

Reflections on the archives from academia: using the data and filling in some gaps

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Scottish Water Archive Hydrologist 1992-1995





Outline

- Background
- Teaching applications
- Research applications
- Some data quality and representativeness issues
- Concluding remarks

NRFA/NGLA data and students

EV11001 THE PHYSICAL ENVIRONMENT Hydrology workshop 1: Hydrological behaviour of UK rivers

Your name: _____

Assigned river and gauging location: _____

National River Flow Archive number: _____

Catchment area (km²) _____

Grid reference ()

This workshop is concerned with the hydrology of UK rivers – how quickly and how much they rise and fall, how hydrographs vary between summer and winter, and the seasonality of flows generally. Each student is to work on their own river. Together, we will achieve a collective insight about the diversity of river flow behaviours in the UK. You have chosen your river by your choice of one-page summary sheet at the start of the class, showing the name of the river, its reference number on the UK National River Flow Archive (4, 5 or 6 digits), a description of its catchment and some of its key hydrological characteristics. Enter the river gauging station details in the box above.

Left-click on the 'gauged' link for your river and gauging station from the list at <http://www.nwl.ac.uk/ih/nrfa/webdata/index.html>
Then **right-click** on [Long term data file](#) (csv - comma separated value format) - this allows you to **Save Target As...** a .csv file into your own disk space in column format, allowing the data to be opened in Excel.

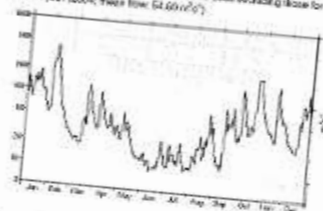
54001 - Severn at Bewdley

Grid Reference: 32 (SO) 782 762
 Operator: EA
 Local number: 2001
 Catchment Area: 4325.0 km²
 Level of Station: 17.0 mOD
 Max. Altitude: 327.0 mOD
 Mean flow: 61.17 m³s⁻¹
 95% exceedance (Q95): 10.66 m³s⁻¹
 10% exceedance (Q10): 146.1 m³s⁻¹
 61-90 Av. Ann. Rainfall: 913 mm

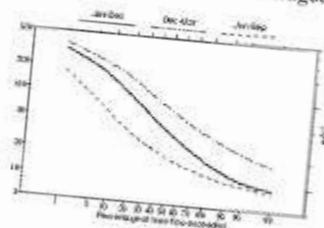


Sample Hydrograph of Gauged Daily Flows

Max. and min. daily mean flows from 1901 to 2005 excluding those for the featured year (2004; mean flow: 64.69 m³s⁻¹)



Flow Duration Curve for Gauged Daily Flows



Station Description

20-path US gauge. VA station with rock control prior to 1989. Peak flows available from 1972. Stage monitoring site relocated in 1950 and 1968; lowest flows reprocessed in 1976 for 1921-68. Pre-1968 records of modest precision. Significant exports for PWS and power generation; minimum flow maintained by releases from Clywedog and Vyrnwy Reservoirs and Shropshire g/w. Naturalised flow series, from 1968 only, accommodates major usages other than g/w support. Some earlier records adjusted for Vyrnwy (1965-7).

Catchment Description

Diverse catchment; wet western 50% from impermeable Palaeozoic rocks and river gravels; drier northern 50% from Drift covered Carboniferous to Liassic sandstones and marls. Moorland, forestry, mixed farming.

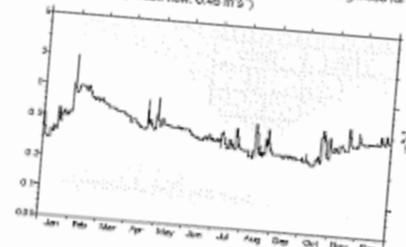
29003 - Lud at Louth

Grid Reference: 53 (TF) 337 879
 Operator: EA
 Catchment Area: 55.2 km²
 Level of Station: 15.4 mOD
 Max. Altitude: 149.0 mOD
 Mean flow: 0.45 m³s⁻¹
 95% exceedance (Q95): 0.125 m³s⁻¹
 10% exceedance (Q10): 0.891 m³s⁻¹
 61-90 Av. Ann. Rainfall: 699 mm

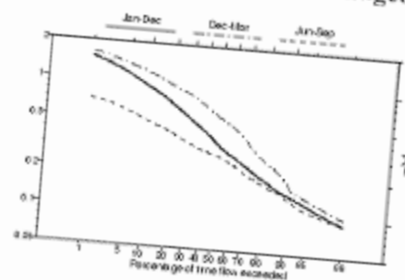


Sample Hydrograph of Gauged Daily Flows

Max. and min. daily mean flows from 1968 to 2005 excluding those for the featured year (2004; mean flow: 0.45 m³s⁻¹)



Flow Duration Curve for Gauged Daily Flows



Station Description

Crump profile weir, 4.569m wide, at u/s end of long culvert (capacity limited to 20 cumecs - yet to



You are here: CEH Web | National River Flow Archive | Data | 14001

- National River Flow Archive Home Page
- Search for NRFA data
- Search by regional maps
- NRFA Data Holdings
- NRFA Data Retrieval
- National Hydrological Monitoring Programme
- Hydrometry in the UK
- NRFA Publications
- Long records
- Contacts

14001 - Eden at Kemback

- Station Info
- Time Series Data**
- Spatial Data
- Future Flows

Data Series: Gauged Daily Flow

Time Series Statistics

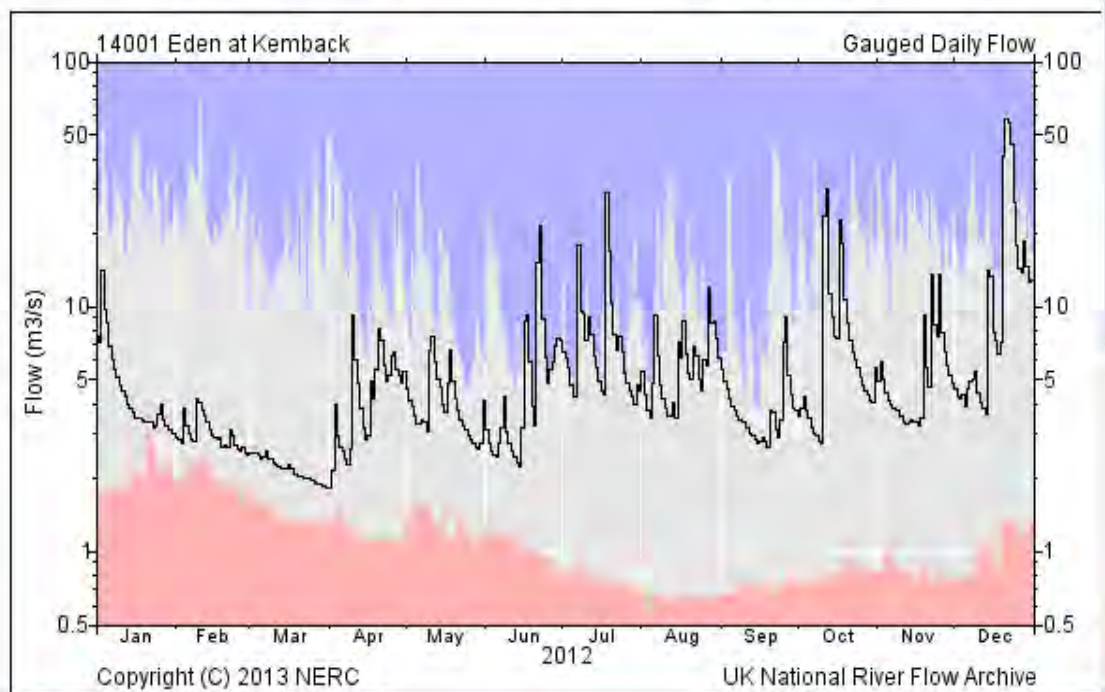
- Period of Record: 1967 - 2012
- Percent Complete: 100 %
- Base Flow Index: 0.63
- Mean Flow: 4.054 m³/s
- 95% Exceedance (Q95): 0.98 m³/s
- 70% Exceedance (Q70): 1.833 m³/s
- 50% Exceedance (Q50): 2.765 m³/s
- 10% Exceedance (Q10): 8.212 m³/s

Download data

River flow time series data are available for this station for download.

Download flow data

Graph Type: Annual Hydrograph Year: 2012 Refresh



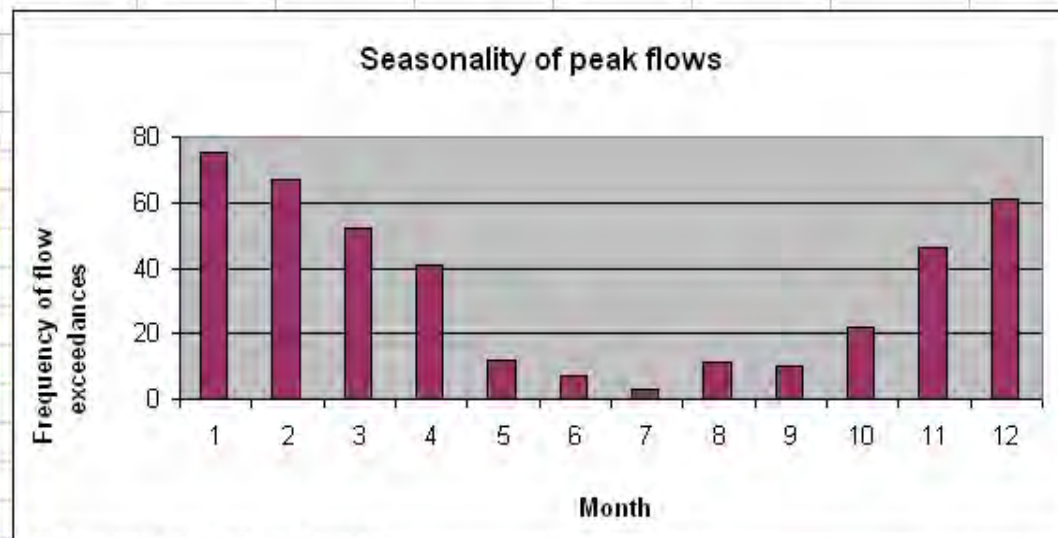


A1 3. Peak flow seasonality

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	3. Peak flow seasonality												
2													
3													

4	Month	Count	
5	1	75	
6	2	67	
7	3	52	
8	4	41	
9	5	12	
10	6	7	
11	7	3	
12	8	11	
13	9	10	
14	10	22	
15	11	46	
16	12	61	

Adjust threshold



Flow threshold: 12.18 cumecs

Proportion of all days above threshold: 2.5%

Number of days above threshold: 407

The arrows above let you adjust the flow threshold used to identify peak flows. By lowering it, you include more peak flows above the threshold.

3.1 Using the **default** threshold delivering just 0.05% of all days above the threshold, how many months long is the peak flow season?
 Number of months: 11

Now, lower the threshold to give 2.5% of days above the threshold.

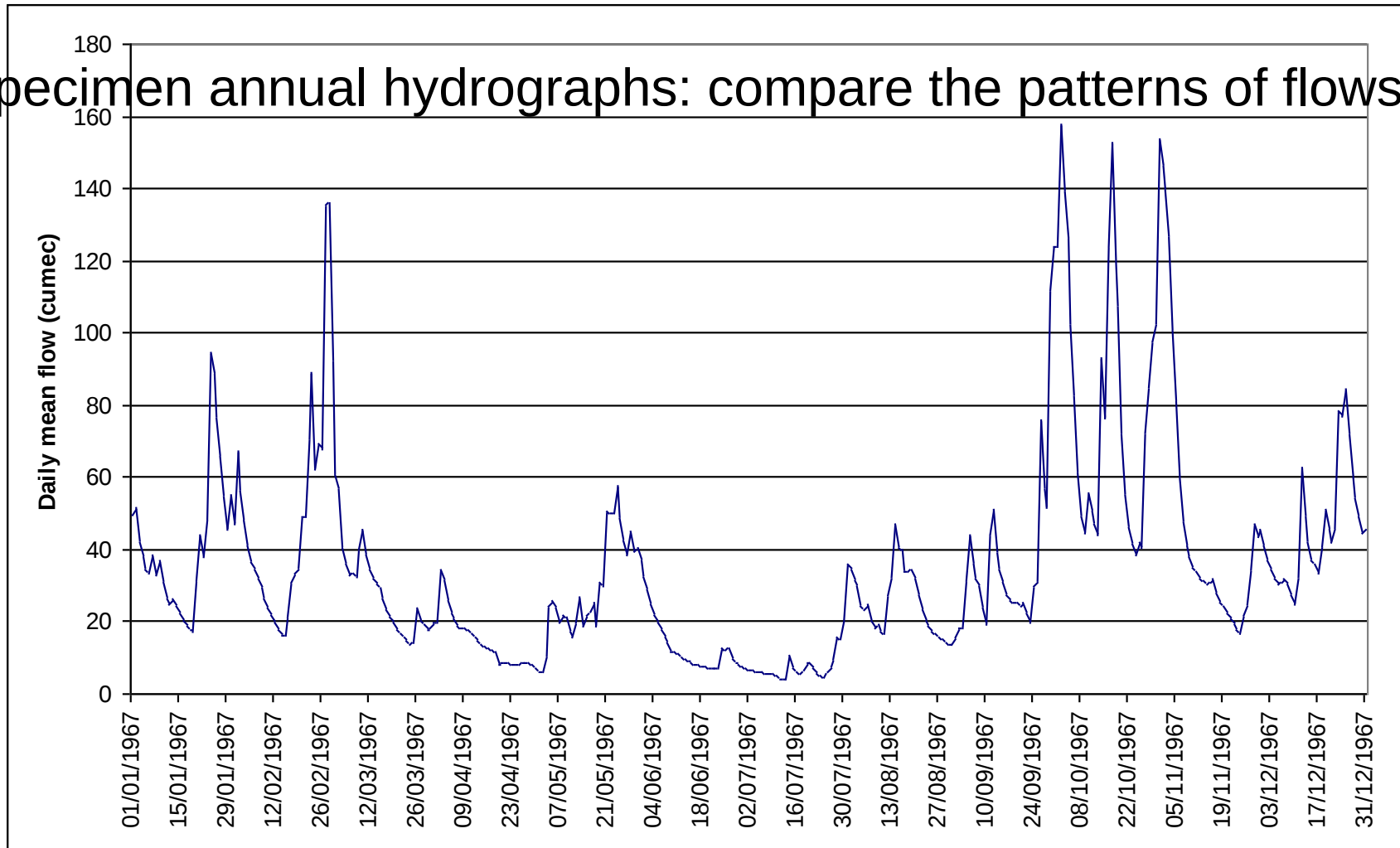
3.2 How has the peak flow season changed compared with 3.1 above?

All months are in the peak flow season with the threshold higher compared with 11. The frequencies have also risen and the possibility of defining

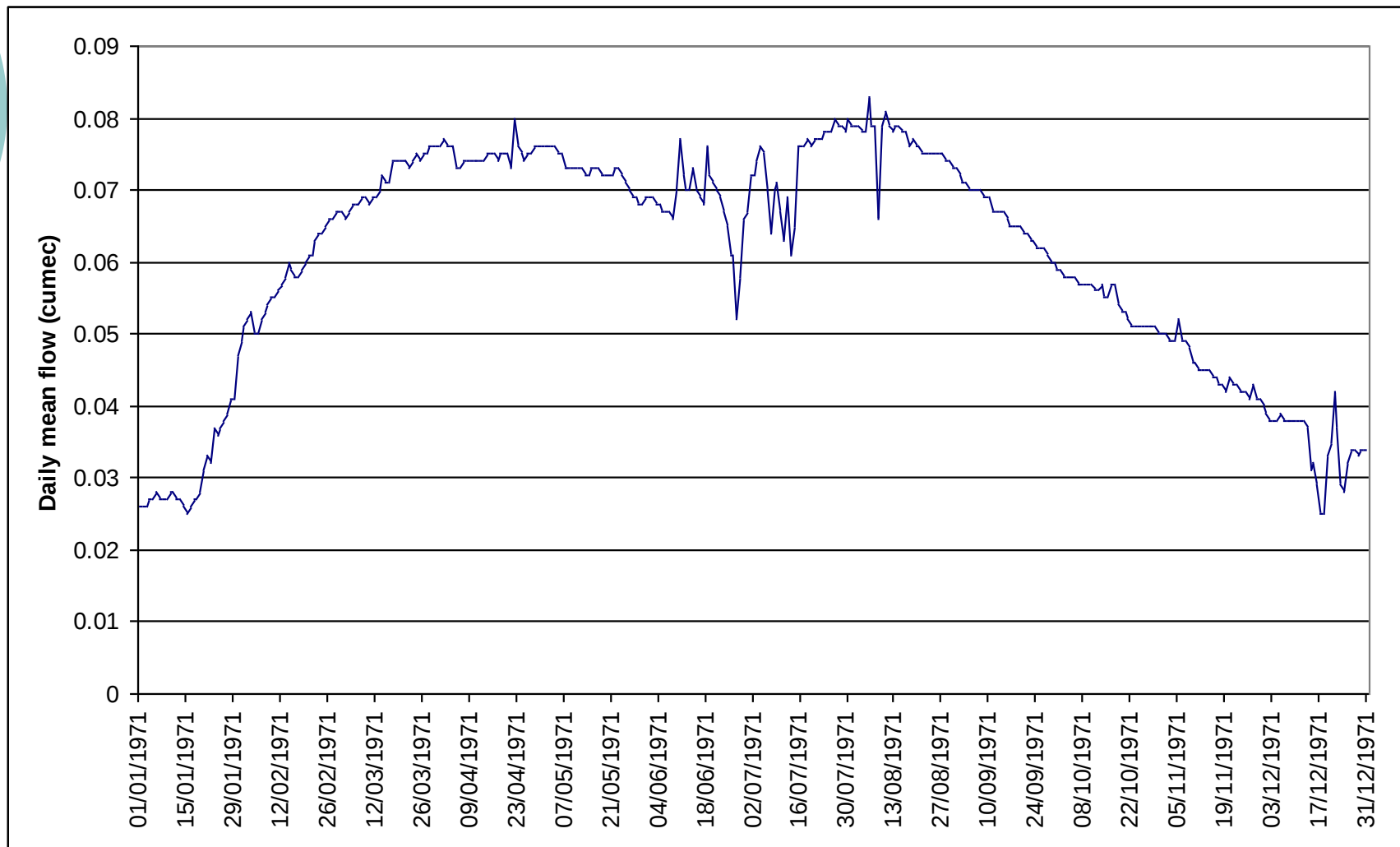
A1	file														
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	file	timestamp	2013-08-18T20:33:07												
2	database	id	nrfa_public												
3	database	name	NRFA public												
4	station	id	12001												
5	station	name	Dee at Woodend												
6	station	gridReferer	NO6348295613												
7	station	stationCon	Velocity-area station; about 60m wide section. Cableway rated, fairly stable natural control. Present station (built in 1972) replaced earlier station (												
8	station	catchment	Mountainous headwaters, often snowy in winter. Dalradian and Moinian metamorphics along most of valley, flanked by igneous intrusives. Respon:												
9	dataType	id	gdf												
10	dataType	name	Gauged Daily Flow												
11	dataType	parameter	Flow												
12	dataType	units	m3/s												
13	dataType	period	Day												
14	dataType	measurem	Mean												
15	data	first	01/10/1929												
16	data	last	31/12/2012												
17	01/10/1929	14.95													
18	02/10/1929	76.4													
19	03/10/1929	44.51													
20	04/10/1929	53.89													
21	05/10/1929	23.33													
22	06/10/1929	115.4													
23	07/10/1929	144.1													
24	08/10/1929	45.48													
25	09/10/1929	34.83													
26	10/10/1929	29.93													
27	11/10/1929	27.69													
28	12/10/1929	27.69													
29	13/10/1929	21.41													
30	14/10/1929	20.3													
31	15/10/1929	24.3													
32	16/10/1929	23.33													

Hydrograph: River Teifi

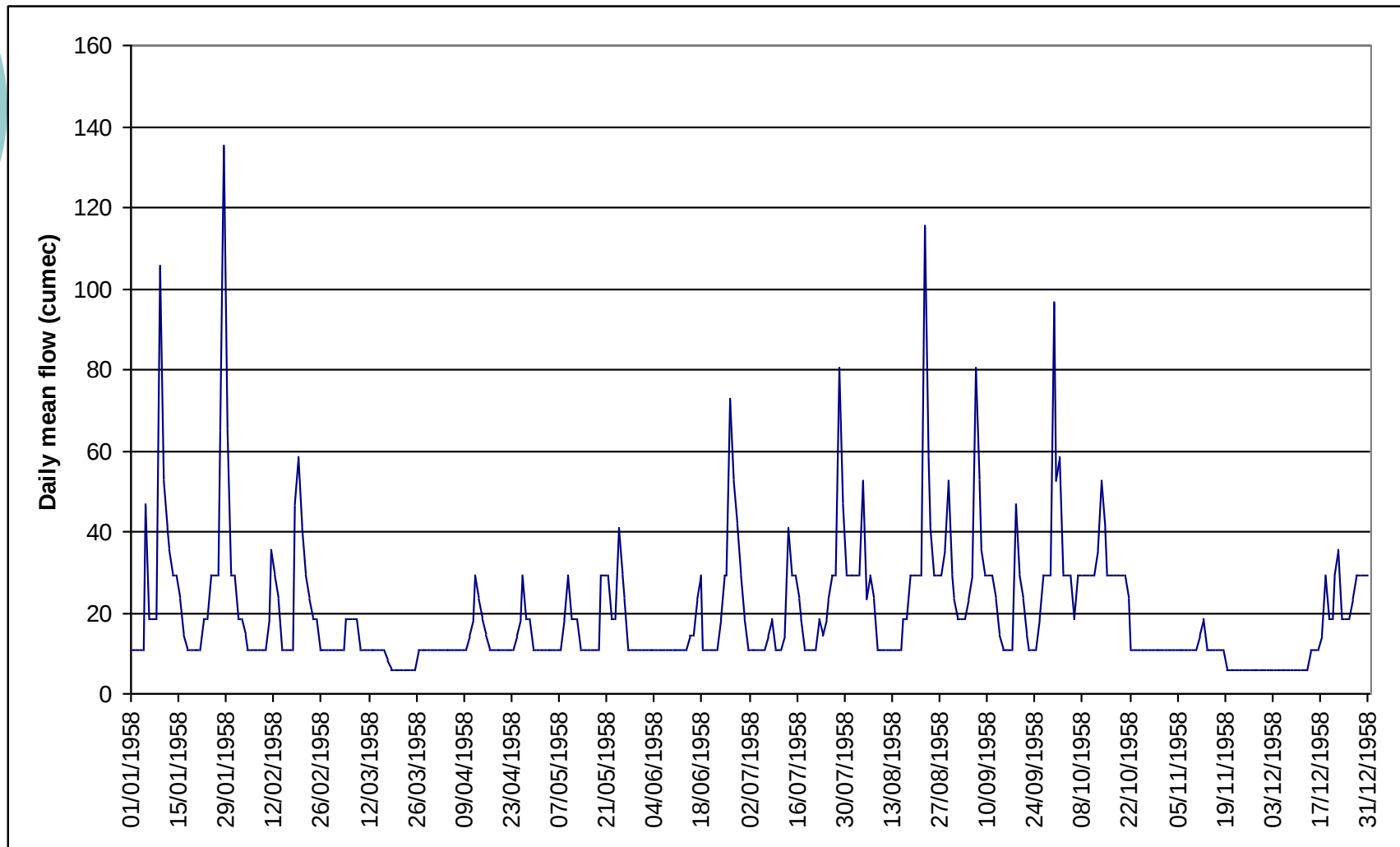
Specimen annual hydrographs: compare the patterns of flows



Hydrograph: Ewelme Brook



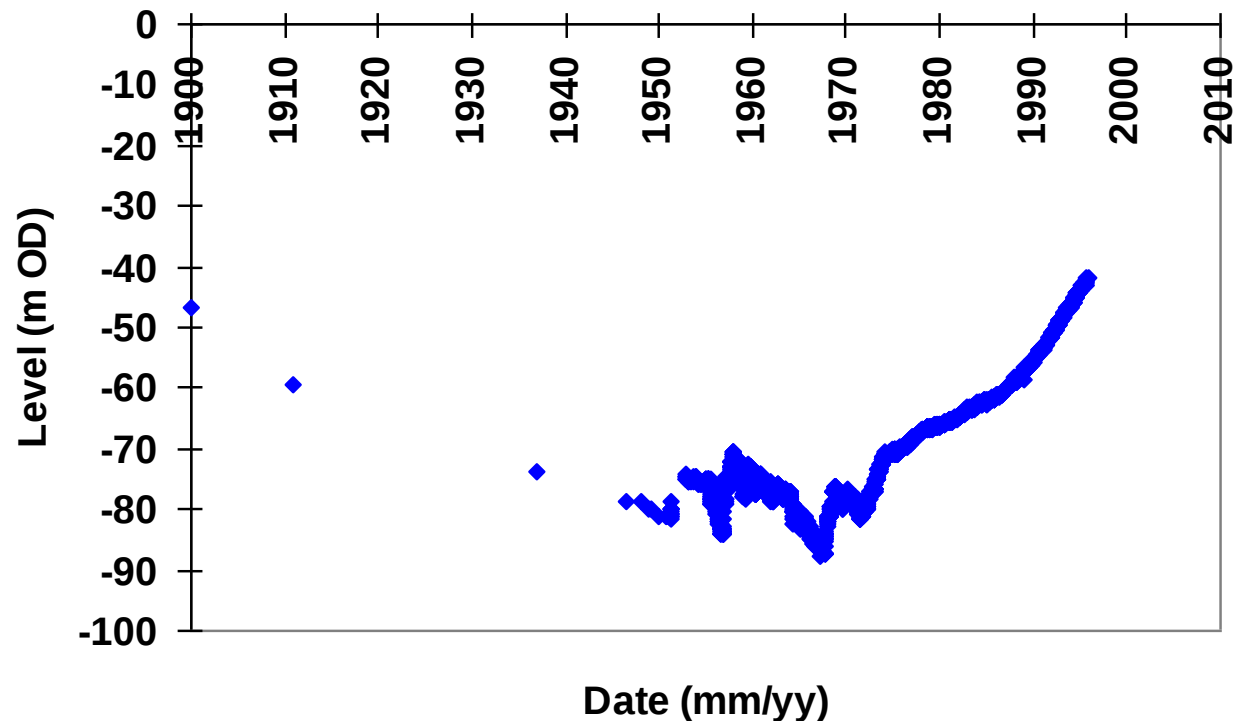
Hydrograph: River Lyon



NRFA/NGLA data and students

- Dissertations

**Groundwater levels: Trafalgar Square,
London 1901-1995**





NRFA download service

- Great search tools - inc maps
- Great documentation
- High quality info at fingertips
- Ease of access promotes use
- Whole of UK
- Expert staff available to answer queries



Student benefits

- Engaging introduction to the hydrology of the UK
 - “Is this a flashy regime?”
 - “Does this river have a large baseflow?”
 - “Is that natural?”
- Data handling skills
- Communication skills

Scholar

About 480 results (0.06 sec)

NRFA supporting research

Articles

Case law

Any time

Since 2013

Since 2012

Since 2009

Custom range...

Sort by relevance

Sort by date

☒ include patents☒ include citations

📧 Create alert

[Systematic application of United Kingdom river flow and quality databases for estimating annual mass loads \(1975–1994\)](#)

IG Littlewood, CD Watts, JM Custance - *Science of the Total Environment*, 1998 - Elsevier

This article describes the first effective merger of the Harmonised Monitoring Scheme (HMS) database of river quality and the **National River Flow Archive** (NRFA). ...

[Cited by 81](#) [Related articles](#) [All 4 versions](#) [Cite](#) [More ▾](#)

[Observed long-term changes in UK river flow patterns: a review](#)

J Hannaford - 2013 - nora.nerc.ac.uk

The aim of this paper is to provide a state-of-the-art assessment of the evidence for long-term river flow changes in the UK. This paper necessarily focuses on climate-driven changes in flow, as opposed to capturing changes caused by human influences such as water ...

[Cite](#)

[Capitalising on river flow data to meet changing national needs—a UK perspective](#)

TJ Marsh - *Flow Measurement and Instrumentation*, 2002 - Elsevier

... This paper examines recent UK initiatives to address strategic river flow information needs with particular reference to the UK gauging station network and the **National River Flow Archive** (NRFA).

2. The UK gauging station network. ... 3. The **National River Flow Archive**. ...

[Cited by 15](#) [Related articles](#) [All 2 versions](#) [Cite](#) [More ▾](#)

[Hydrological regimes, sampling strategies, and assessment of errors in mass load estimates for Kingdom rivers](#)

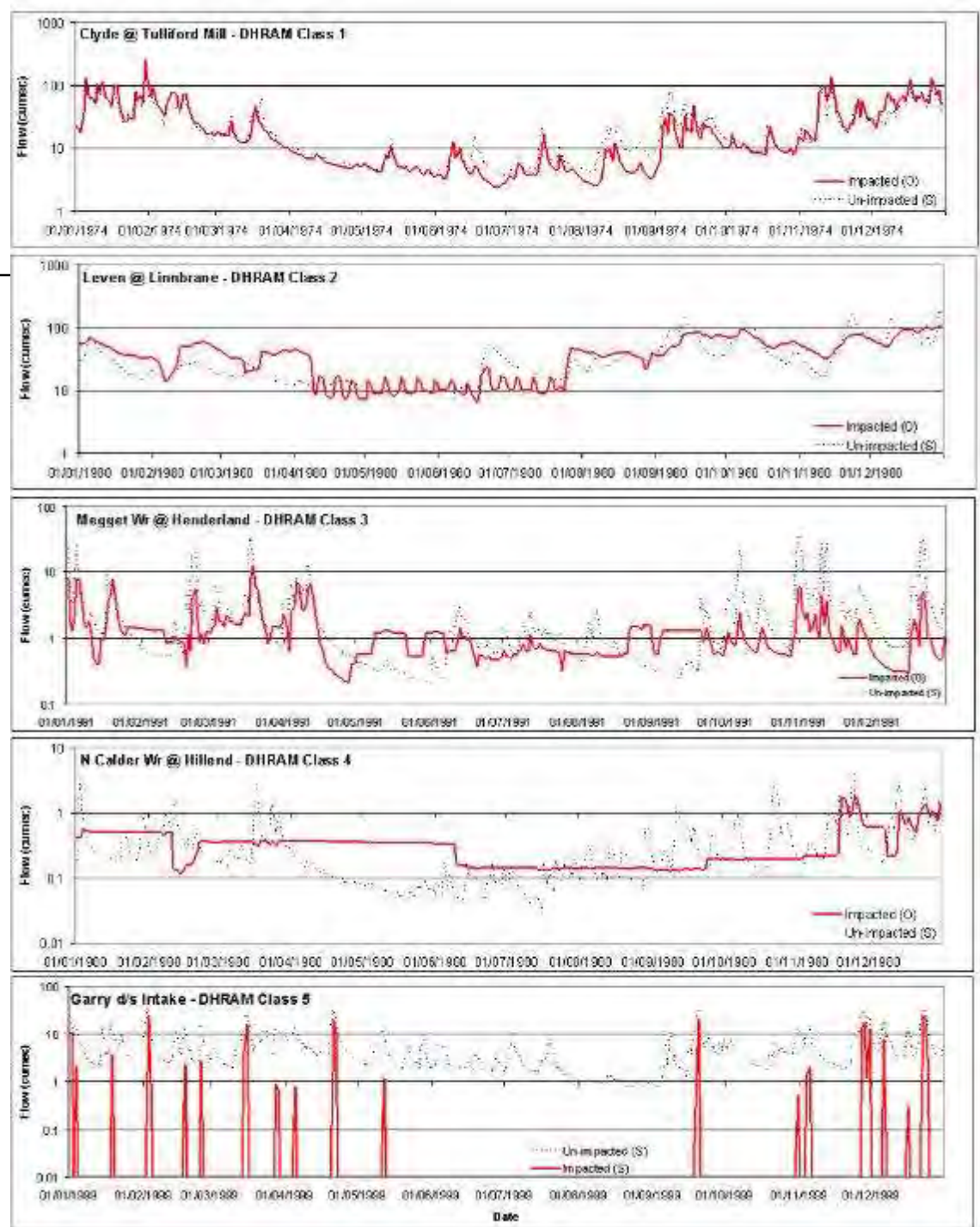
IG Littlewood - *Environment International*, 1995 - Elsevier

... The **National River Flow Archive** maintained by the Institute of Hydrology contains daily mean flow data for over 1000 operational flow gauging sites on the UK river network (the average record length for 211 212 all sites, open or closed, is about 23 y). Regional measurement ...

[Cited by 83](#) [Related articles](#) [All 6 versions](#) [Cite](#)

Research

WFD48: Development
of Environmental
Standards (Water
Resources)



Data demand vs provision in Scotland to 2004: catchment areas to FRA sites compared with gauging network

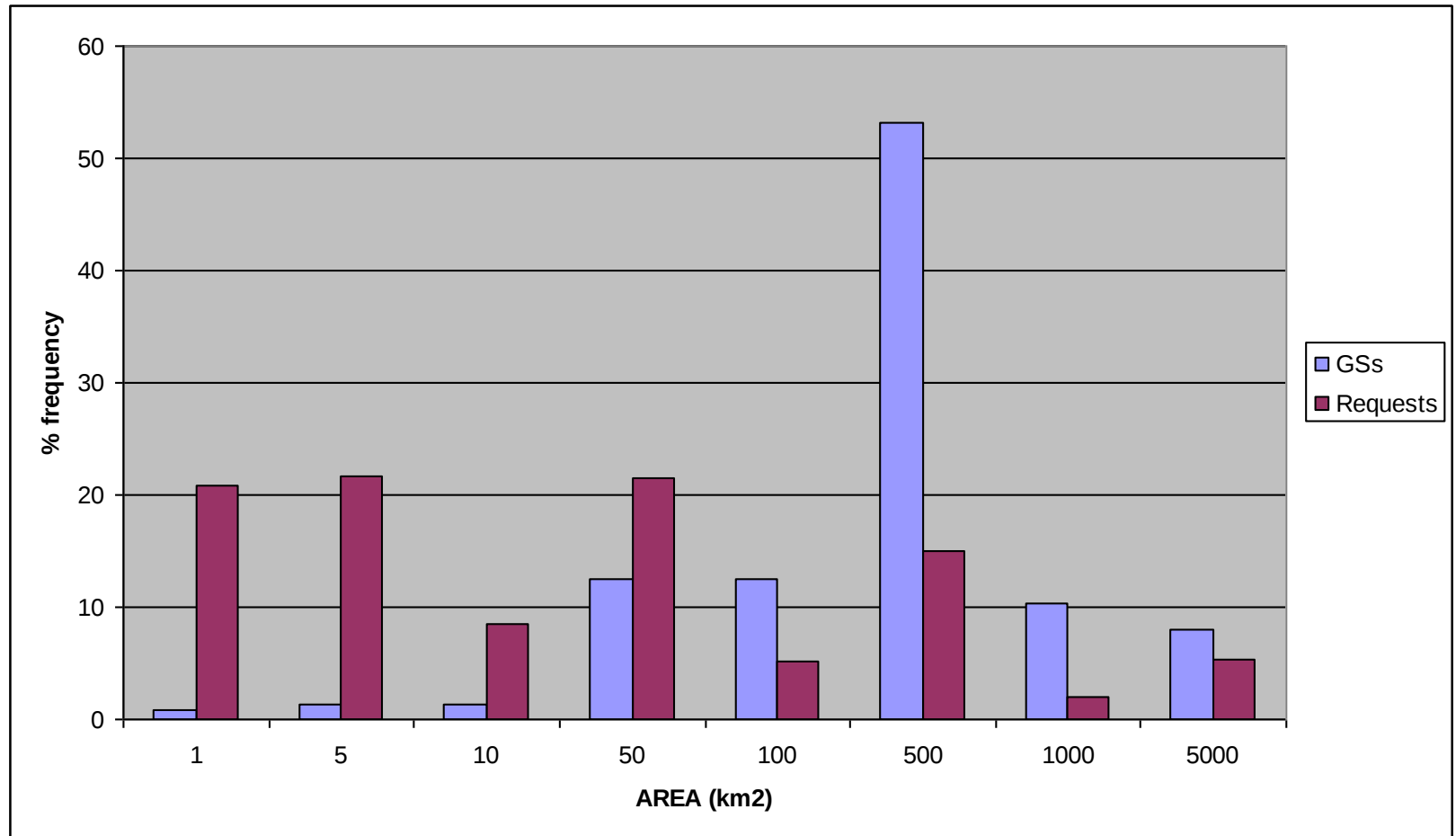
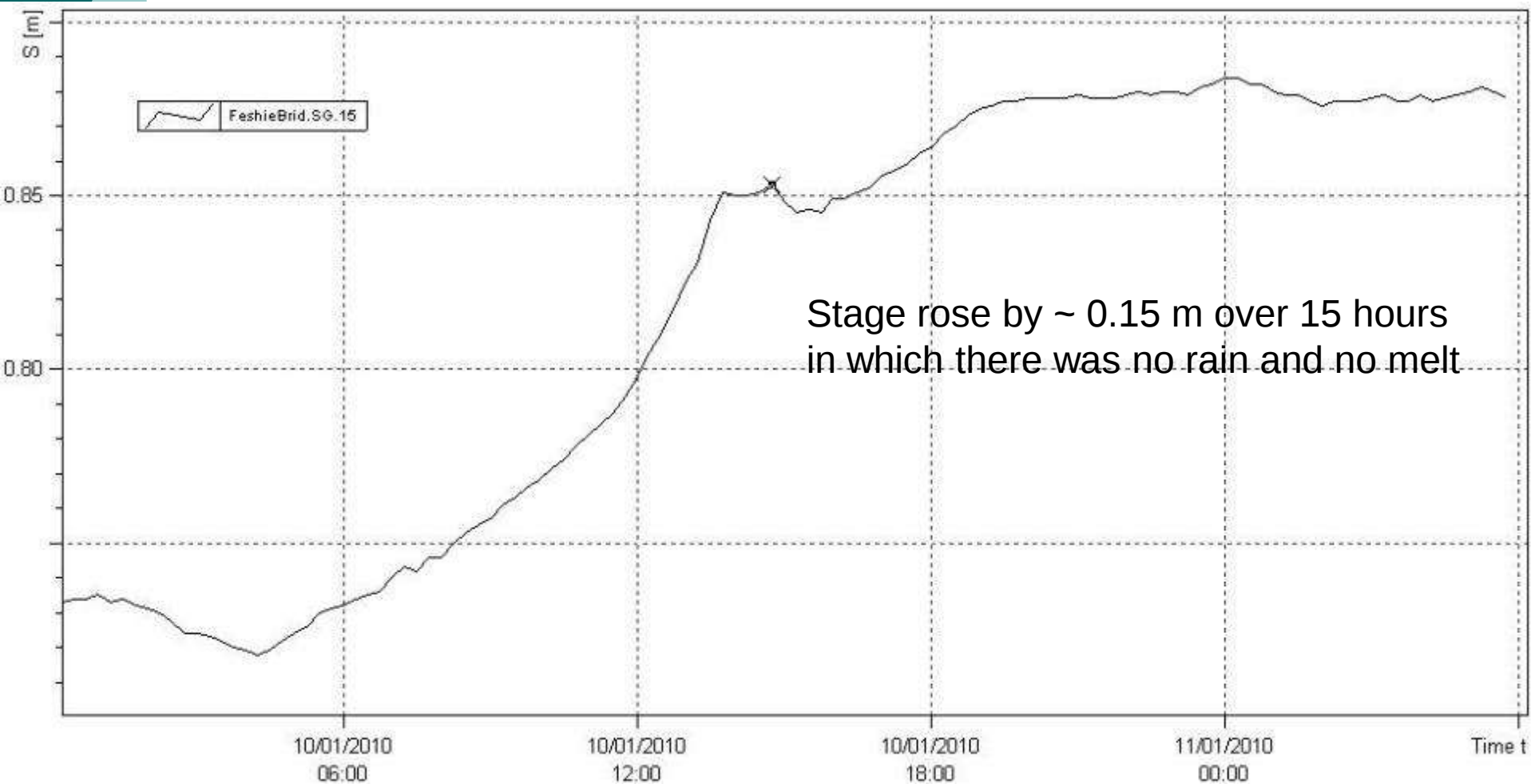






Illustration of ice build up



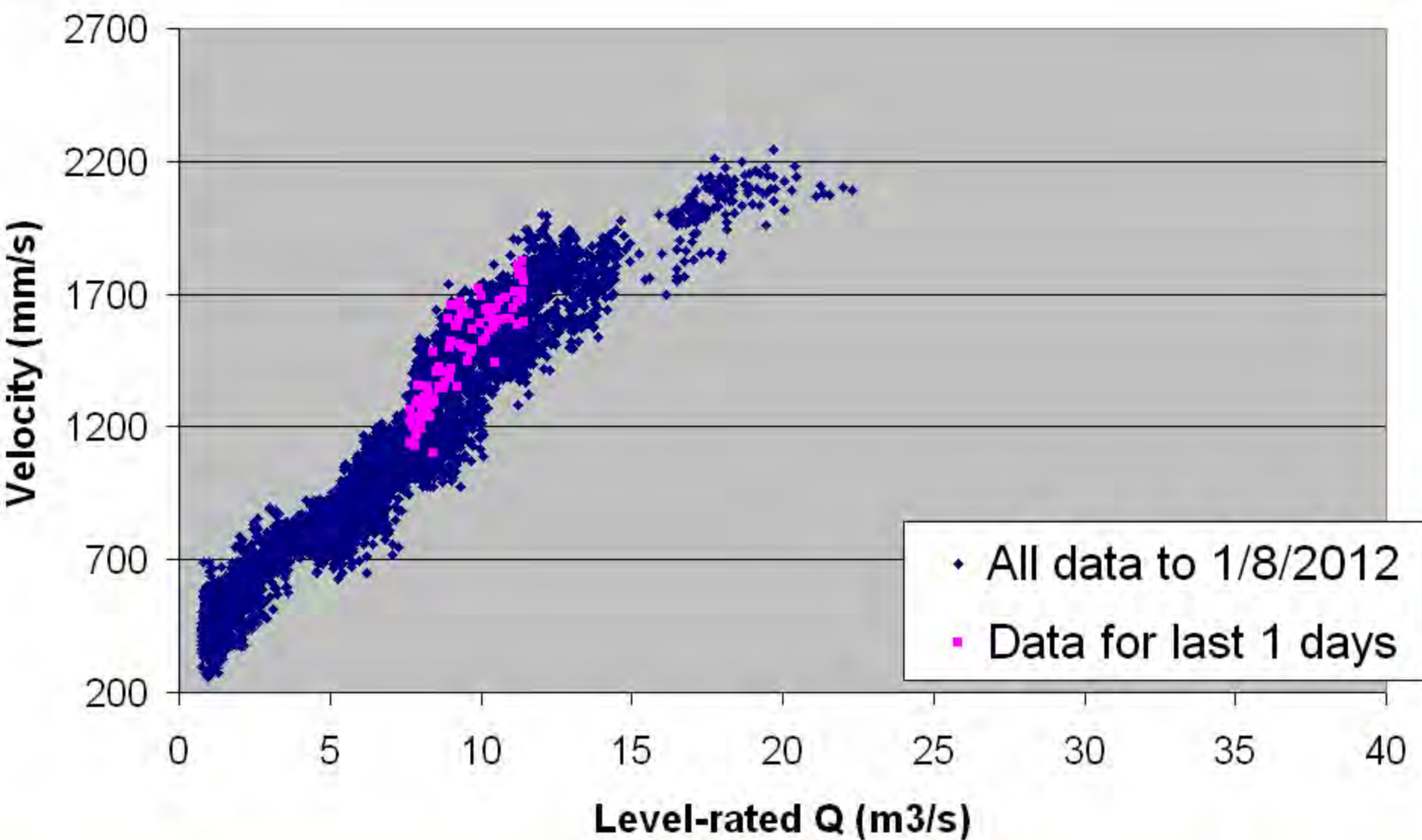
BGS Virkisjökull Glacier Monitoring Project

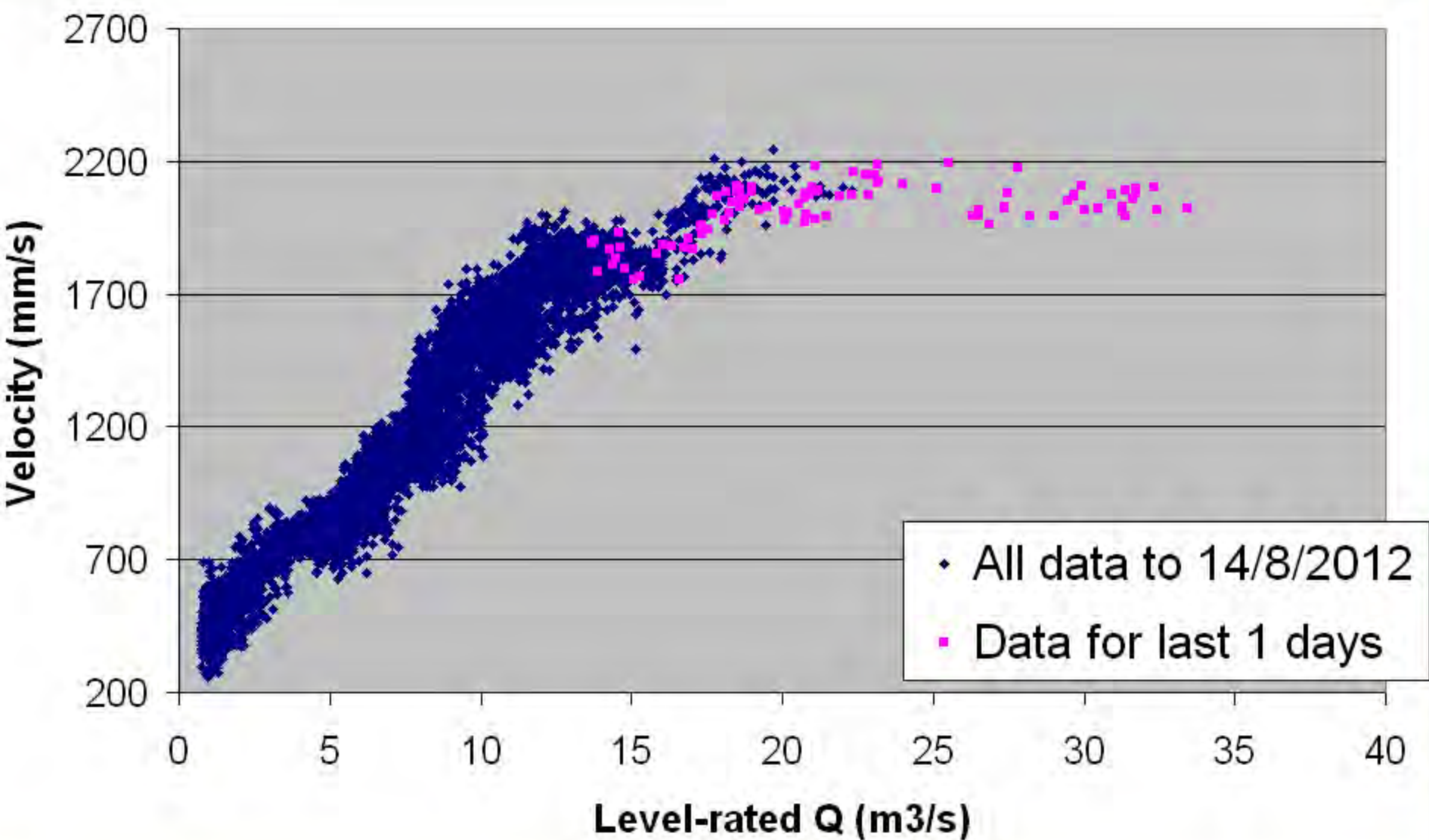


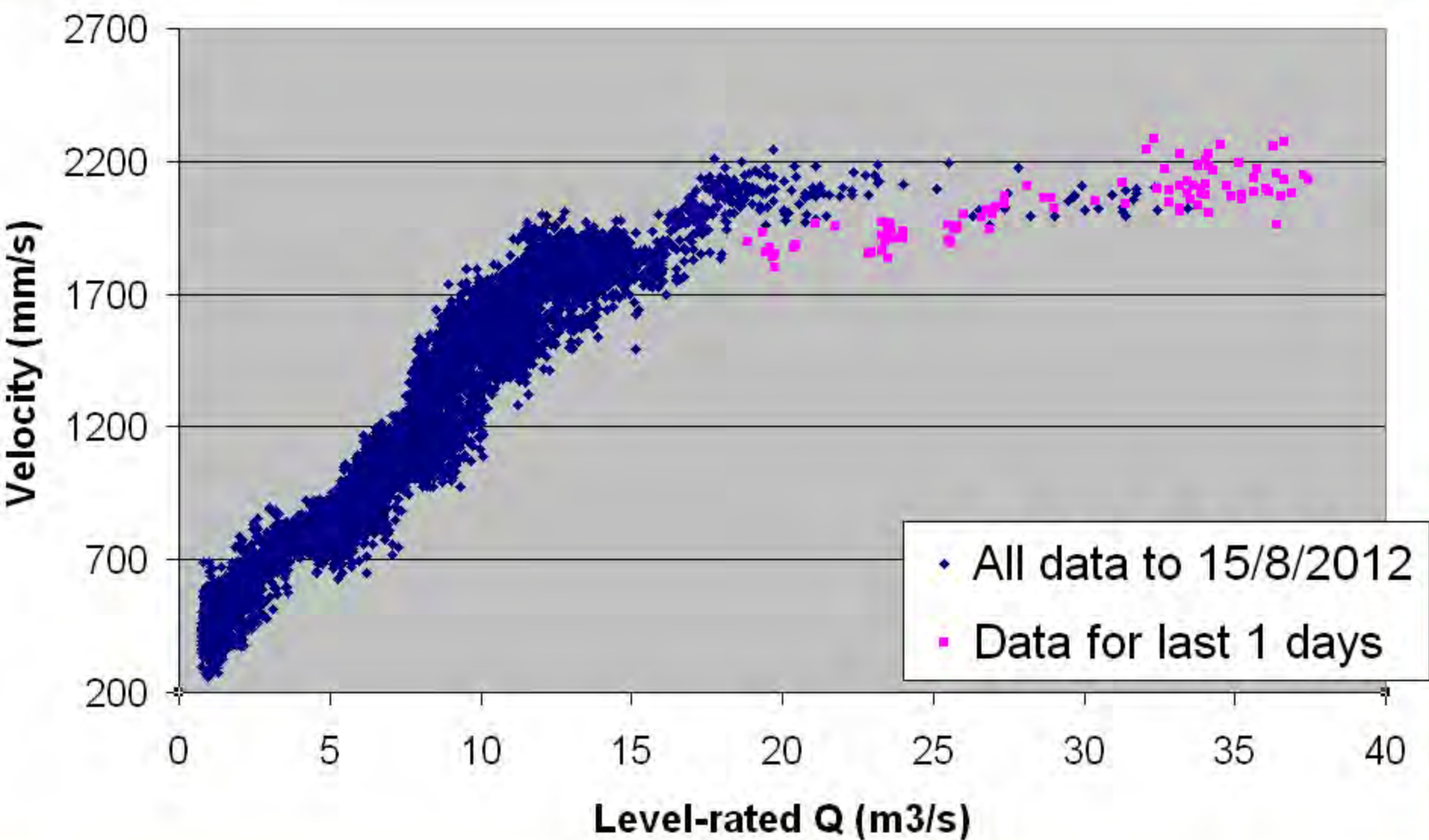
A photograph of a bridge over a river. The bridge has a metal guardrail and a concrete pier. A small white radar sensor is mounted on the side of the bridge, pointing towards the river. The river is flowing rapidly, creating white water. The riverbank is covered in dark, wet rocks. The sky is overcast.

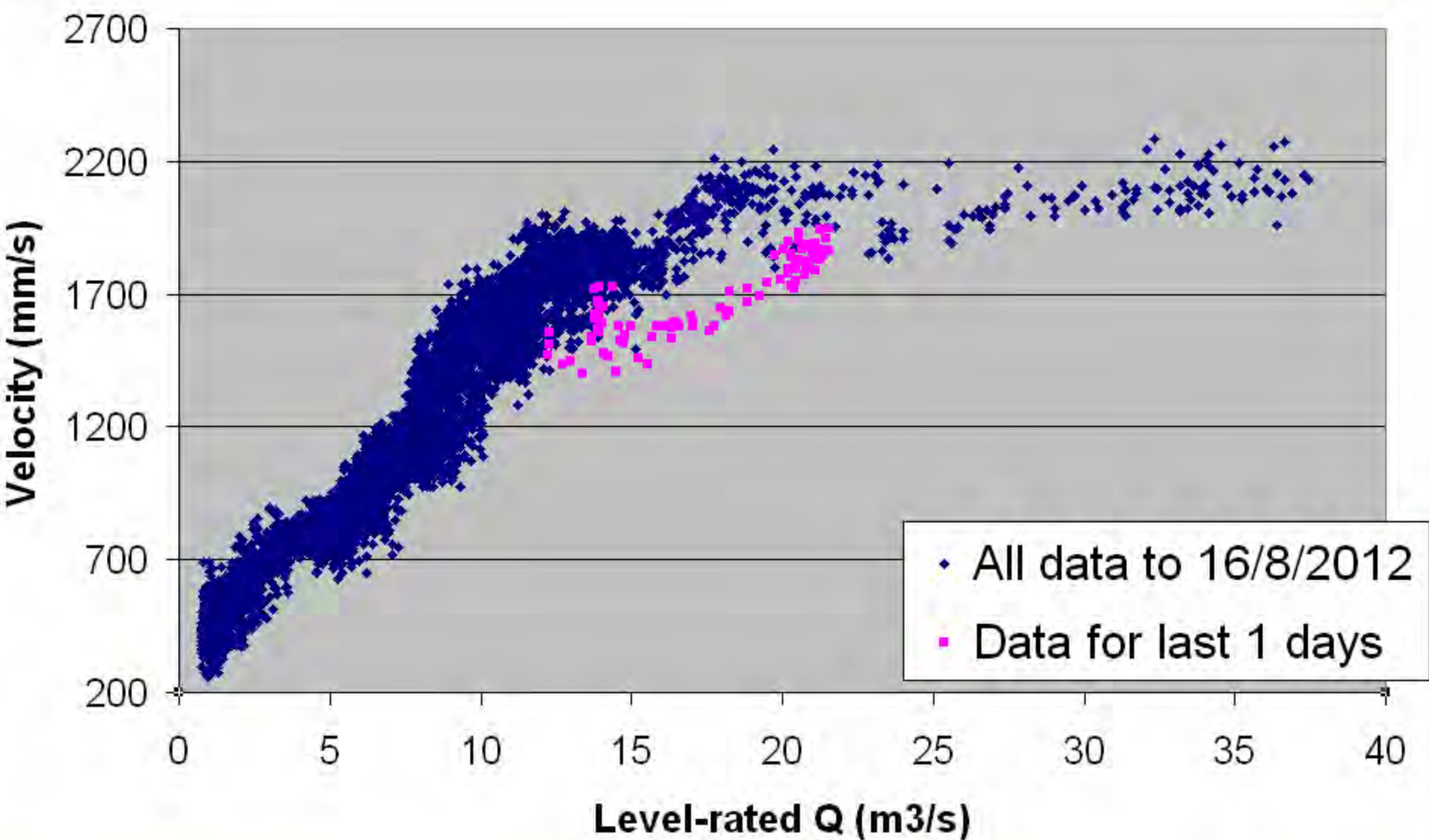
Surface water velocity monitoring (radar)

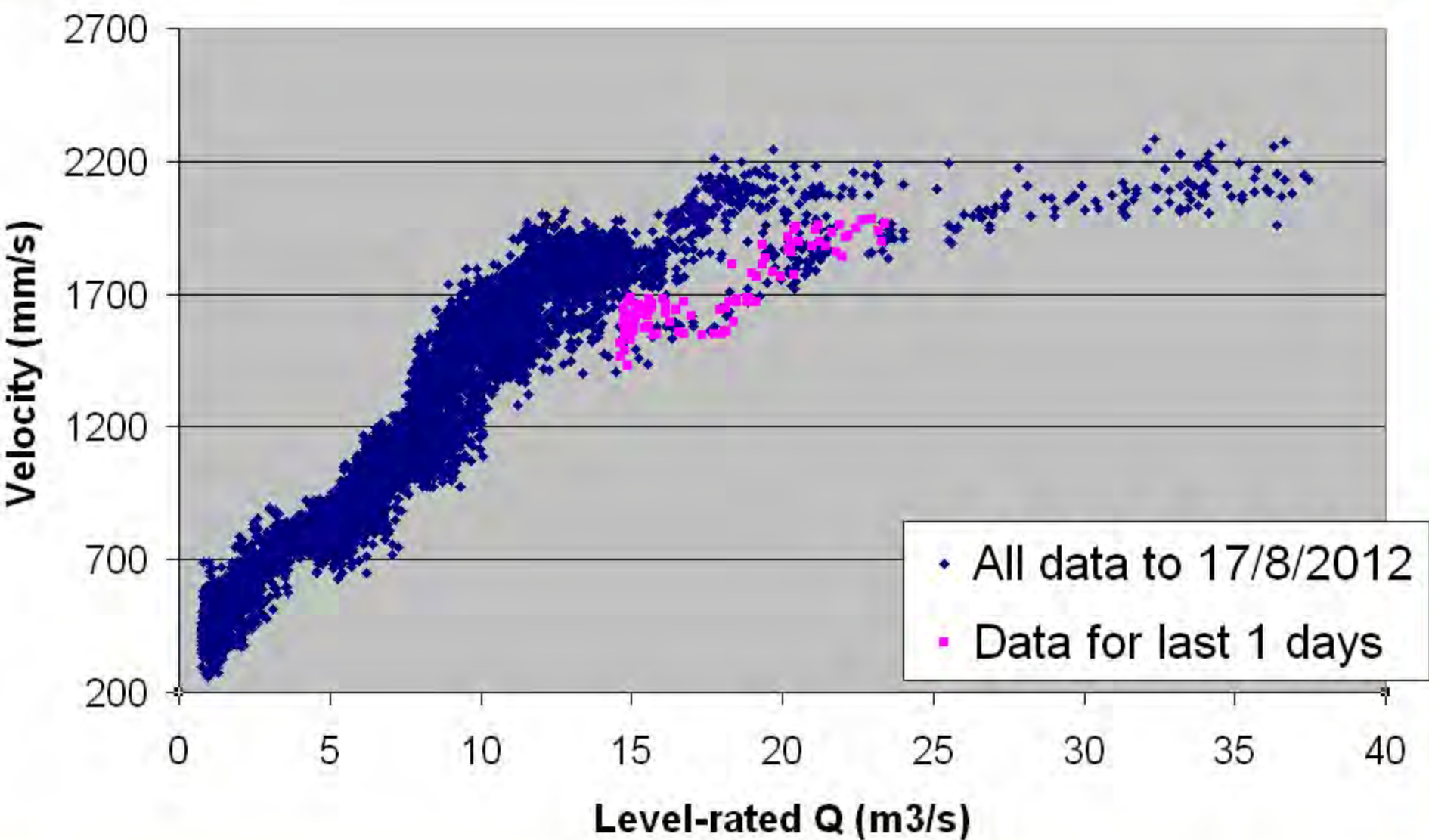
Radar used for continuous velocity monitoring in a highly unstable Icelandic river

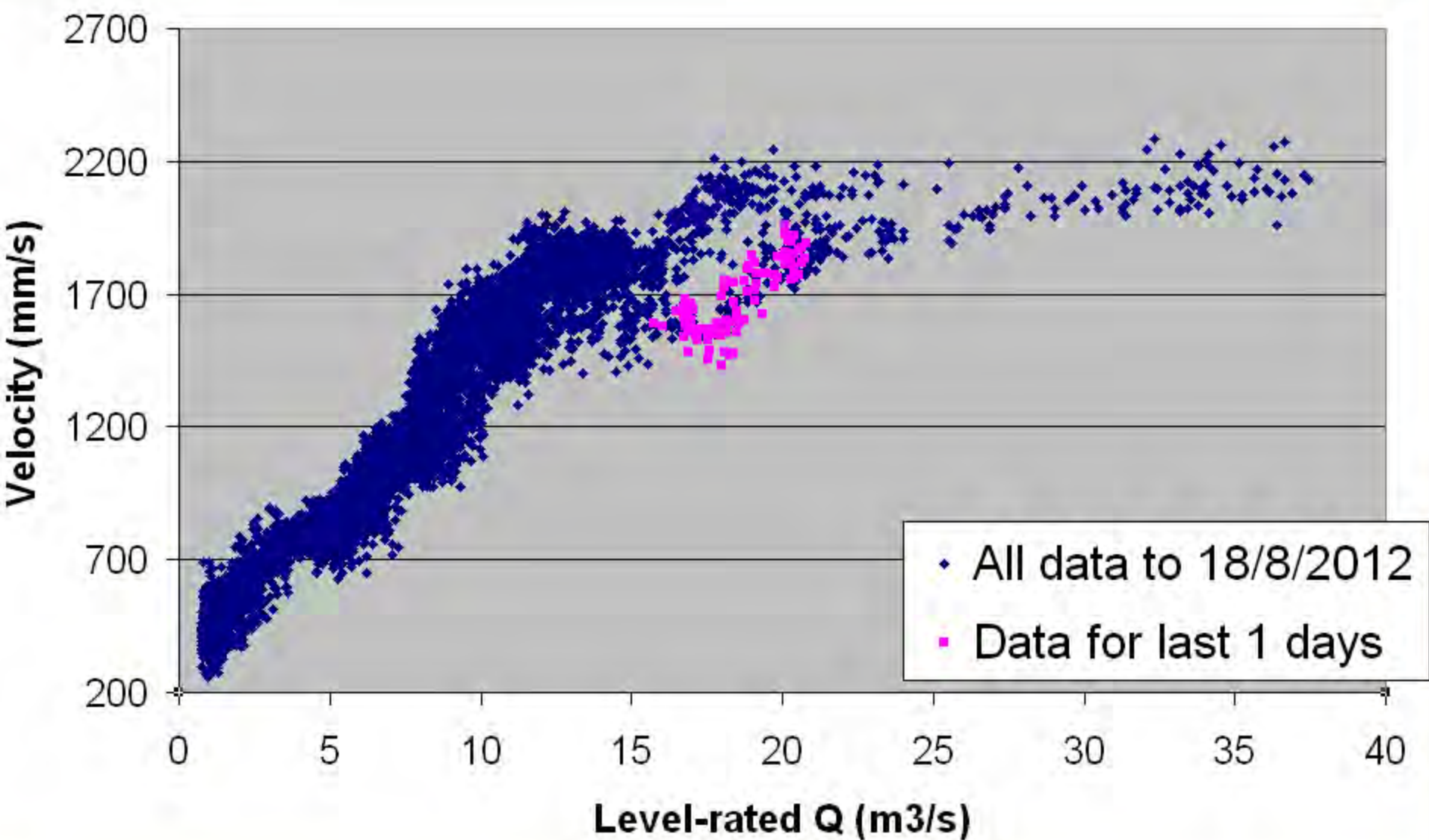


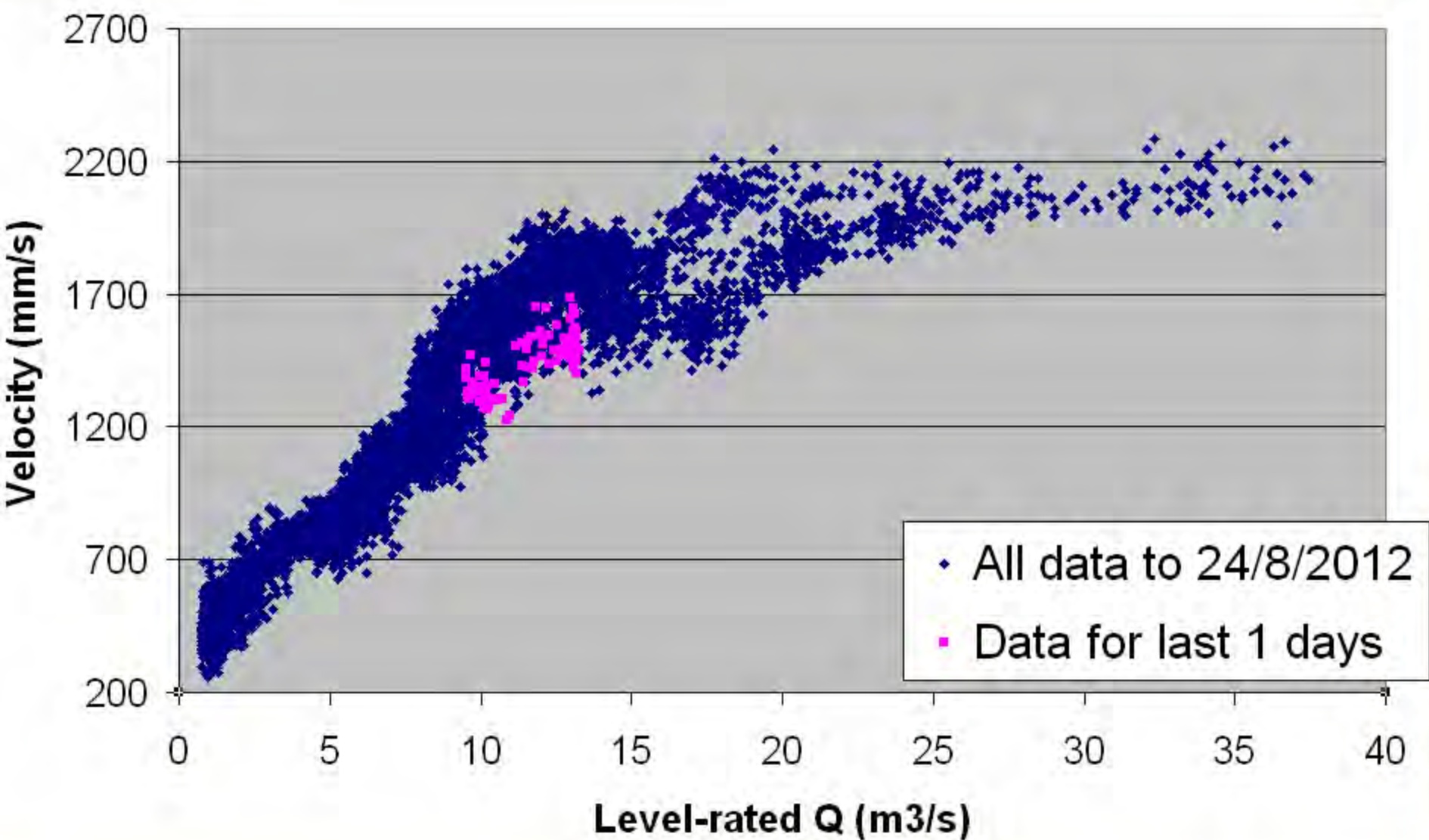


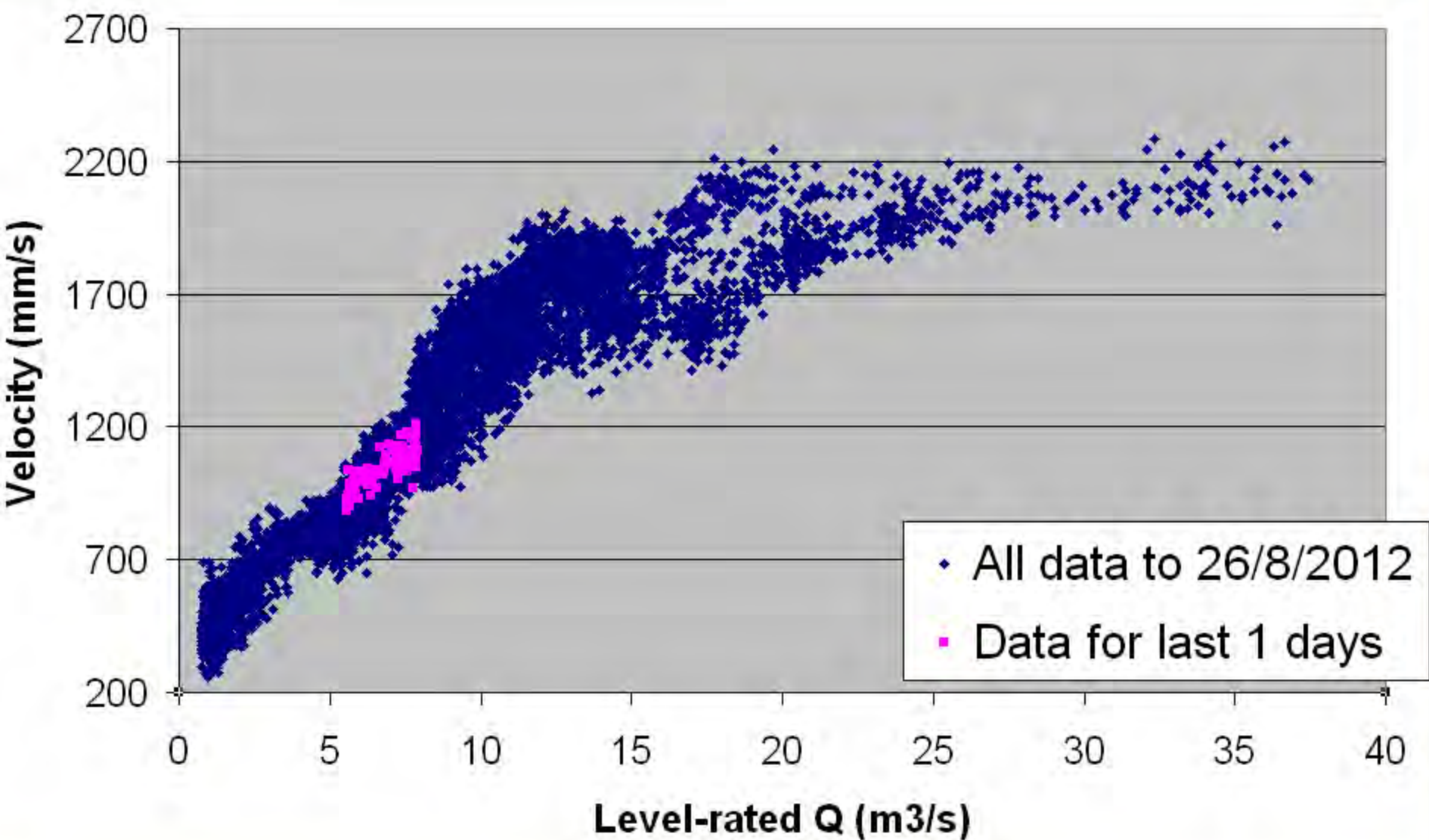


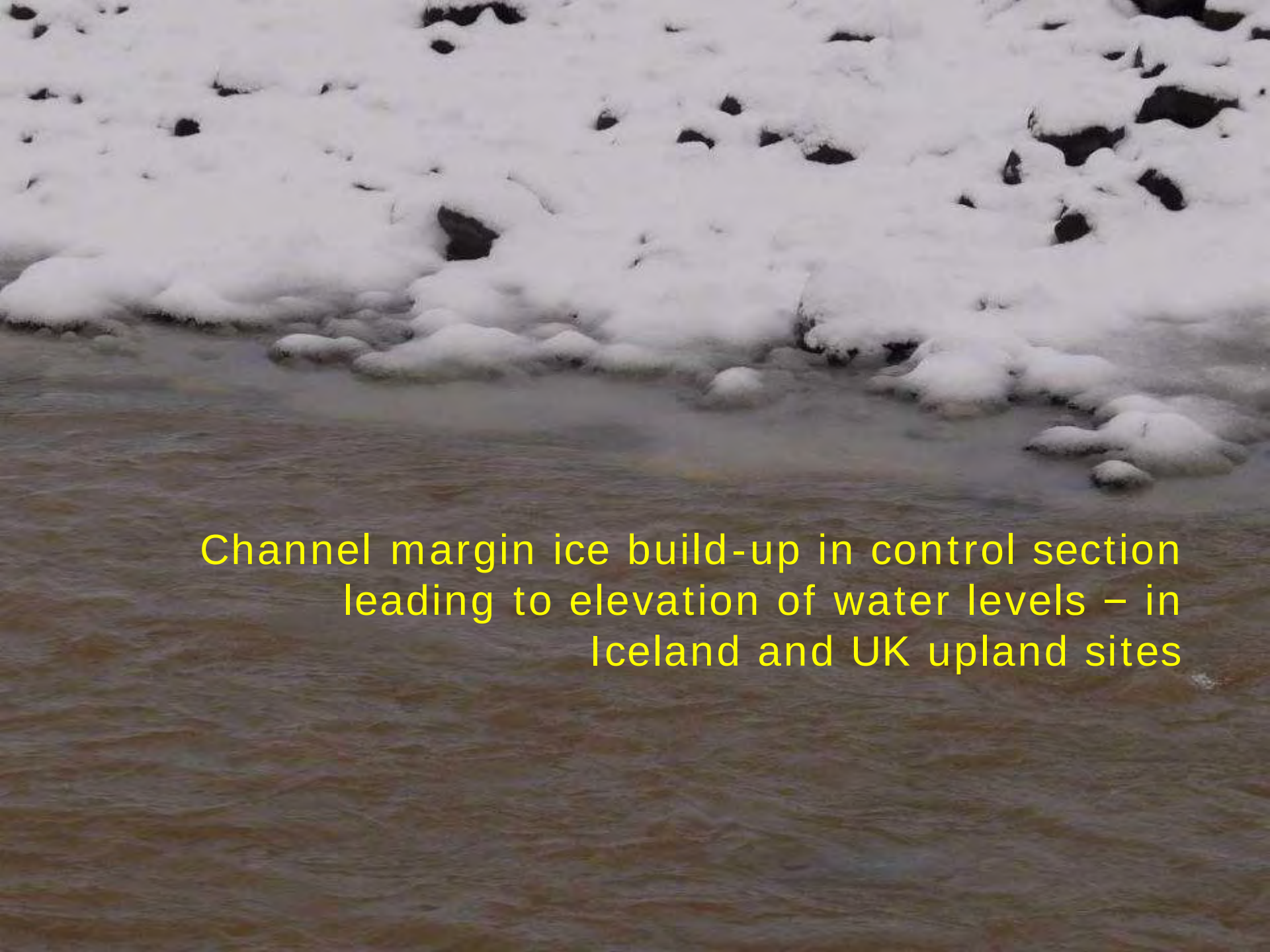








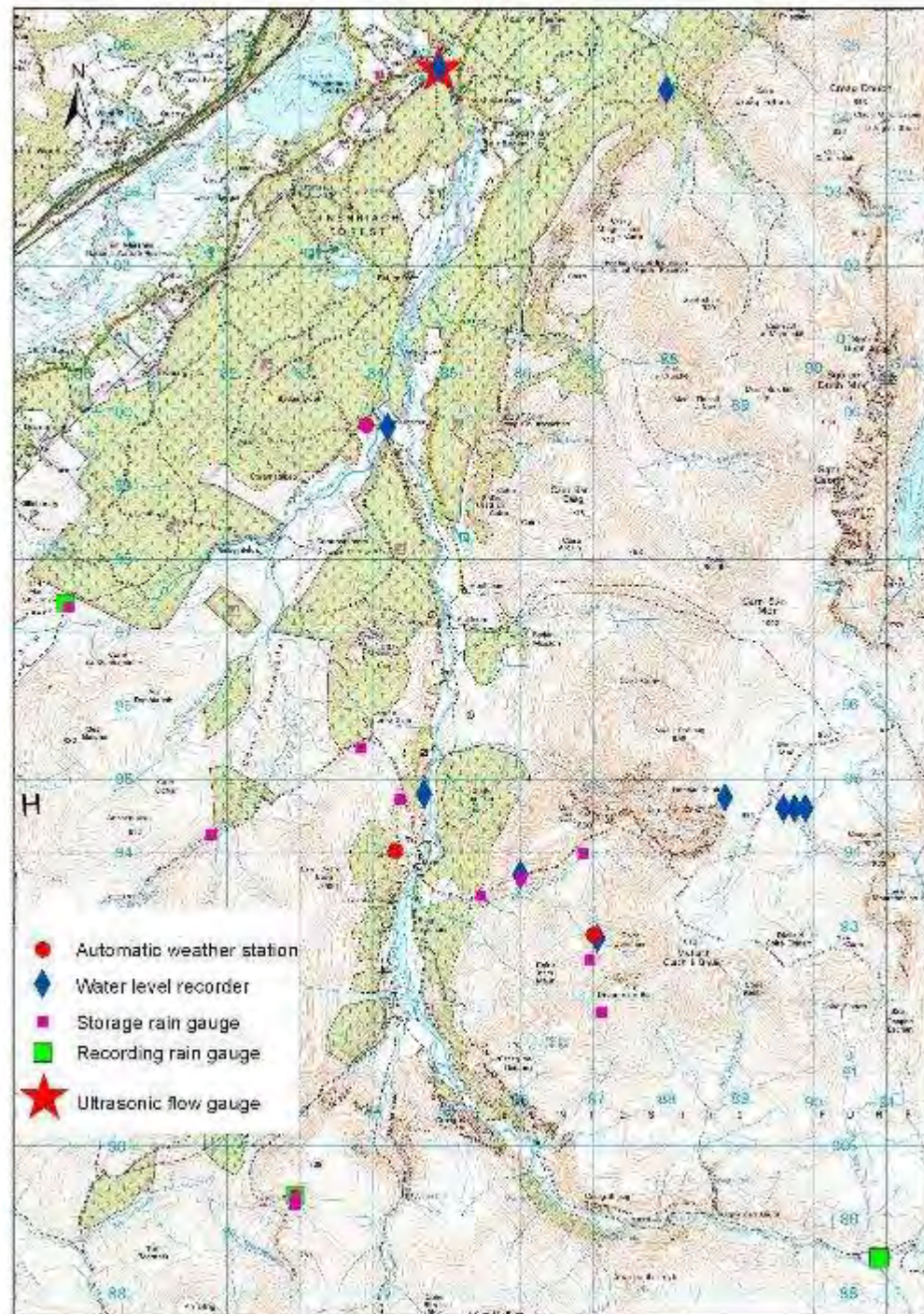


A photograph showing a close-up of a channel margin. The foreground is filled with dark, rippling water. In the middle ground, there is a significant accumulation of white, fluffy ice or snow along the edge of the water. The background shows more of this ice build-up, with some dark rocks visible underneath. The overall scene illustrates the effect of ice on water levels in a control section.

Channel margin ice build-up in control section
leading to elevation of water levels – in
Iceland and UK upland sites

Cairngorms CHASM+

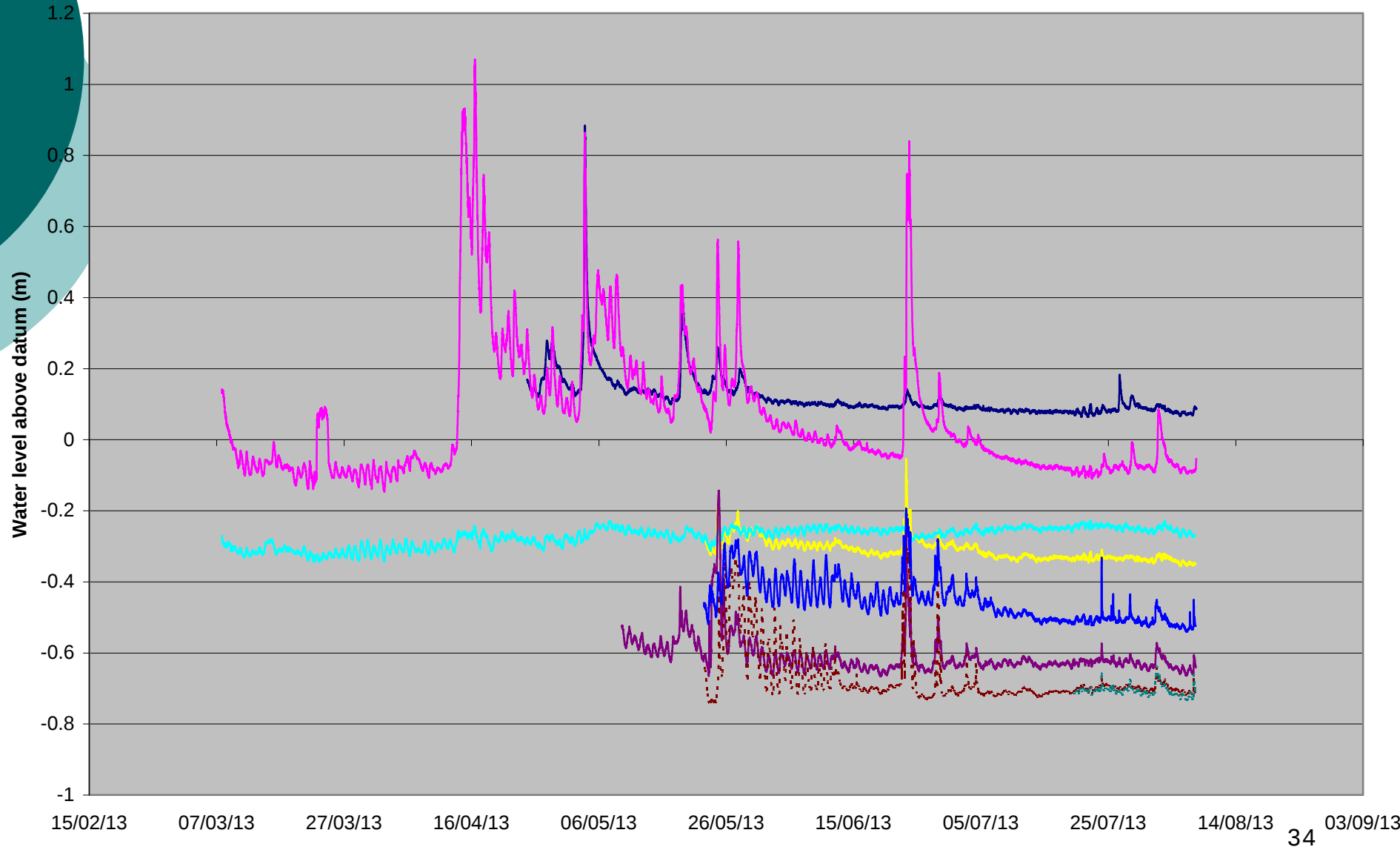
Network established for one set
of questions now proving ideal
for addressing previously
unforeseen others



Native woodland regeneration following intensified deer management



Nested catchment responses (levels)



Data quality enhancement 'must have' 2012



Data quality enhancement 'must have' 2013

- Allows access to remote areas
- Affords opportunities to diversify monitoring networks





To conclude: key themes

- Data representativeness
 - In time
 - In space
 - In catchment space
- Completeness
- Accuracy of flows
- Accuracy of extreme floods