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# Testing the new precipitation scheme in ALADIN

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Precipitation is especially important but still one of the most problematic issues in weather forecast. A high resolution limited area hydrostatic model ALADIN is run twice per day to prepare forecasts up to 72h. The current operational precipitation scheme does not use any prognostic condensed species. Water vapour only passes from one time step to the next and gets advected, while all condensates are removed in the same time step through precipitation. Resulting precipitation field is unrealistically variable, there is a positive bias on the windward and negative bias on the leeward side of the orography, precipitation falls too fast and it is generally overestimated.

To fix some of these problems, a new scheme was developed. The routine includes prognostic cloud and precipitation condensates and allows pseudo-fluxes between water vapour and four condensed species. Furthermore, the processes of autoconversion, collection and evaporation/melting are parameterized. The routine uses statistical treatment of the sedimentation process, combining three sources of precipitation: 1) coming from the layer above, 2) already available in the layer from previous time step and 3) generated in the layer during the current time step.

The intent of this work is to test the new precipitation scheme. To verify that the scheme is working properly, specific tests are performed. The scheme is set up to make it as close as possible to the operational one. The study of the behaviour of the new scheme is carried out on a few case studies with mixed rain-snow events.

First tests show that snow melts properly and a somewhat bigger amount of snow in the mid-troposphere is the result of the fact that it is falling slower than rain. Sensitivity tests for the autoconversion from cloud water to snow show that stronger pro-

cess produces a small decrease in production of snow. The tests for autoconversion of stratiform ice showed that the scheme is well tuned with respect to the amounts of cloud ice and upper-level cloudiness. The prognostic cloud condensates produced by the microphysics have the same order of magnitude as those produced by cloudiness scheme. Furthermore, stratiform precipitation fluxes in new scheme have similar vertical distribution and almost identical magnitudes as the reference. All of this leads to the conclusion that the scheme is well tuned. The basic thermodynamic tests show that the precipitation field is much smoother with lower extremes hence the new scheme is performing better than the operational one.