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The RainCloud project: providing finescale probabilistic forecasts of precipitation for avalanche warning using Cloud Computing

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Precipitation in mountainous regions is an essential process in meteorological research for its strong impact on the hydrological cycle and on avalanche danger. Our meteorological aim is to investigate and simulate precipitation uncertainties in mountainous regions with a simple linear model of orographic precipitation (short: LM). One major advantage is its short compute time so that it can be easily run in a large number of iterations for parameter studies, i.e. the same setup with variations in certain input parameters, or to sample possible future states more completely.
We present the design of a meteorological application for the Tyrolean Avalanche Service using the ECMWF ensemble prediction system as basis and further extend it with variations on various parameters. With about 500-600 variations per timestep, the LM is used to provide the Tyrolean Avalanche Service (”Lawinenwarndienst Tirol“) with a spatially detailed (500 m resolution) probabilistic precipitation forecast to help them forecast avalanche danger.
We show results and analysis from an operational period at the end of winter season 2012/2013. We also demonstrate the underlying technology using Amazon EC2 Cloud Computing to gain important speedup with important operational cost reductions.