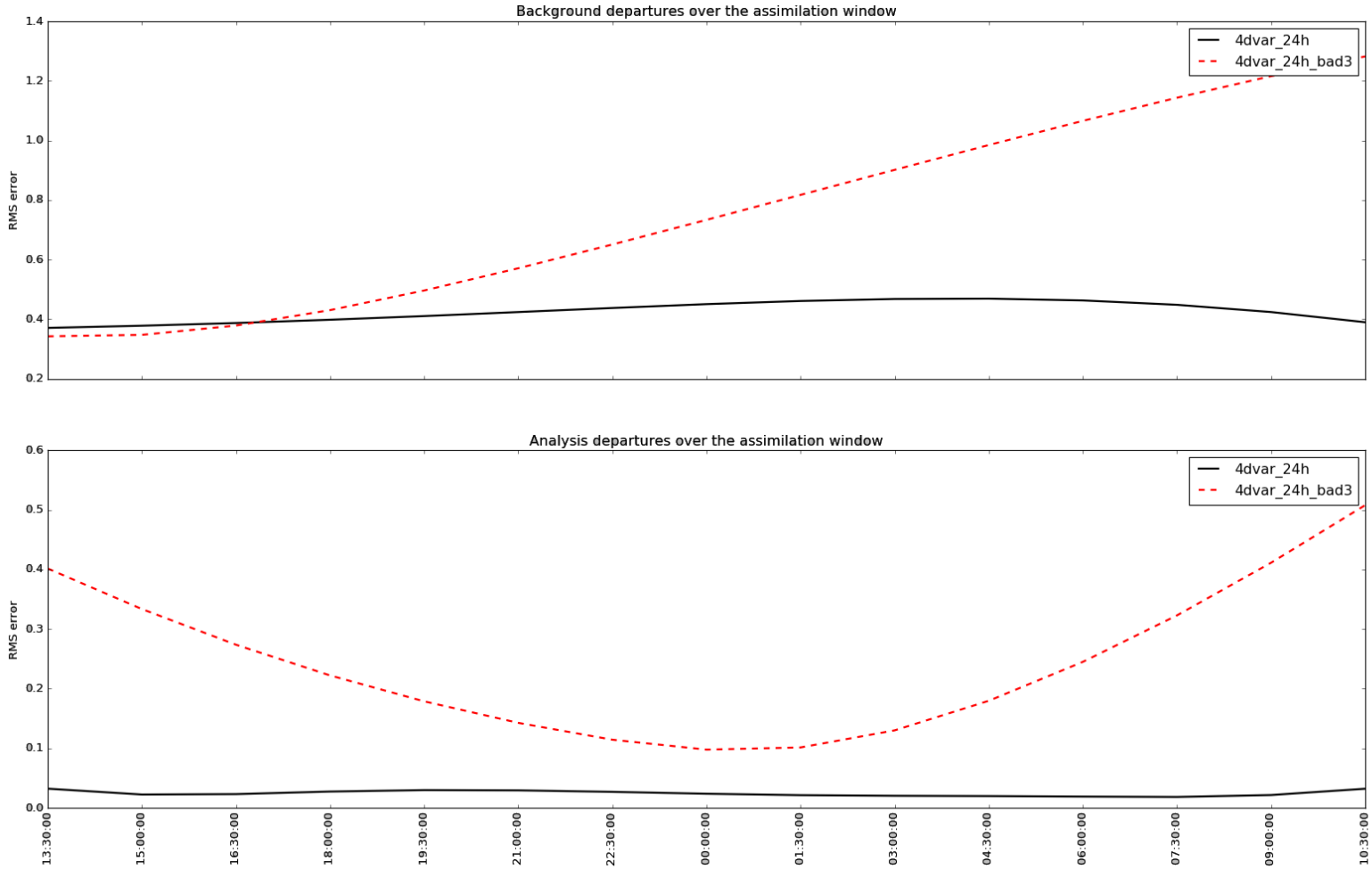
Using the dynamic of the model in the assimilation process to assimilate the observations at the correct time produces a better analysis (smaller error, better fit)

You need to know the dynamical properties of your system and the type of observations you assimilate to choose the best method and the best window

Problems you can encounter with 4D-Var

Quality of the model (model biases)

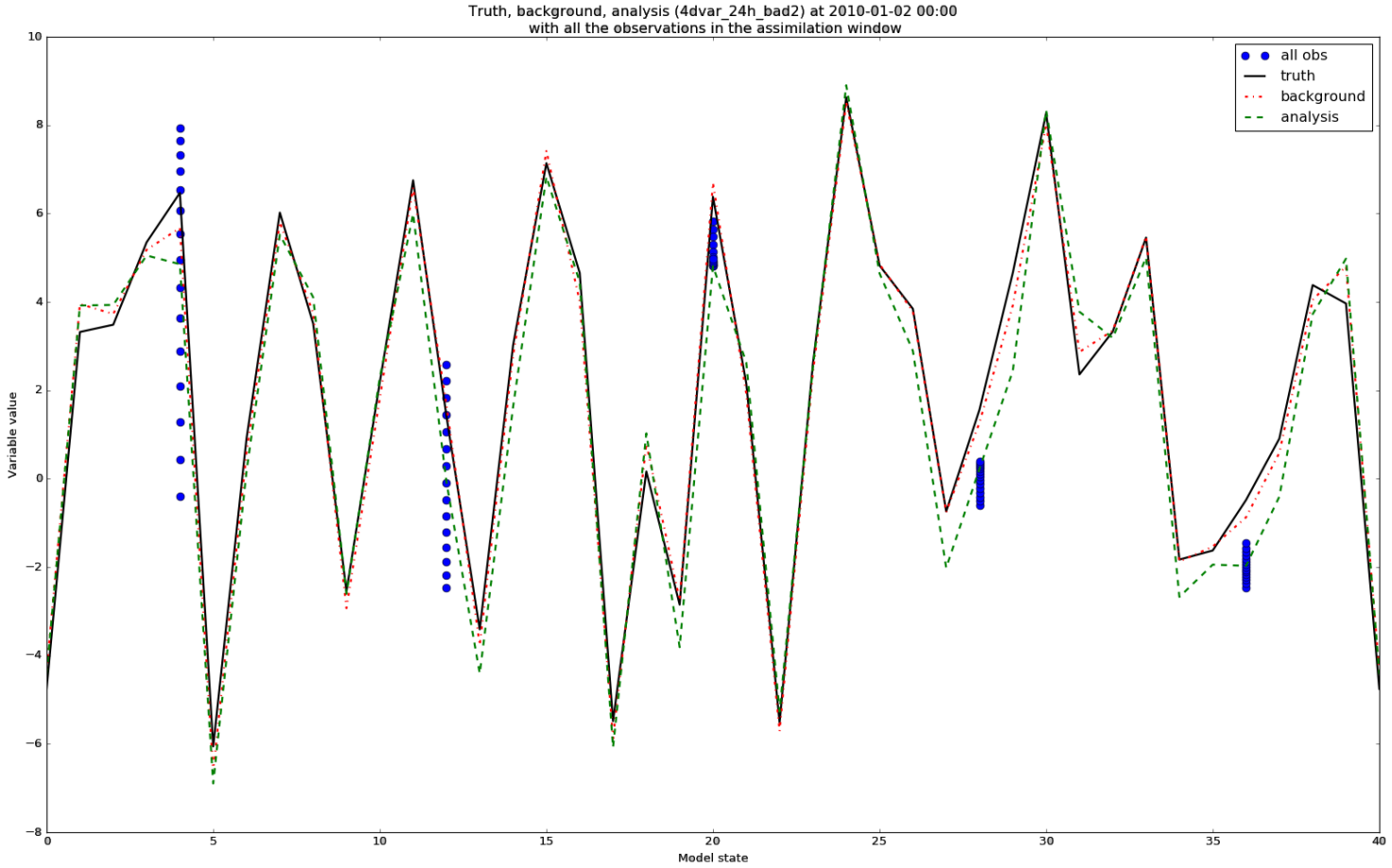
Several diagnostics are usually needed to find the explanation of poor performance (Timeseries, Histogram, Scatter, Increment, …)



Problems you can encounter with 4D-Var

Quality of the observations (systematic error): VarBC

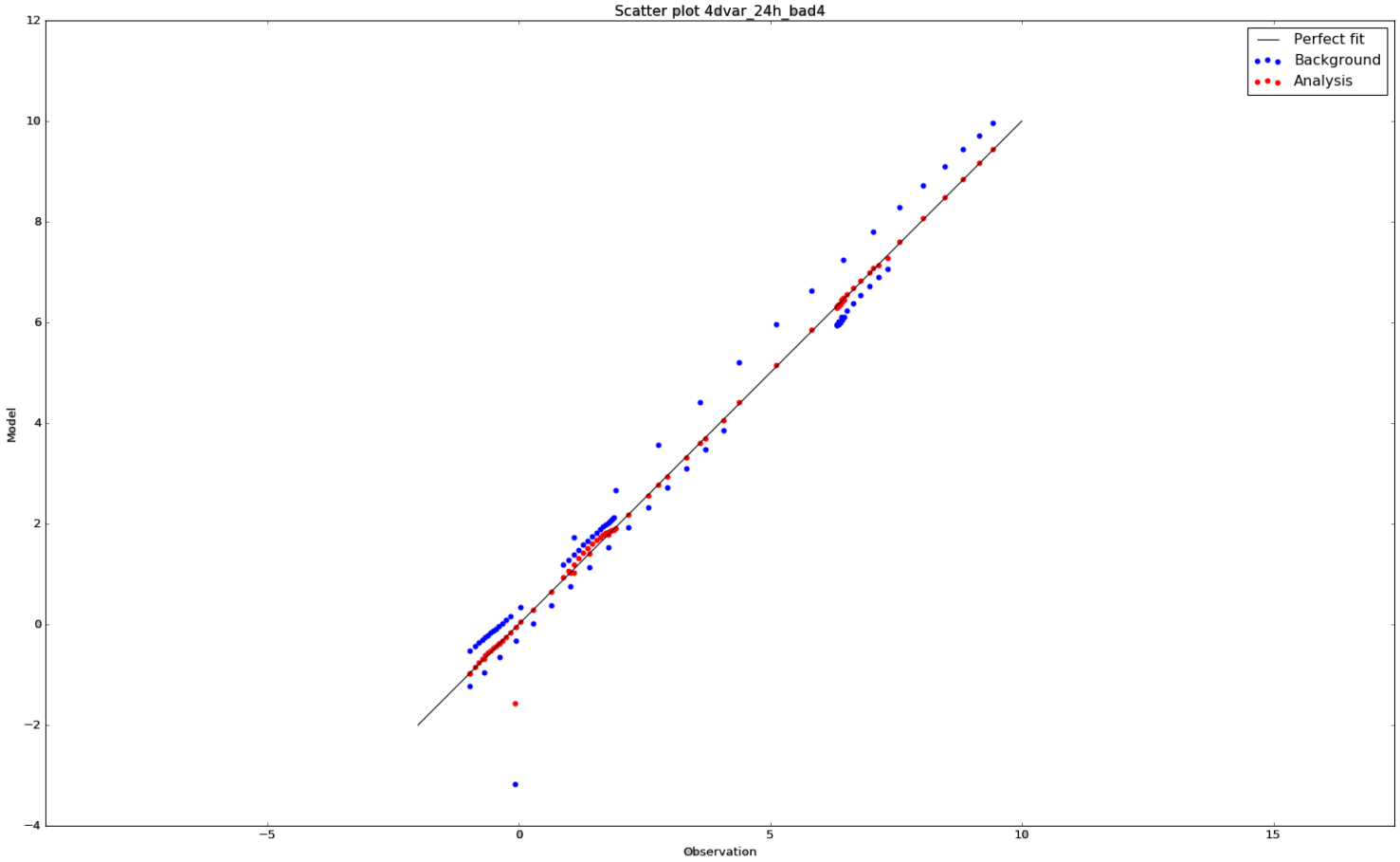
Several diagnostics are usually needed to find the explanation of poor performance (Timeseries, Histogram, Scatter, Increment, …)



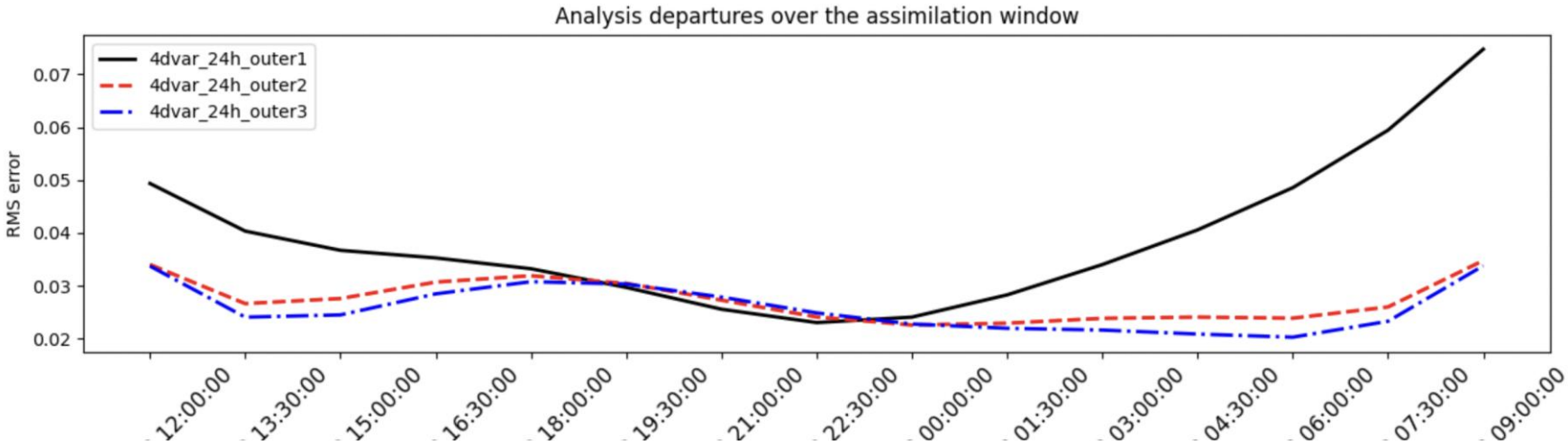
Problems you can encounter with 4D-Var

Quality of the observations (gross errors): VarQC

Several diagnostics are usually needed to find the explanation of poor performance (Timeseries, Histogram, Scatter, Increment, …)



Convergence of 4D-Var



Depending on the computing resources and the convergence speed, the number of outer and inner iterations needs to be tuned

4D-Var minimisation is finding the optimal balance between background and observations

Save your plots if you want to!