Geophysical Research Abstracts
Vol. 20, EGU2018-7060, 2018
EGU General Assembly 2018
© Author(s) 2018. CC Attribution 4.0 license.

Radar-based temporal disaggregation of a merged radar-raingauge precipitation product

Yannick Barton (1), Olivia Martius (2), Ioannis Sideris (3), and Urs Germann (3)

(1) Institute of Geography and Oeschger Centre for Climate Change Research, University of Bern, Switzerland (yannick.barton@giub.unibe.ch), (2) Institute of Geography, Mobiliar Lab for Natural Risks and Oeschger Centre for Climate Change Research, University of Bern, Switzerland, (3) Federal Office of Meteorology and Climatology MeteoSwiss, Locarno, Switzerland

Temporally (and spatially) highly resolved precipitation data is of central importance for the assessment of local high-impact precipitation events and for nowcasting applications. In Switzerland, quantitative precipitation estimations with a high temporal resolution are provided by radar reflectivity and raingauge measurements with a temporal resolution of 5 and 10 minutes, respectively. The combination of both data sources on a 10-minute resolution is challenging for many reasons, among them are a shift in time between remote and ground observations, horizontal drifts caused by wind and variability in precipitation within a radar pixel. The associated discrepancies between radar and raingauges can be mitigated when longer temporal aggregations are employed. Therefore, the geostatistical merging of radar derived precipitation and raingauge measurements is done using hourly aggregated precipitation. A new method to disaggregate the hourly rainfall product named CombiPrecip into 5-minute rainfall maps for Switzerland is presented here.

CombiPrecip is a real-time precipitation data set developed by MeteoSwiss. By means of kriging, it uses hourly radar and raingauge information to produce “raingauge corrected” hourly precipitation of the same spatial resolution as the radar (1 km2). Here, a method is proposed to temporally disaggregate the hourly precipitation into final 5-minute accumulations (CPC5). The 5-minute radar accumulations (AQC5) are known. In theory, for a given hour, CPC5 can be estimated by multiplying each of the 12 AQC5 with the ratio of the hourly CombiPrecip output (CPC60) and the hourly radar accumulations (AQC60). However, there are pixels where CPC60 is positive and AQC60 zero, e.g. when the raingauge sees precipitation where the radar does not, returning an undefined value and creating sharp precipitation gradients in the CPC5 images.

Here, we present a new method to deal with pixels where CPC60 is positive and AQC60 is zero. First, 12 new AQC5 images are produced, for which the respective radar precipitation field is extended iteratively from the edge of the radar precipitation area into areas where only the rain gauges measure precipitation by replacing zero precipitation pixels with by the mean in a box of size 3 km2. With increasing distance from the edge of the radar precipitation the observed precipitation looses its predictive skill and the zero pixels are replaced with values from a spatio-temporally correlated noise field. The new AQC5 images are then aggregated to produce a new AQC60 image. Lastly, using the new AQC5 and AQC60, the ratio of CPC60 and AQC60 and its multiplication by each AQC5 can now be computed at every pixel without returning errors.