Workshop on

Data science for high impact weather and flood prediction

20-22 Nov 2017

University of Reading Greenlands Campus,

Henley-on-Thames

Organisers:

Sarah Dance
Jessica Gardner
Sanita Vetra-Carvalho
Joanne Waller

Data Assimilation for the REsilient City (DARE)

https://research.reading.ac.uk/dare/

DARE is a research project and network funded by an EPSRC Senior Fellowship in Digital Technology for Living with Environmental Change.

Data assimilation is an emerging mathematical technique for improving predictions from large and complex forecasting models, by combining uncertain model predictions with a diverse set of observational data in a dynamic feedback loop. The project will use advanced data assimilation to combine a range of advanced sensors with state-of-the-art computational models and produce a step-change in the skill of forecasts of urban natural hazards such as floods, snow, ice and heat stress.

The Fellowship is held by Dr Sarah L. Dance at the University of Reading and she is working together with a team of other researchers and stakeholders. The Fellowship will influence the future research agenda for how digital technologies can be applied in new and transformative ways to help the human and natural environment be more resilient and adaptable to climate change. In addition to an innovative research programme, Dr Dance is acting as a Champion for this area, developing outreach activities to other researchers, policy makers and industry through workshops, networks and other mechanisms.

Workshop Objectives and Outcomes

The workshop objectives are to enable discussion and exchange of expertise at the boundary between digital technology, data science and environmental hazard modelling, including

- Data assimilation and data science for flood forecasting and risk planning
- Data assimilation and data science for high impact weather forecasting
- Smart decision making using environmental data

Outcomes from the workshop are expected to include

- A meeting report published in an international peer reviewed journal
- Formation of consortia for 2 x £25k pilot projects

Monday 20 November

1030	Registration (Tea/Coffee)	
1100-1240	Session 1 (Chair: Sarah Dance)	
1100	Sarah Dance	Welcome and introduction
1120	Humphrey Lean	Modelling urban weather
1200-1300	Lunch	
1300-1500	Session 2 (Chair: Joanne Waller)	
1300	Simon Bell	Low cost weather observations
1340	Dave Jones	The Met Office WoW (Weather Observation Website)
1420	Luke Madaus	Assimilating weather data from smartphones
1500	Coffee	
1530	Speed networking	
1615-1740	Session 3 (Chair: Gert-Jan Steeneveld)	
1615	Amanda Anderson	Vehicle based weather observations
1700	Tao Cheng	Big data and natural hazards
1800	Drinks/Posters/Flash Flood!	
1900	Dinner	

Tues 21 November

9.00-10.20	Session 4 (Chair: Humphrey Lean)	
9.00	Joanne Waller	Observation uncertainty and urban observations
9.40	Sytse Koopmans	Using data assimilation to model the urban climate of Amsterdam
10.20-10.40	Tea/Coffee Please sign up for breakout groups	
1040-1200	Session 5 (Chair: Onno Bokhove)	
1040	Gordon Blair	Data science and flooding
1120	Geoff Parkin	Community sourced flood data
1200-1300	GROUP PHOTO, followed by Lunch	
1300-1500	Session 6 (Chair: Elizabeth Cooper)	
1300	Avinoam Baruch	Crowdsourced flood data
1340	David Mason	Using SAR to delineate flood extents

1420	Sanita Vetra-Carvalho	Flood data assimilation and big data
1500	Breakout groups	
1530	Coffee	
1600	Breakout plenary	
1640-1800	Session 7(Chair: Jon Bevington)	
1640	Mike Gibson	Urban flood modelling
1720	Onno Bokhove	Drowning by numbers: how the Wetropolis flood demonstrator inspired flood excess-volume estimates
1900	Dinner	

Weds 22 November

9.00-10.20	Session 8 (Chair: Sanita Vetra-Carvalho)	
9.00	Sophie Ricci	Data assimilation and flood forecasting
9.40	Renaud Hostache	Flood forecasting using the particle filter
10.20-10.40	Tea/Coffee Please sign up for breakout groups	
1040-1200	Session 9 (Chair:Renaud Hostache)	
1040	Elizabeth Cooper	Improving flood prediction using data assimilation
1120	Hans Lievens	Data Assimilation and hydrology
1200-1300	Lunch	
1300-1420	Session 10 (Chair: David Mason)	
1300	Jon Bevington	The Flood Foresight System
1340	Lindsay Beevers	Water resilient cities
1420	Breakout groups	
1450	Breakout plenary and wrap up	
1530	Workshop Close (Tea/Coffee)	
1600-1700	DARE Advisory Board meeting	

Speed networking

The speed networking session on Monday afternoon will be an opportunity to meet other workshop participants and discuss possible opportunities for collaboration. We hope that this will help you begin to come up with ideas for DARE pilot projects.

Icebreaker & poster session featuring Flash Flood!

At the icebreaker and poster session on Monday evening we will have wine and canapés. You will have the opportunity to have a virtual reality "Flash Flood!" Experience. Flash Flood was developed as an outreach activity by the NERC Flooding from Intense Rainfall programme team, and is a reconstruction of the flood at Thinhope Burn, Northumberland on 17 July 2007. Watch as the rain gets heavier and the water begins to rise, before a flash flood bulldozes its way down the valley, destroying everything in its path.

Breakout groups:

Tuesday

1. Big data – privacy, intellectual property (Chair: Tao Cheng, Rapporteur: Amanda Anderson)
    a. What are appropriate data protection and privacy measures for collection of "big data" that still allow practical use for environmental problems? (e.g., collecting locations for time series of car temperature sensor data is required to use the observations, but it tells us where a driver was and whether they were breaking the speed limit).
    b. Who should own "big data" intellectual property? (e.g., in the car example is this the car manufacturer, the driver, the car owner, the smartphone app owner) Can this be generalized or should it be determined on a case by case basis?

2. Public participation in crowd sourcing/citizen science (Chair: Geoff Parkin, Rapporteur: Sanita Vetra-Carvalho)
    a. What are the best ways to motivate the public to participate in crowd-sourcing/citizen science?
    b. Does this depend on the type of data?

3. Quality control and provenance (Chair: Malcolm Kitchen, Rapporteur: Joanne Waller)
    a. What are the main issues with data quality control and provenance? Are these generalizable or do they depend on data-type?
    b. How can we overcome the problems?

Wednesday

1. Training needs (Chair: Lindsay Beevers, Rapporteur: Zak Bell)
    a. What training do meteorologists/hydrologists need in data science?
    b. What training do data scientists need in environmental science?
2. Business and environmental data (Chair:Jon Wicks, Rapporteur: Elizabeth Cooper)
    a. What needs are there in business for environmental data?
    b. What opportunities are there in environmental data for business?
3. Environmental science and data science (Chair: Gordon Blair, Rapporteur: Lila Collet)
    a. What key developments are needed in data science to push forward environmental prediction?
    b. What can data science learn from environmental science?