

# Sonderüberwachung bei hydrologischen Extremereignissen im tschechischen und deutschen Einzugsgebiet der Elbe

LANDESAMT FÜR UMWELT,  
LANDWIRTSCHAFT  
UND GEOLOGIE



**Elbe at Schmilka  
Low water 2015**

**Elbe at Schmilka  
Normal water**



**Elbe at Schmilka  
Flood 2013**

pictures: BfUL

**Workshop der IKSE 6./7. Dezember 2017**

# Motive and goals

## I Motive

- I Flood 2002 and 2006
- I Low water 2003

## I Goals

- I Estimation of acute risks due to harmful substances and hygienic pollutions
- I Exceptional situations with regard to mass transport
- I Estimation of long-term and large-scale risk potentials (freights, floodplains, seas)
- I Uncovering hidden risk potential
- I Increased information needs of the public
- I Scientific interest
  - I Influence on the transport behavior of dissolved and solid substances

# Strategy paper of the FGG Elbe for the coordination of surveillance



responsibilities  
coordination



FGG ELBE



Time aspects,  
triggering levels

## Monitoring program of extreme hydrological events on the Elbe

Parameter range,  
quality assurance

Selection of monitoring  
points

Execution of the  
monitoring program

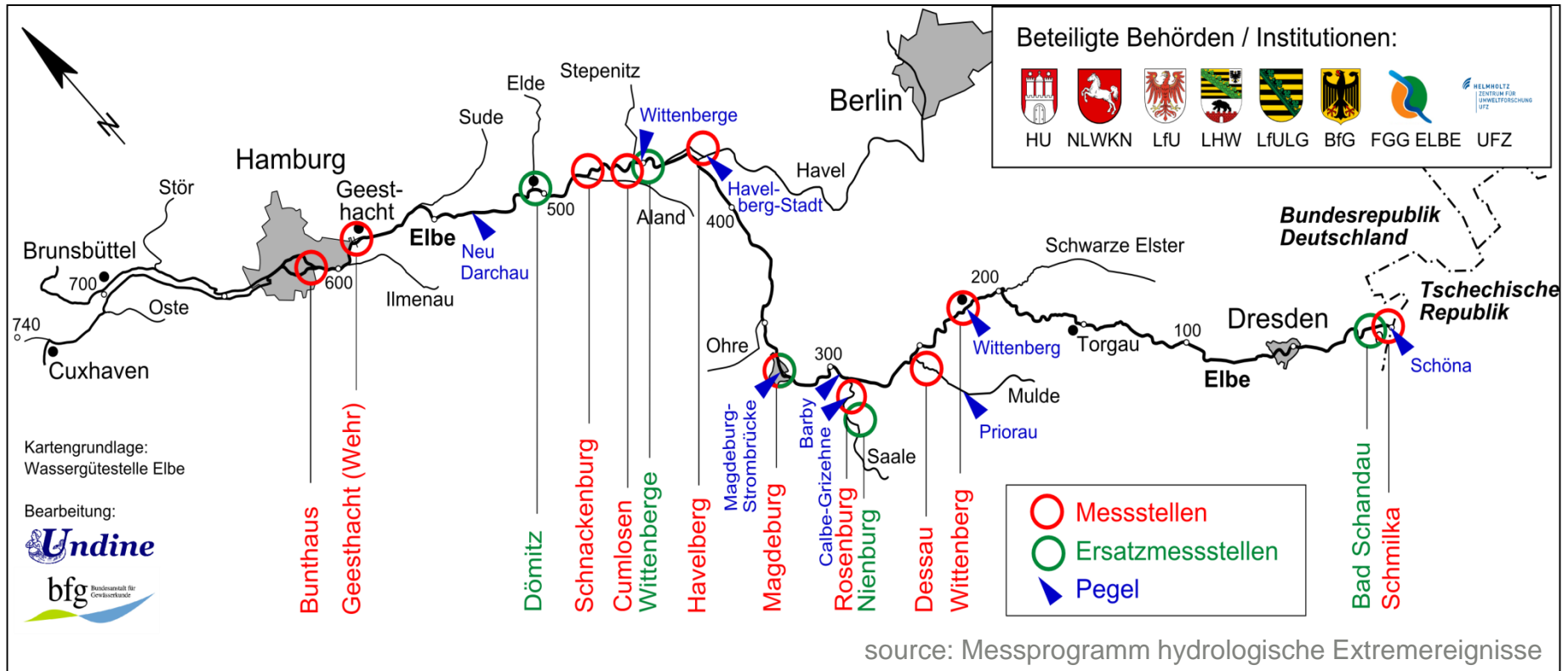
presentation of results

Transfer and use of data

# Responsibilities / Coordination

- Coordination by the BfG
  - Timely information on precipitation development
- Monitoring program for extreme hydrological events is part of the strategy of the national measuring program
- Activation of the monitoring programs by the countries
  - Designation of contact persons
  - Organization of sampling and laboratory operation
  - Data transfer
- Votes on the assessment of the situation
- Support with sampling

# Selection of monitoring points



## criteria

- representative and flood-proof
- Preferably already routine monitoring point (e.g. monitoring station)
- regular collection of data under normal water conditions

# Selection of monitoring points

## varies with the event

Emergence types	Regional typ	Monitoring point
<b>Flood</b> - Meltwater & rain or - large-scale heavy rain	Obere Elbe	Schmilka, Wittenberg, Magdeburg, Wittenberge, Cumlosen, Schnackenburg, Geesthacht, Bunthaus
	Obere Elbe + Mulde	+ Dessau, Mulde
	Obere Elbe + Saale	+ Rosenberg, Saale
	Obere Elbe + Saale + Mulde	all monitoring points of the monitoring programs
	<b>Mittlere Elbe + Saale + Mulde</b>	all monitoring points of the monitoring programs
<b>Low water</b> - Low precipitation and high evaporation (late summer / early autumn) or - frost-related localisation of precipitation (winter)		all monitoring points of the monitoring programs  (except Bunthaus and Geesthacht)

# Parameter spectrum

- based on the parameter spectrum of the Coordinated Elbe Monitoring Program (KEMP) of the FGG Elbe
- At every extreme water event
  - General parameters (e.g., pH, conductivity, oxygen, turbidity)
  - Nutrient condition
  - Metals and organic micropollutants in the water
  - Hygienic parameters
- **Special features at flood**
  - **Analysis of metals and organic substances in suspended matter**



# Time aspects / triggering levels

## Flood

- Recording the rise of the flood wave
- Start criterion
  - Flow threshold ( $Q_s$ ),  
in which the erosion of sediments above the measuring point begins
- Additional information about the origin of sources of pollution
- Determination of the event-related freight as part of the annual freight
  - Measurement until the flow returns to normal level



# Triggering levels

Gauge	Schöna, Elbe	Barby, Elbe	Bad Döben 1, Mulde	Halle-Trotha, Saale
<b>Flood</b>				
MHQ	1330 m <sup>3</sup> /s		443 m <sup>3</sup> /s	362 m <sup>3</sup> /s
Triggering level	1400 m <sup>3</sup> /s [590 cm]		540 m <sup>3</sup> /s [627 cm]	460 m <sup>3</sup> /s [538 cm]
<b>Low water</b>				
MNQ	103 m <sup>3</sup> /s	207 m <sup>3</sup> /s		
Triggering level	105 m <sup>3</sup> /s [89 cm]	210 m <sup>3</sup> /s [71 cm]		

# Execution

## I Flood

- I **Start:** 24 hours (or 48 hours) after exceeding the tripping level
- I **Daily sampling and measurements**
- I **End:** reaching the normal water level
  - After crest passage
    - Reduction of the sampling frequency to 3 days
  - One week after falling below the trigger level- final sampling for freight determination

## I Low water

- I **Start:** At least 14 days below the triggering water level at a reference gouge and forecast of a longer, low-rainfall period / frost period.
- I **Biweekly sampling**
- I **End:** if the value exceeds MNQ for 6 days and precipitation forecast / end of frost period.



# Uniform presentation of results for Flood and Low water

Colour	Designation	classification
withe	inconspicuous	value < maximal value „normal year“
yellow	increased	value > maximal value „normal year“ but $\leq$ Flood maximum value / Low water normal value
orange	clearly increased	value > maximal value „normal year“ and > Flood maximum value / Low water normal value
light grey	in processing	
grey	no measurement	

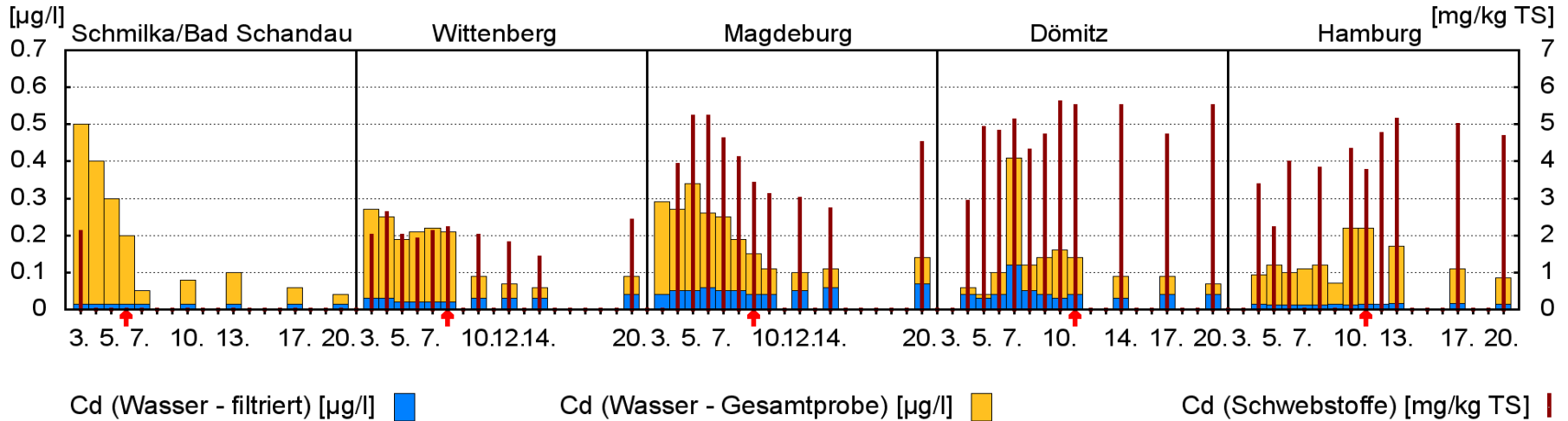
Normal year – Definition 2012

Flood maximum value: from the floods 2002, 2006 or 2013

Low water maximum value: Low water 2015

# Flood 2013

## Flood typical results



## Comparison with other flood events

### Pollution in Schmilka are declining

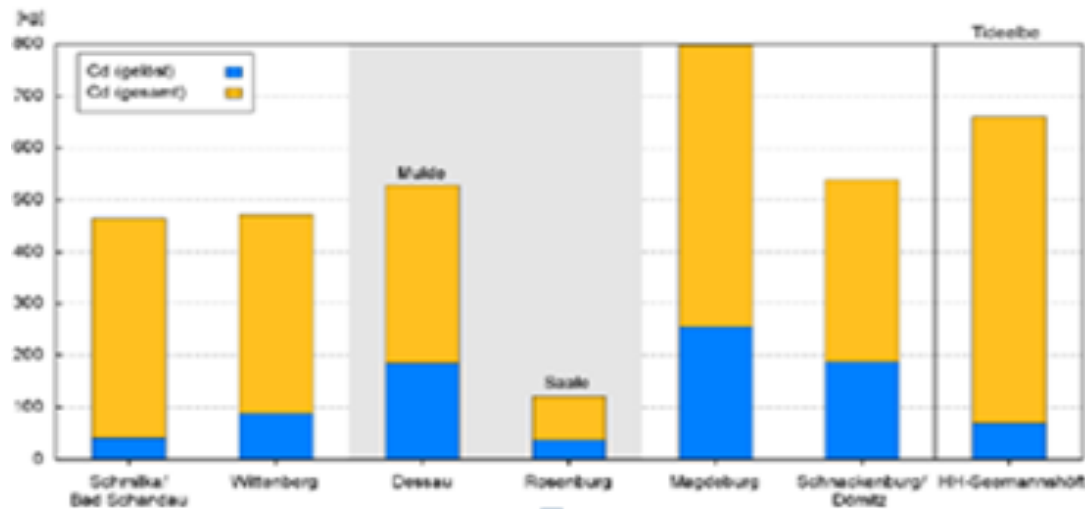
HW [ $\mu\text{g/L}$ ]	Schmilka/ Bad Schandau			Wittenberg		Magdeburg			Schnackenburg/ Dömitz		HH- Seemannshöft	
	2002	2006	2013	2002	2013	2002	2006	2013	2002	2013	2002	2013
Cd ges.	0,73	0,6	0,5	0,48	0,27	0,82	0,24	0,34	0,25	0,41	0,25	0,22
Cd gel.	0,07	0,05	<0,03	k.D.	0,04	k.D.	k.D.	0,07	k.D.	0,12	k.D.	0,02

# Freight estimation in the period 03.-20.6. 2013

## I suspended solids and TOC

	Schmilka/ Bad Schandau	Wittenberg	Magdeburg	Schnackenburg/ Dömitz	HH-See- mannshöft Tideelbe	Dessau Mulde	Rosenburg Saale
abf. St.	142572	171383	122939	62245	134298	37612	23878
TOC	32863	37658	48841	47545	42619	8040	8683

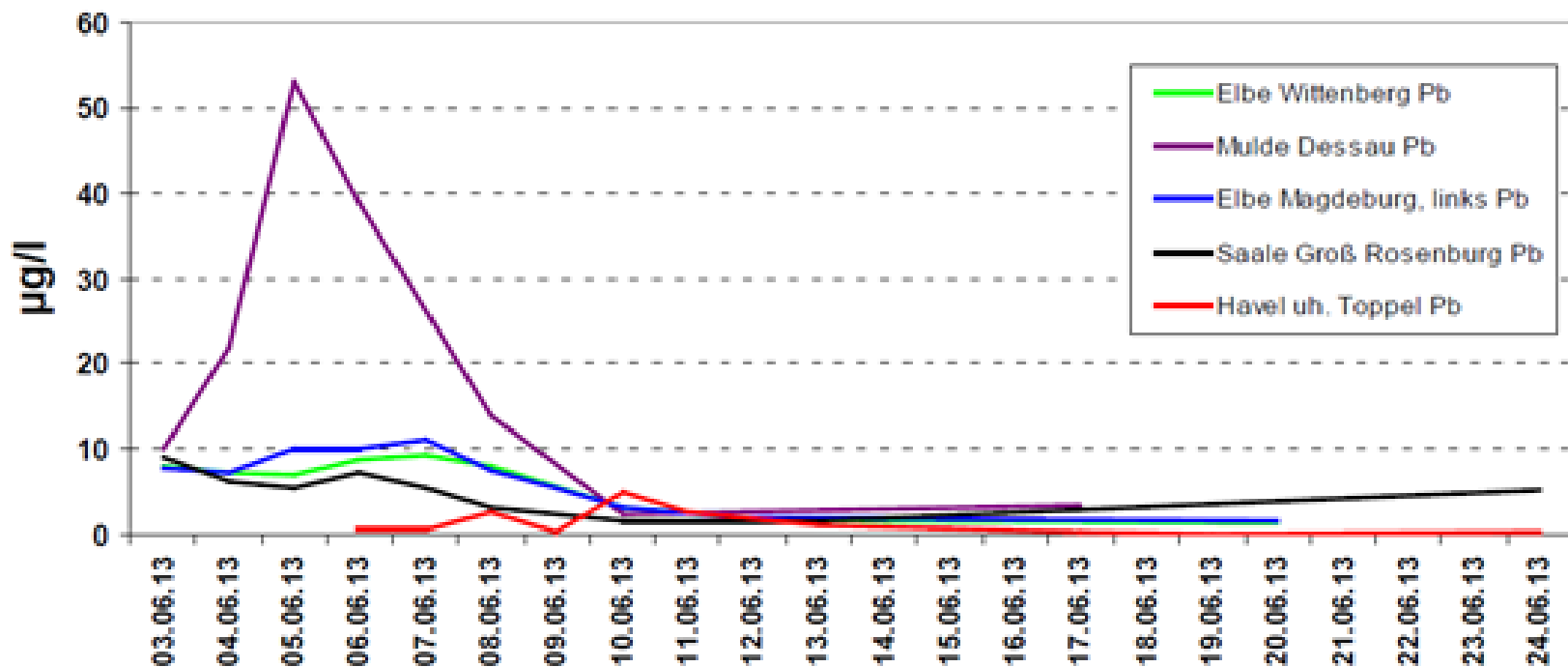
## I Cadmium in the period 03.-20.6.2013



Quelle: SCHWANDT,  
D.&HÜBNER,G.  
mit Unterstützung der AG  
OW (FGG);  
„Das Messprogramm  
Extremereignisse beim Juni  
Hochwasser der Elbe 2013  
Schadstoffkonzentrationen  
und-frachten Koblenz/  
Magdeburg Juni 2014

# Result - Water

## Pb gesamt



Abnormalities in the lead (Pb) concentration in the Mulde

Predominantly lower concentrations than during the floods 2002 and 2006

# Transfer and use of data

- Timely publication on the internet of the countries
- Information platform Undine of the BfG (interim data management)
  - *Common* information platforms of all players in the German part of the Elbe



- Archive data storage in the technical information system of the FGG Elbe

**Das Fachinformationssystem (FIS) der FGG Elbe**



-  **Messprogramme / Datenumfang**  
Aufstellung der Messprogramme und Übersicht über den Gesamtdatenbestand
-  **Messstellen**  
Informationen zu den Messstationen und Entnahmestellen
-  **Datenabruf**  
Auswahl und Ausgabe von Messdaten als Tabellen und Grafiken

<https://www.fgg-elbe.de/dokumente/fachberichte.html>



**Das Messprogramm Extremereignisse beim  
Junihochwasser der Elbe 2013**

Schadstoffkonzentrationen und -frachten



Schwebstoff / Probenahme mit  
Zentrifuge am 7.6.2013 in Wittenberg.

Herausgeber:  
Flussgebietsgemeinschaft Elbe



**Wasserbeschaffenheit und Schadstofftransport  
beim extremen Niedrigwasser der Elbe  
von Juli bis Oktober 2015**



Elbe bei Schnackenburg (links) am 14.8. 2015

Herausgeber:  
Flussgebietsgemeinschaft Elbe





# New: Flood Profiles

## Hochwasserereignisse im Elbegebiet: Das Junihochwasser 2013

### Hydrometeorologische Situation

Die Großwetterlagen "Trog Mitteleuropa" und "Tief Mitteleuropa" bestimmen Wettergeschehen im Elbegebiet. Mit dem "Trog Mitteleuropa" breitete sich insbesondere im Norden und in der Mitte Deutschlands kam es zu stark bodennahe Tiefdruckgebiete über dem östlichen Mitteleuropa herum strömte Mittelmeerraum ein. Diese Luftmassen glitten wolken- und niederschlagsverstärkt auf die vorhandene Kaltluft auf und führten insbesondere im Süden der Tschechischen Republik zu kräftigem Dauerregen. Vom 30. Mai bis 2. Juni ergossen sich in Sachsen und Thüringen über 30 mm Niederschläge. In Sachsen und Thüringen erreichte die Niederschlagsmenge (Der insgesamt sehr feuchte Mai 2013 führte zum Monatsende zu historischen Messungen in der 1960er Jahren) und einer entsprechend hohen Abfluss:

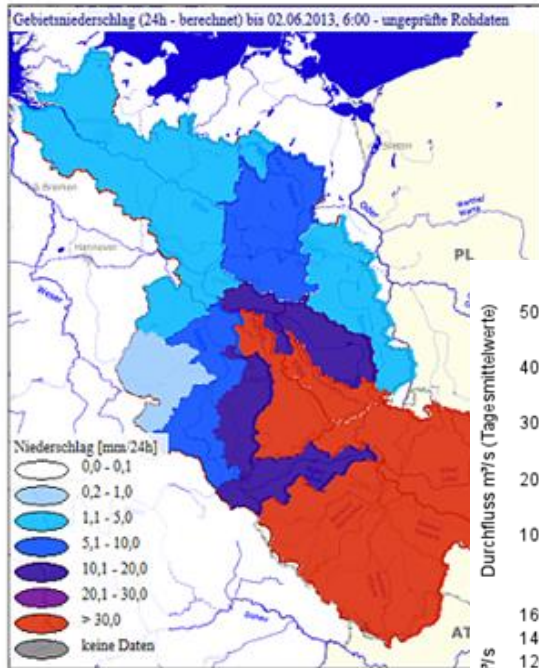
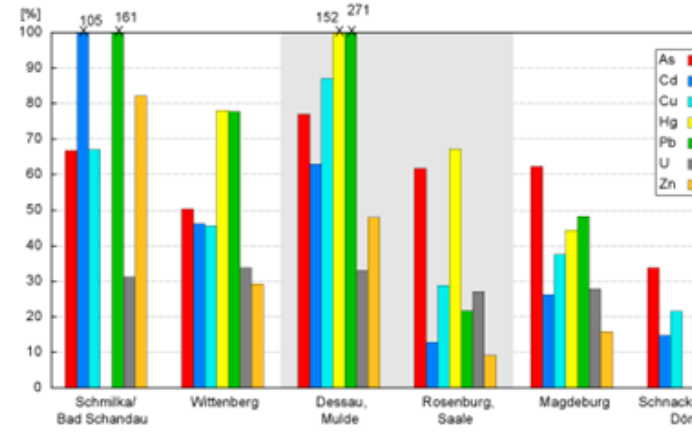
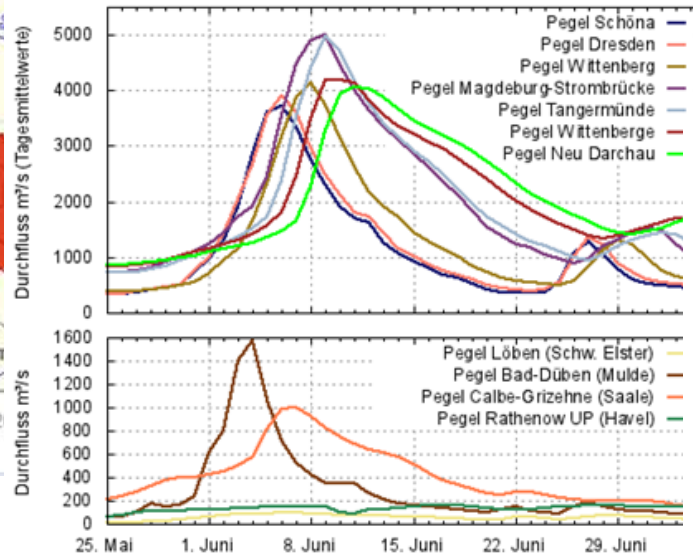


Abb. 1: Gebietsniederschlag (24h) Elbegebiet bis 2.6.2013 6 Uhr



# Monitoring station in Schmilka



**Flood-proof  
Reconstruction until  
June 2018**





# Suggestion

**Development of a monitoring program of extreme hydrological events in the context of the IKSE**

**Thank you for your attention**