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A (c)loud revolution in meteorolgy and climate

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The developments of digital infrastructures and advancement in weather and climate research and operations have gone hand in hand. Until recently this development steadily went on, scaling up to larger computers, simulating finer scales, assimilating more data and simulating more ensemble members. Now, the digital world around is drastically changing. High performance computing is not driven by meteorology. Currently, machine learning drives the development of hardware. Moreover, the increasing footprint of our calculations need new paradigms of scientific computing. A next generation of hardware architecture is needed and the community will need to redesign the workflow and software of our simulations and data handling. Also science in general is changing towards more data-driven science. Big data, both in volume and heterogeneity, allows for new, unexploited opportunities. Machine learning techniques are alredy used to learn from data and to optimize numerical modelling systems. The problem at hand, to simulate and skilfully predict smaller and smaller scales, and to make use of new e-infrastructures and methodologies requires a new way of thinking. Meteorology can learn from other areas of research where these new developments are embraced and tailor it to its own needs. In a future infrastructure these challenges will need to be integrated in a ‘cloud’that allows for deployment of simulations on multiple HPCs, a cloud that allows for access to distributed huge data sets and perform analytics on it. And when the data becomes too big, real time data analytics on interactively simulated data. If we combine this with the user-friendlyness and capabilities of current cloud providers, who are already active in the weather services arena, a (c)loud revolution takes place that puts meteorology and climate research at the forefront of sciences and of applications and services.

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