

24/7 Population modelling for natural hazard assessment

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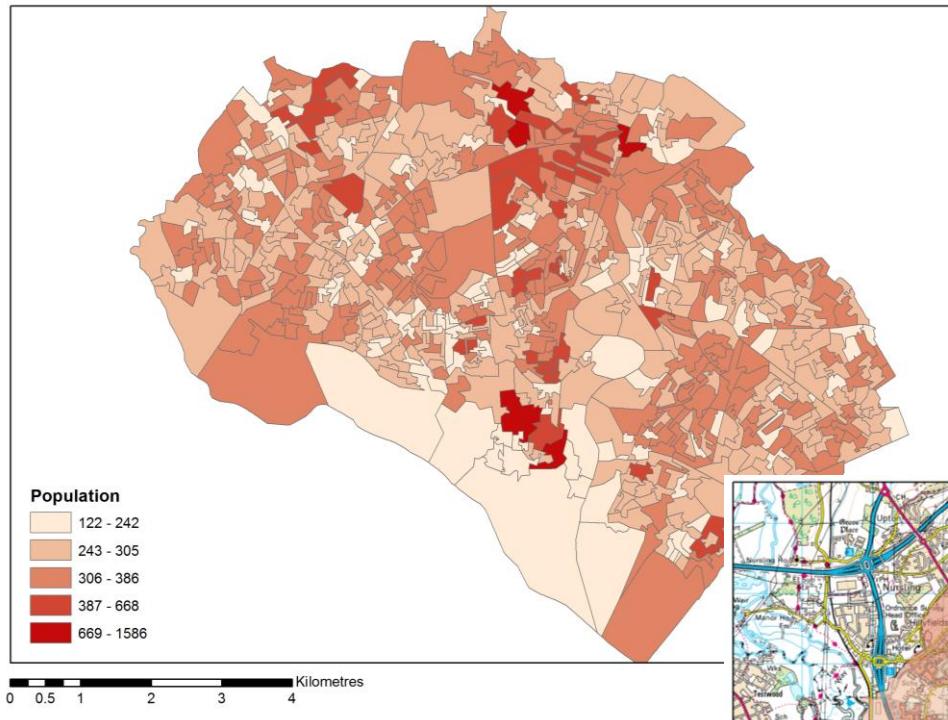
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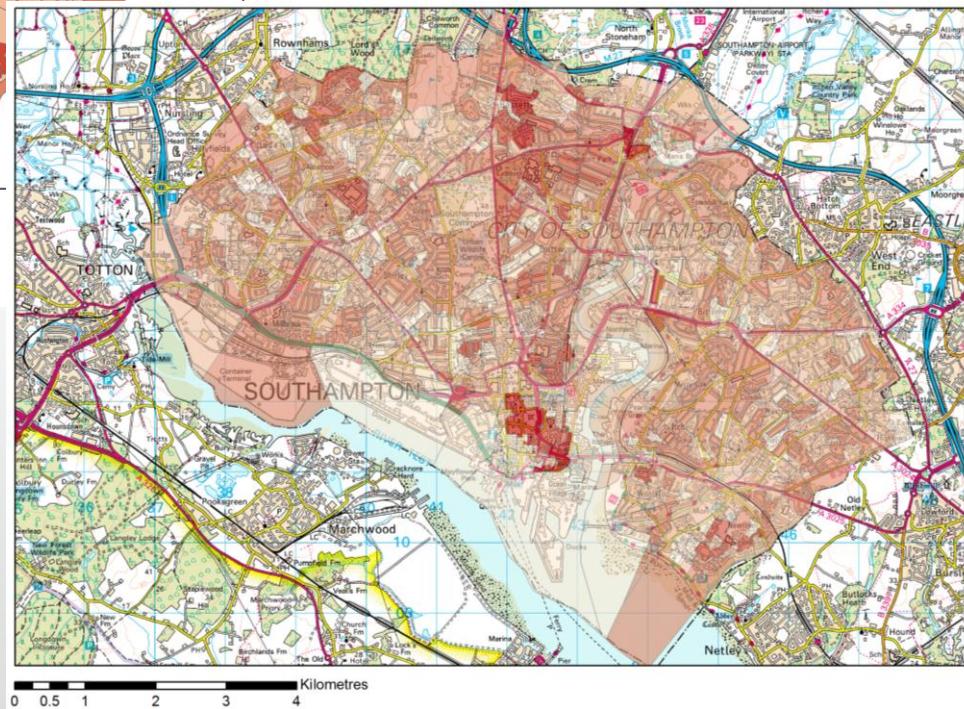
Background

- Better population estimations are required for hazard risk assessment
- Censuses typically provide a decadal ‘night-time’ population estimation
- This does not take into account the large fluxes of temporary populations during the day
- Events of 2011/12 have focused global attention on natural hazards and their impacts

Conventional density maps



Southampton, UK



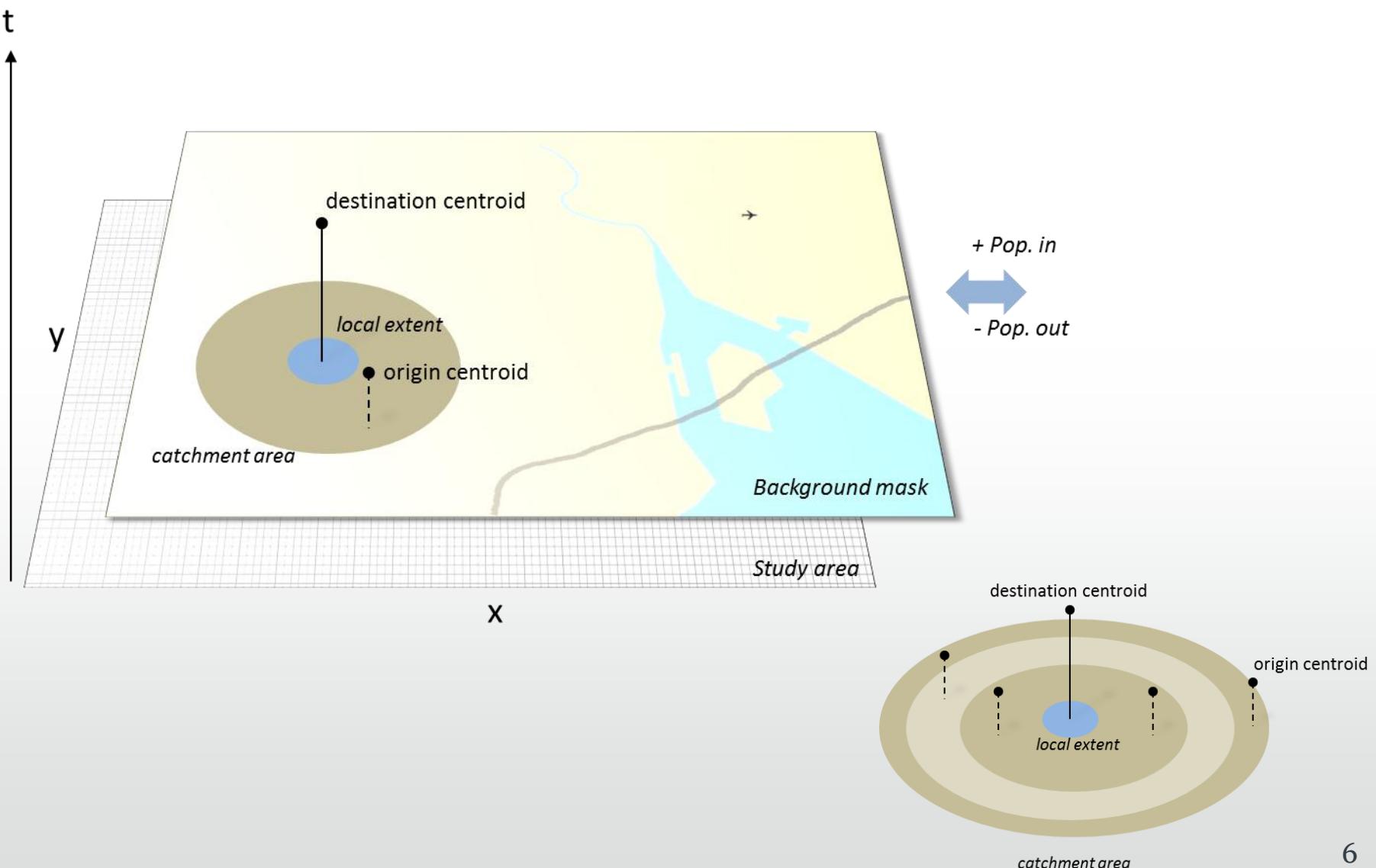
Southampton

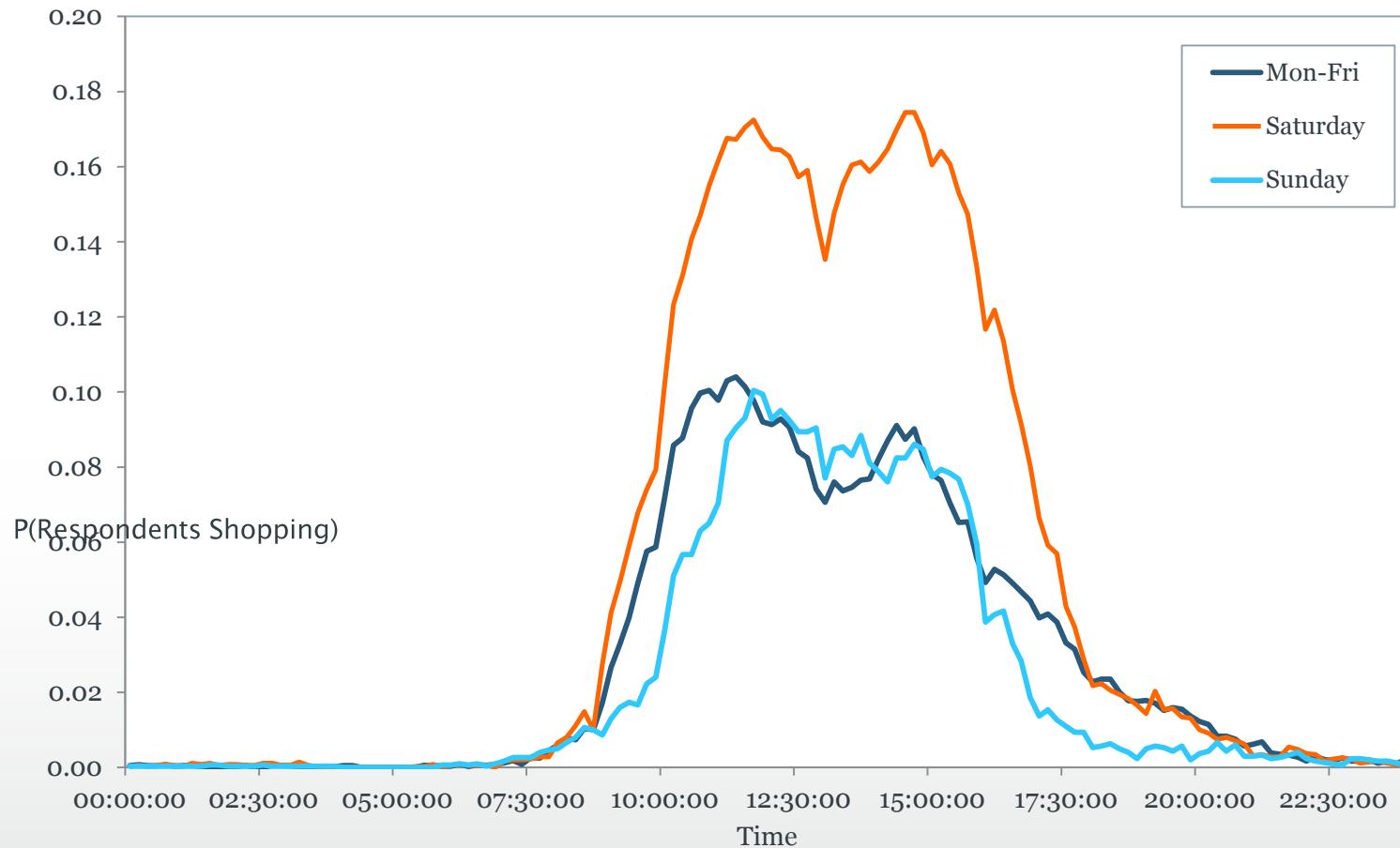


“Pop 24/7” overview

- Spatio-temporal gridded population modelling
 - Variable kernel density estimation (KDE)
 - Utilises population centroids
 - Redistributions resident populations according to a temporal profile
 - Population subgroups
- Removal of arbitrary administrative boundaries
- Allows locations of zero population density (Eg. Water)

Space-time interpolation





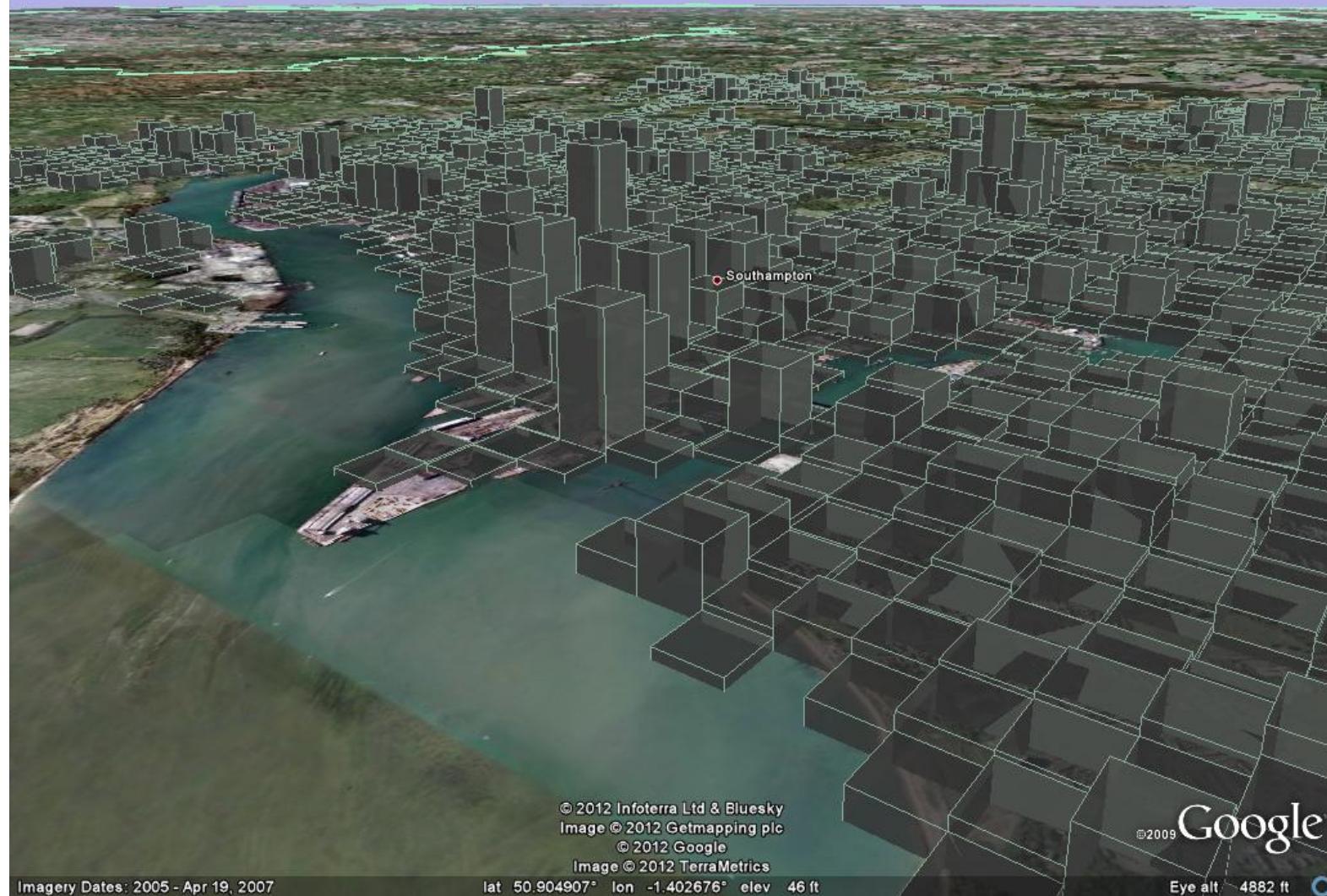
Temporal Profile

A retail example of a temporal profile derived from the *Time Use Survey 2000* indicating potential shopper numbers for a given time.

Results

- Variable grid size, currently using 200 metre resolution
- Visualization for public communication
- Population weighted to background mask
- Combination and analysis with hazard footprint data
- Application to a UK flooding scenario, using the Environment Agency's 'Flood Map'.

Oct 10, 2012 12:00:00 pm



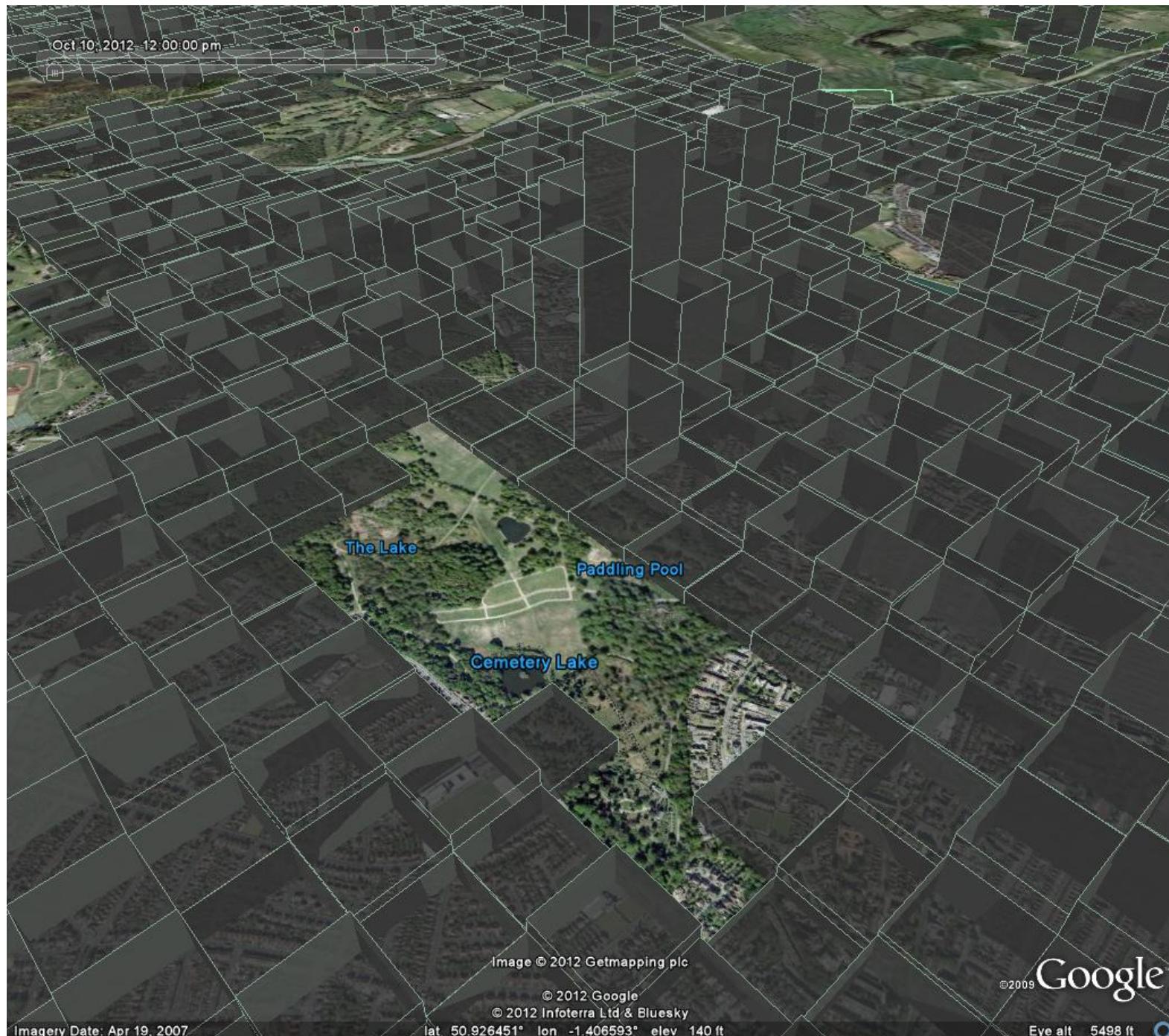
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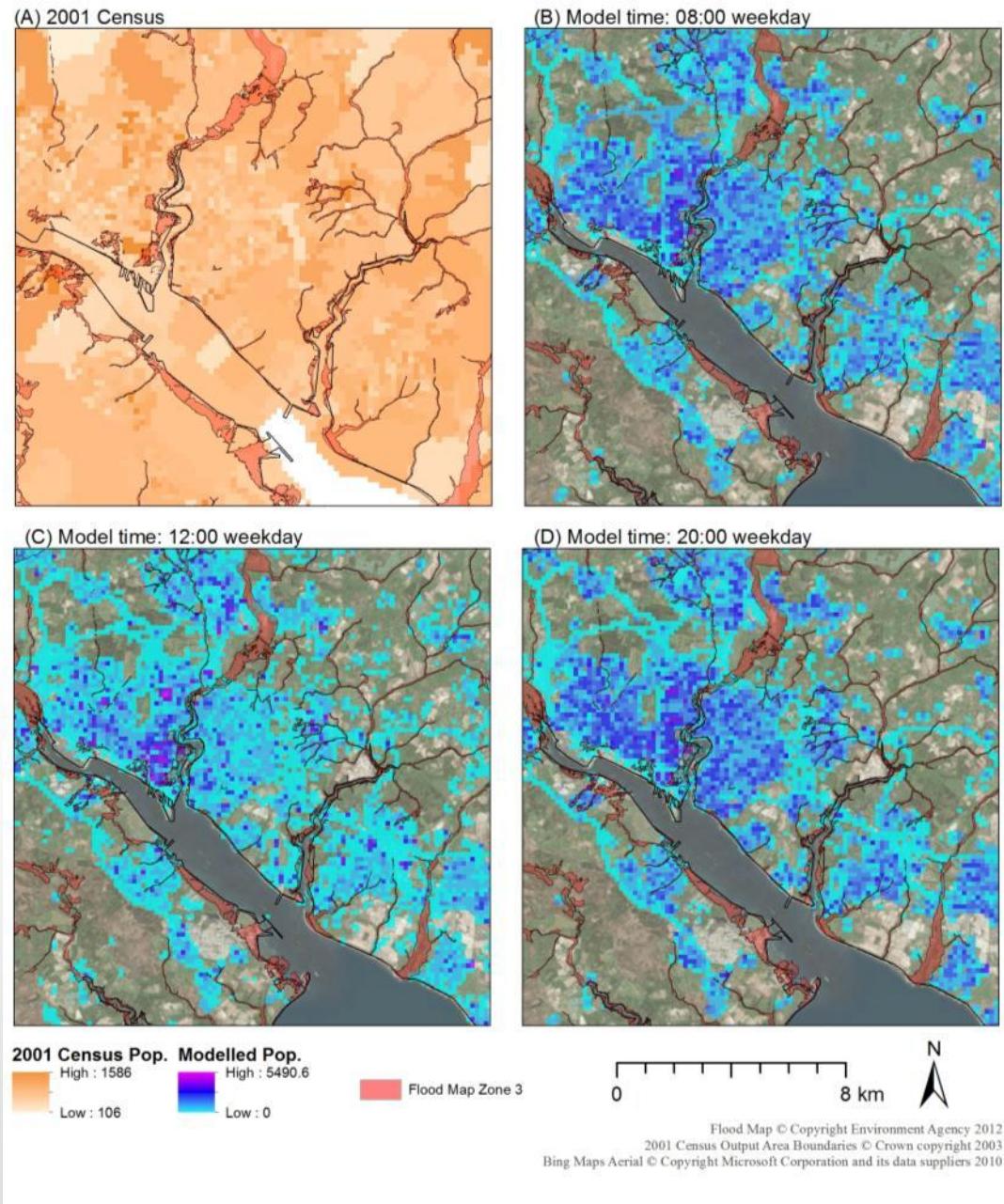
Imagery Dates: 2005 - Apr 19, 2007

lat 50.904907° lon -1.402676° elev 46 ft

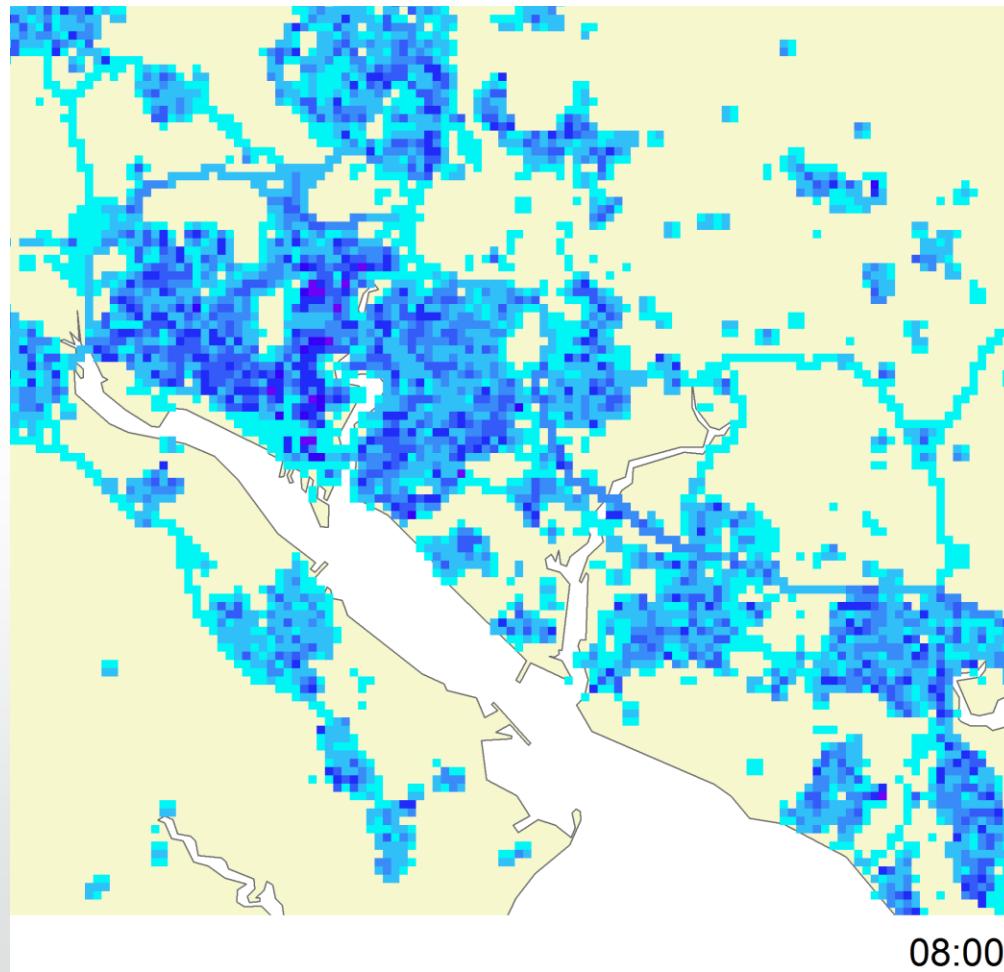
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Eye alt 4882 ft

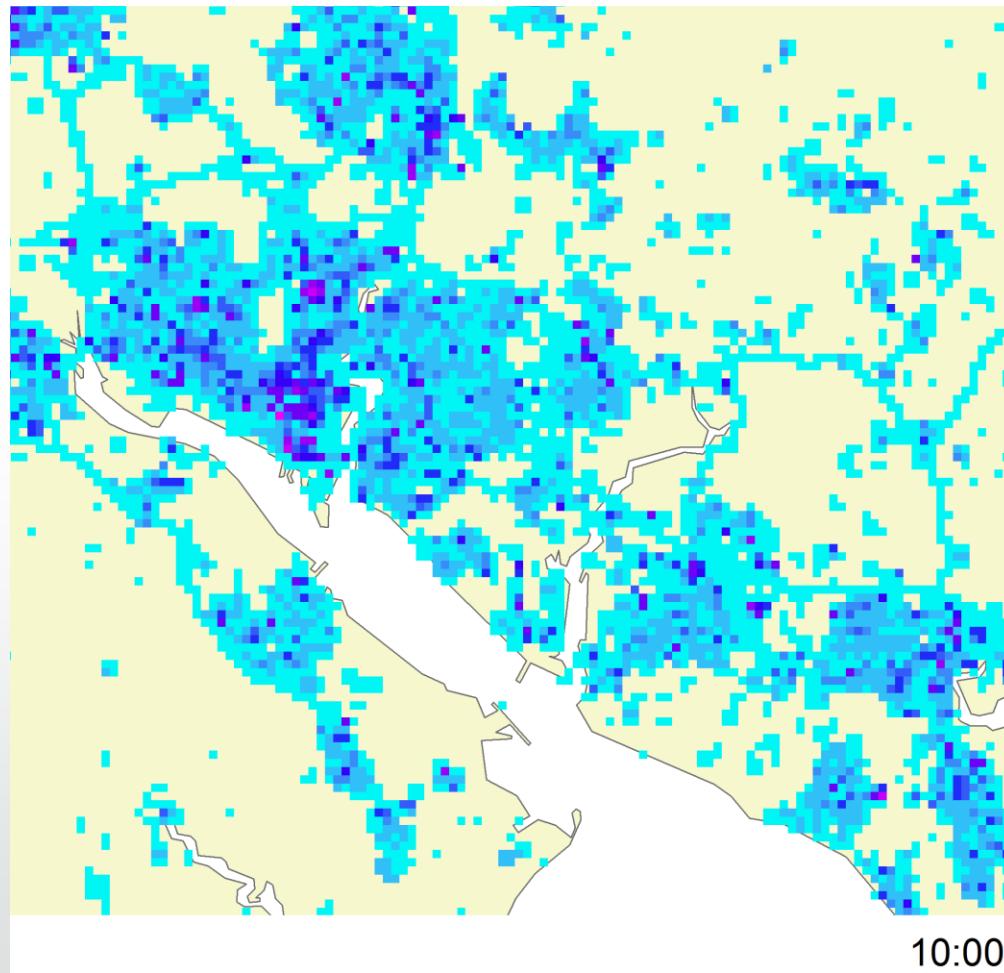




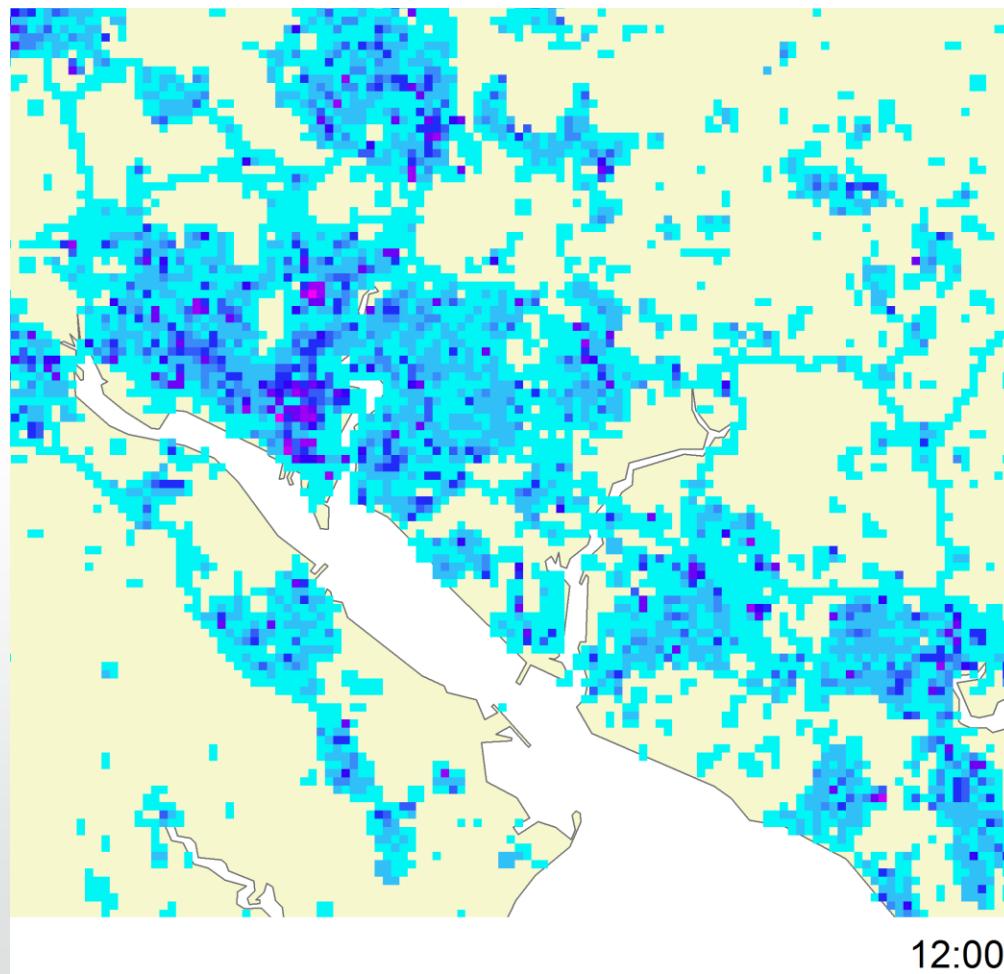
Example weekday population



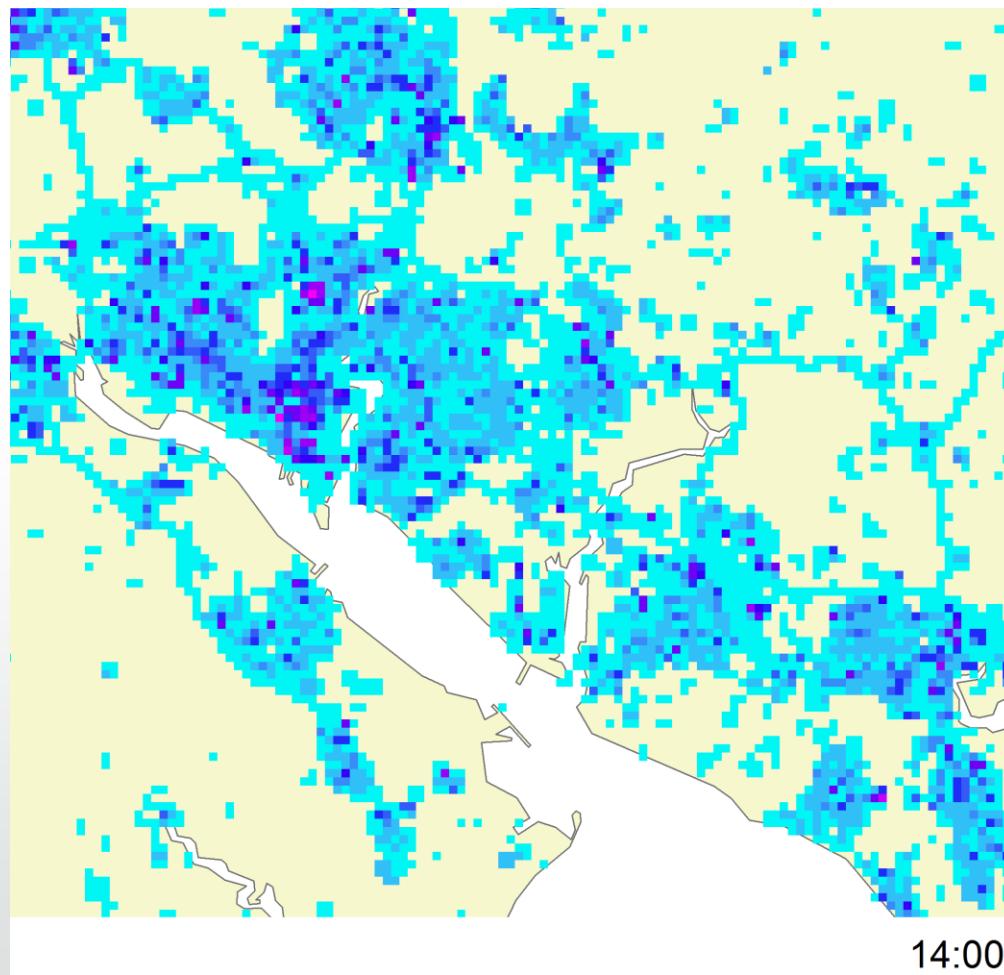
Example weekday population



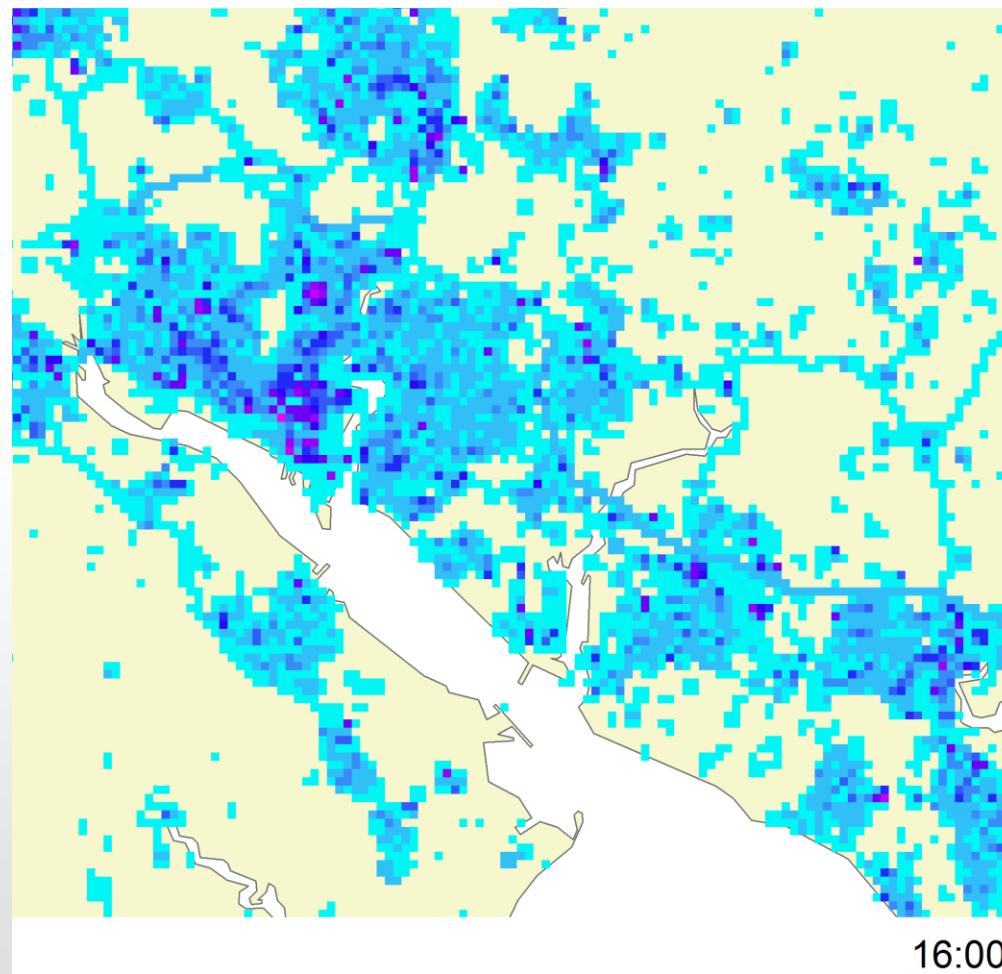
Example weekday population



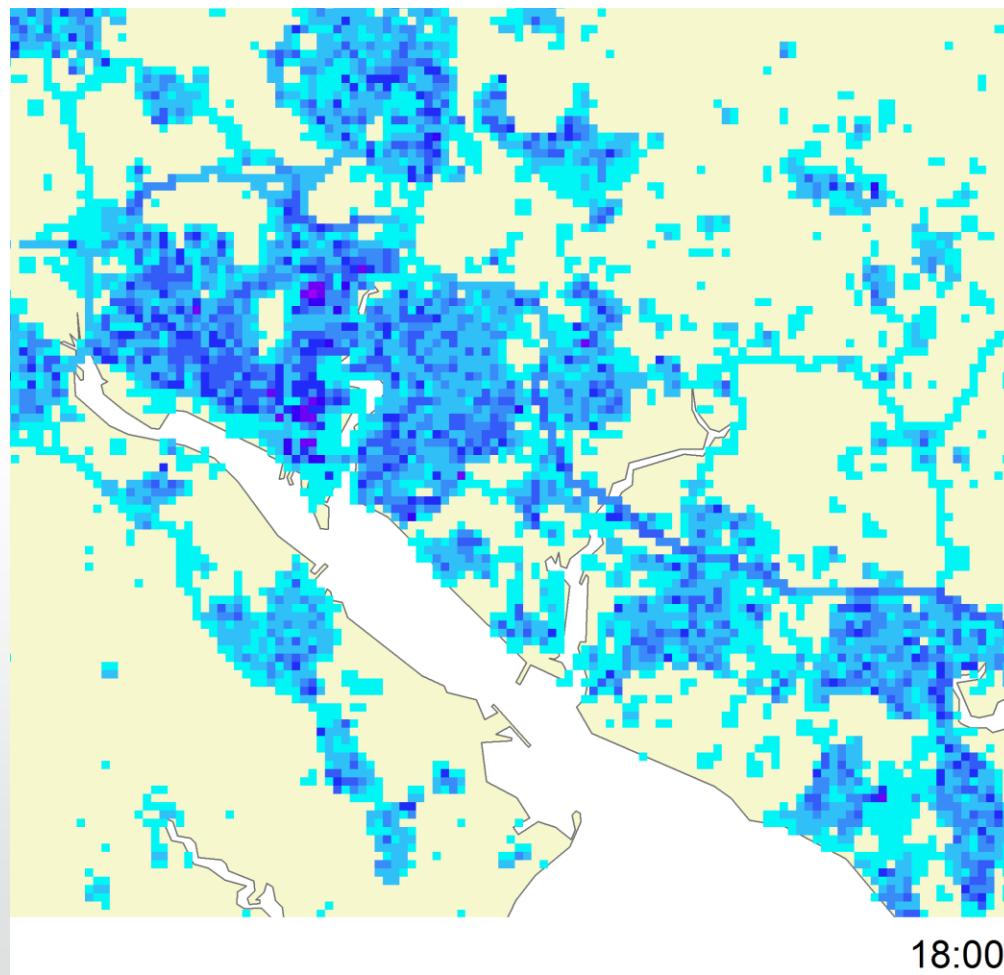
Example weekday population



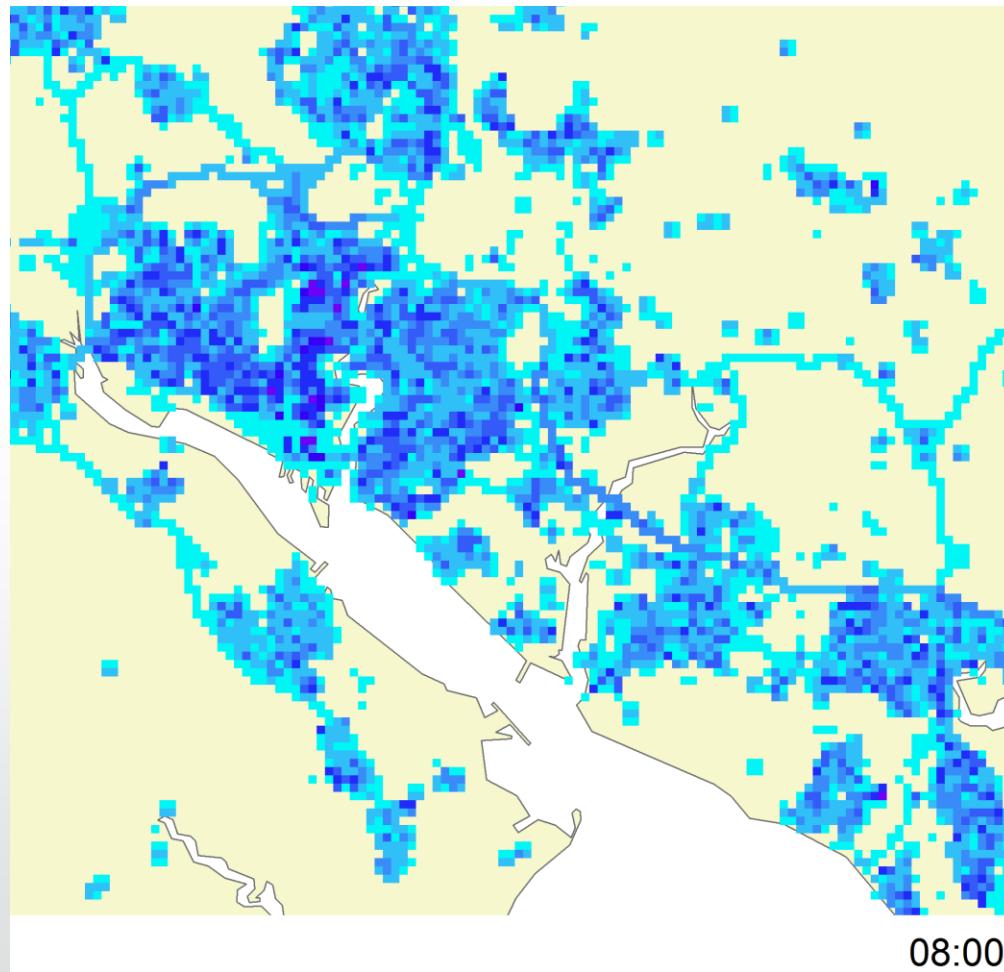
Example weekday population



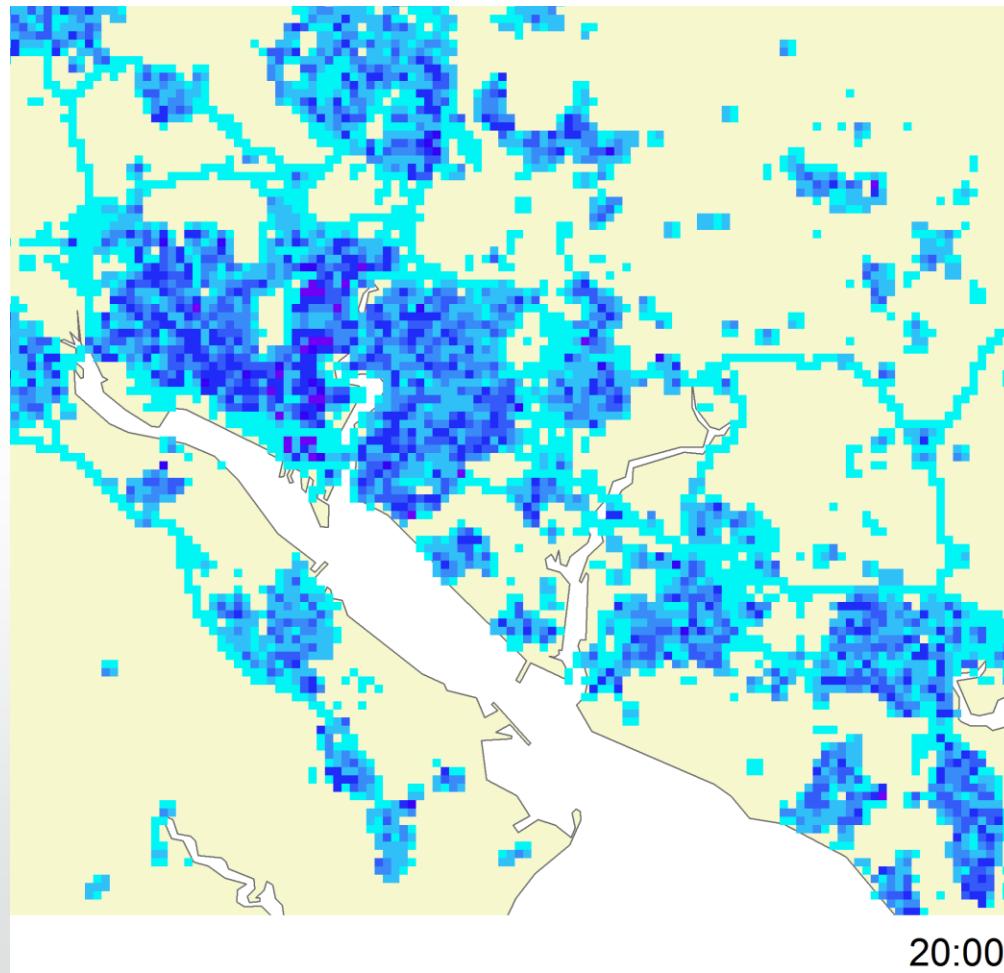
Example weekday population

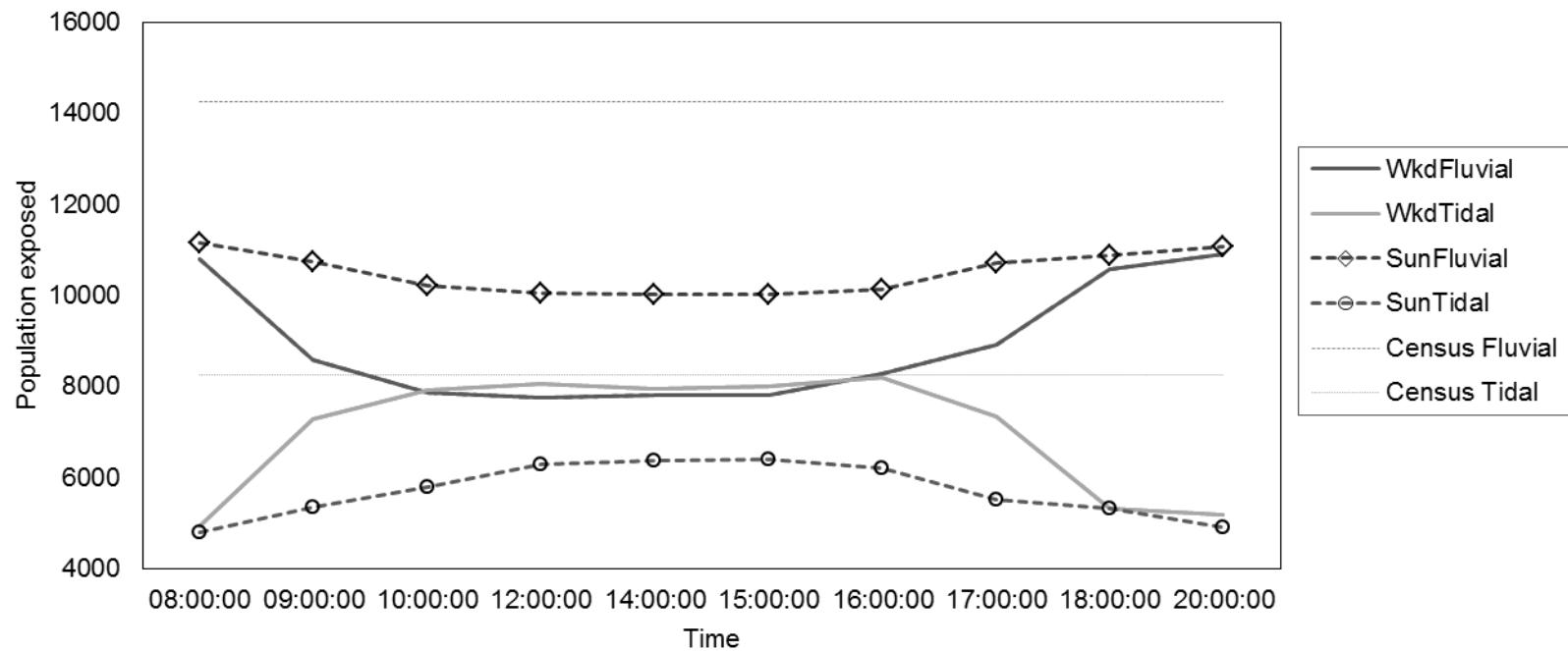


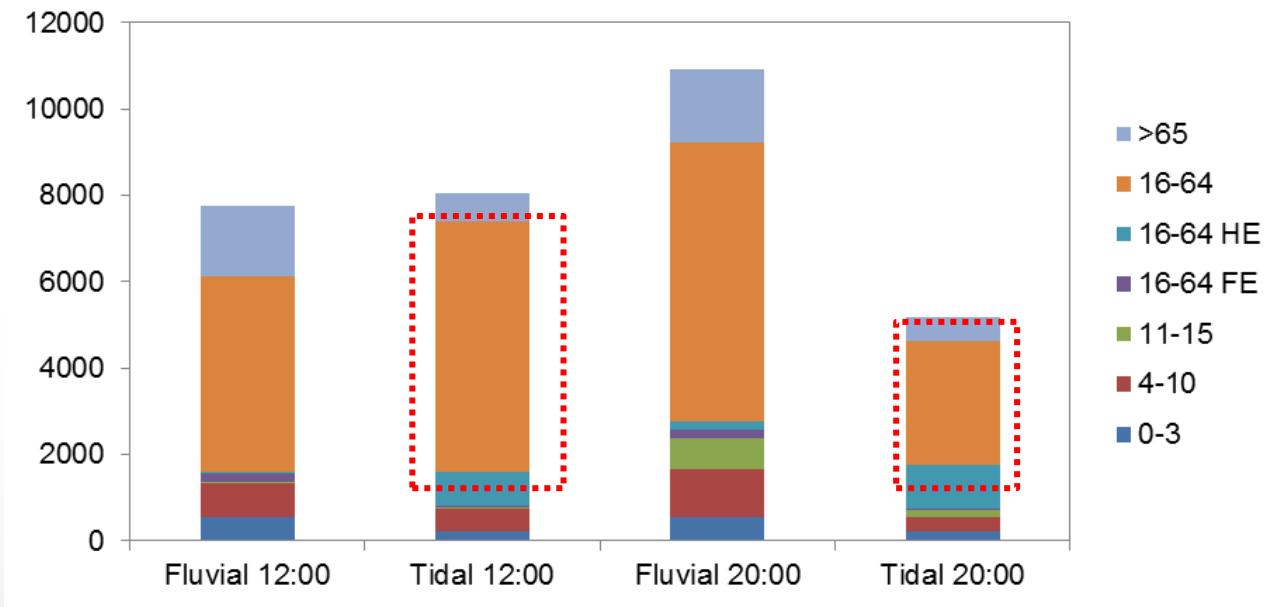
Example weekday population

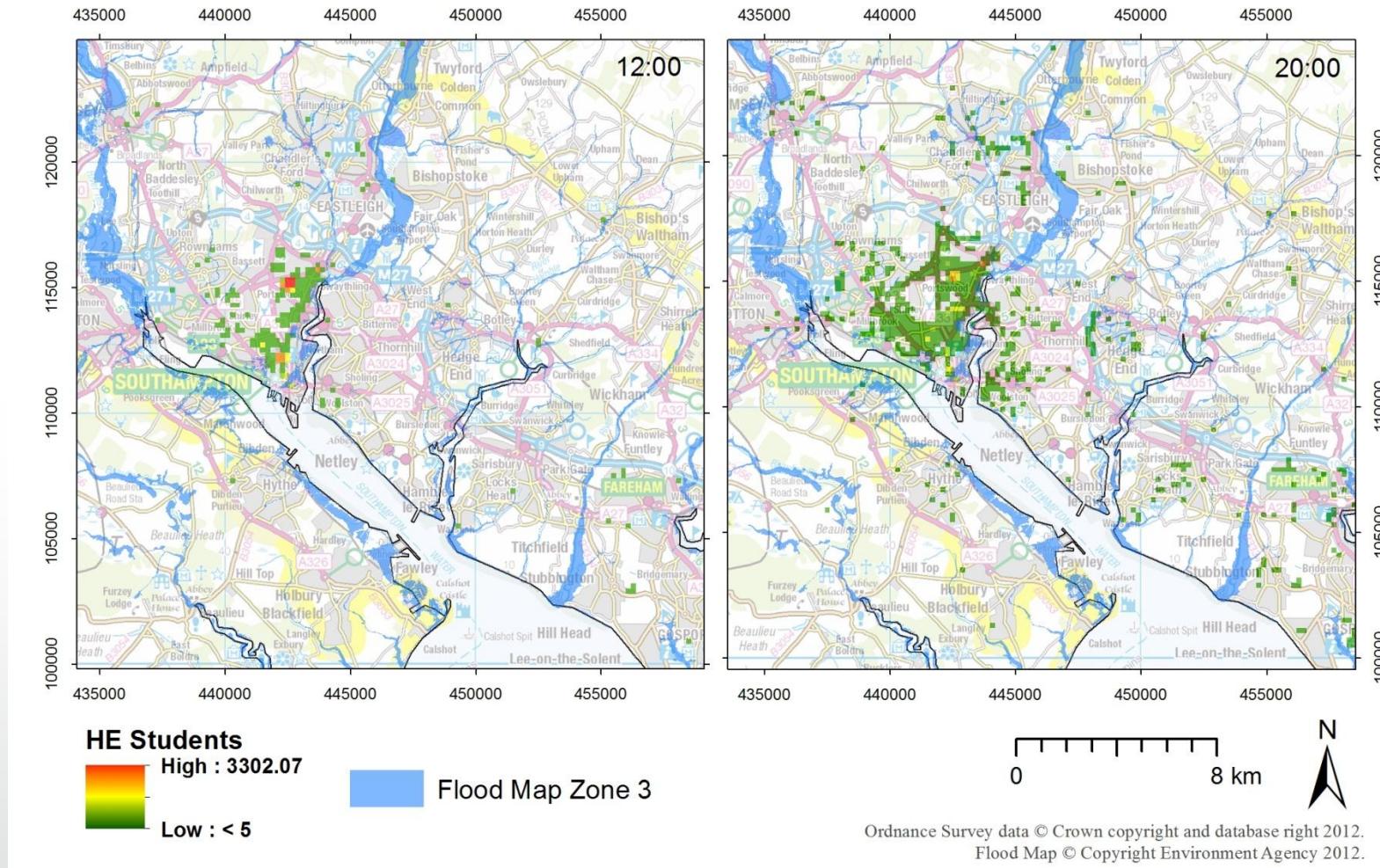


Example weekday population





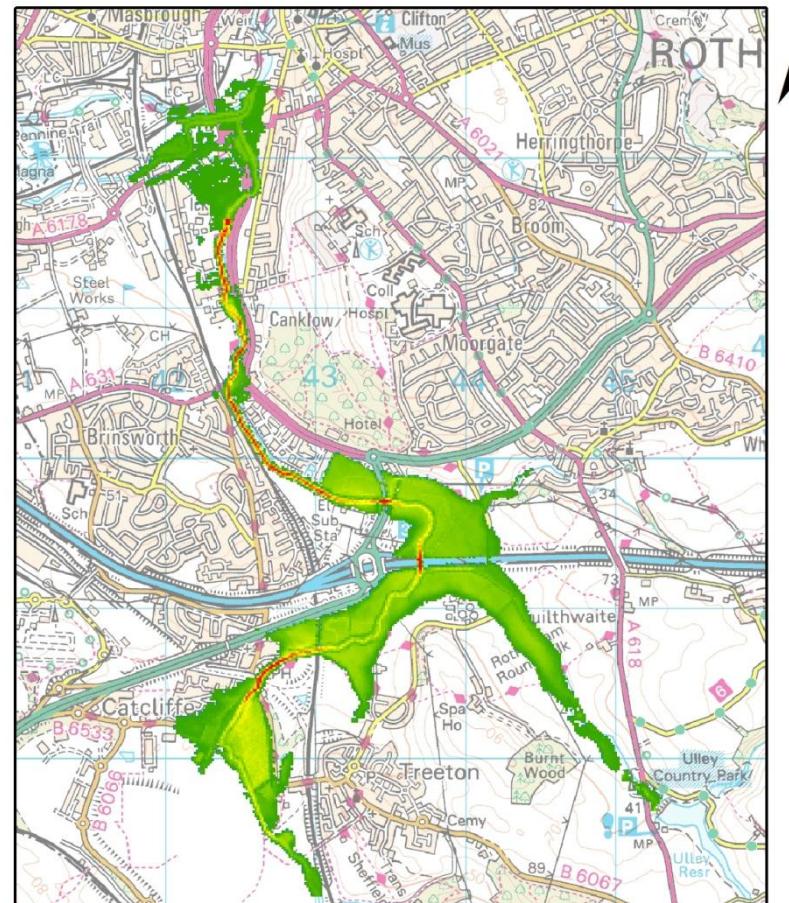




Flood modelling (TELEMAC-2D)



- Destabilized 25/07/2007
- M1 J32-34 closed 40 hours
- 1000 evacuated
- High voltage pylons
- High pressure gas main



Hazard Rating

23
>0

0 0.5 1

2 Kilometres

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Next steps

- Continued development of datasets and temporal profiles
- Demonstrate improved exposure estimations
- Advances in natural hazard risk management

Acknowledgments

Developing the “Pop 24/7” methodologies:

Professor David Martin

Dr Samantha Cockings

http://www.southampton.ac.uk/geography/research/projects/space_time.page

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