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EUROPE IS GOING X: four European cities are moving to X-band radar technology in order to innovate rainfall observation and flood management



Two of the latest generation, X-band, radars have recently been purchased in Paris and Rotterdam. Other types of weather X-band radars are being tested in London and Leuven. The radars will give a very accurate picture of precipitation patterns and in particular precipitation peaks in these cities; greatly helping to better manage urban floods and reduce water damages. The RainGain project has 3.6 M€ worth of funding provided by the European Commission in the

framework of the [Interreg IVB NWE Programme](#).

Rain radars are the only measuring instruments that can provide precipitation data on the space-time scales that are required to better cope with intense storms. The new generation radars provide a significant increase in measurement resolution. This corresponds to multiplying the number of rainfall pixels by the order of one hundred.

Innovative water management solutions based on the newly available high resolution rainfall data are to be developed by four universities – École des Ponts ParisTech, Imperial College London, KU Leuven and TU Delft – in collaboration with water managers, city managers and weather institutes. These improvements are particularly necessary for flood management, as well as for water pollution reduction. This will strengthen the resilience of our cities to climate change and facilitate their sustainable development.





École des Ponts ParisTech orders a latest generation radar for high-resolution rainfall observation

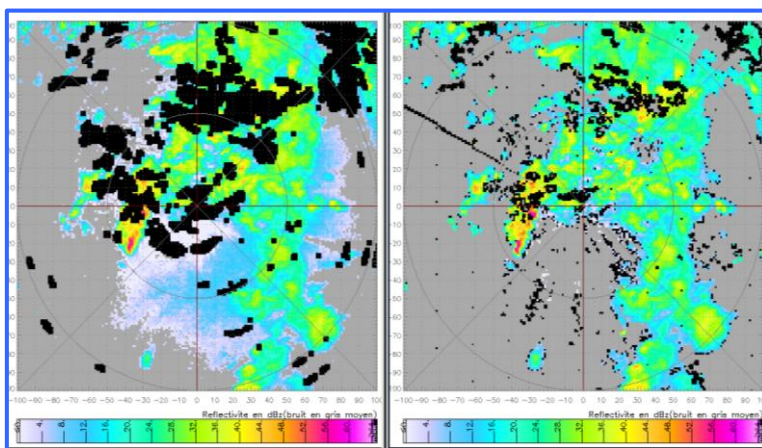
The company Selex is to supply and install an X-band dual polarisation radar system for École des Ponts ParisTech. The signature of the contract, which follows a Europewide invitation to tender, is an important stage in testing the contribution of the technology to urban water management and, the protection of populations and infrastructures, while also reducing pollution.

Band-X radar is a remote detection system used to: estimate rainfall at a high resolution, improve rainfall forecasting and model rainwater run-off in the city. This is an innovative technology that offers multiple advantages compared to traditional meteorological radar systems (C or S band): greatly enhanced spatial resolution, reduction in fixed echoes, a more compact and less costly system.

This acquisition is the outcome of fruitful collaboration by the "Meteorology and Complexity" research group at LEESU (Water, Environment and Urban Systems Laboratory) and the Chair of "Hydrology for a Resilient City", underpinned by a partnership with Veolia. It was made possible by the European Union (Interreg NWE RainGain project) and the Île-de-France Region (RadX@IdF project), with the support of research networks in Île-de-France working on sustainable development (R2DS) and complex systems (ISC-PIF). The RadX@IdF and RainGain projects also help to reinforce research and innovation synergies at a regional (Seine Saint Denis and Val de Marne general councils, Véolia and Météo France) and European level (Imperial College London, Technical University of Delft, Catholic University of Louvain and their partners). Beyond Europe, collaborations are being developed on similar experiments in Japan (TOMACS) and the United States (CASA).



X band dual-polarized radar (© Selex).



A comparison between the visibility of a S-band radar and the visibility of a X band radar (© FRAMEA experiment at Collobrières-Var).

This will reinforce École des Ponts ParisTech's position at the cutting edge of research and innovation, and in the training of future environmental engineering executives. It will offer new responses to the challenges of the resilient and sustainable city.

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Rotterdam rain radar to facilitate very accurate measurement of city precipitation

The construction of a rain radar has started on the roof of the Nationale Nederlanden building in Rotterdam. The project is being supported financially by the City of Rotterdam, the Province of Zuid-Holland and the European Union.

Precipitation in the city – The rain radar, which is currently being built in Rotterdam, specialises in measuring local precipitation. The radar will make it possible to measure precipitation patterns in the city much more accurately and, as such, facilitate improvements in the quality and efficiency of the city's water management. Possible applications for the data include the intelligent control of pumping stations, the use of water storage (such as the water squares) and local weather reports. Noordwijk-based SSBV Aerospace & Technology Group is supplying the rain radar, which is expected to be completed and used for the first time in November 2013.



*The Delftse Poort in Rotterdam
(© Wikipedia/Michiel1972).*

As high as possible – For the best possible observations and registration, the rain radar must be placed as high as possible and will therefore be located on top of the Nationale Nederlanden office building at the Delftse Poort twin-tower skyscraper complex. The owner of the Delftse Poort building is providing the location on the roof of the office building on Weena at no cost. And the tenant, Nationale Nederlanden, will be providing the electricity needed to power the radar, also free of charge.

Extreme showers – Leading the RainGain project is researcher Dr Marie-Claire ten Veldhuis from TU Delft: 'The rain radar helps water managers better understand the past (how much rain has fallen) and better predict the future (how much rain will fall and where). The purpose of this project is to obtain detailed data on peak precipitations and flooding on an urban scale. Information on this scale has been lacking up to now.'

Daniëll Goedbloed from the City of Rotterdam added: 'These measurements will improve the accuracy and effectiveness of water system models; for example, for the purpose of establishing what action should be taken in the event of extreme rainfall. The city will then be able to prepare more effectively for the unexpected effects of climate change;

both the daily and the hourly rainfall are increasing and this will help us better control these heavy showers.'

European cooperation – Recent developments in radar technology have made different types of urban applications possible. The most effective application depends on the radar technology and the urban area in which the rain radar is installed. Ten Veldhuis stressed the importance of European cooperation. 'That's why we are pleased that Paris will soon have a radar too and that other types of radar technology are being tested in London and Leuven, because this means that we will have an effective means of comparing the precipitation measurement in these cities.'

Rotterdam and Zuid-Holland – Other Dutch partners in the Rotterdam-based project besides TU Delft (research) include the Province of Zuid-Holland (co-funding) and Rotterdam City Management Department (co-funding and implementation). The rain radar will cost 400,000 euros to construct and install. The Province of Zuid-Holland and the City of Rotterdam (City Management Department) have received 230,000 euros from Europe. The Delfland, Hollandse Delta, and Schieland en de Krimpenerwaard district water boards are also helping the City of Rotterdam fund the project.

Recent events



National Observers Groups have met in Aartselaar, London, Paris and The Hague



Marie-Claire ten Veldhuis, project coordinator, welcomes participants to the 2nd Belgian NOG meeting.

National observers are local stakeholders that are interested in the results of the project and in getting involved in RainGain's implementation and dissemination. RainGain NOG meetings were attended by representatives from water boards, local authorities, institutes of meteorology, consultancy companies and universities.

At the Province of Zuid-Holland, on 12th March, and at École des Ponts ParisTech, on 22nd April, a discussion has been initiated about management and use of radar data.

The UK NOG meeting, held on 16th April at the City Hall of London, has been an opportunity to present the different surface water flooding challenges that local



Maik Schuermann (SELEX) presents the radar that will be installed beside the campus of École des Ponts ParisTech.

authorities face in the North-Western European Region and how they are innovating to overcome them through; thereafter, small groups discussed on particular issues such as financial and organisational limitations of local authorities, choice between low or high-tech solutions, involvement of the local communities and after-disaster measures.

During the last NOG meeting, held at Aquafin (Aartselaar) on 16th May, the debate regarded the lack of knowledge on pluvial floods and the need to better understand the risk and to inform local authorities. Furthermore, it was mentioned that a sub-regional system should be created to allow small urban areas in Belgium to afford advanced systems for flood prevention and protection.



Attendees at the 2nd UK NOG meeting.



RainGain at the EGU 2013: X-band radar technologies innovate rainfall observation and flood prevention in cities

The progress and future developments of the RainGain project have been presented at the EGU General Assembly, the largest and most prominent European geosciences event, attracting over 11,000 scientists from all over the world. Chaired by Daniel Schertzer (École des Ponts ParisTech) The meeting has been an important opportunity of discussion and exchange with the partners of the European project "FP7 Smartest", as well as with Venkatachalam Chandraekar from the CASA experiment (US), which have important links with RainGain. From the 8th to the 12th of April, RainGain has been mentioned during several EGU events presented by the project partners.



Venkatachalam Chandraekar (CASA).

