

Minutes of RainGain Workshop

Prepared by Auguste Gires and Rosa Vicari

Date: Tuesday 22nd October 2013

Venue: École des Ponts ParisTech (FR)

Purpose of the meeting:

In-depth scientific and technical discussion

Present:

Name		Organisation
Susana Ochoa Rodriguez	(SO)	Imperial College London (UK)
Cedo Maksimovic	(CM)	Imperial College London (UK)
Barry O'Brien	(BO)	Local Government Flood Forum (UK)
Andrew Walker	(AW)	Local Government Flood Forum (UK)
Christophe Zobrist	(CZ)	Veolia (FR)
Isabelle Baudin-Bizien	(IBB)	Veolia (FR)
Marie-Claire ten Veldhuis	(MTV)	TU Delft (NL)
Guendalina Bruni	(GB)	TU Delft (NL)
Erik de Haan	(EDH)	Province of Zuid Holland (NL)
Steven Kroll	(SK)	Province of Zuid Holland (NL)
Johan Van Assel	(JVA)	Aquafin (BE)
Patrick Willems	(PW)	KU Leuven (BE)
Laurens Cas Decloedt	(LCD)	KU Leuven (BE)
Damian Murla Tulys	(DMT)	KU Leuven (BE)
Rosa Vicari	(RV)	Ecole des Ponts Paris Tech (FR)
Ioulia Tchiguirinskaia	(IT)	Ecole des Ponts Paris Tech (FR)
Daniel Schertzer	(DS)	Ecole des Ponts Paris Tech (FR)
Auguste Gires	(AG)	Ecole des Ponts Paris Tech (FR)
Daniel Goedbloed	(DG)	Gemeente Rotterdam (NL)
Johan Verlinde	(JV)	Gemeente Rotterdam (NL)
Herman Russchenberg	(HR)	TU Delft (NL)
Ricardo Reinoso	(RR)	TU Delft (NL)

Name		Organisation
Timothy Darlington	(TD)	Met Office (UK)
Jacqueline Sugier	(JS)	Met Office (UK)
David Goutx	(DG)	Météo France (FR)
Abdellah Ichiba	(AI)	Conseil Général du Val-de-Marne (FR)
Philippe Bompard	(PB)	Conseil Général du Val-de-Marne (FR)
Alwin Wink	(AW)	TU Delft (NL)
Regina Edoó	(RE)	TU Delft (NL)
George Fitton	(GF)	Ecole des Ponts Paris Tech (FR)
Agathe Giangola-Murzyn	(AGM)	Ecole des Ponts Paris Tech (FR)
Julien Richard	(JR)	Ecole des Ponts Paris Tech (FR)
Yacine Mezemate	(YM)	Ecole des Ponts Paris Tech (FR)
Pierre-Antoine Versini	(PV)	Ecole des Ponts Paris Tech (FR)
Ali Fadel	(AF)	CNRS Libanais (LB)

Apologies:

Name		Organisation
Andrew Johnston		Local Government Flood Forum (UK)
Karleskind Eve		Conseil Général du Val-de-Marne (FR)
Natalija Stancic		Conseil général de Seine-Saint-Denis (FR)
Jean-Luc Chèze		Météo-France (FR)
Pierre Tabary		Météo-France (FR)
Li-Pen Wang		KU Leuven (Belgium)
Pat Mackenzie		Met Office (UK)
Laurie Thraves		LGIU (UK)
Tirza Molegraaf		Province of Zuid Holland (NL)
Erik van der Wal		Province of Zuid Holland (NL)
Dave Mayenburg		Gemeente Rotterdam (NL)
Marc Moreau		Veolia (FR)



MINUTES

1) Implementation and validation of radar in urban environments

JVA presented some issues they are facing with the Leuven single pol radar:

- Wet radome issue: during severe storms, when the radome gets wet there is some severe attenuation and rainfall estimations cannot be achieved. They are planning to install a small roof and use the blind angle due to the Brussels airport to fix it.
- They are testing both static and dynamic adjustment with the rain gauge network which is needed because the Leuven radar is a single pol.
- They noticed a strong wind effect resulting in a shift in XY of the radar images with regards to the rain gauges data
- He regretted that they do not have access to the raw data which limits their capacities to test new algorithms

JS presented the Met Office activities dealing with clutter correction and attenuation:

- Removing non precipitation echo (wind farms, birds, the French coast...). With single pol. data they compute the variability of the returned signal pulse to pulse and remove the pixel if the variability is too low. Satellite data is also used to compute a probability of rainfall occurrence. With dual pol, which is not yet operational, they are developing a technique that relies on computing histograms of polarimetric output, checking their shapes and removing the corresponding pixel if the observed shapes are not in agreement with those usually found for rainfall.
- Attenuation correction. With single pol, they use the simple Hitschfield and Bordan relation ($A=0.0044R^{1.17}$). With dual pol., they believe that research is still needed and are mainly focusing on Φ_{DP} .

HR mentioned that the clutter removal technique suggested also removed from the image the rain located above a pixel where a spurious echo was found. He suggested using a Doppler polarimetric filter, i.e. implementing a simple threshold on the velocities of the Doppler velocity spectra and finally re-integrating over the velocities.

HR also insisted on the need to get the rawest possible data because much more algorithms can be implemented on it. He said that much of the corrections



usually implemented and discussed during this meeting could be avoided by working directly on the raw data.

TD presented a wind drift correction process that Met Office is currently testing. This is only preliminary work, and the idea is to implement it operationally if the results are satisfactory.

SO presented some of the activities ICL is carrying out with the single pol RainScanner Selex lent them. They are facing a severe clutter issue: they increased the antenna height and tried to implement static and dynamic clutter removal (it was discussed during the meeting the possibility to use Met Office algorithm with ICL data and it seems feasible). Despite the corrections, rainfall quantitative estimates exhibit a very significant under-estimation with regards to their rain gauge network. The operational Nimrod product of Met Office which is based on its C-band radar network performs much better. ICL is planning to implemented additional corrections especially concerning the vertical profile of reflectivity. ICL is planning to use the radar field to grasp the spatial structure of the field and then merge the data with the rain gauges one to obtain quantitative rainfall estimations.

DS presented some work done on the speckle effect which is unfortunately usually neglected by radarist. Indeed standard formulas assume a homogenous distribution of rain drops in the scanned volume, whereas there are some empirical evidences of the clustering of drop centres leading to coherent backscattering. DS shows some quantitative estimates of the discrepancies associated with this effect.

HR followed by presenting some work one of his students did on DSD retrieval using Doppler spectra, which shows that there is not a single DSD distribution. He mentioned that these results are likely to be related to what DS just presented.

AG presented the activities of ENPC dealing with the installation and initial comparison of 3 disdrometers that will be used for radar validation. The possibility to use the available data on drop size to work on the speckle was then discussed.

2) Radar-rain gauge merging and downscaling, global vs event-based rainfall data retrieval, rainfall nowcasting

LCD presented some work on wind correction at Leuven. A discussion followed on whether it is really needed to invest time in rain gauges within the RainGain project, because it was reminded that a lot of work has already been done and published by WMO on this issue.

GF presented some of his results showing that wind exhibits a scaling behaviour down to very small scale.

DS showed a video “the wind wall” an artwork designed by Charles Sowers that aims at showing the complexity of the small scale pattern of wind (alternating of sequence of turbulent motion and quick wind swept). DS also showed some simulations reproducing similar patterns. He used this to emphasize the need not to hide the complexity but on the contrary to explicitly show it. HR asked whether there was a link between wind properties and particle size distribution. DS said that there is no clear answer and that numerical lab should be developed to improve our understanding of the measurements themselves.

AG presented some results that validate a downscaling model with the help of two dense networks of point measurements, and how small scale rainfall variability affects the comparisons one can make between radar and rain gauge or disdrometer measurements which are not performed at the same resolution. PW mentioned that the downscaling model could be used to develop quantile corrections for rain gauges measurements.

AI presented the results and especially the methodology relying on multifractal analysis that he used to compare two operational radar products that are based the same raw data from the C-band radar of Trappes operated by Météo-France.

PW suggest to organize a “WP2 technical workshop dedicated to the comparison of the various rainfall estimation algorithm” and to set up a systematic research plan. The idea is accepted and the workshop will probably be organized right after the next project meeting in Antwerp (March 2013). PW will prepare a document summarizing the algorithm used by the various teams and possible comparisons, in order to foster discussion and collaboration meanwhile. Various opinions are expressed with regards to the approach that should be implemented in this WP : some (CM, JVA) arguing not to forget the rest of the



WP and set up a precise schedule to produce practical tools, others (DS) reminding that we should think about innovation and not simply repeat what has already been done.

3) Recent and future developments in modelling

AG presented the results of an MSc student who implemented and validated with actual measurement the Multi-Hydro model on a 0.5 km² catchment located just up-stream the Morée-Sausset catchment.

JR presented the initial implementation of Multi-Hydro in Rotterdam. It appeared that some developments are needed in the model to be able to take into account the pumps, the fact that there are the outlet(s) can change for a given catchment according to the flow conditions, and the high quality of the elevation data which for instance takes into account trees.

GB presented some results she obtained on her case studies by degrading the resolution of the rainfall data coming from the Cabaw radar for two events.

MTV and SO presented the possible outline of a common paper to be submitted at the WRaH conference to be held in Washington in April. The idea is to use the same rainfall data on various case studies of the RainGain partners and to test the sensitivity of the model and catchments to the rainfall resolution. Each team would contribute with results and descriptions, but the main writing will be done by SO and MTV. There was discussion about the actual possibility of performing a sensitivity analysis because different models are used on each location and the rainfall data will anyway be different (the sizes of the catchment are different; and furthermore their orientation is also different, i.e. whether the heaviest rainfall are located near the outlet or upstream strongly affects the results). It was decided that each team would think about it, and potential co-authors will meet in Feb. 2014 to discuss this joint paper.

SO presented the various data formats that can be used to exchange radar data. TD presented the HDF5 format that is used by the meteorological services that are involved in the OPERA program. It was decided that the HDF5 format was relevant and SO will investigate more precisely whether it is possible to use it within the FEWS platform.



SO asked all partners to provide her with a list of the algorithms for rainfall processing that they are planning to share through the FEWS platform by providing an .exe file.

4) Miscellaneous

JR presented his PhD work to create a 3D visualisation software that would enable to convert the research model Multi-Hydro into a decision and management tool usable by stake holders.

IT gave an overview of the “Pathfinder” project that was submitted to Climate KIC and rejected. The decision was taken to submit in April 2014 a new proposal for future radar data use and maintenance of radar platforms.

EDH highlighted the importance of defining the right business model to implement and disseminate RainGain results. He presented some market opportunities in the present and the future. Dutch partners will have to define a business model for the radar in Rotterdam as part of Workpackage 1.

RV invited the attendees to present their answers to the questionnaire on the dissemination platforms that was distributed on the previous day. Their answers are reported in the ATTACHMENT 2 of the 4th Project Meeting Minutes : http://www.raingain.eu/sites/default/files/minutes_4th_project_meeting_2110_2013_0.pdf

5) Steering committee decisions

- 1. Financial report period January-June 2013 approved
- 2. Progress report period January-June 2013 approved
- 3. Extension end date to 31-12-2015 approved
- 4. Date for 2nd project meeting Autumn 2014 agreed on 6 and 7 October 2014; location in London or Exeter (yet to be decided)
- 5. Visit JTS in spring 2014 to discuss project progress and future opportunities in Interreg framework and other potential schemes

6) Main conclusions of workshop



- Alwin will provide us with the rules concerning budget change
- Extra internal Workshop WP2, probably at the next project meeting in Antwerp (March 2013)
- Meet in February 2014 with co-authors to discuss joint paper
- Susana will wrap-up algorithms and create the adaptor for using them in Delft-DEWS