

Temporal and spatial change in design flood estimates

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Floods - Homes



Floods - Businesses



Kings Staith - now part of the river Ouse 06/11/00
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Floods – Infrastructure



Floods - People

Policeman dies as devastating deluge strikes Britain

Four bridges collapse, main roads are blocked and hundreds are evacuated as 12 inches of rain falls in Cumbria in 24 hours

Yorkshire & Lincolnshire

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Michael Barnett died in 2007 flooding.

Flood death - rescue workers speak.

The death of one man in Hull during the floods which hit the UK in 2007 became a terrible symbol of the power of nature. Members of the emergency services who tried to save Michael Barnett have spoken for the first time about that day to [Inside Out](#).

In June and July 2007, 50,000 families were flooded out of their homes in the UK's worst summer floods in living memory.

Michael Barnett died in a suburban street, in full view of the world's media, and despite the presence of all three emergency services with all the equipment at their disposal.

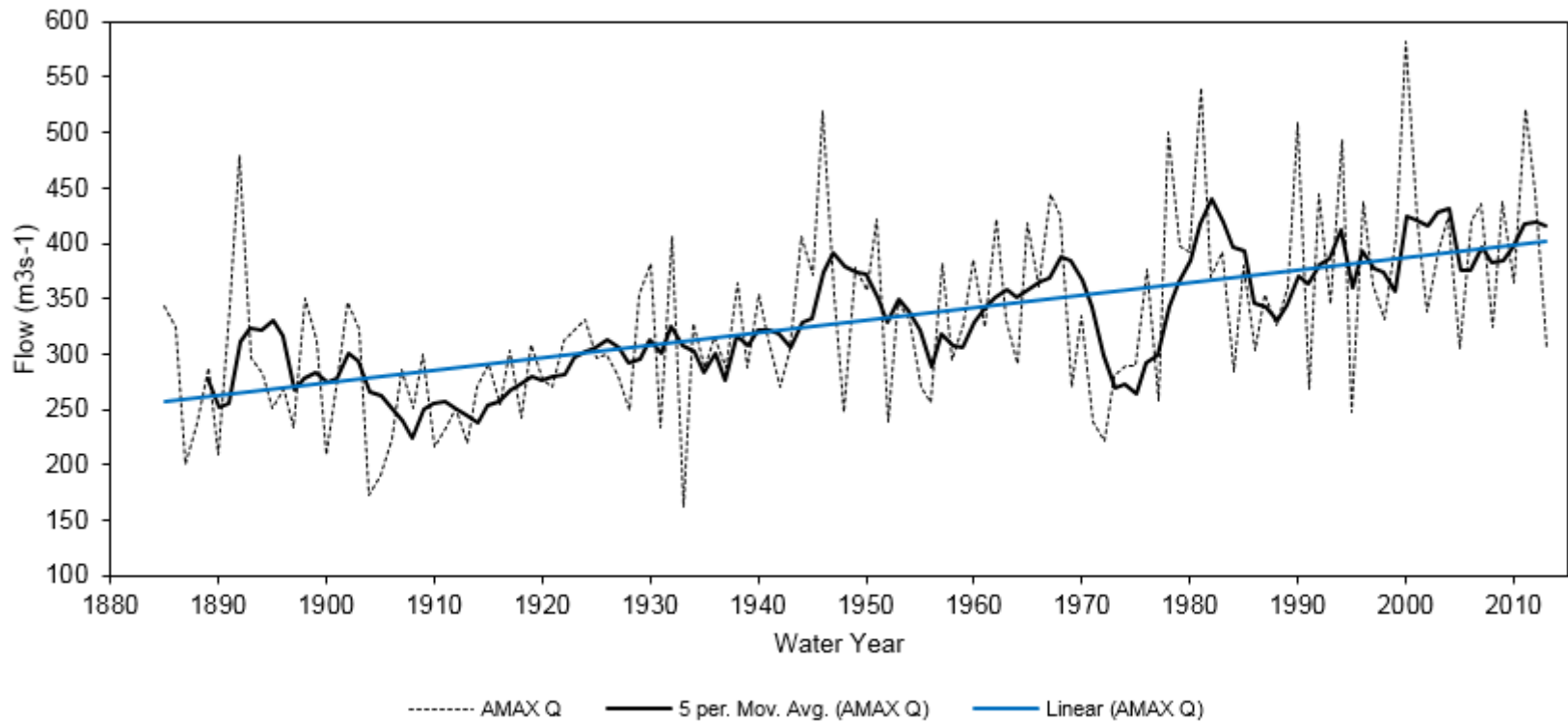


The screenshot shows the top navigation bar of the BBC News website. It features the BBC logo on the left, followed by a 'Sign in' button with a user icon. To the right are links for 'News', 'Sport', 'Weather', 'iPlayer', 'TV', and 'Radio'. Below this is a large red banner with the word 'NEWS' in white. Underneath the banner is a horizontal menu with links for 'Home', 'UK', 'World', 'Business', 'Politics', 'Tech', 'Science', 'Health', and 'Family & Education'. A second row of links includes 'UK' (underlined), 'England', 'N. Ireland', 'Scotland', 'Alba', 'Wales', 'Cymru', and 'Local News'.

Storm Desmond: Thousands of people flooded out of homes

Design flood estimates

Annual Maximum Flow - Ouse @ Skelton (27009) - 1885-2013



Design flood estimates

Generalised Logistic L-Median

Station details

Number: 27009
 Name: Ouse
 Location: Skelton
 Years: 129

Fitted parameters

$x_0 = 322.000$
 $\alpha = 44.388$
 $k = -0.116$
 Bound = -62.245

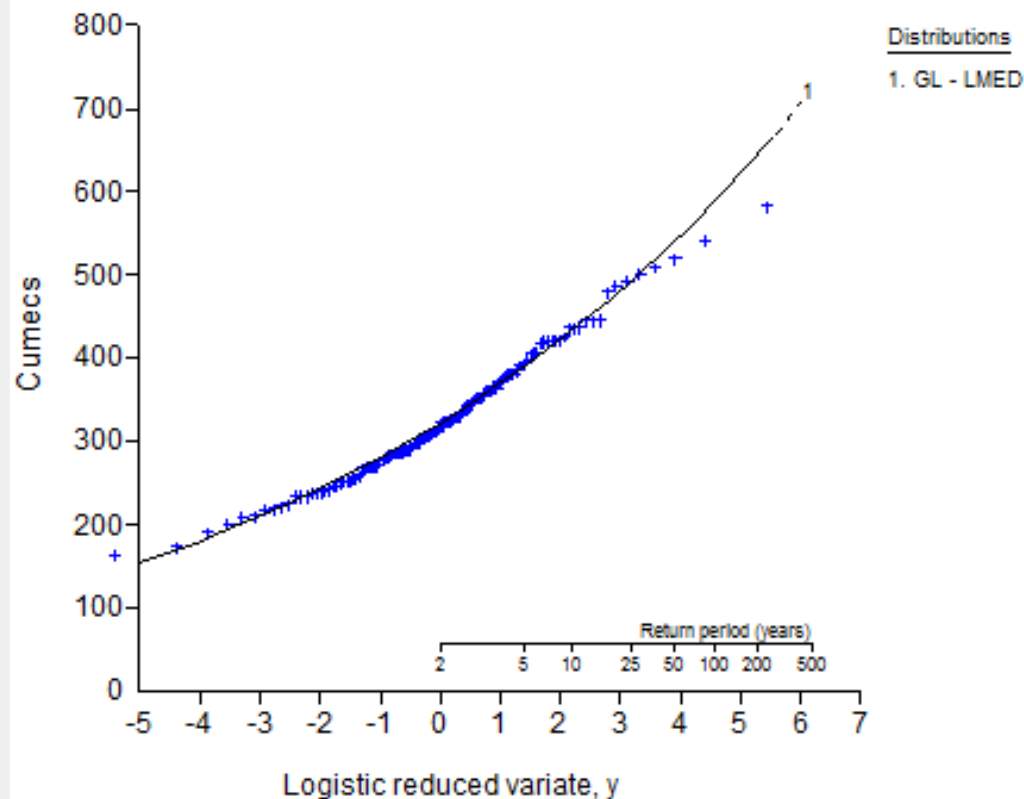
Standardisation details

Not standardised.

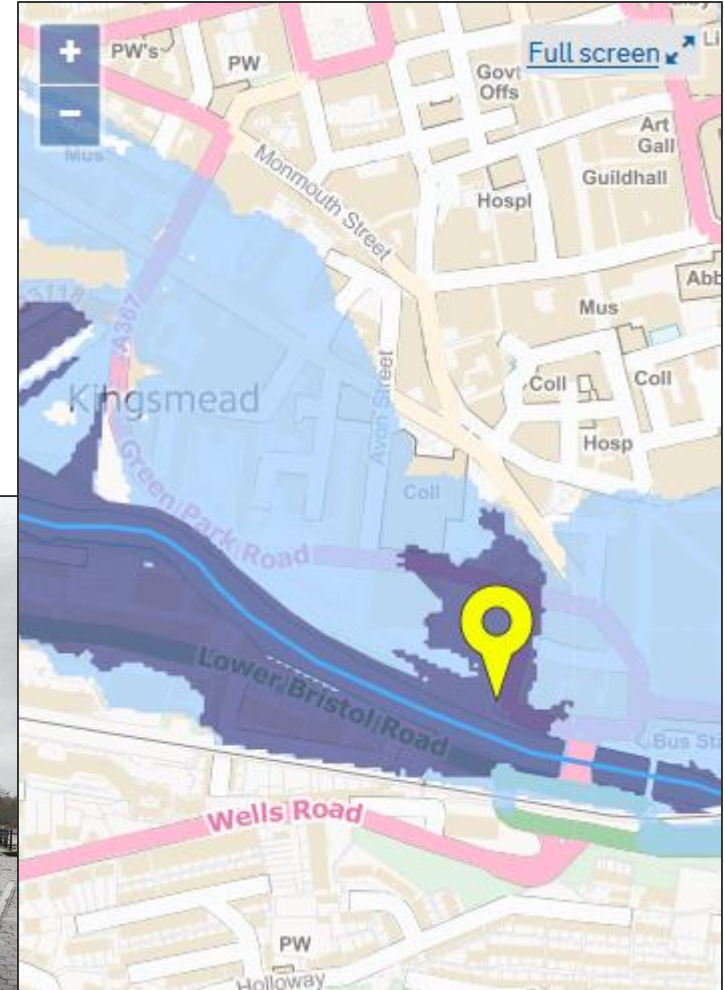
Return Period	Magnitude	Confidence
2	322.0	
5	388.7	
10	433.0	
25	492.4	
50	540.1	
100	591.1	
* 200	646.0	

* Target return period > record length

Ouse @ Skelton

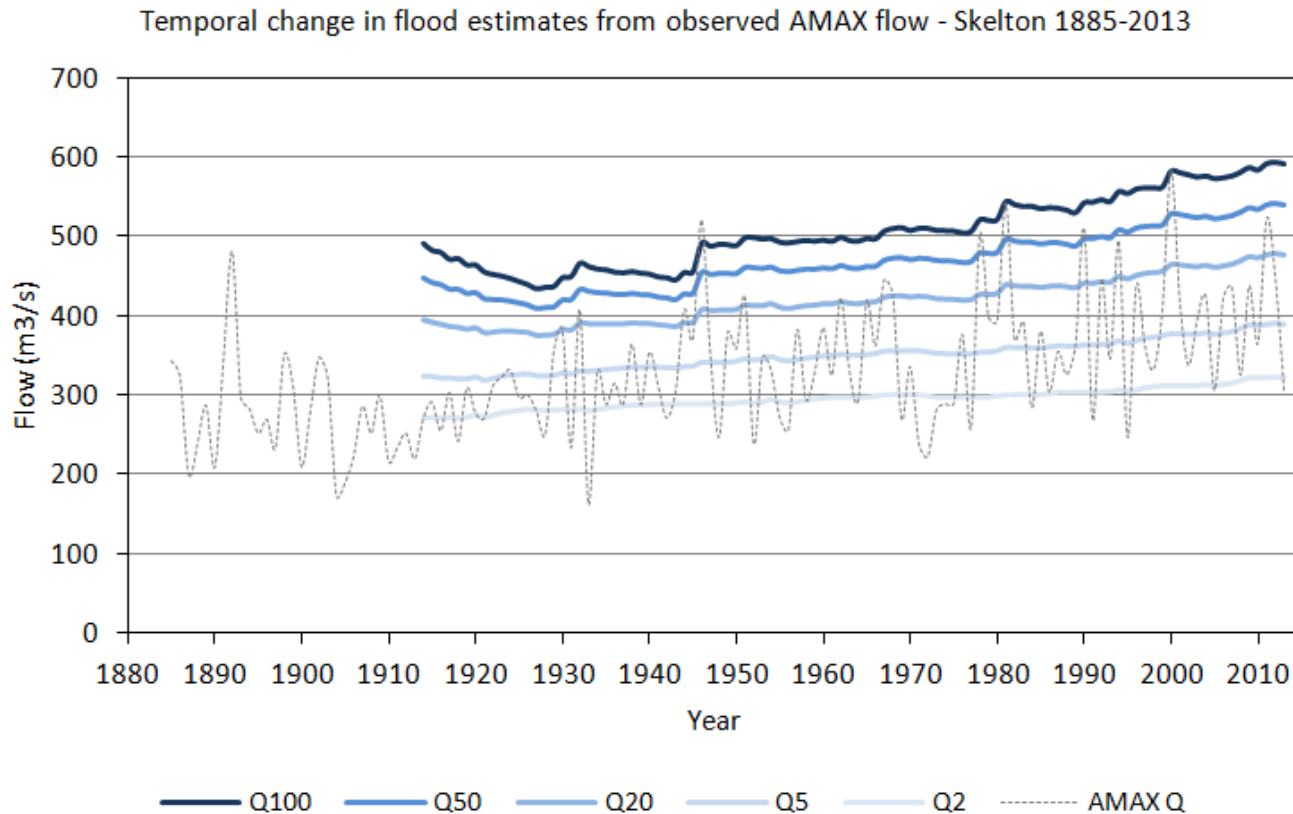


Design flood estimates - applications



Changing design flood estimates

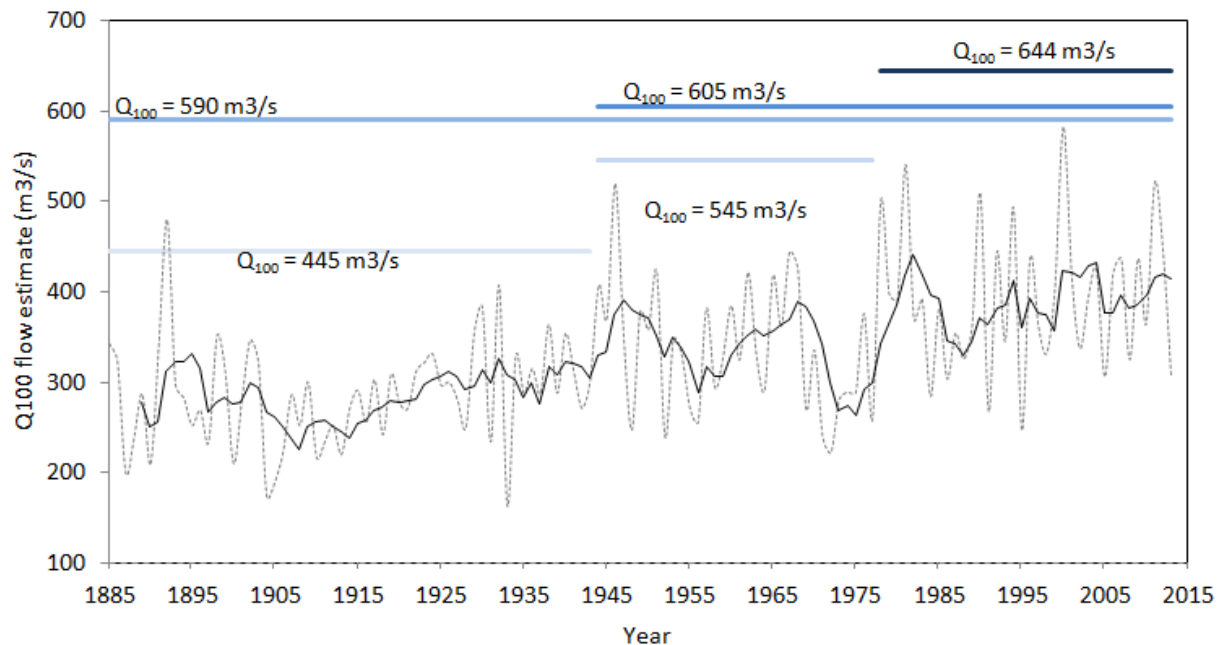
We know that design flood estimates change over time –
how can we make sense of this?



Changing design flood estimates

We know that design flood estimates change over time –
how can we make sense of this?

Q100 flow estimates for time periods identified from change-point analysis, River Ouse at Skelton (York)



- 1885-2013
- 1885-1943
- 1944-1977
- 1944-2013
- 1978-2013
- AMAX
- 5 per. Mov. Avg. (AMAX)

Changing design flood estimates

How sensitive are design flow estimates to the time period chosen for analysis?

We usually use entire AMAX record - could there be a case for only using part of the record (e.g. a “flood rich” period)?

Can we identify the part of the flood record that will give the highest flood estimates? What does that tell us?

Can we develop an indicator to show how sensitive a flood record is to the time period chosen?

Is there evidence of non-stationarity?

How does this vary spatially?

Changing design flood estimates

QMED (2-year return period) is critical to flood estimation.

How does QMED vary over time?

Are there any spatial patterns in QMED variation?

How might we apply changing QMED to flood estimation?

How could varying QMED through time impact on design flood estimates?

Changing design flood estimates

How sensitive are design flood estimates to 'extreme' events?

Can one big flood event change design flows significantly?

How should we define big?

Can they unduly influence trend tests?

Are some sites more susceptible than others?

Are there any spatial patterns to this?

Can we develop an indicator to show how sensitive a site is to big events?

Perception of increasing extremes

There is a perception that extreme flood events are happening more often – is this true?

How do we define extreme?

How can we detect 'clusters' of extreme flood events?

What's the best data to use – AMAX, POT, monthly, daily, 15-minute?

Do we see 'clusters' now or in the past?

Does this vary spatially?

How might clustering impact our design flood estimates?

Trendy rivers?

How might we decide if rivers are responding to climate change and/or land-use change?

What (novel) statistical tests could we use to detect change in flood time series?

What data should we use to detect change (AMAX, POT, daily, 15-minute)?

Are we seeing 'change' in our flood records?

Are these changes spatially coherent?

How might we attribute cause to any observed changes?

Any questions?