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The sensitivity of precipitation simulations to the soot aerosol presence

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The role of aerosols in nonlinear feedbacks on atmospheric processes is in a focus of many researches. Particularly, the importance of black carbon particles for evolution of physical weather including precipitation formation and release is investigated by numerical modelling as well as observation networks. However, certain discrepancies between results obtained by different methods are remained. The increasing of complexity in numerical weather modelling systems leads to enlarging a volume of output data and promises to reveal new aspects in complexity of interactions and feedbacks.
The Harmonie-38h1.2 model with the AROME physical package is used to study changes in precipitation life-cycle under black carbon polluted conditions. A model configuration includes a radar data assimilation procedure on a high resolution domain covering the Scandinavia region. Model results show that precipitation rate and distribution as well as other variables of atmospheric dynamics and physics over the domain are sensitive to aerosol concentrations. The attention should also be paid to numerical aspects, such as a list of observation types involved in assimilation. The use of high resolution radar information allows to include mesoscale features in initial conditions and to decrease the growth rate of a model error with the lead time.