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

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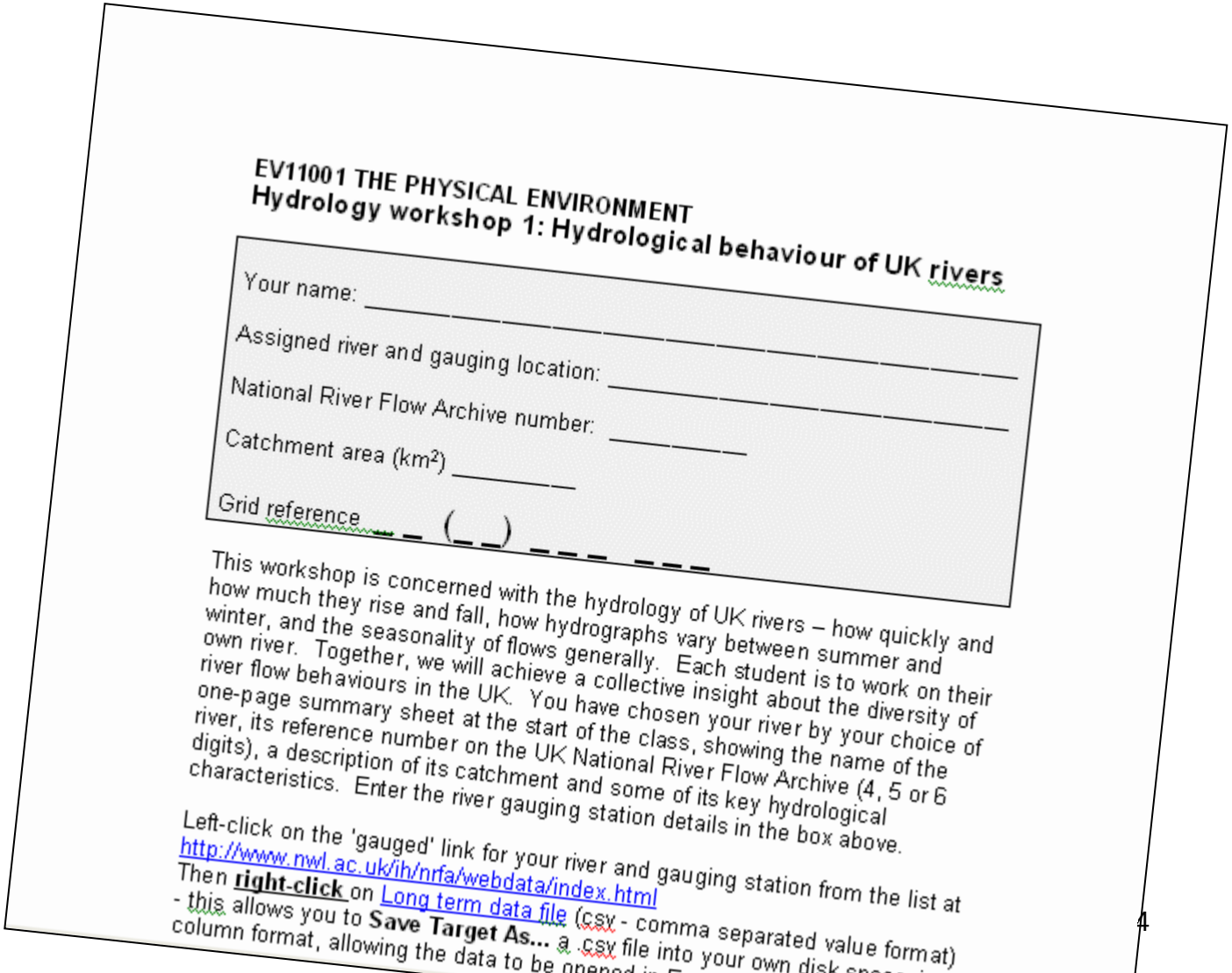
Scottish Water Archive Hydrologist 1992-1995

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 (km^2) _____

Grid reference _ _ (_ _) _ _ _ _ _ _

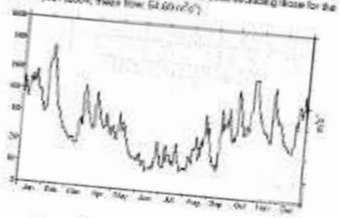
This workshop is concerned with the hydrology of UK rivers – how quickly and how much they rise and fall, how hydrographs vary between summer and winter, and the seasonality of flows generally. Each student is to work on their own river. Together, we will achieve a collective insight about the diversity 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
column format, allowing the data to be opened in

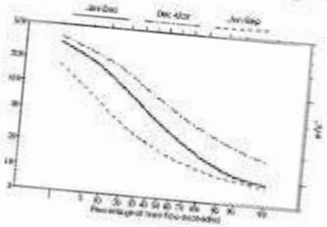
54001 - Severn at Bewdley

Grid Reference:	32 (SO) 782 762
Operator:	EA
Local number:	2001
Catchment Area:	4325.0 km^2
Level of Station:	17.0 mOD
Max. Altitude:	827.0 mOD
Mean flow:	61.17 m^{3}s^{-1}
95% exceedance (Q95):	10.66 m^{3}s^{-1}
10% exceedance (Q10):	146.1 m^{3}s^{-1}
61-90 Av. Ann. Rainfall:	913 mm

Sample Hydrograph of Gauged Daily Flows



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 (1966-7).

Catchment Description

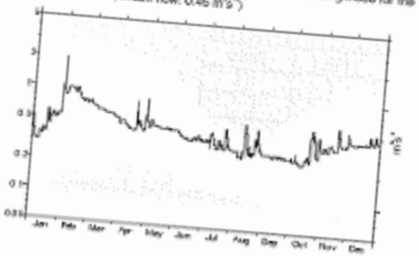
Diverse catchment; wet western 50% from impermeable Palaeozoic rocks and river gravels; drier northern 50% from Drift covered Carboniferous to Liassic sandstones and marls. Moorland, forestry, mixed farming.

29003 - Lud at Louth

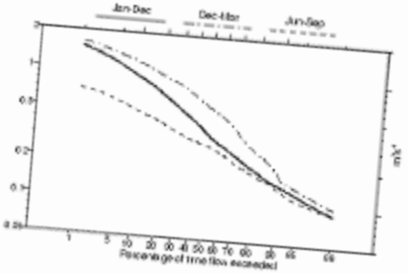
Grid Reference:	53 (TF) 337 879
Operator:	EA
Catchment Area:	55.2 km^2
Level of Station:	15.4 mOD
Max. Altitude:	149.0 mOD
Mean flow:	0.45 m^{3}s^{-1}
95% exceedance (Q95):	0.125 m^{3}s^{-1}
10% exceedance (Q10):	0.891 m^{3}s^{-1}
61-90 Av. Ann. Rainfall:	699 mm

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 m^{3}s^{-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

Centre for Ecology & Hydrology
NATURAL ENVIRONMENT RESEARCH COUNCIL

Cymraeg | Feedb

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

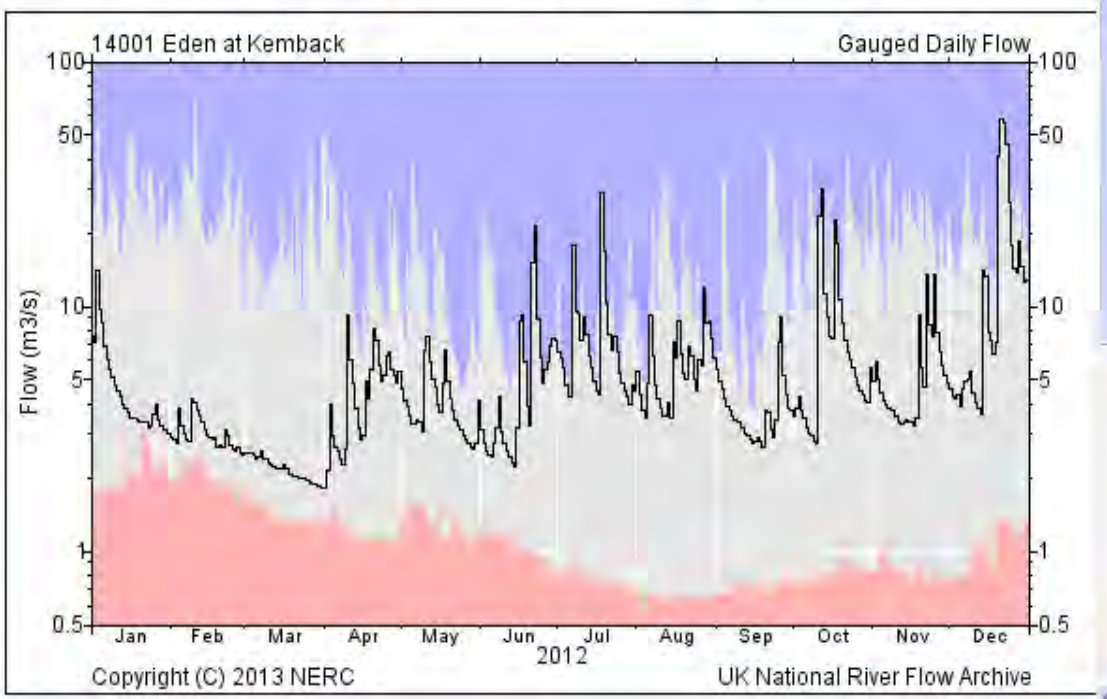
Period of Record:	1967 - 2012
Percent Complete:	100 %
Base Flow Index:	0.63
Mean Flow:	4.054 m^3/s
95% Exceedance (Q95):	0.98 m^3/s
70% Exceedance (Q70):	1.833 m^3/s
50% Exceedance (Q50):	2.765 m^3/s
10% Exceedance (Q10):	8.212 m^3/s

Download data

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

Download flow data

Graph Type: Annual Hydrograph Year: < 2012 > Refresh



Microsoft Excel - _acraig_attempt_2012-10-22-11-39-13_Workshop1 (2012) student alison.xls

File Edit View Insert Format Tools Data Window Help

Type a question for help

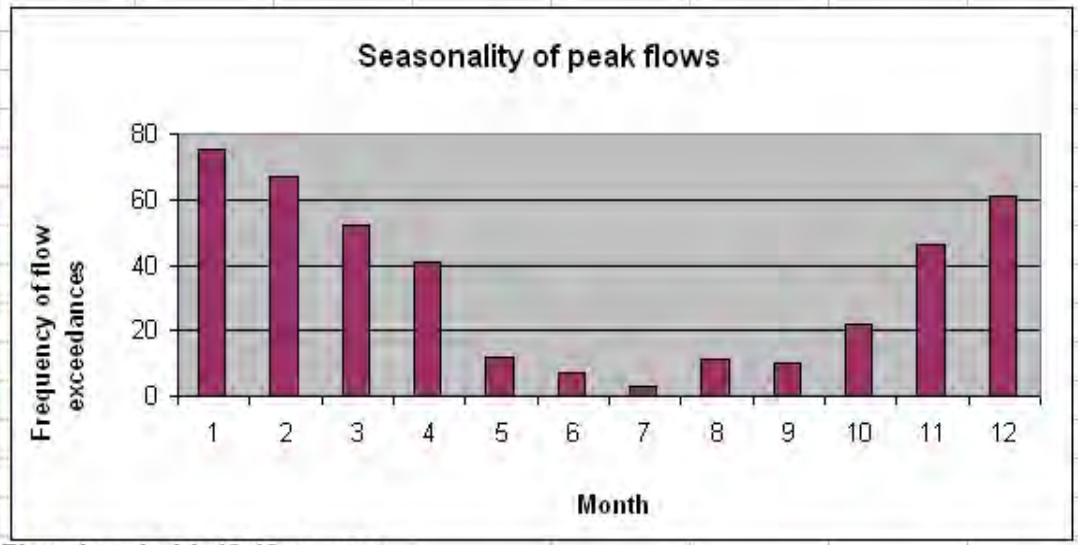
115% Zoom Arial 12

A1 3. Peak flow seasonality

3. Peak flow seasonality

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

Adjust threshold



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

Flow threshold: 12.18 cumecs

Proportion of all days above threshold: 2.5%

Number of days above threshold: 407

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.

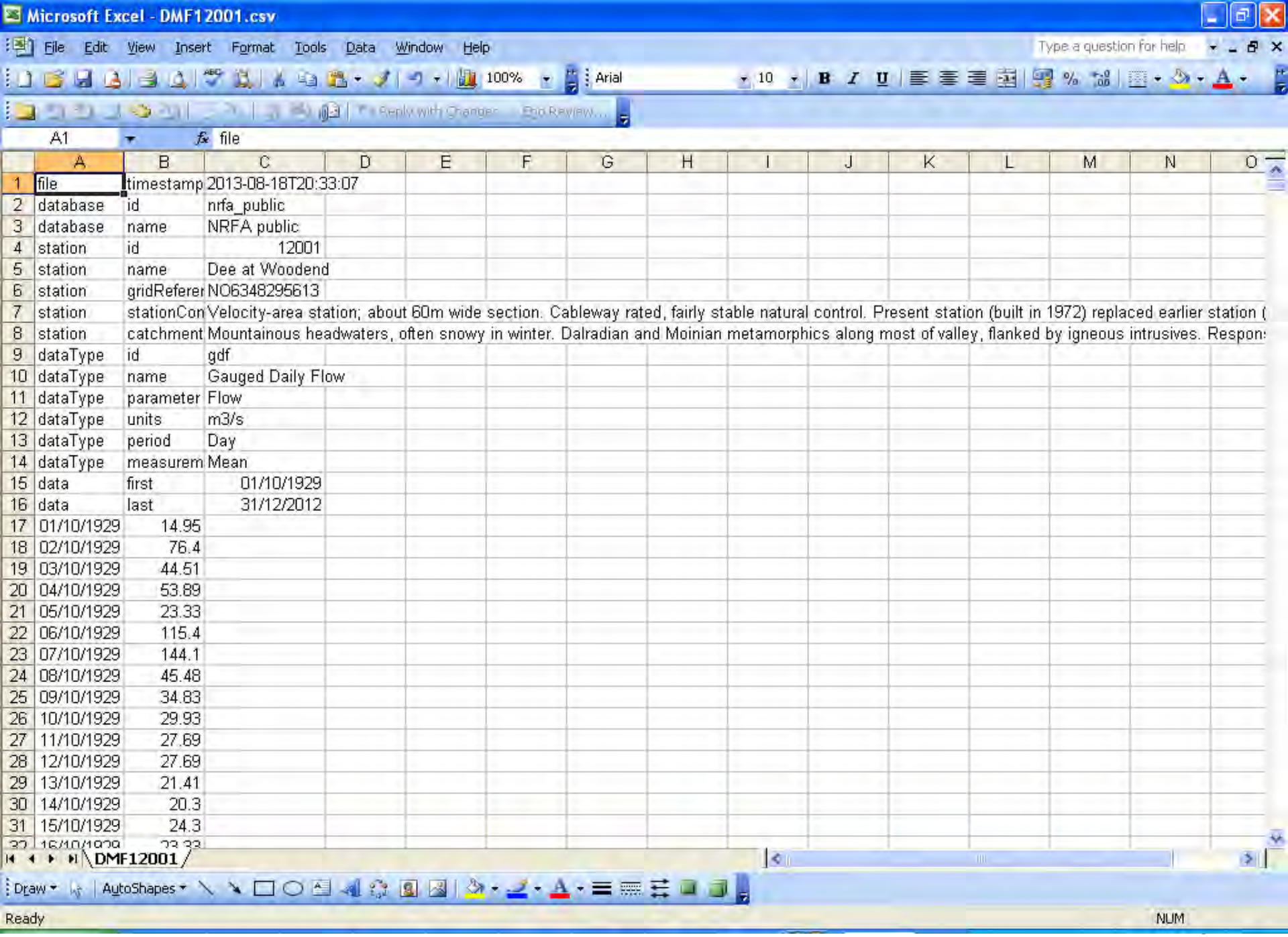
3.2 How has the peak flow season changed compared with 3.1 above?

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

Intro DATA Annual Rises+falls **Seasonality** Works

Draw AutoShapes

Ready NUM



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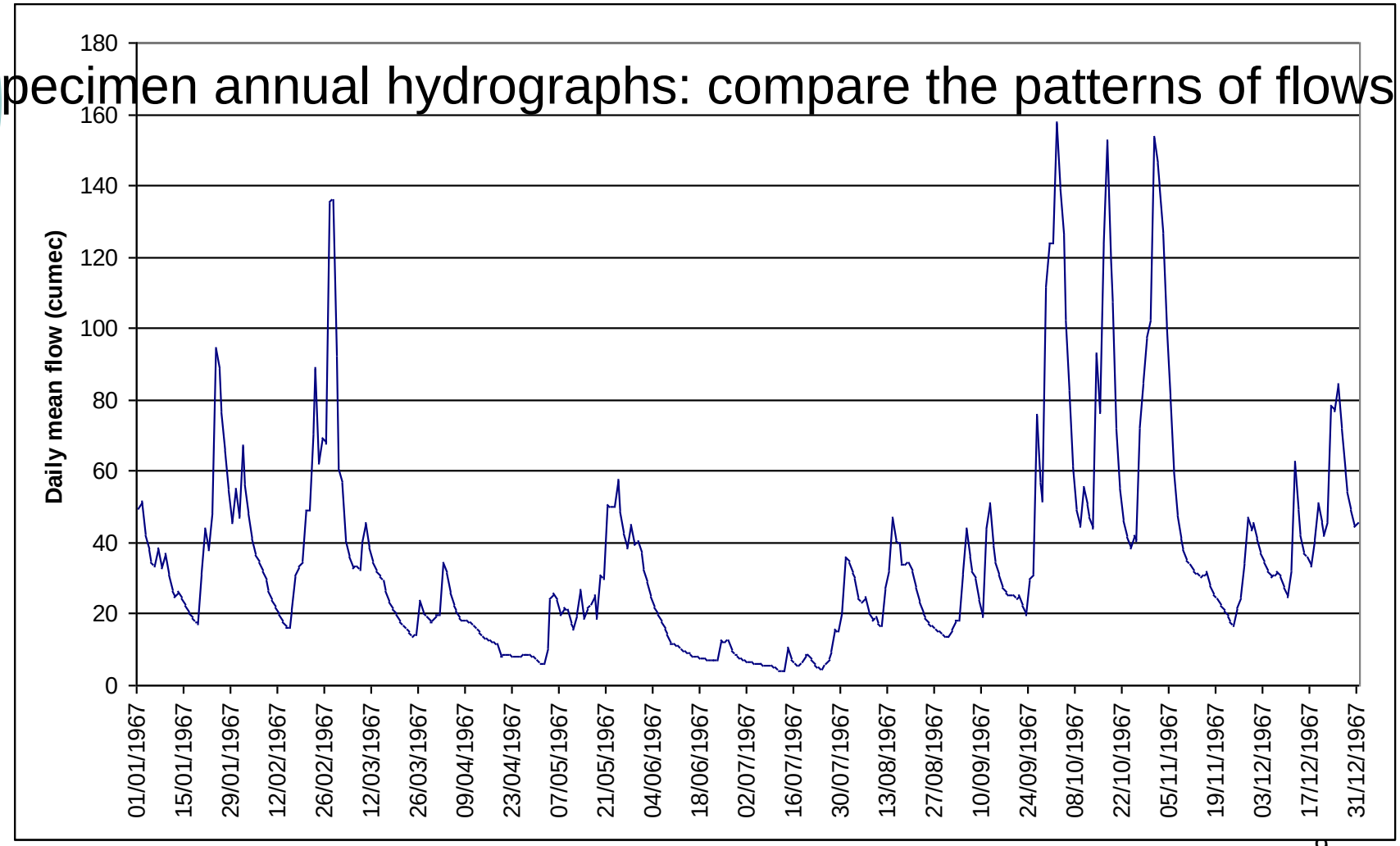
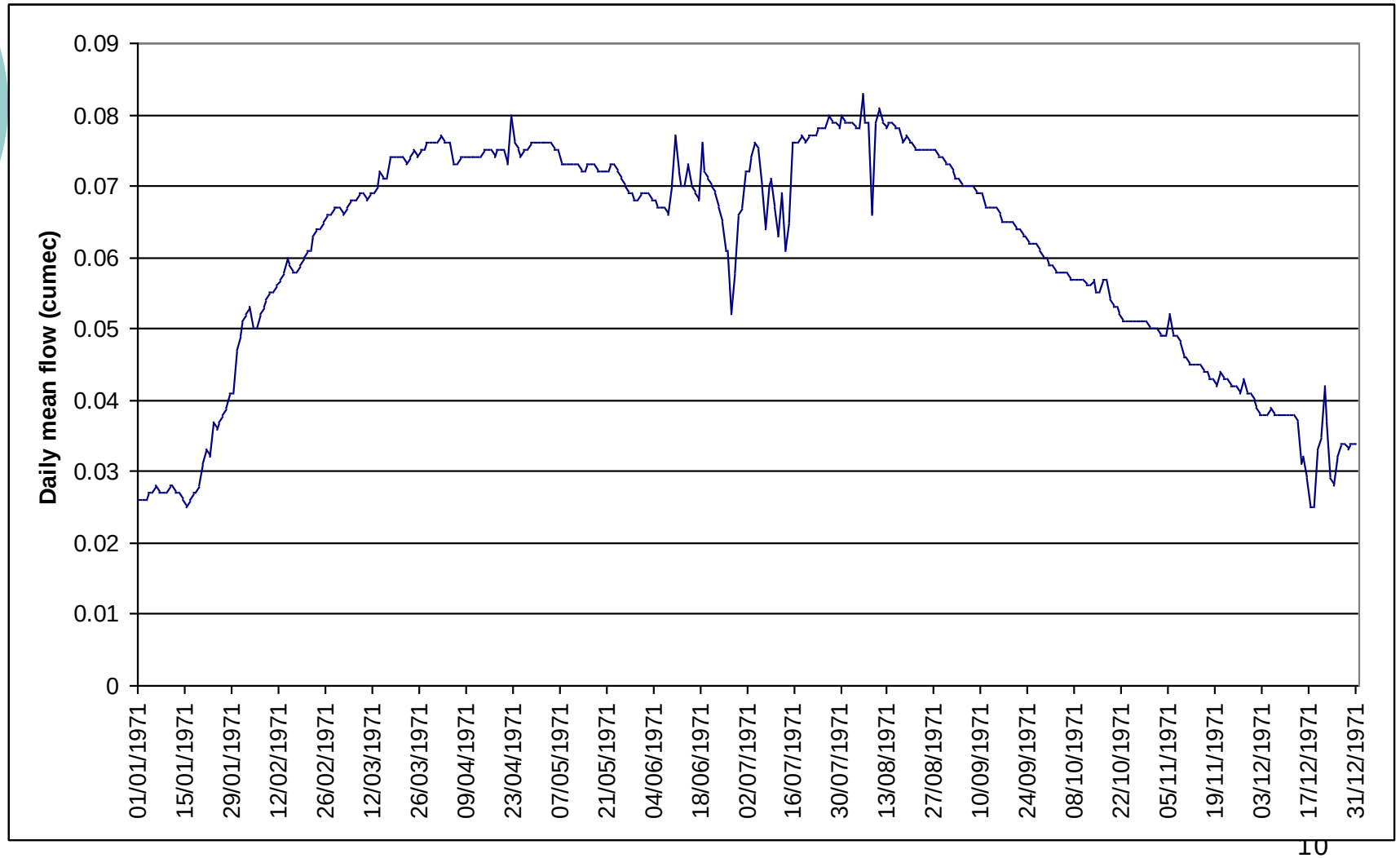
2	database	id	nrfa_public												
3	database	name	NRFA public												
4	station	id	12001												
5	station	name	Dee at Woodend												
6	station	gridReferer	NO6348295613												
7	station	stationCon	Velocity-area station; about 60m wide section. Cableway rated, fairly stable natural 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

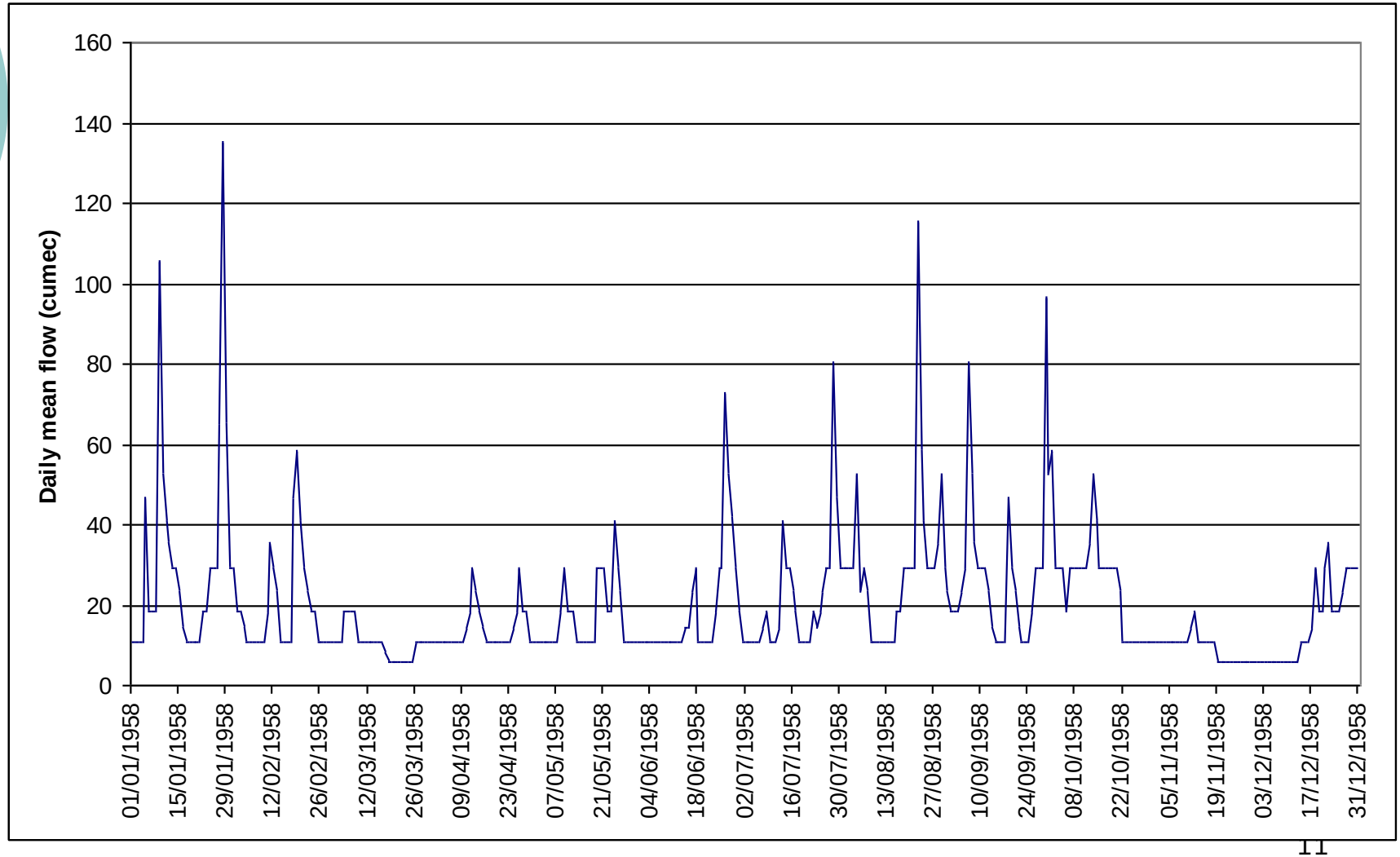
Specimen annual hydrographs: compare the patterns of flows



Hydrograph: Ewelme Brook

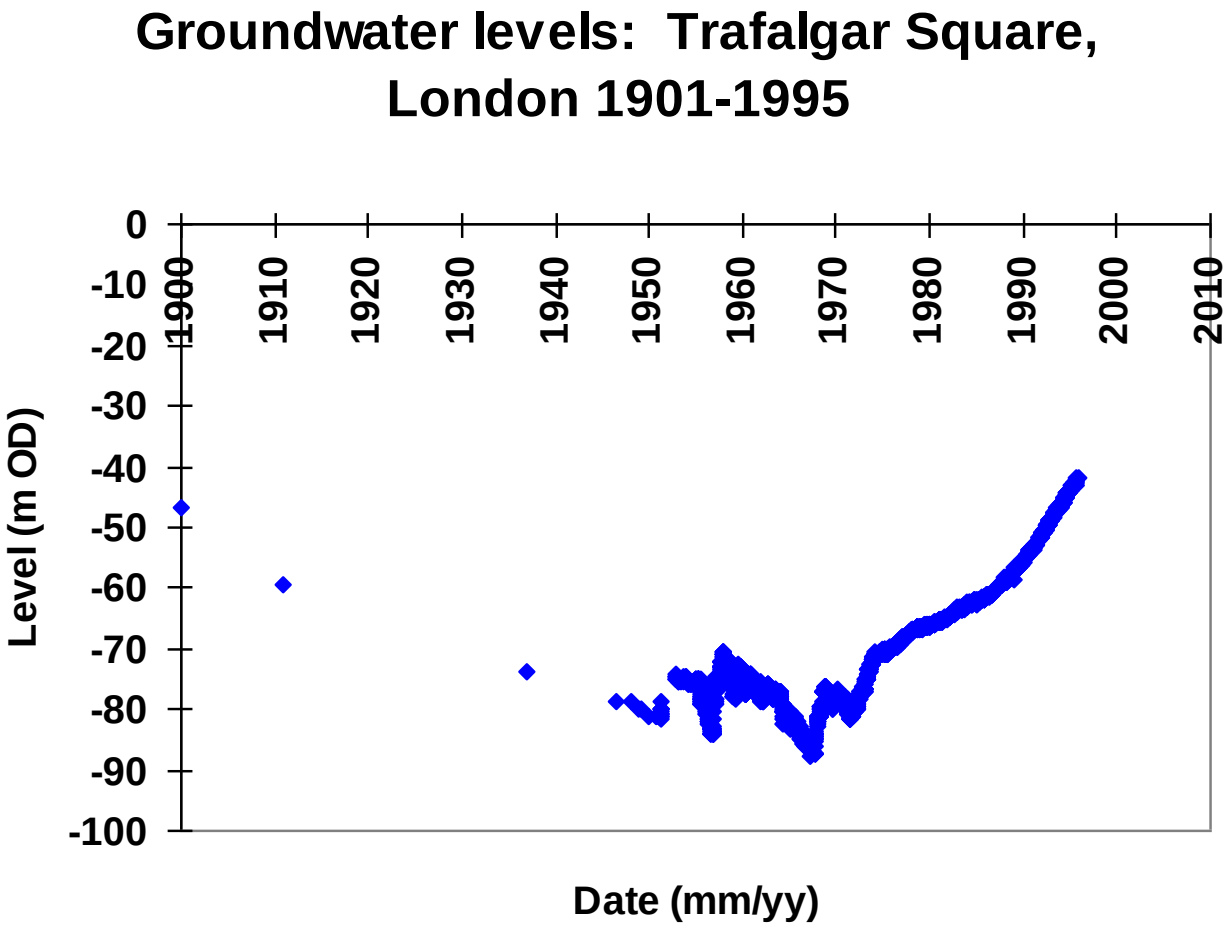


Hydrograph: River Lyon



NRFA/NGLA data and students

- Dissertations



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

Google "national river flow archive"

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 r 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

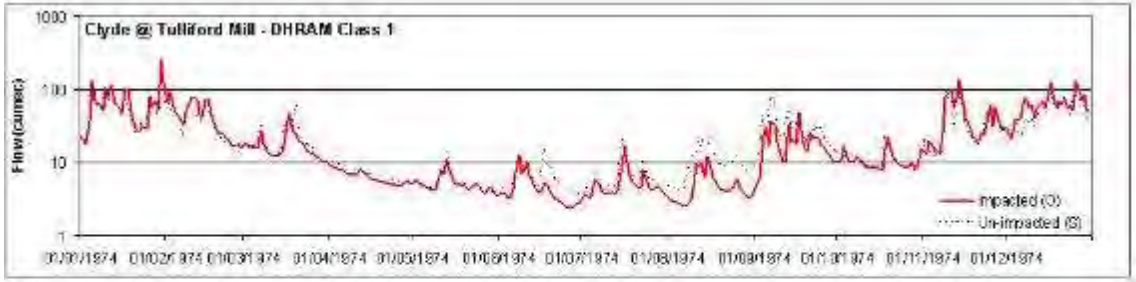
Observed long-term changes in UK river flow patterns: a review
J Hannaford - 2013 - nora.nerc.ac.uk
The aim of this paper is to provide a state-of-the-art assessment of the evidence for long-term river flow changes in the UK. This paper necessarily focuses on climate-driven changes in flow, as opposed to capturing changes caused by human influences such as water ...
Cite

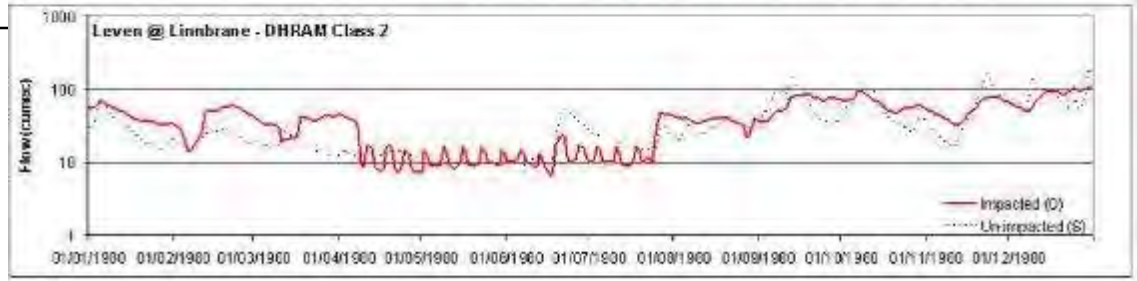
Capitalising on river flow data to meet changing national needs—a UK perspective
TJ Marsh - Flow Measurement and Instrumentation, 2002 - Elsevier
... This paper examines recent UK initiatives to address strategic river flow information needs with particular reference to the UK gauging station network 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

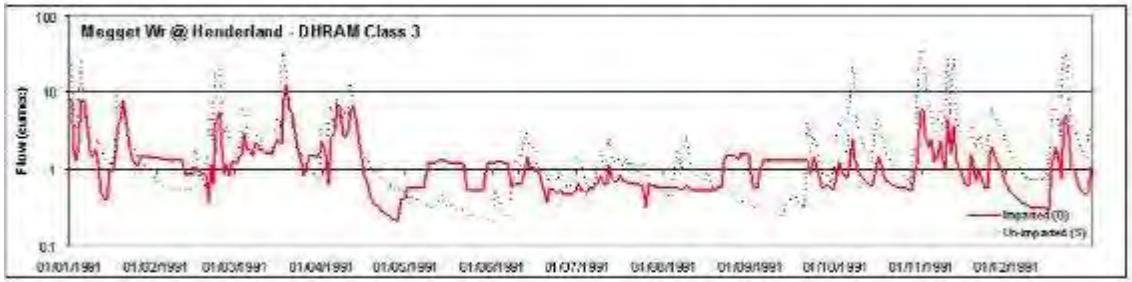
Hydrological regimes, sampling strategies, and assessment of errors in mass load estimates for Kingdom rivers
IG Littlewood - Environment International, 1995 - Elsevier
... The **National River Flow Archive** maintained by the Institute of Hydrology contains daily mean flow data for over 1000 operational 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

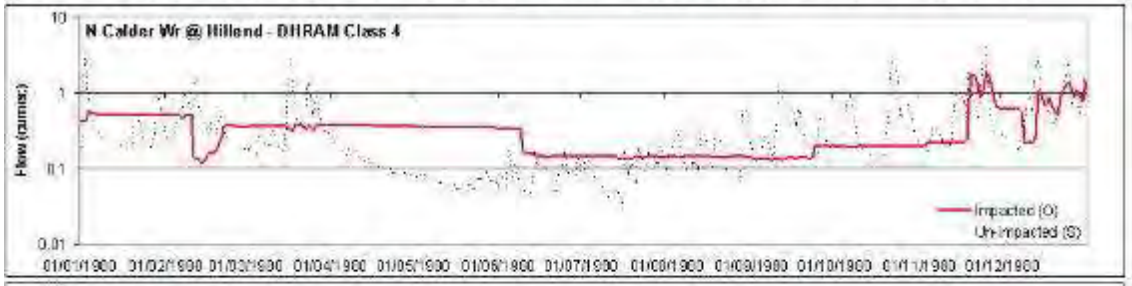
Research

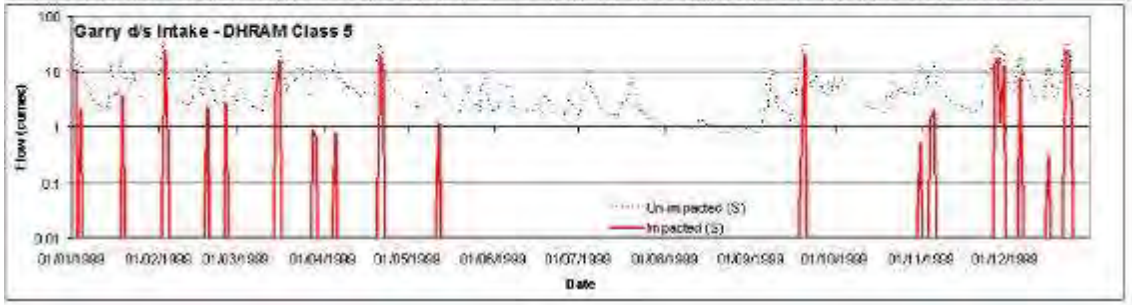
WFD48: Development of Environmental Standards (Water Resources)











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

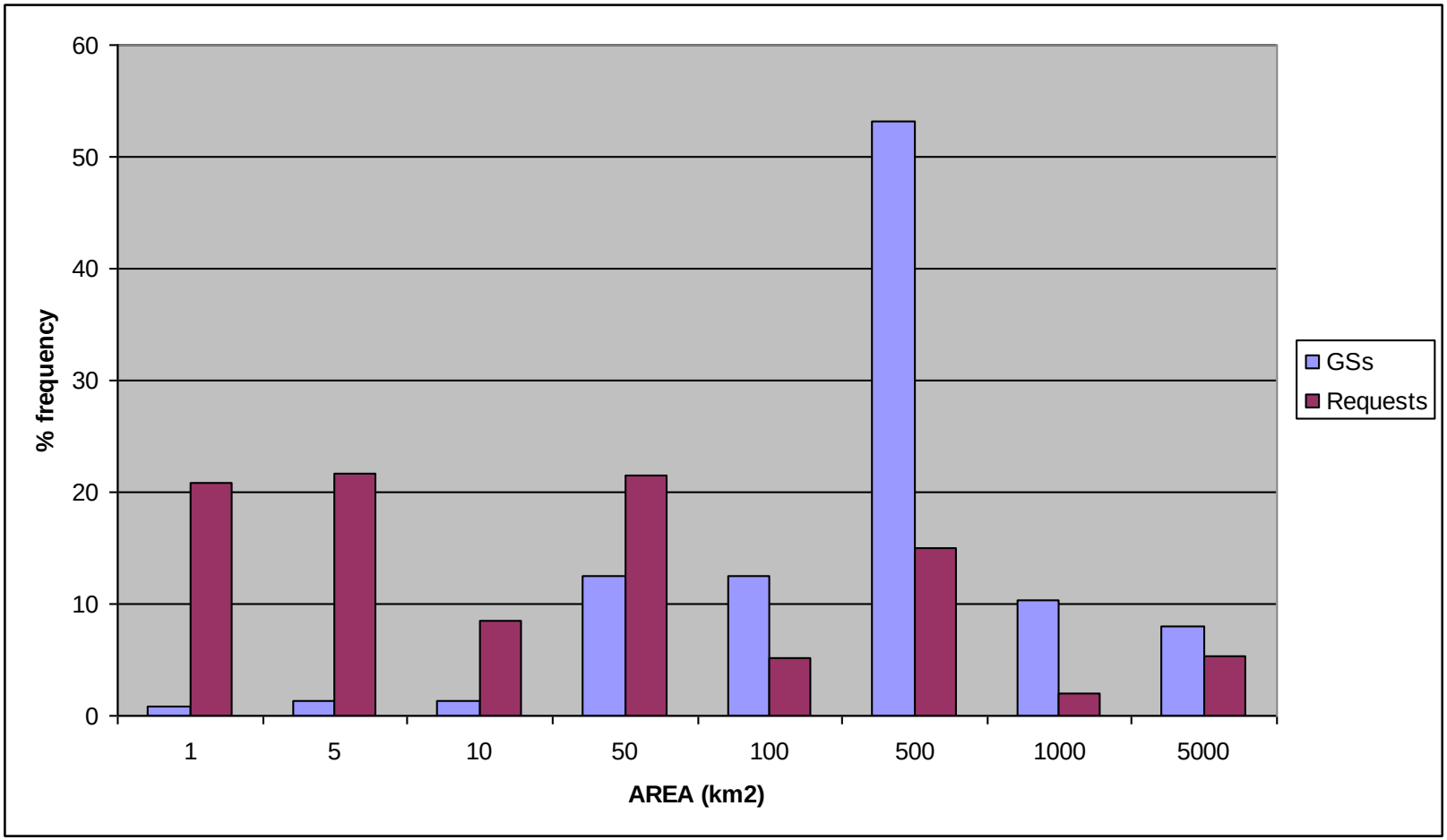
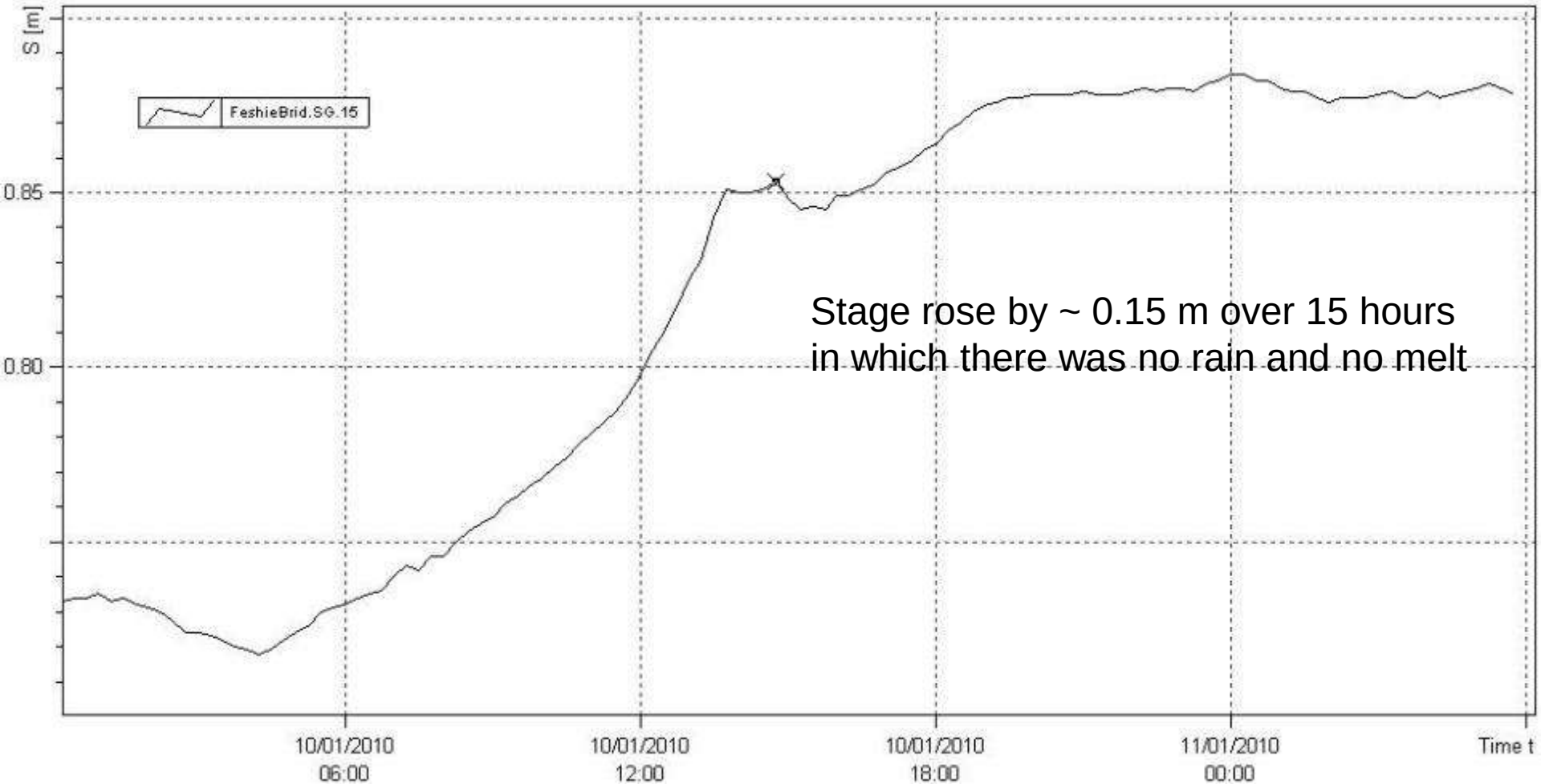


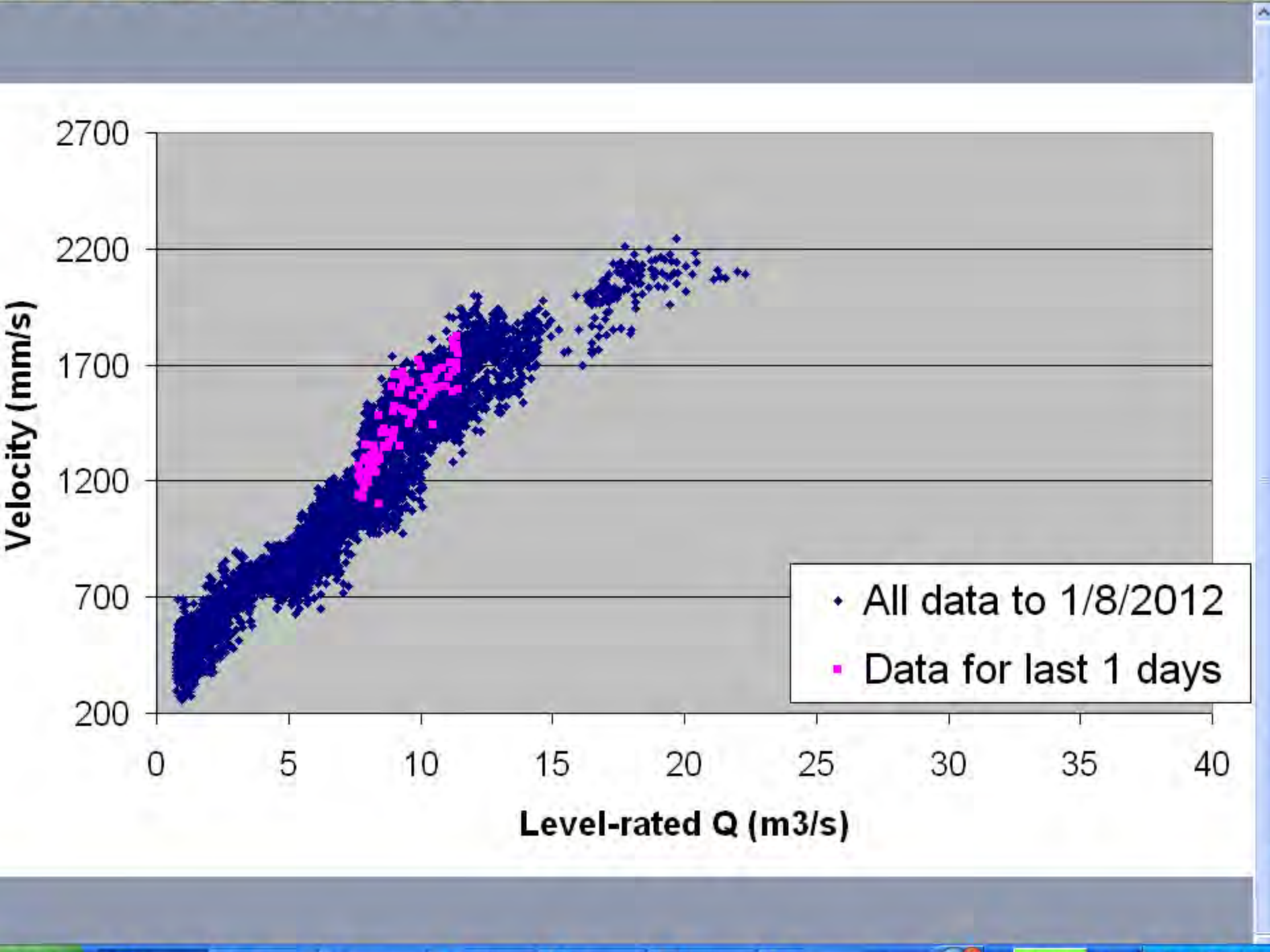
Illustration of ice build up



Stage rose by ~ 0.15 m over 15 hours
in which there was no rain and no melt

BGS Virkisjökull Glacier Monitoring Project


Surface water velocity monitoring (radar)
Radar used for continuous velocity monitoring in a highly unstable Icelandic river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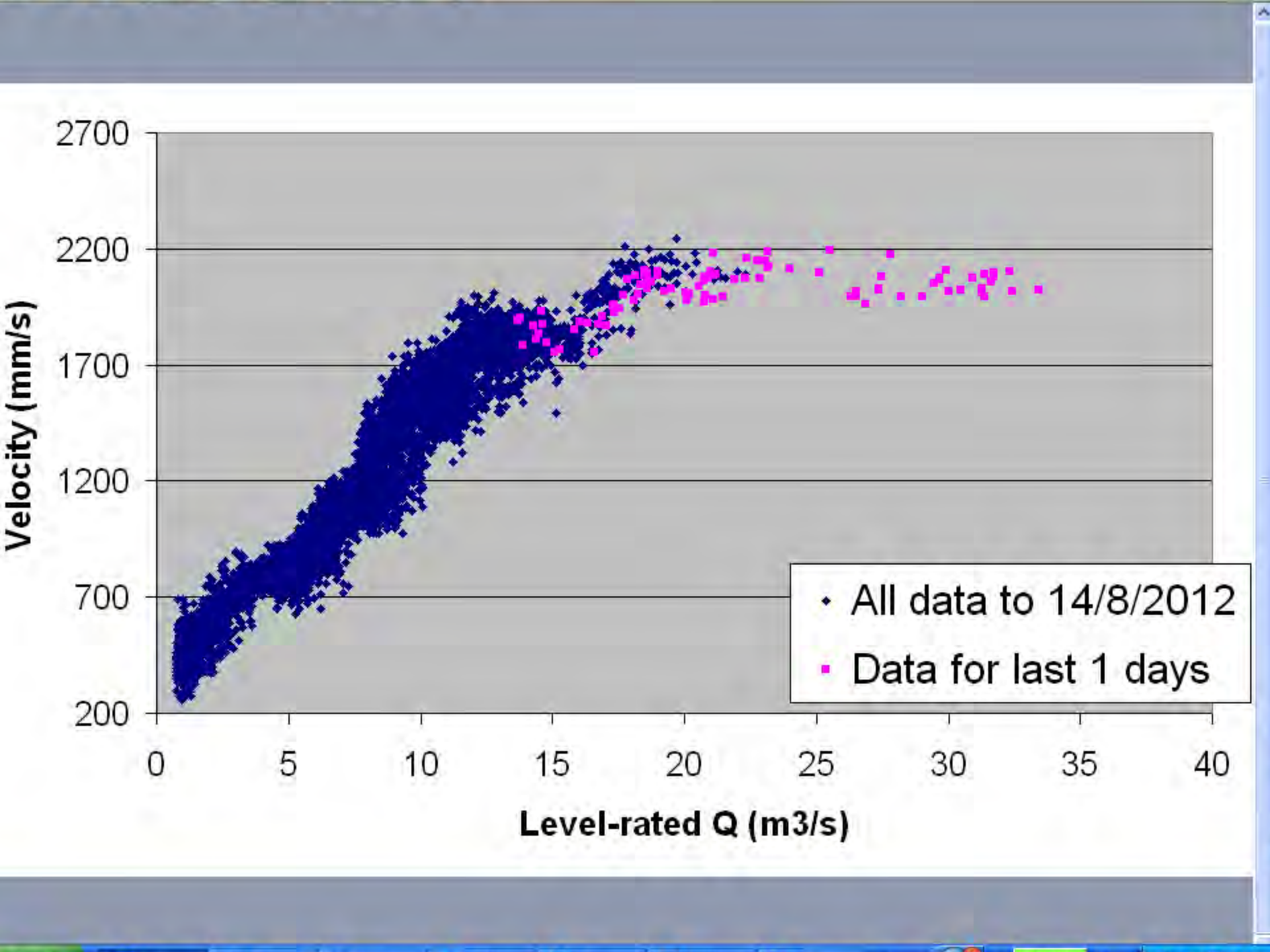
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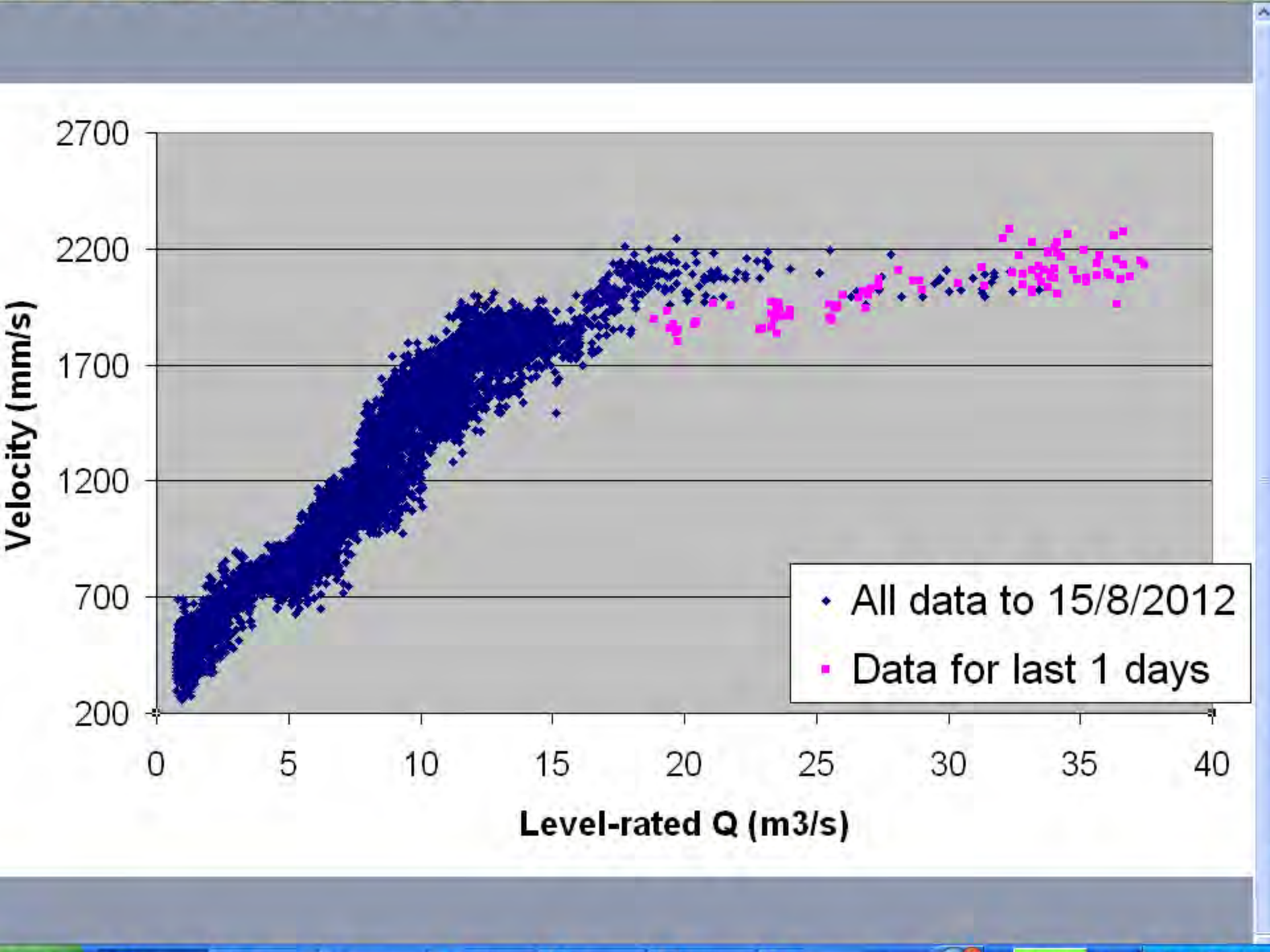
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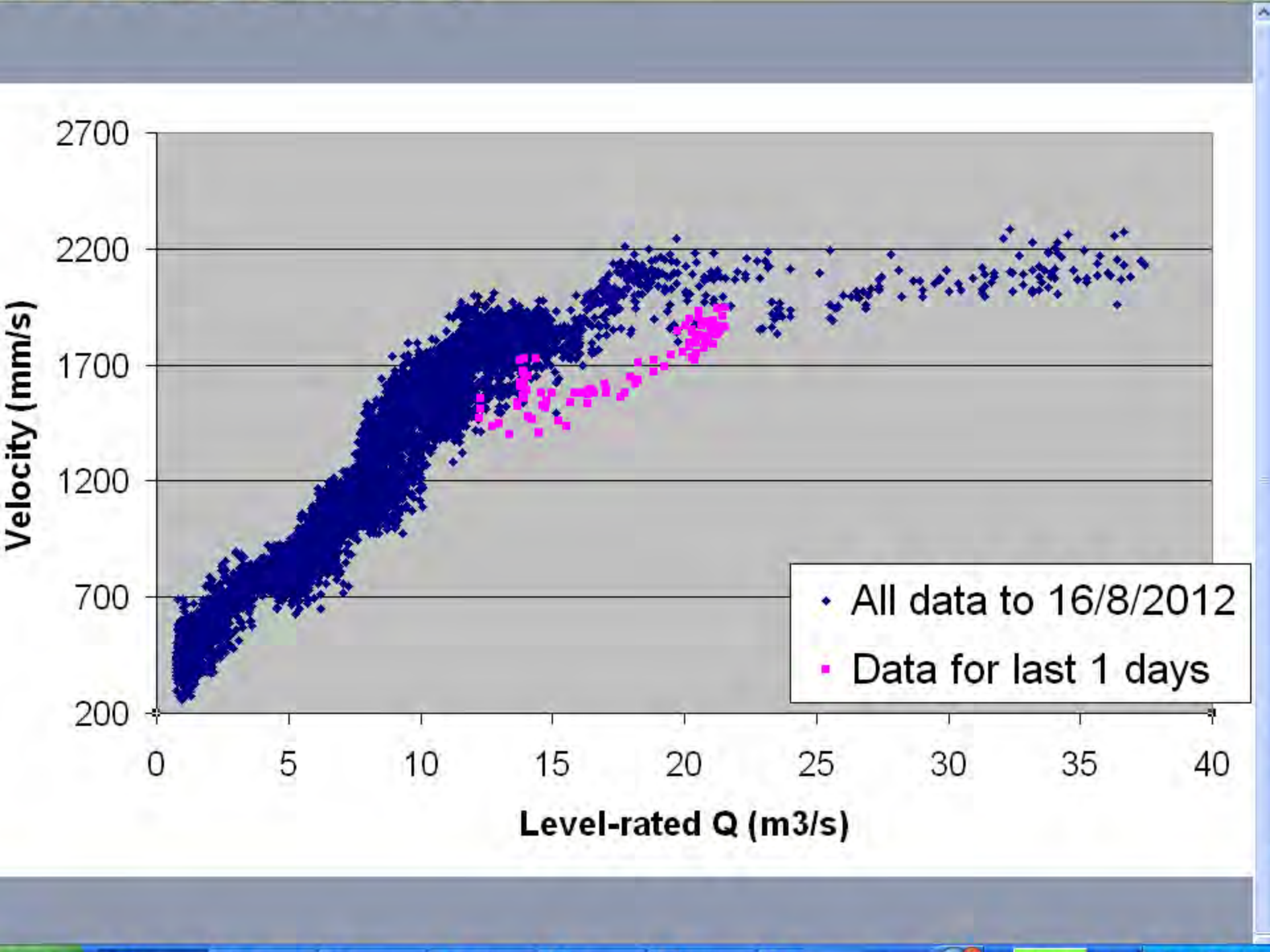
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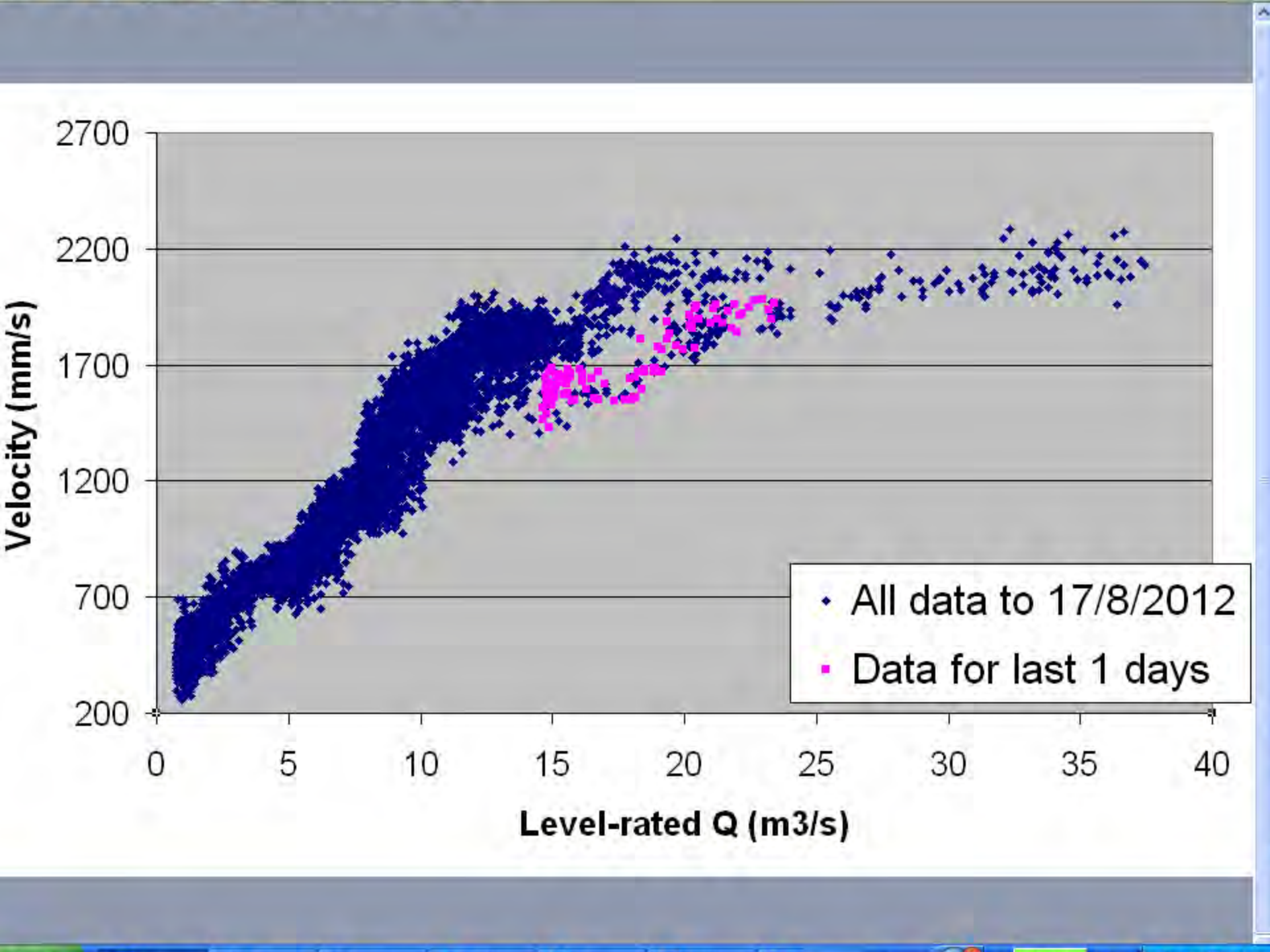
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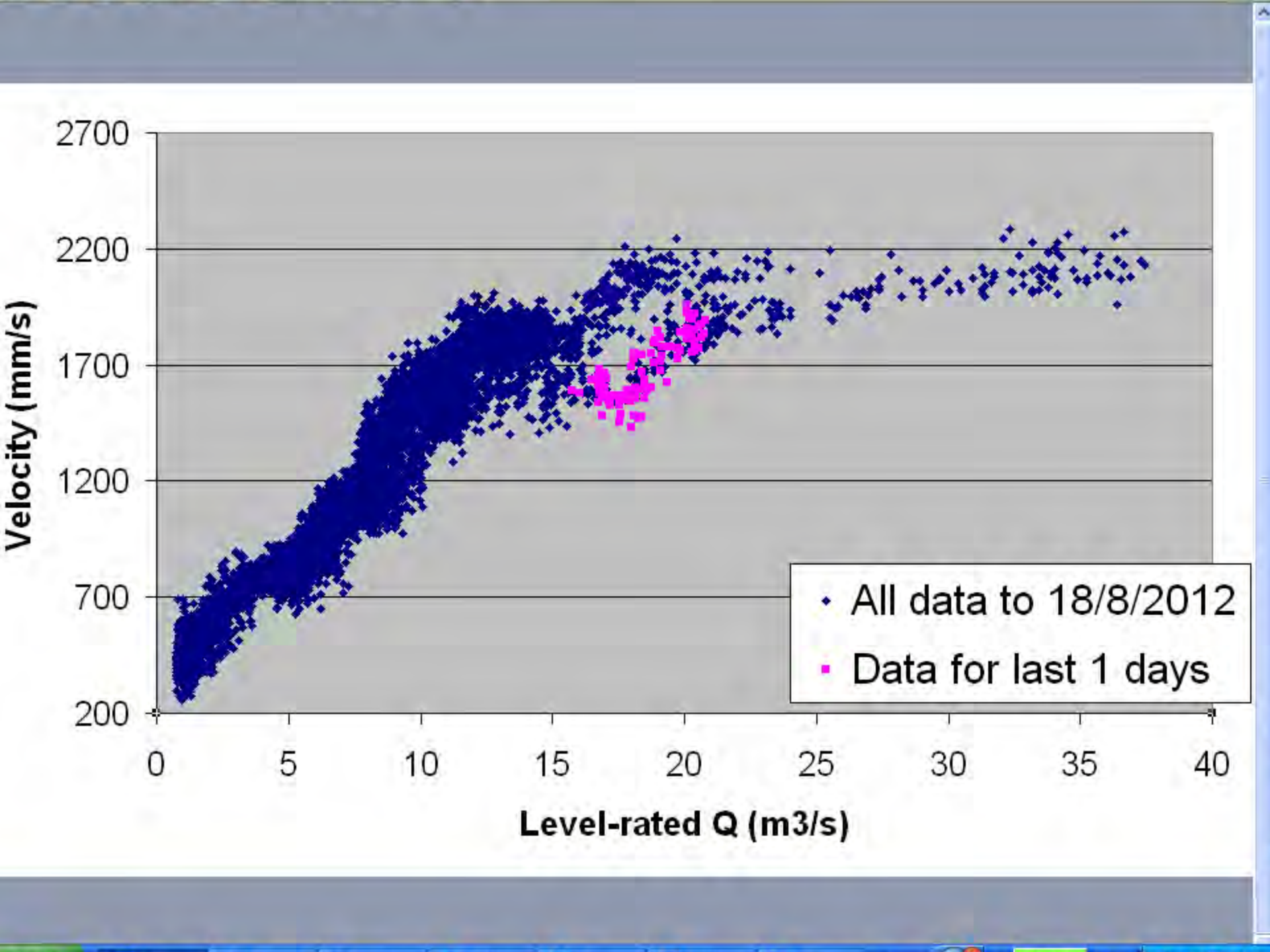
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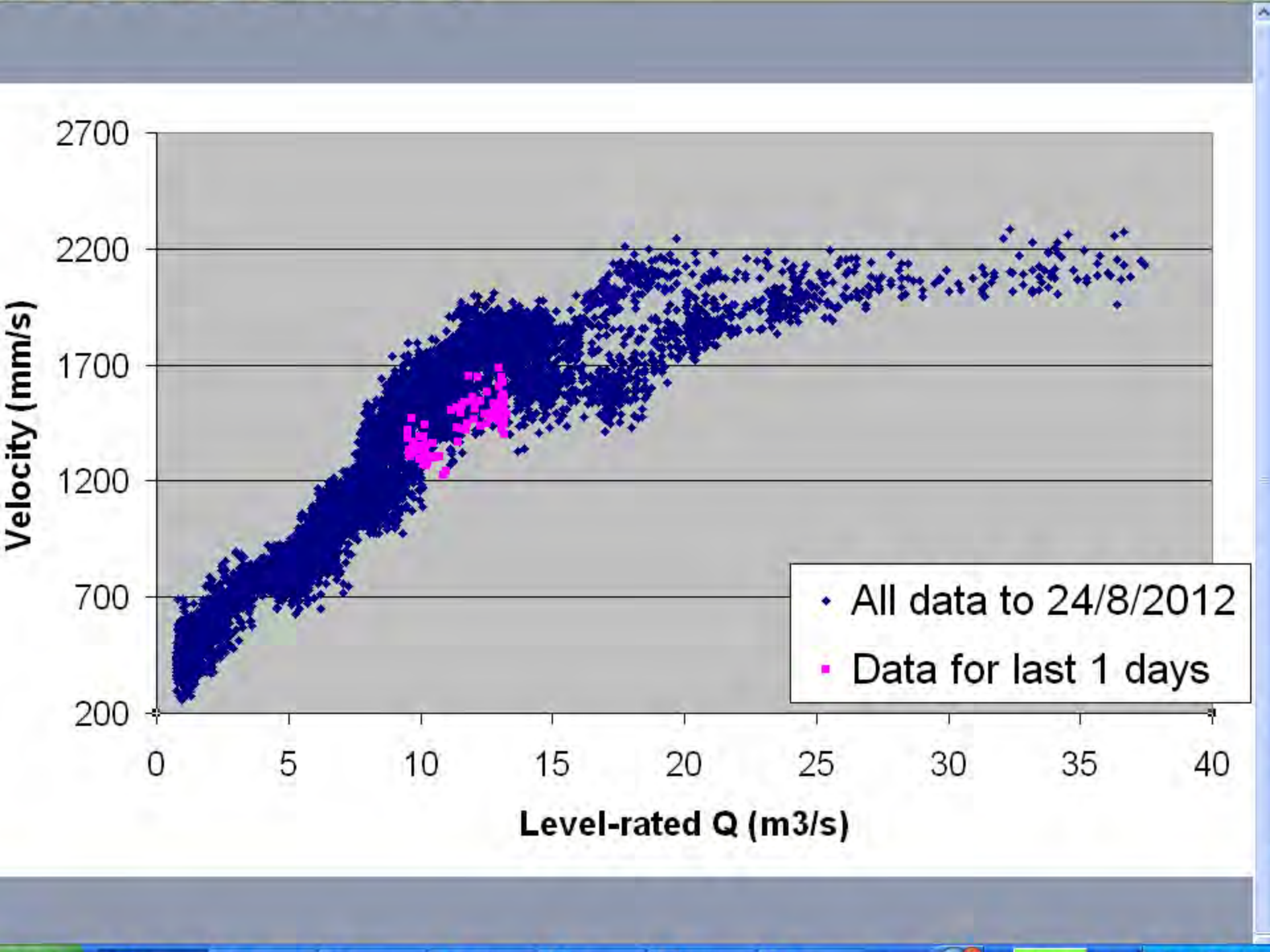
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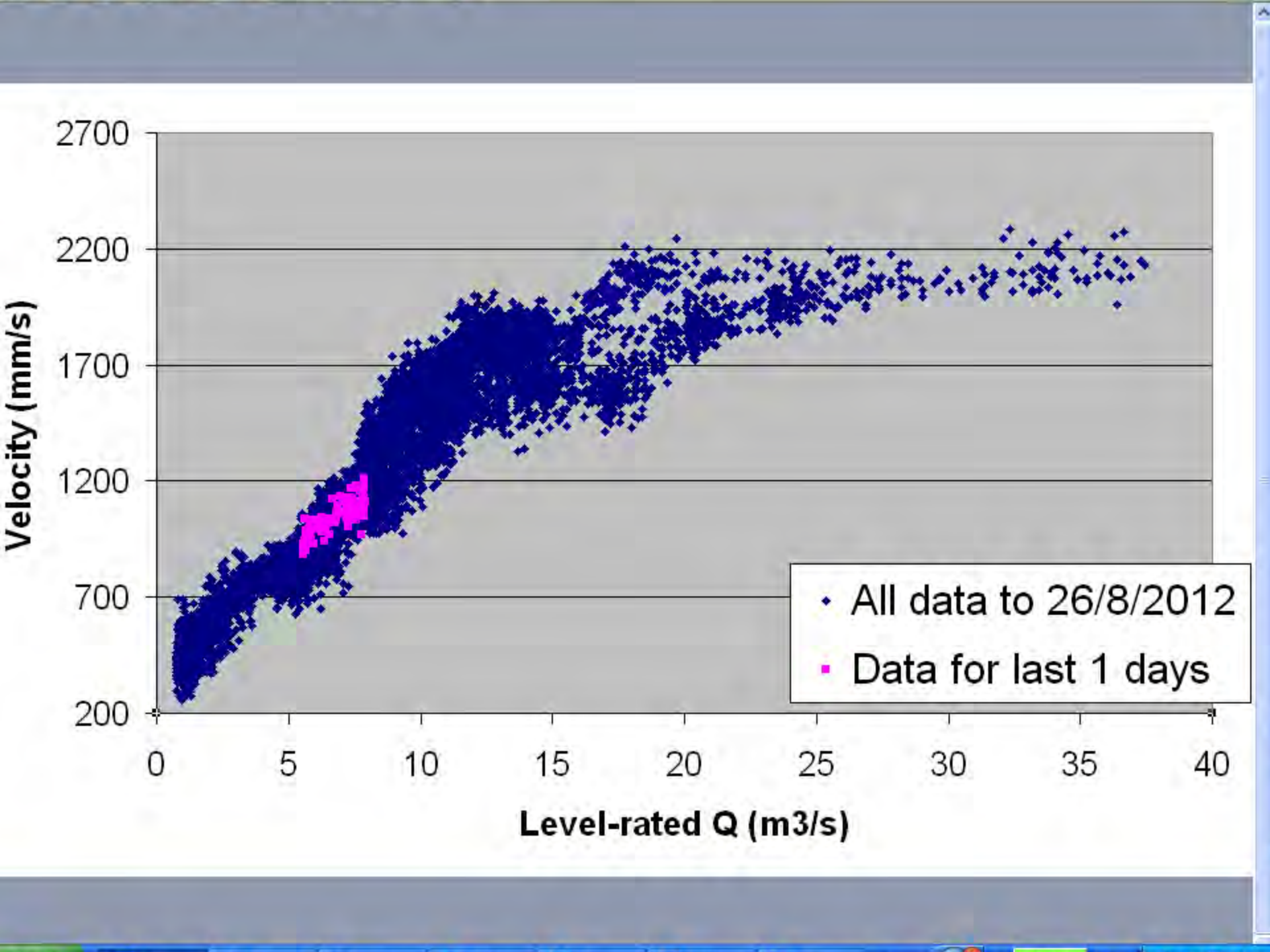
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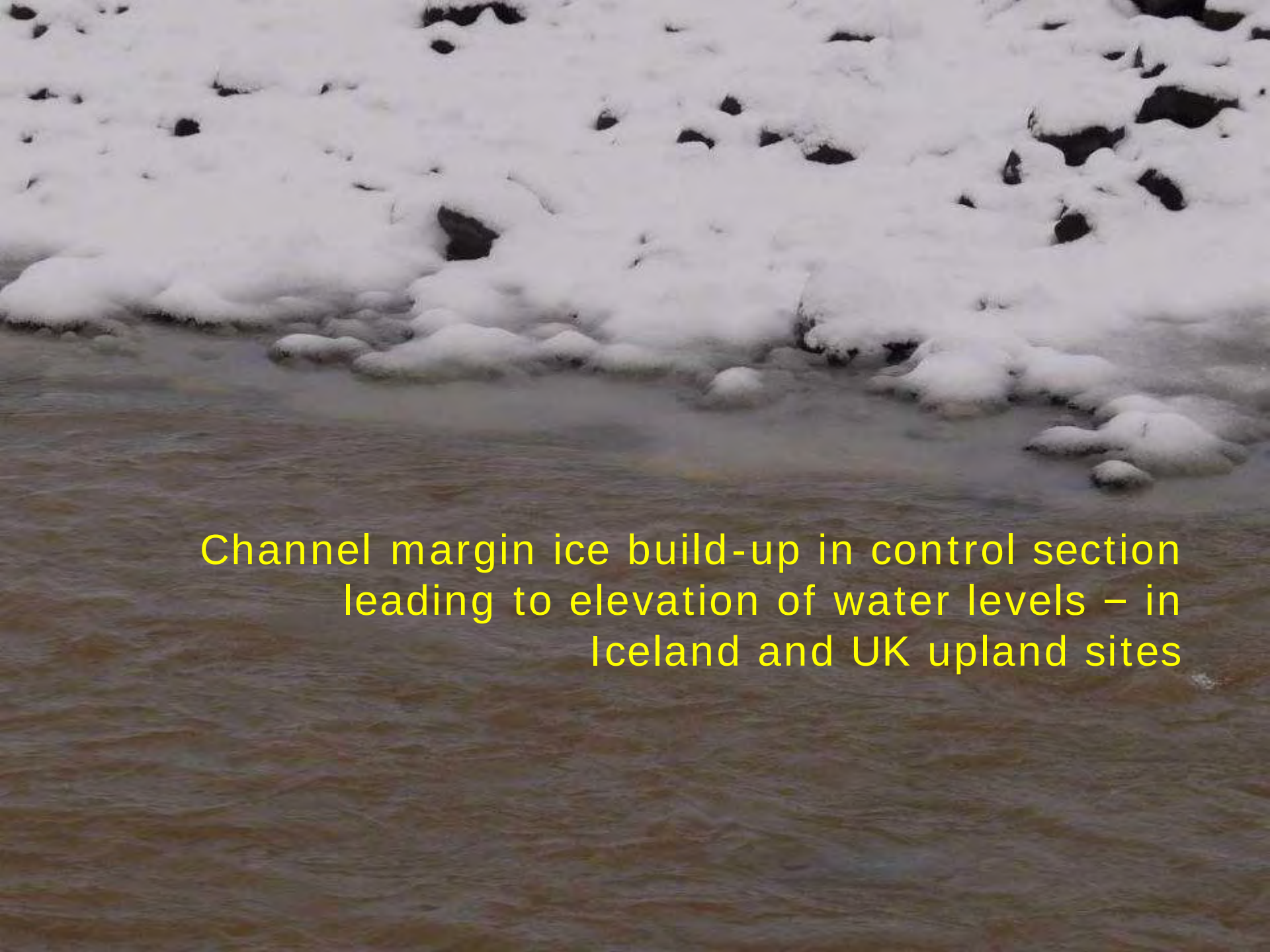
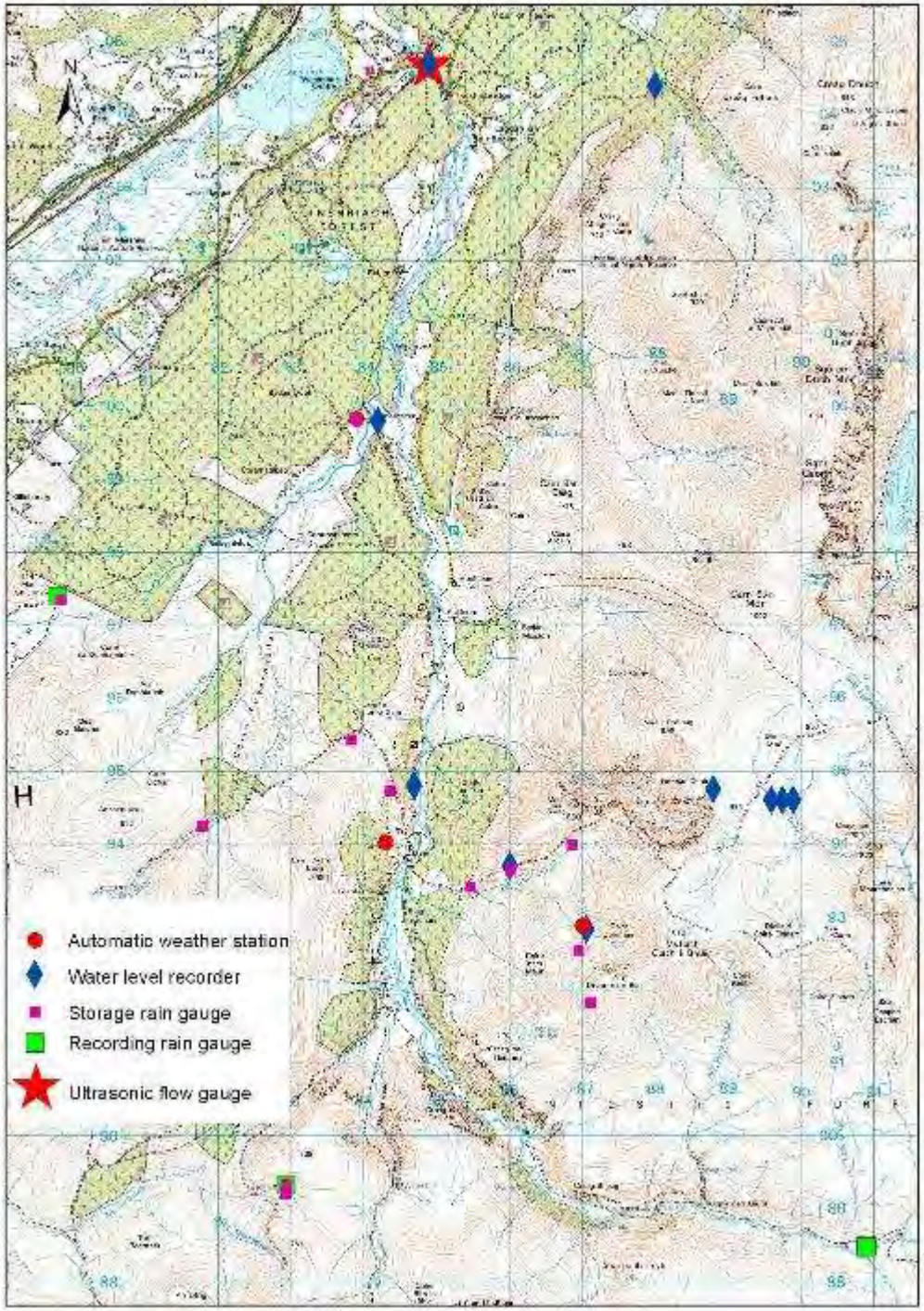
Data for last 1 days



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

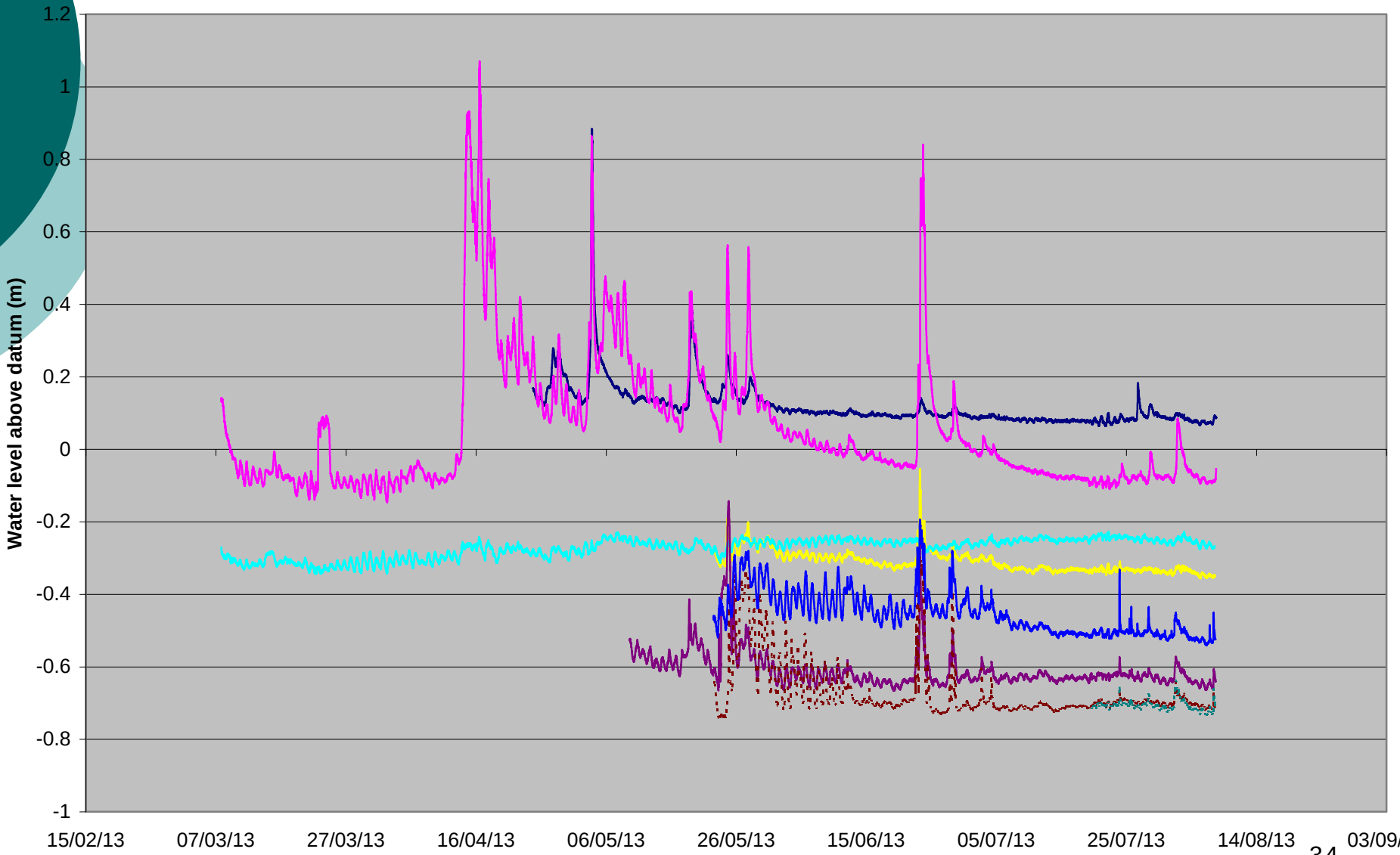
Cairngorms CHASM+

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