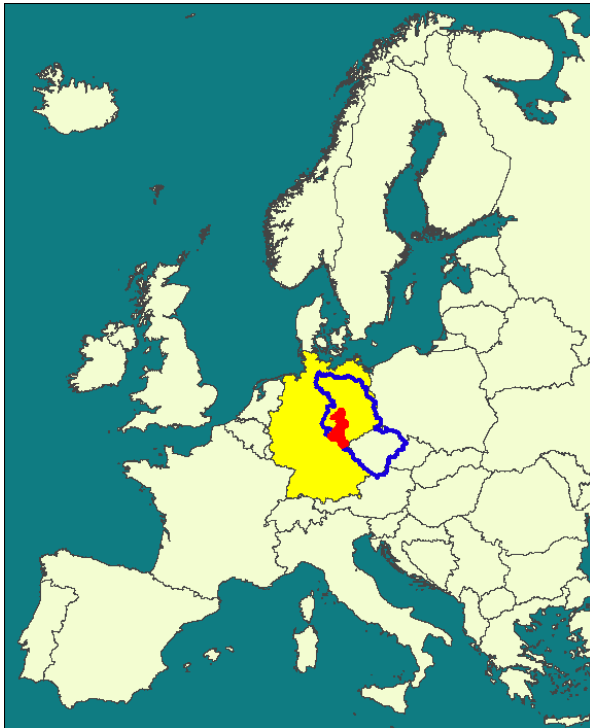




Preliminary Results of the Scenario Studies for the German Elbe River Basin



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Overview

- **Introduction Scenario Studies**
 - Defined Scenarios by the IKSE
 - Data implemented
 - Examples of calibration results within the Elbe River Basin (Germany)

- **Reservoir Study**
 - Study Objectives with regard to the IKSE Flood Action Program
 - Examples of calibration results within the Saale River Basin and Elbe
 - Scenario results
 - **Flood April 1994**
 - **Flood August 2002**
 - **Flood January 2003**

- **Polder Study**

- **Conclusion**

- **Further time schedule**



Introduction Scenario Studies

- **Defined Scenarios by the IKSE**



Common Scenarios defined by the IKSE

Joint Research Centre

Measure	Reservoirs	1994 SAALE	2002 ELBE	2003 ELBE	0210 ELBE	0220 ELBE	0230 ELBE
		Apr 94	Aug 2002	Jan 2003	2002-10%	2002-20%	2002-30%
2002 Dykebreaks	Current operation	-	2002 DB B	-	-	-	-
Reference	Current operation	1994 RF B	2002 RF B	2003 RF B	0210 RF B	0220 RF B	0230 RF B
	Optimized Moldau/Saale	1994 RF R	2002 RF R	2003 RF R	0210 RF R	0220 RF R	0230 RF R
Dyke overtopping	Current operation	1994 DO B	2002 DO B	2003 DO B	0210 DO B	0220 DO B	0230 DO B
	Optimized Moldau/Saale	1994 DO R	2002 DO R	2003 DO R	0210 DO R	0220 DO R	0230 DO R
Dyke Enlargement (Lenzen)	Current operation	1994 DR B	2002 DR B	2003 DR B	0210 DR B	0220 DR B	0230 DR B
	Optimized Moldau/Saale	1994 DR R	2002 DR R	2003 DR R	0210 DR R	0220 DR R	0230 DR R
Additional measures Saxony	Current operation	1994 ZM B	2002 ZM B	2003 ZM B	0210 ZM B	0220 ZM B	0230 ZM B
	Optimized Moldau/Saale	1994 ZM R	2002 ZM R	2003 ZM R	0210 ZM R	0220 ZM R	0230 ZM R
Polders/optimum Steuerung	Current operation	1994 PO B	2002 PO B	2003 PO B	0210 PO B	0220 PO B	0230 PO B
	Optimized Moldau/Saale	1994 PO R	2002 PO R	2003 PO R	0210 PO R	0220 PO R	0230 PO R
Polders/threshold Steuerung	Current operation	1994 PT B	2002 PT B	2003 PT B	0210 PT B	0220 PT B	0230 PT B
	Optimized Moldau/Saale	1994 PT R	2002 PT R	2003 PT R	0210 PT R	0220 PT R	0230 PT R
Polders/always open	Current operation	1994 PN B	2002 PN B	2003 PN B	0210 PN B	0220 PN B	0230 PN B
	Optimized Moldau/Saale	1994 PN R	2002 PN R	2003 PN R	0210 PN R	0220 PN R	0230 PN R
3B+4B+5B	Current operation	1994 PD B	2002 PD B	2003 PD B	0210 PD B	0220 PD B	0230 PD B
	Optimized Moldau/Saale	1994 PD R	2002 PD R	2003 PD R	0210 PD R	0220 PD R	0230 PD R



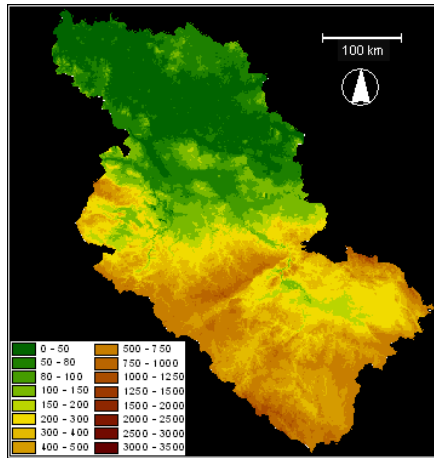
97 Scenarios



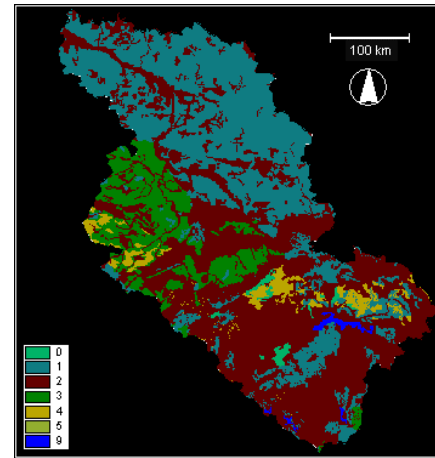
Data implemented



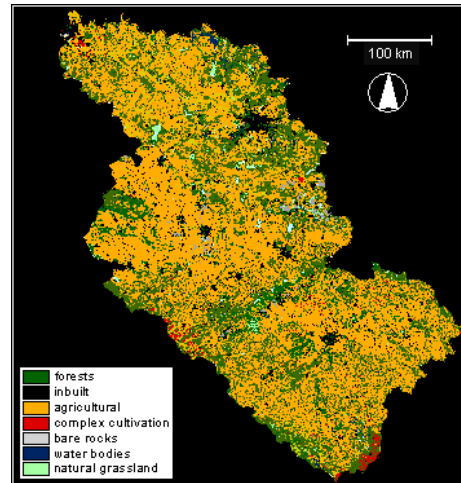
Data used from the JRC European data base for the Elbe River Basin



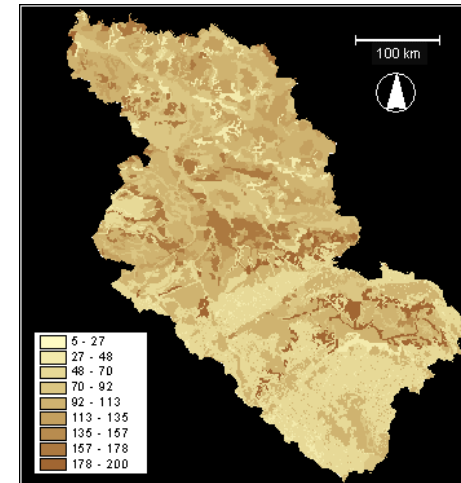
Elevation



Soil data



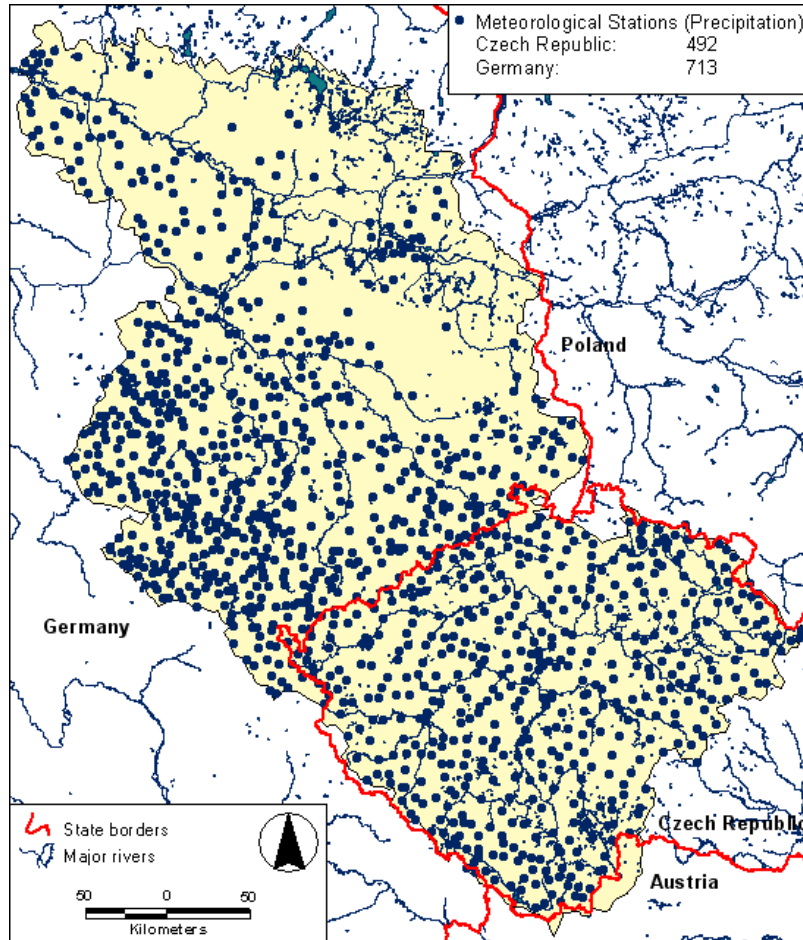
Land use



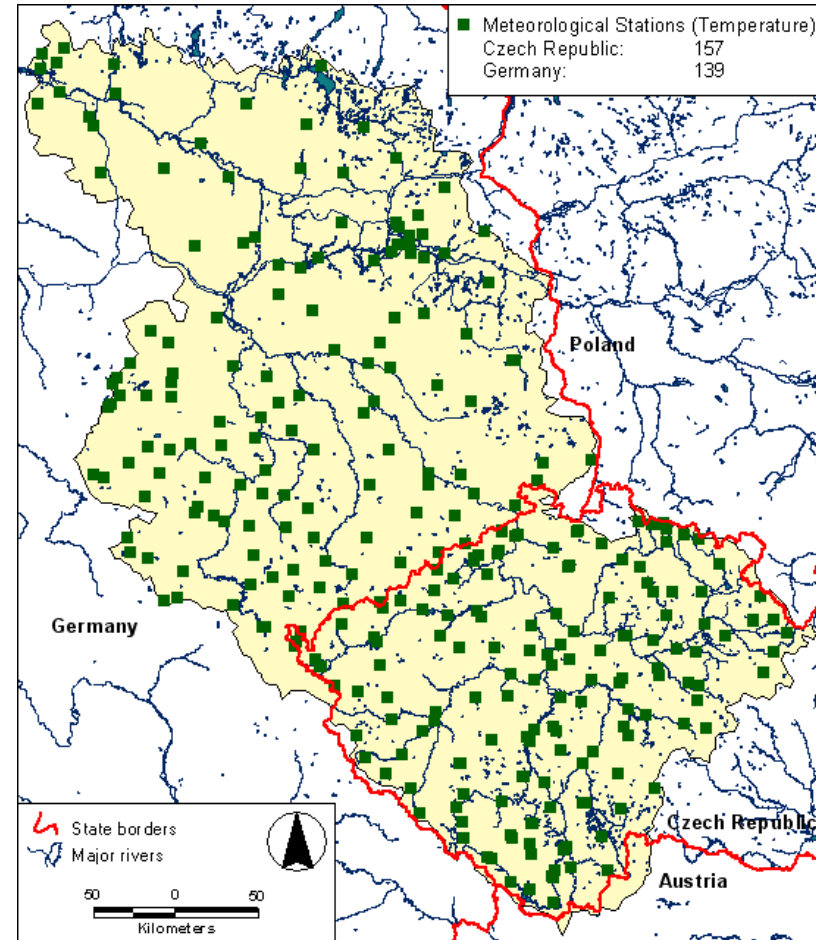
Soil depth



Available high resolution meteorological data gathered from Germany and the Czech Republic



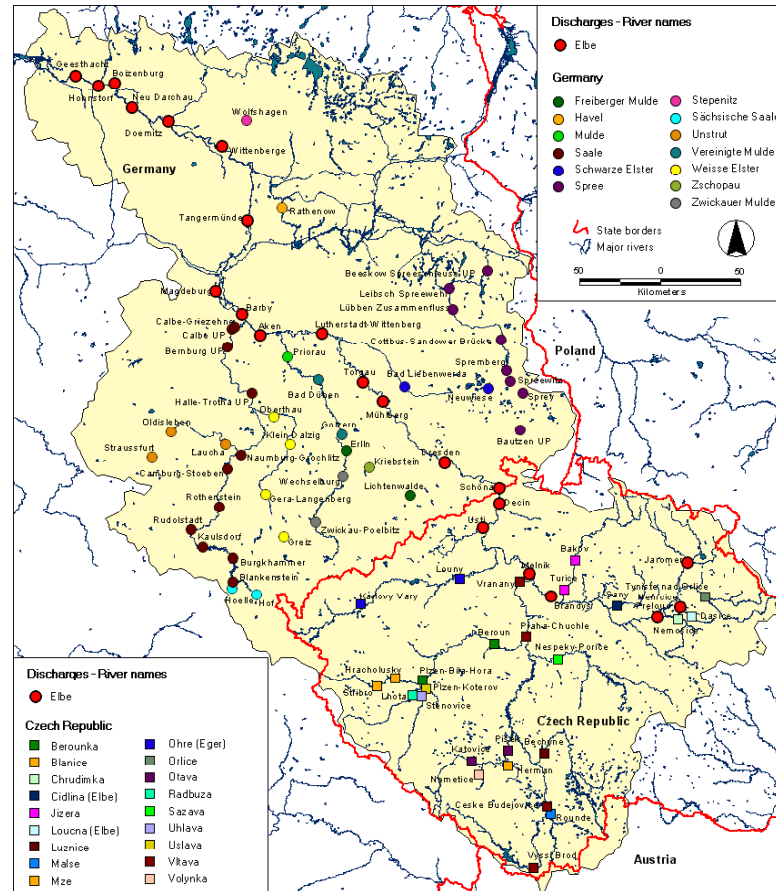
Stations with precipitation data



Stations with temperature data



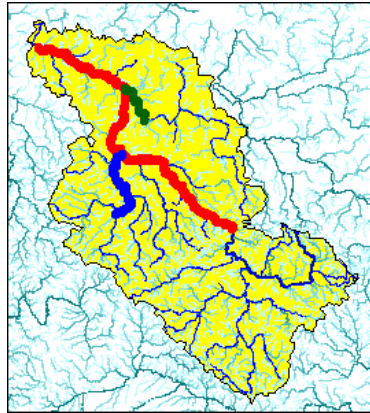
Available national discharge/water level data gathered from Germany and the Czech Republic



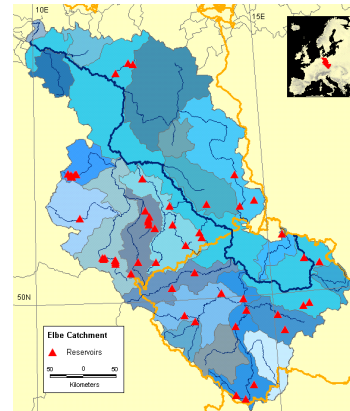
Available stream gauging stations with observed discharge and measured water level data for the time period 1993 until 2002/2003 in the Elbe River Basin



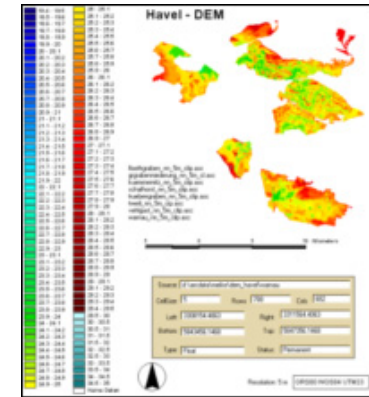
Further available specific national data for the German Elbe



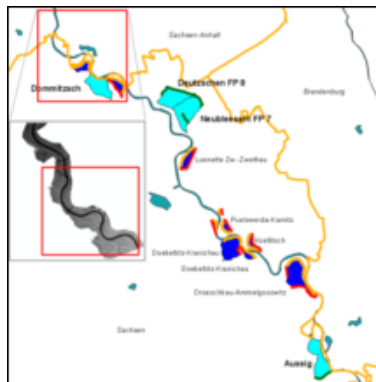
Elbe River cross section data



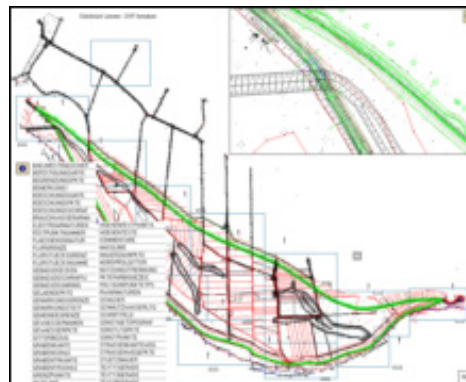
Reservoirs within the Elbe river basin



Visualisation of a high resolution DEM for the Havel River (Brandenburg)



Visualisation of potential retention polder (Saxony)



Visualisation of the dyke enlargement at Lenzen (Brandenburg)

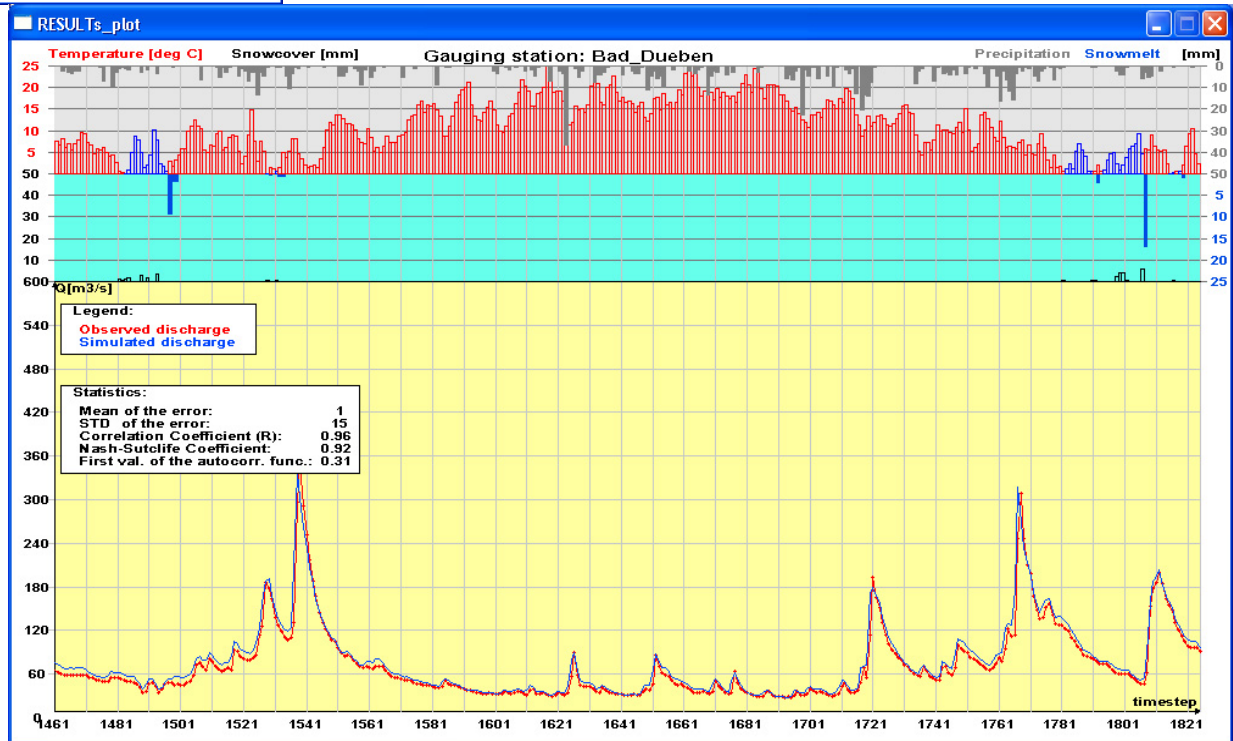
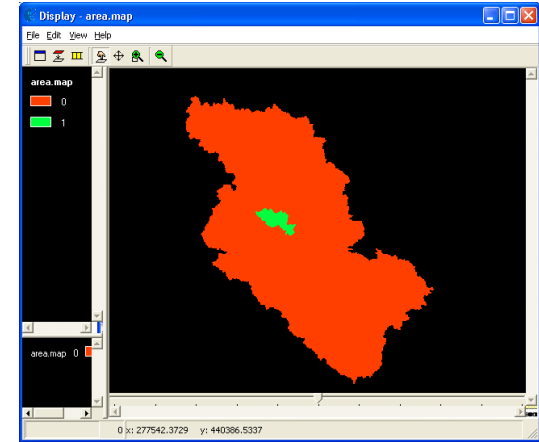
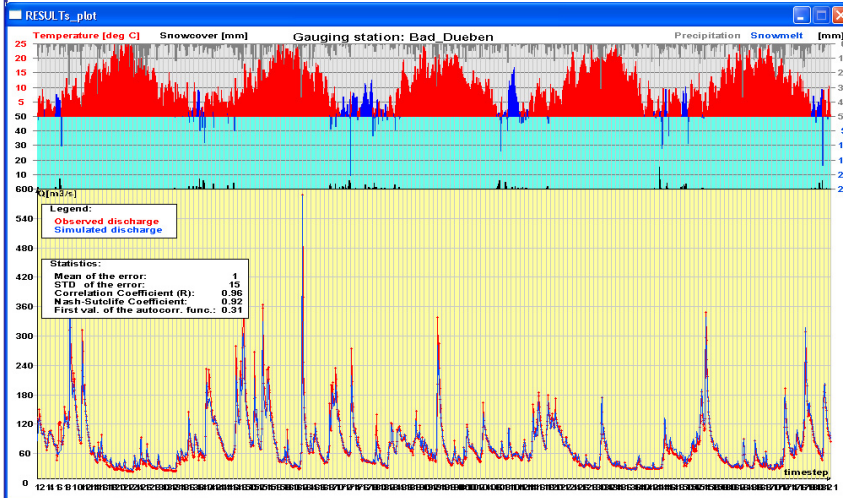


Examples of calibration results within the Elbe River Basin (Germany)



Mulde/Bad Döben (1994-1998, used inflow Golzern)

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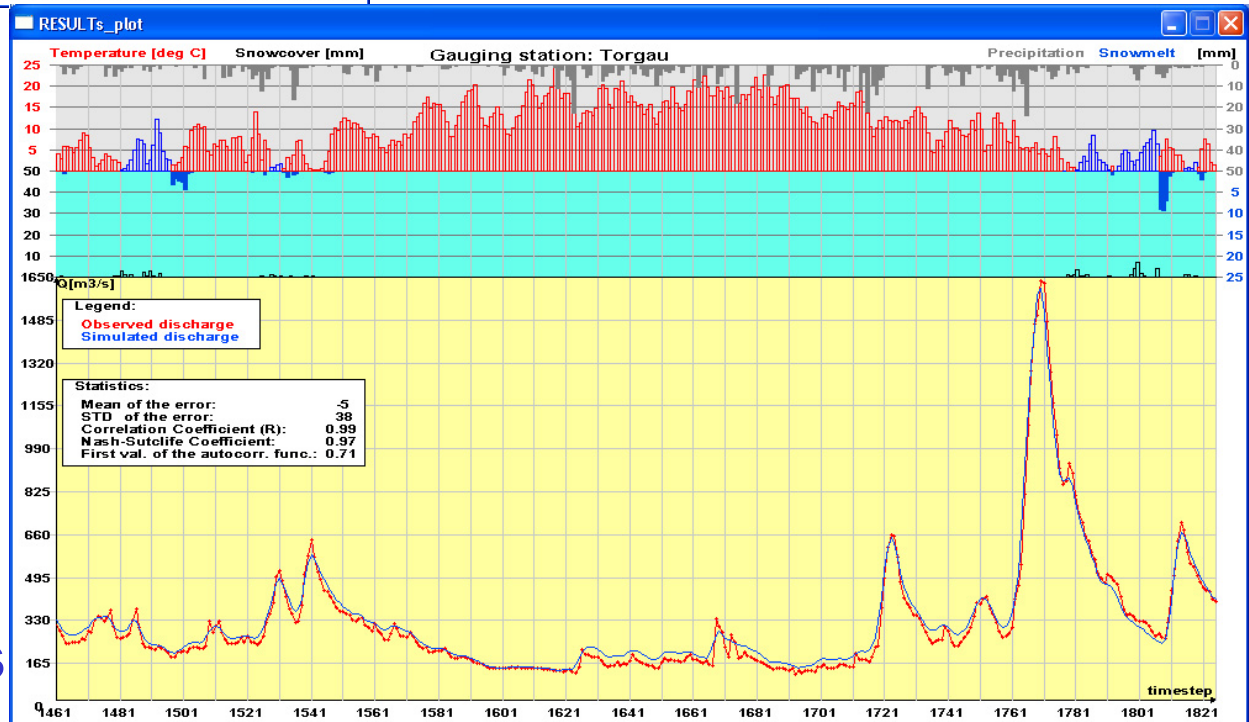
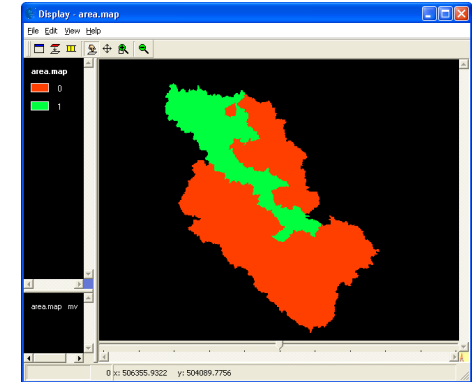
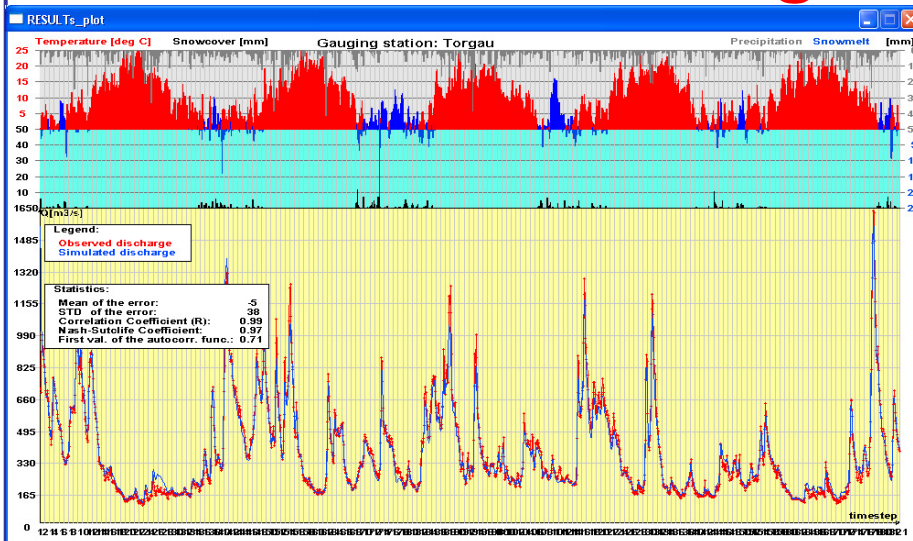


→ Reasonable results



Elbe/Torgau (1994-1998, used inflow Usti)

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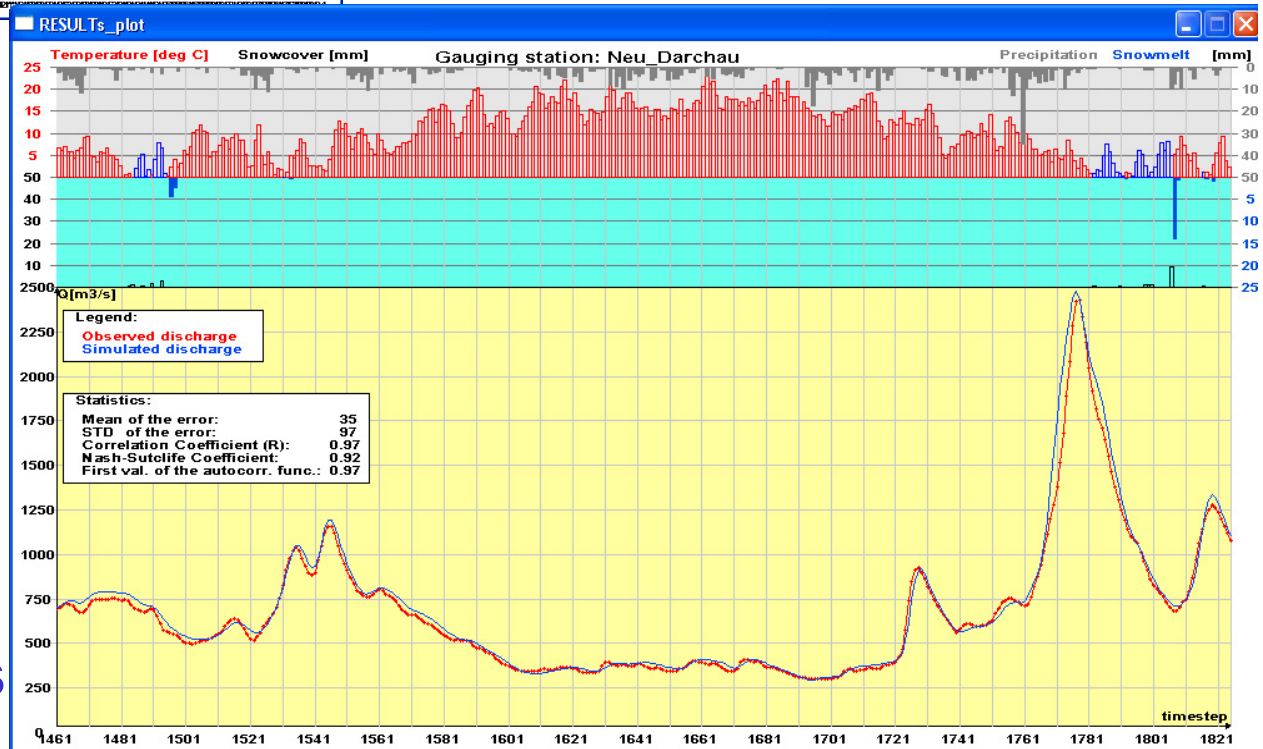
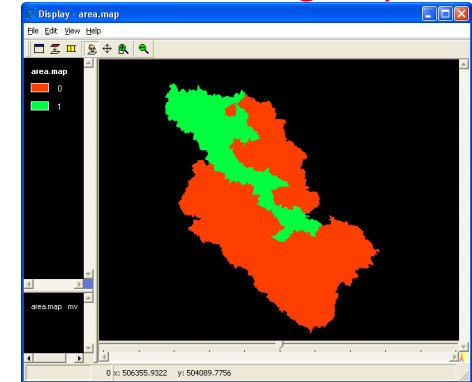
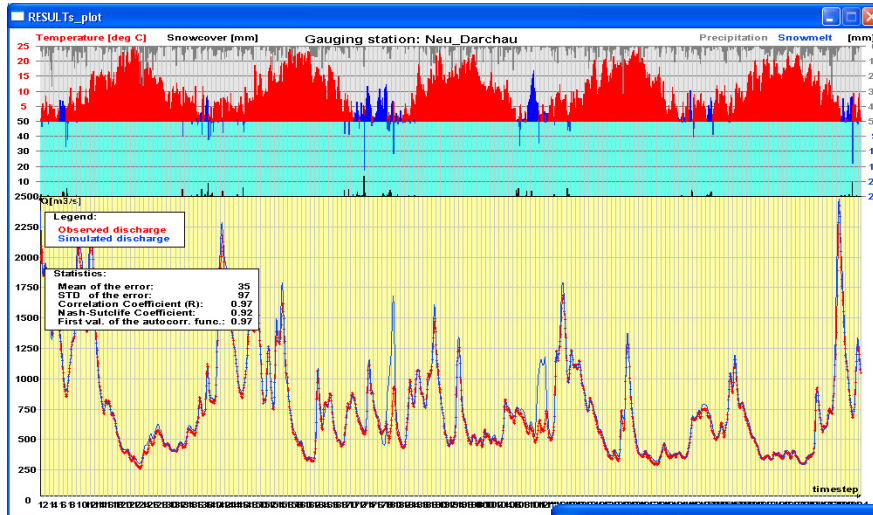


-> Reasonable results



Elbe/Neu Darchau (1994-1998, used inflow Torgau)

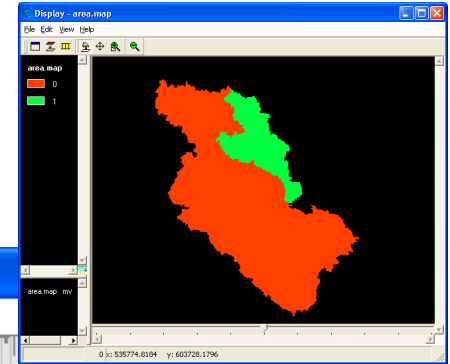
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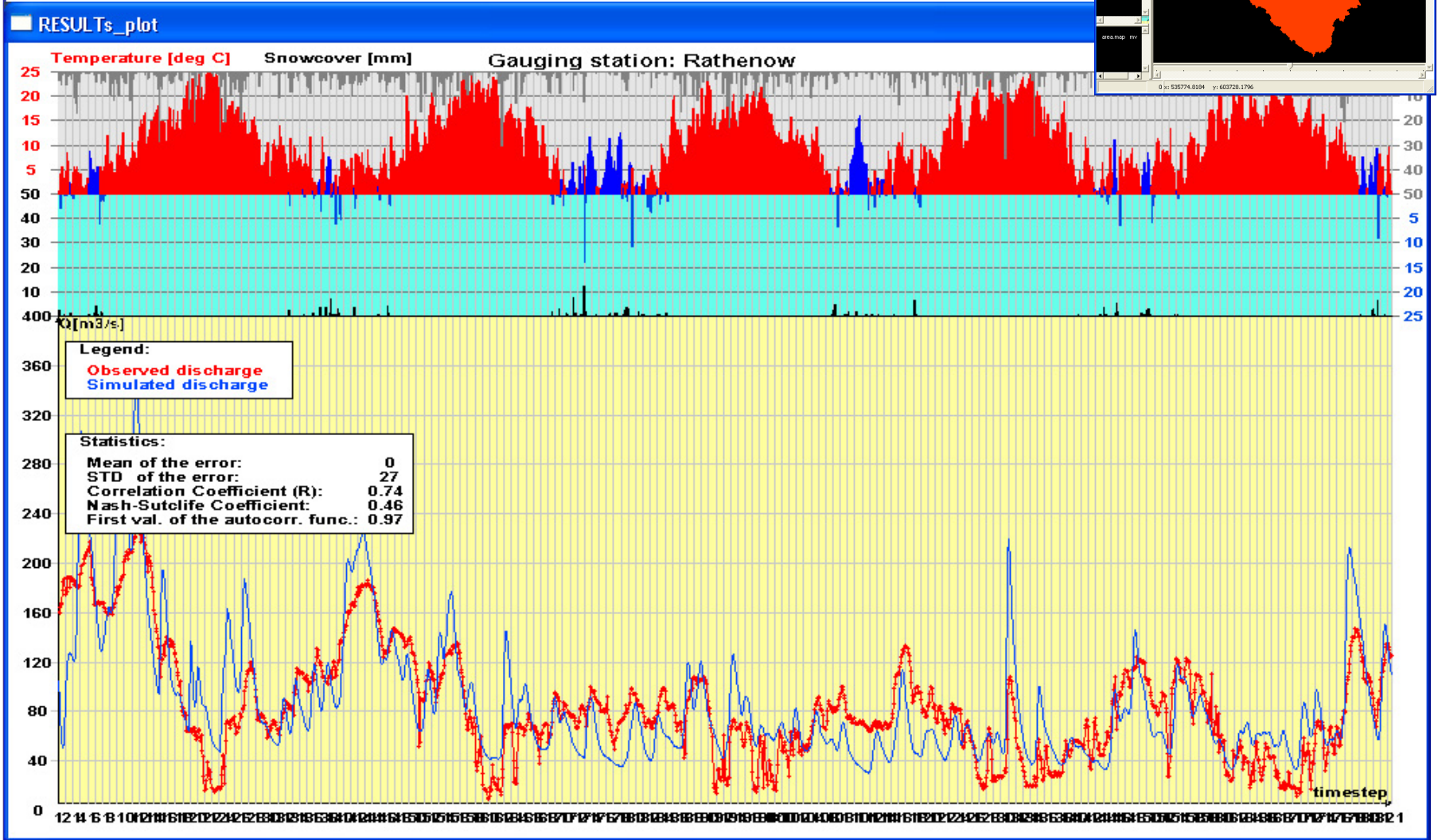
→ Reasonable results



Havel/Rathenow (1994-1998)



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-> No reasonable results - regulated „lake change“



Reservoir Study



Study Objectives with regard to the IKSE Flood Action Program

- Assessment of steering influence of the Saale Reservoirs (Bleiloch, Hohenwarte) to the flood regime downstream of the reservoirs up to the Elbe - **influenced and non influenced** by the reservoirs
- Assessment of the influence of the Czech reservoirs - **optimized reservoir steering and without reservoirs** - on the German part of Elbe



Simulation for the Saale River by the German side

Current steering:

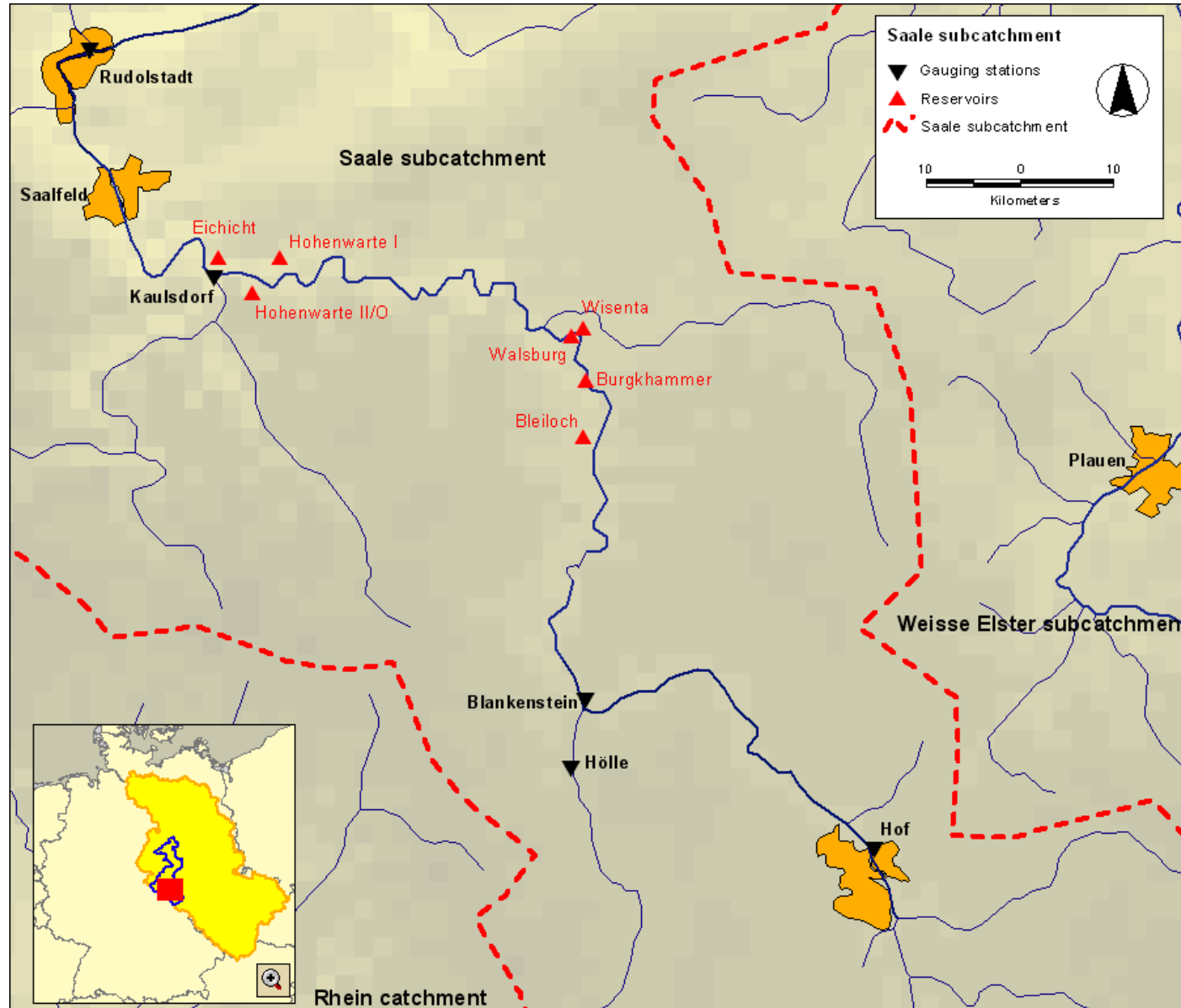
- Reservoirs Bleichloch and Hohenwarte filled:
in summer 25 Million m³ and
in Winter 40 Million m³
including Q min outflow of 5 m³/s downstream Loquitzmouth

Planned steering (for all scenarios):

- Reservoirs Bleichloch and Hohenwarte filled:
in summer 35 Million m³ and
in Winter 55 Million m³
including Q min outflow of 6 m³/s outflow reservoir



Preliminary Results of the Saale – Study...





Scenarios for the Elbe River

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Measure	Reservoirs	1994 SAALE	2002 ELBE	2003 ELBE	0210 ELBE	0220 ELBE	0230 ELBE
		Apr 94	Aug 2002	Jan 2003	2002-10%	2002-20%	2002-30%
2002 Dykebreaks	Current operation	-	2002 DB B	-	-	-	-
Reference	Current operation	1994 RF B	2002 RF B	2003 RF B	0210 RF B	0220 RF B	0230 RF B
	Optimized Moldau/Saale	1994 RF R	2002 RF R	2003 RF R	0210 RF R	0220 RF R	0230 RF R
Dyke overtopping	Current operation	1994 DO B	2002 DO B	2003 DO B	0210 DO B	0220 DO B	0230 DO B
	Optimized Moldau/Saale	1994 DO R	2002 DO R	2003 DO R	0210 DO R	0220 DO R	0230 DO R
Dyke Enlargement (Lenzen)	Current operation	1994 DR B	2002 DR B	2003 DR B	0210 DR B	0220 DR B	0230 DR B
	Optimized Moldau/Saale	1994 DR R	2002 DR R	2003 DR R	0210 DR R	0220 DR R	0230 DR R
Additional measures Saxony	Current operation	1994 ZM B	2002 ZM B	2003 ZM B	0210 ZM B	0220 ZM B	0230 ZM B
	Optimized Moldau/Saale	1994 ZM R	2002 ZM R	2003 ZM R	0210 ZM R	0220 ZM R	0230 ZM R
Polders/optimum Steuerung	Current operation	1994 PO B	2002 PO B	2003 PO B	0210 PO B	0220 PO B	0230 PO B
	Optimized Moldau/Saale	1994 PO R	2002 PO R	2003 PO R	0210 PO R	0220 PO R	0230 PO R
Polders/threshold Steuerung	Current operation	1994 PT B	2002 PT B	2003 PT B	0210 PT B	0220 PT B	0230 PT B
	Optimized Moldau/Saale	1994 PT R	2002 PT R	2003 PT R	0210 PT R	0220 PT R	0230 PT R
Polders/always open	Current operation	1994 PN B	2002 PN B	2003 PN B	0210 PN B	0220 PN B	0230 PN B
	Optimized Moldau/Saale	1994 PN R	2002 PN R	2003 PN R	0210 PN R	0220 PN R	0230 PN R
3B+4B+5B	Current operation	1994 PD B	2002 PD B	2003 PD B	0210 PD B	0220 PD B	0230 PD B
	Optimized Moldau/Saale	1994 PD R	2002 PD R	2003 PD R	0210 PD R	0220 PD R	0230 PD R

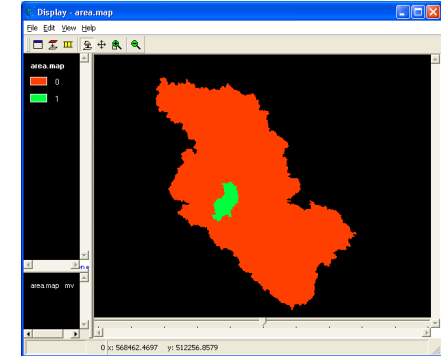


Examples of calibration results within the Saale River Basin

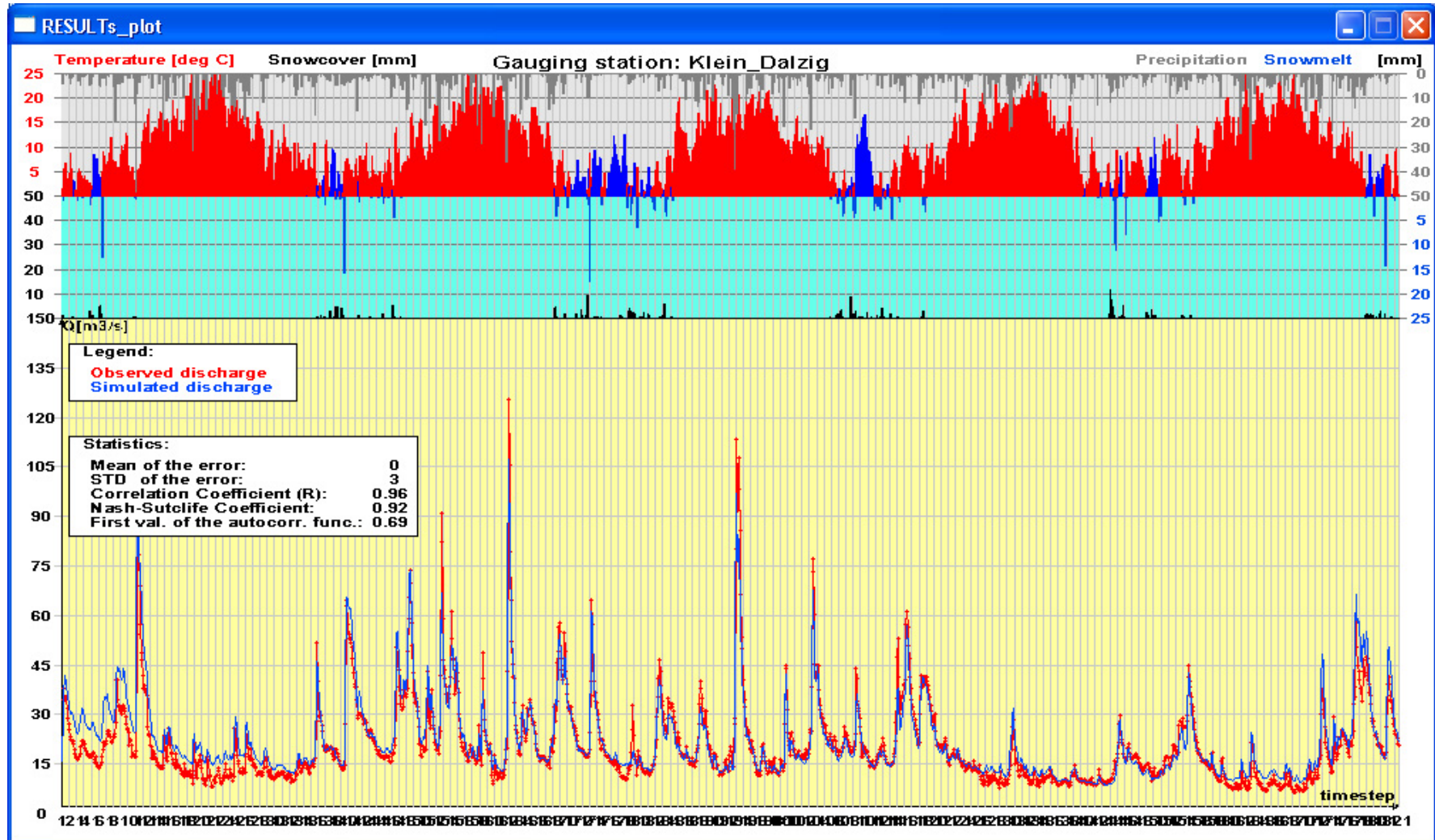


Weisse Elster/Klein Dalzig

(1994-1998, used inflow Greiz)

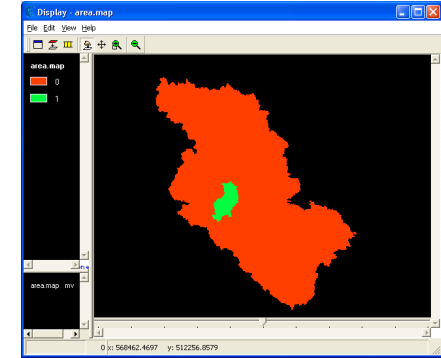


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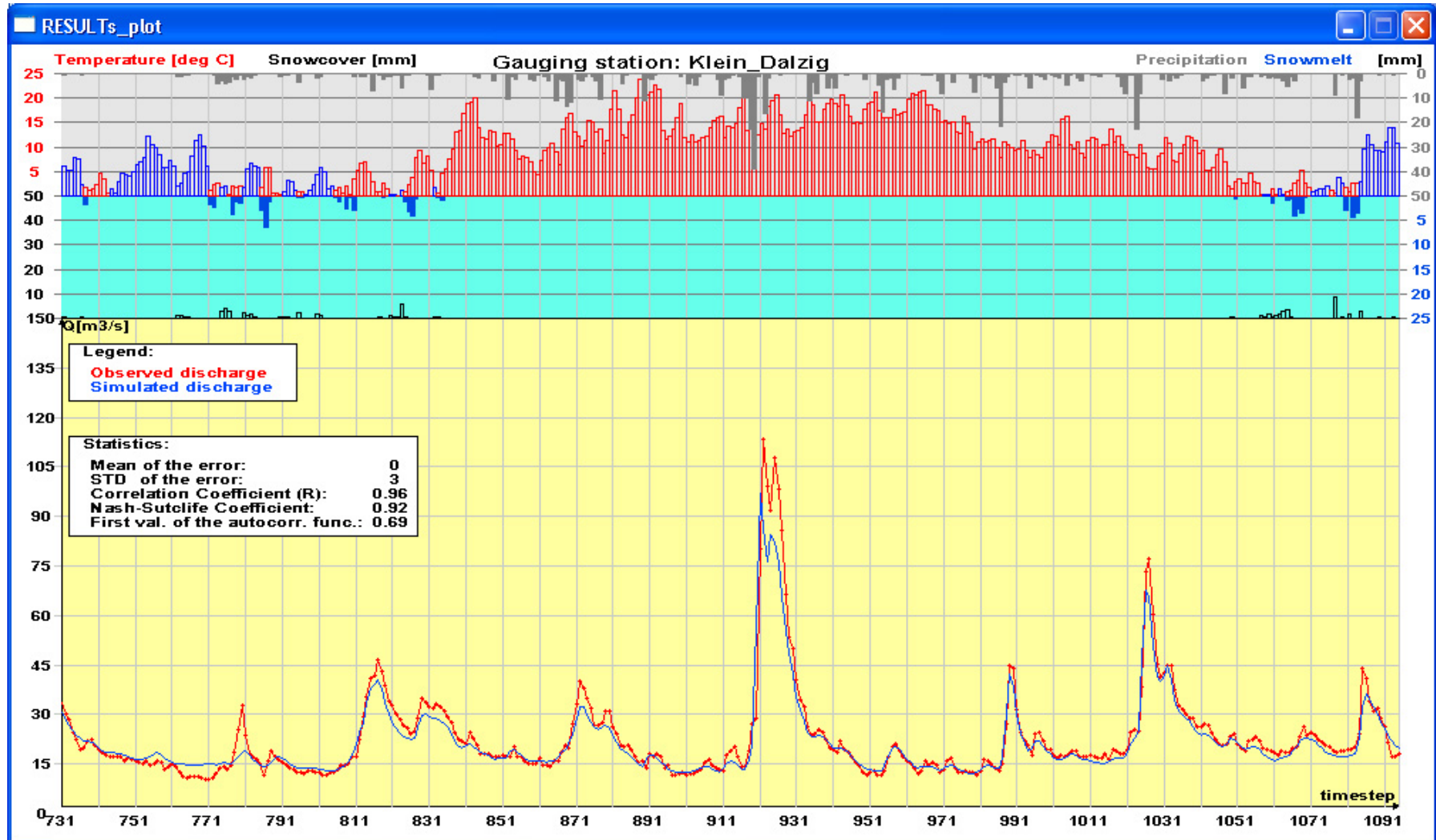




...zoom in

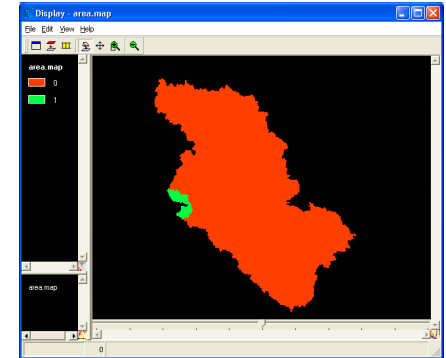


Joint Research Centre

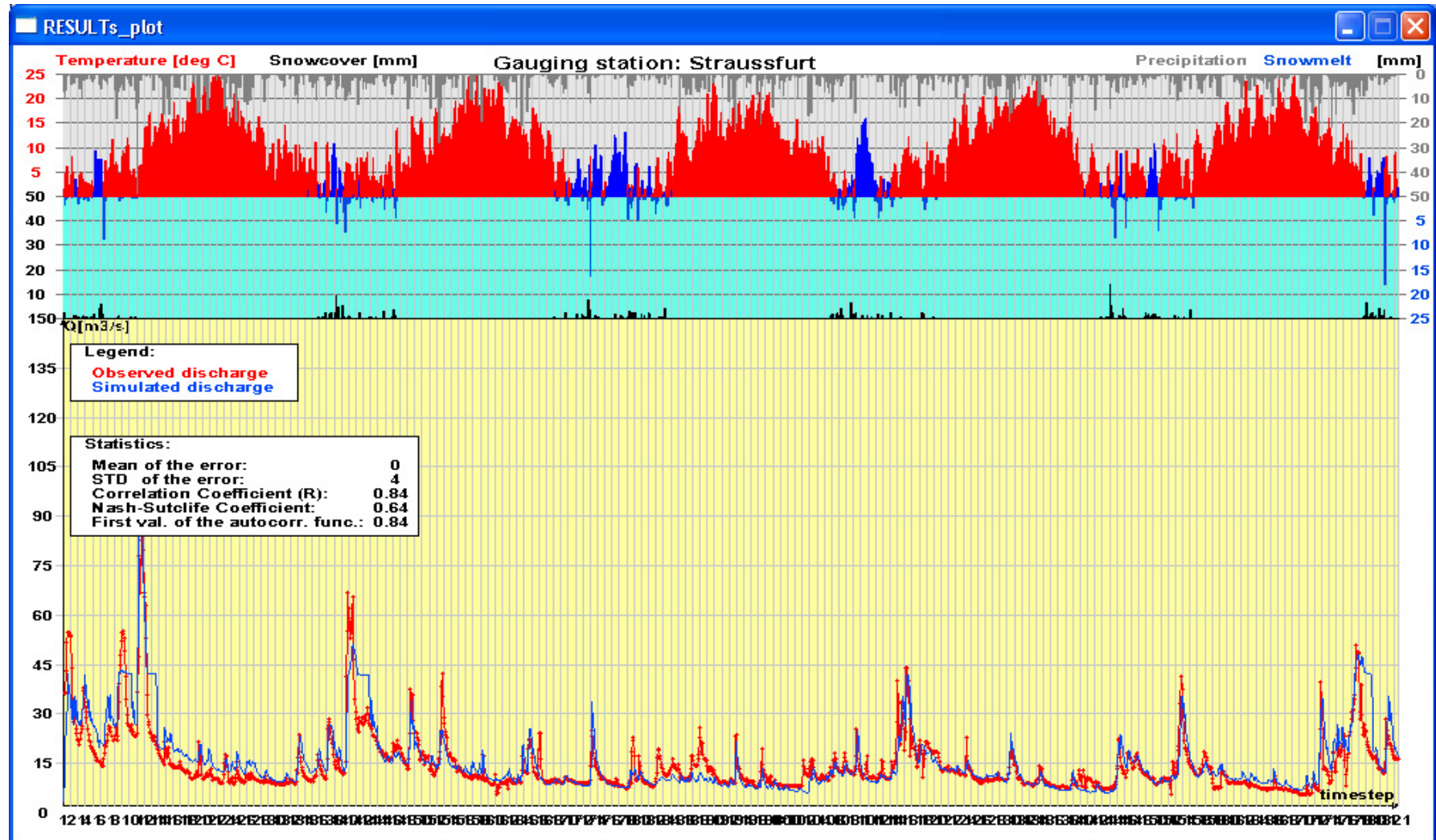




Unstrut/Straussfurt (1994-1998)

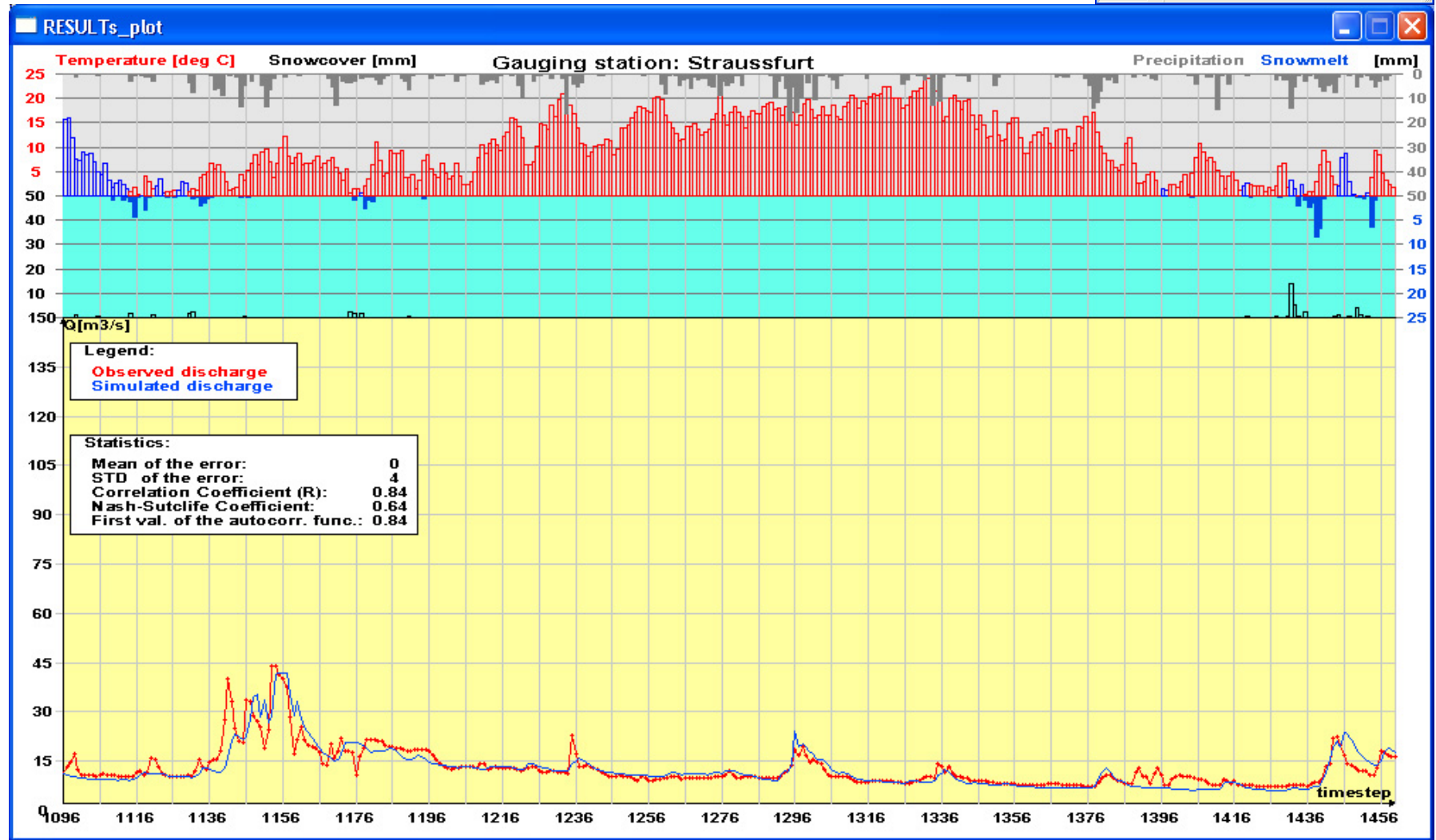
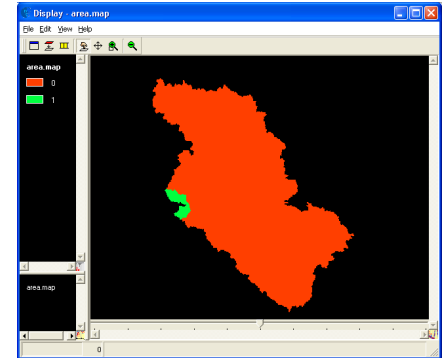


Joint Research Centre





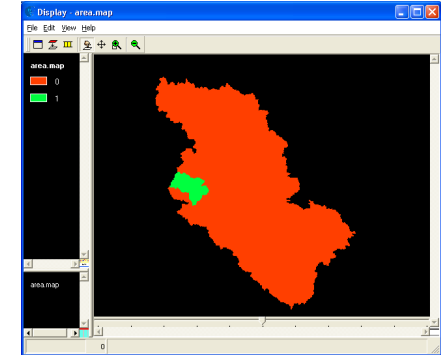
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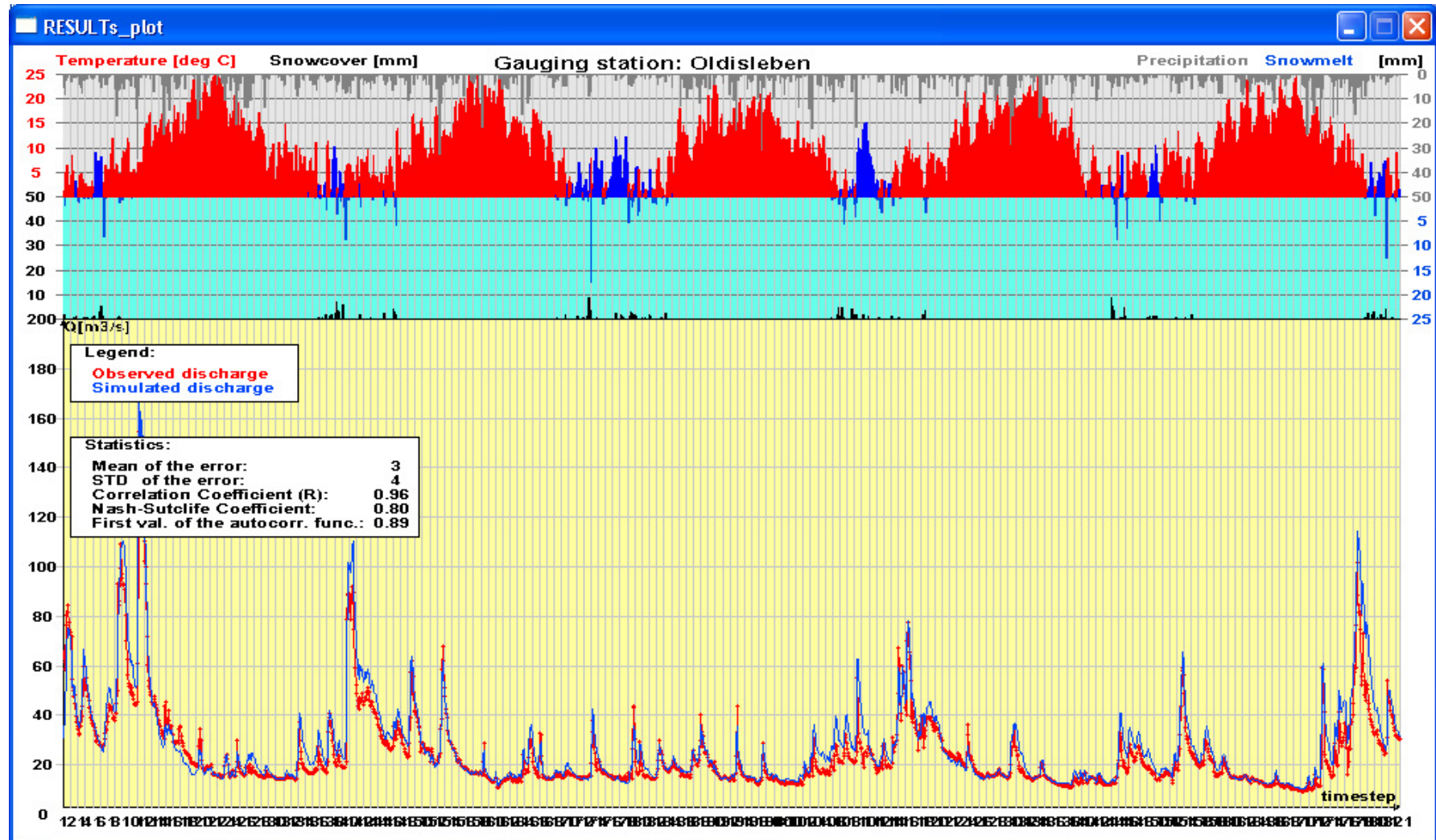


Unstrut/Oldisleben

(1994-1998, used inflow Strausfurt)

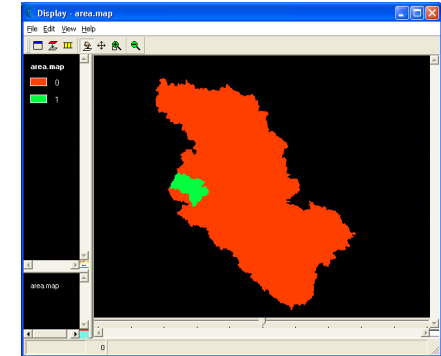


Joint Research Centre

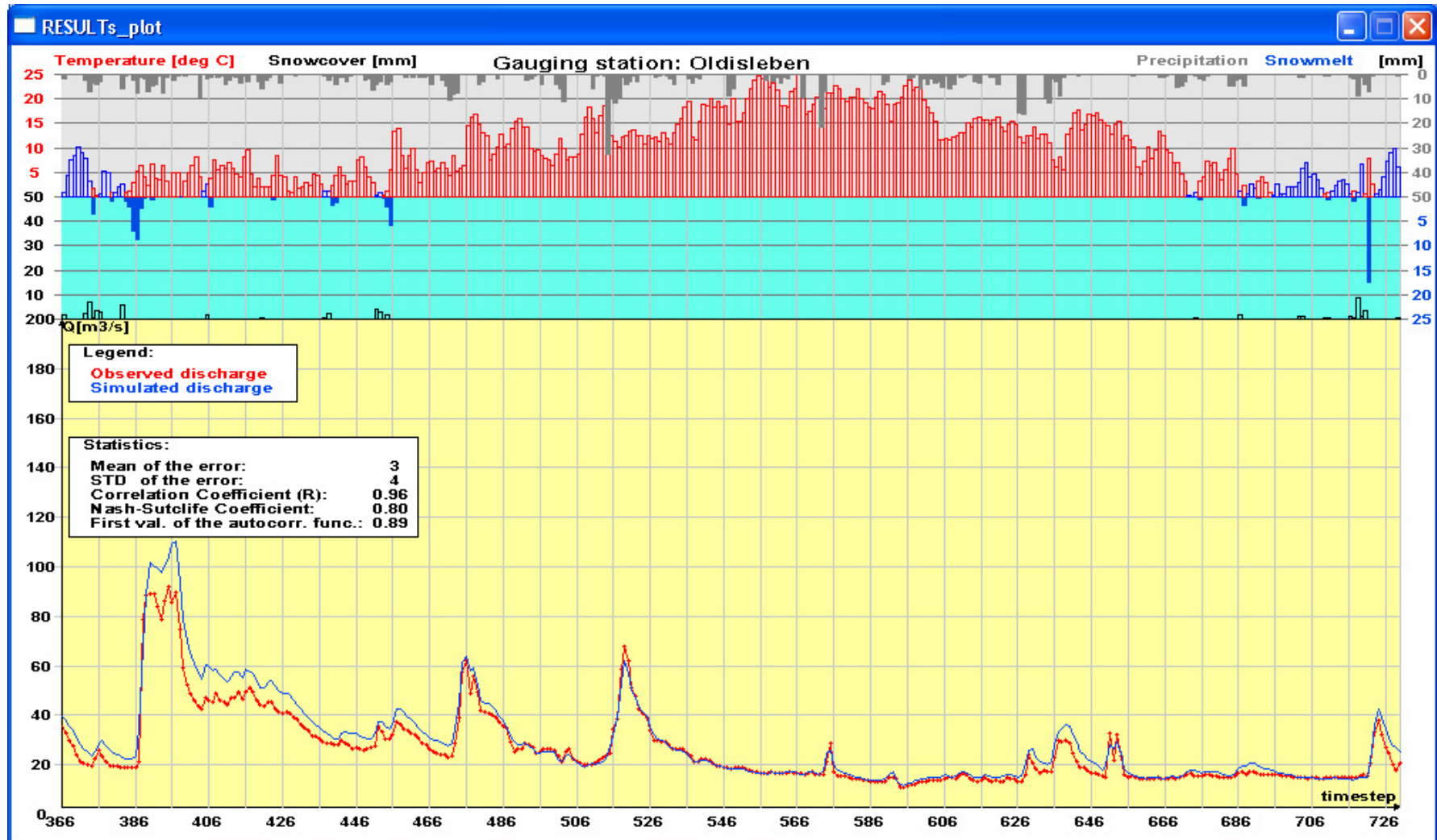




...zoom in



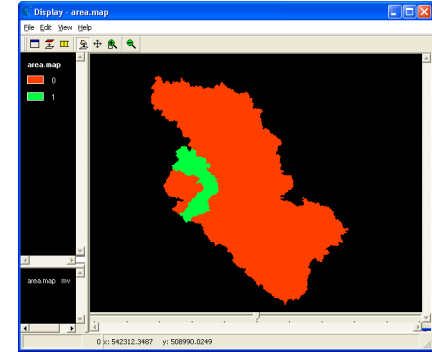
Joint Research Centre



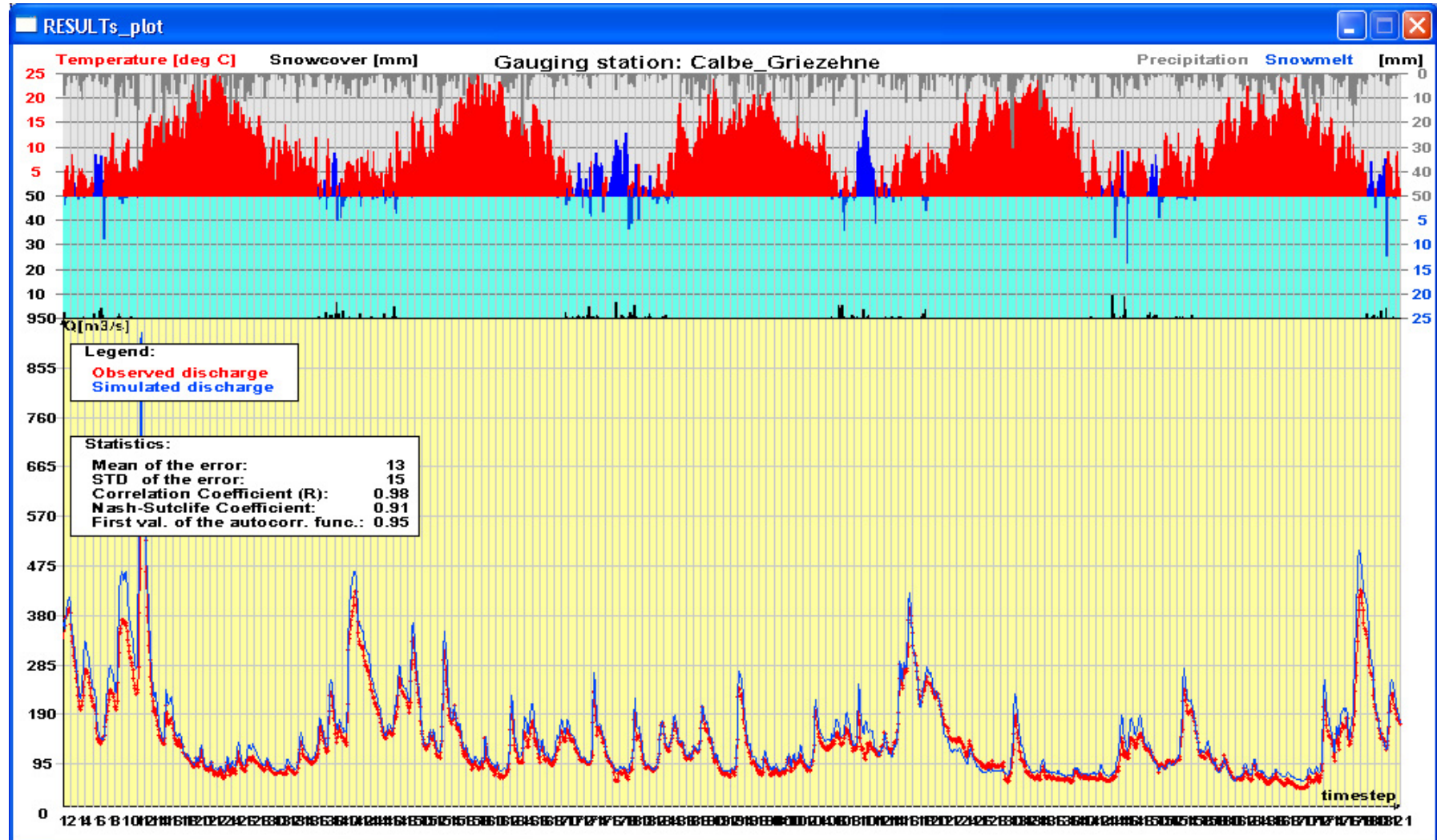


Saale/Calbe-Grieزهne

(1994-1998, used inflow Halle-Trotha)

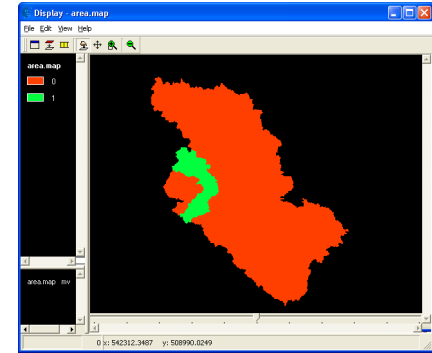


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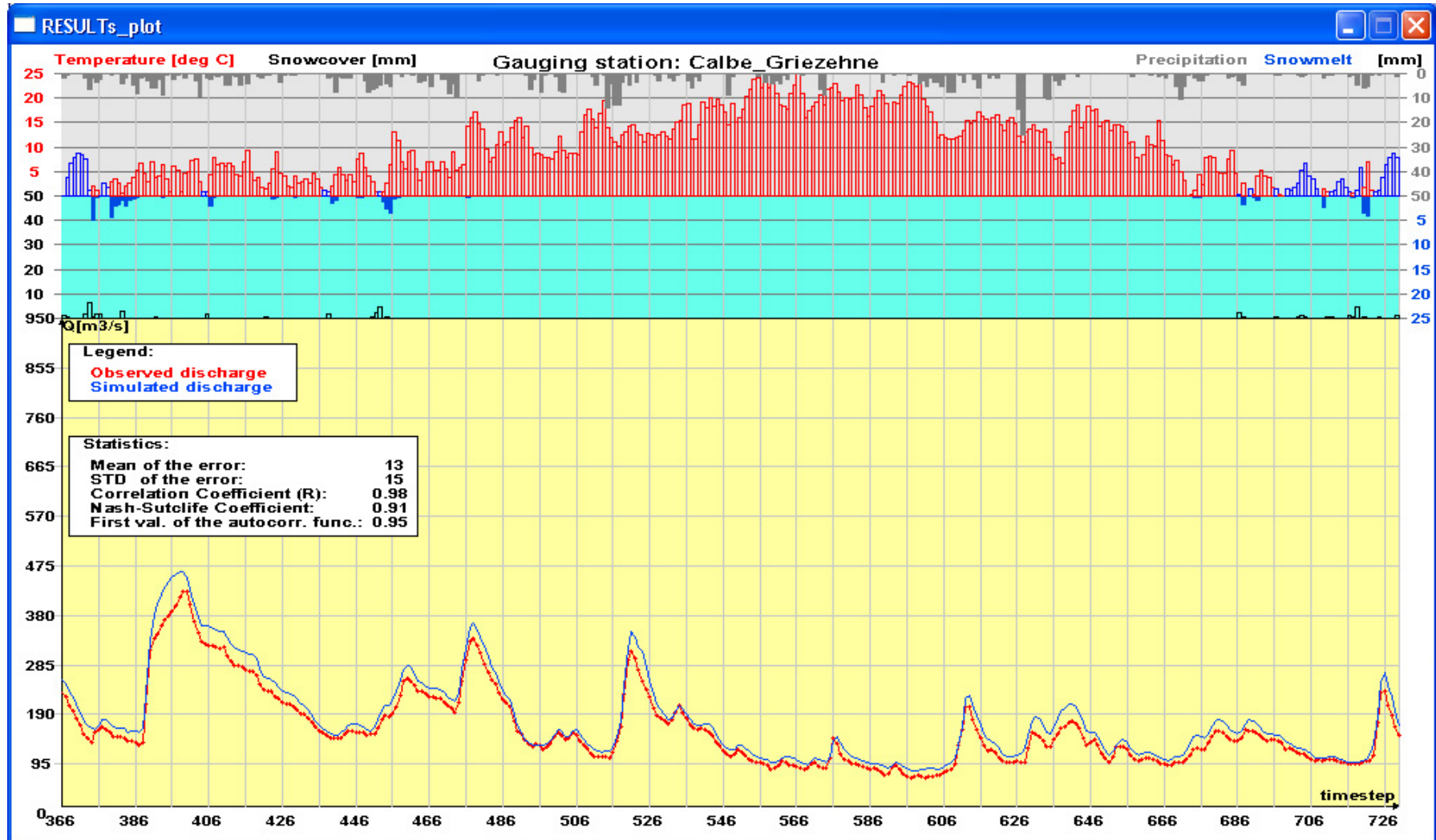




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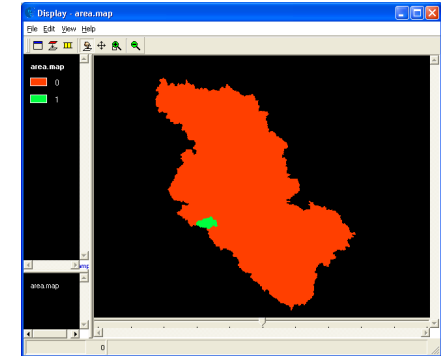
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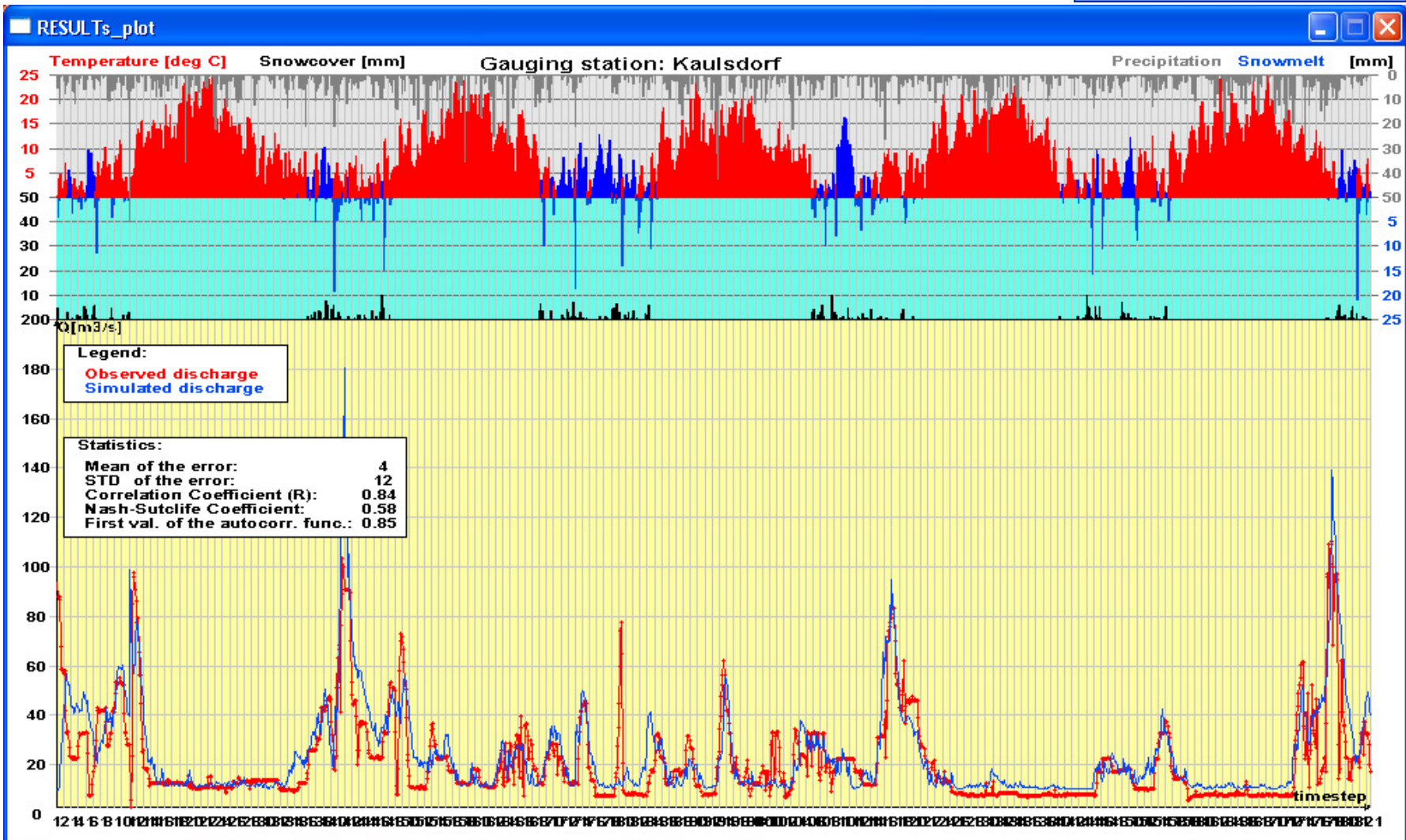


Saale Cascade

(1994-1998, used inflow Blankenstein)

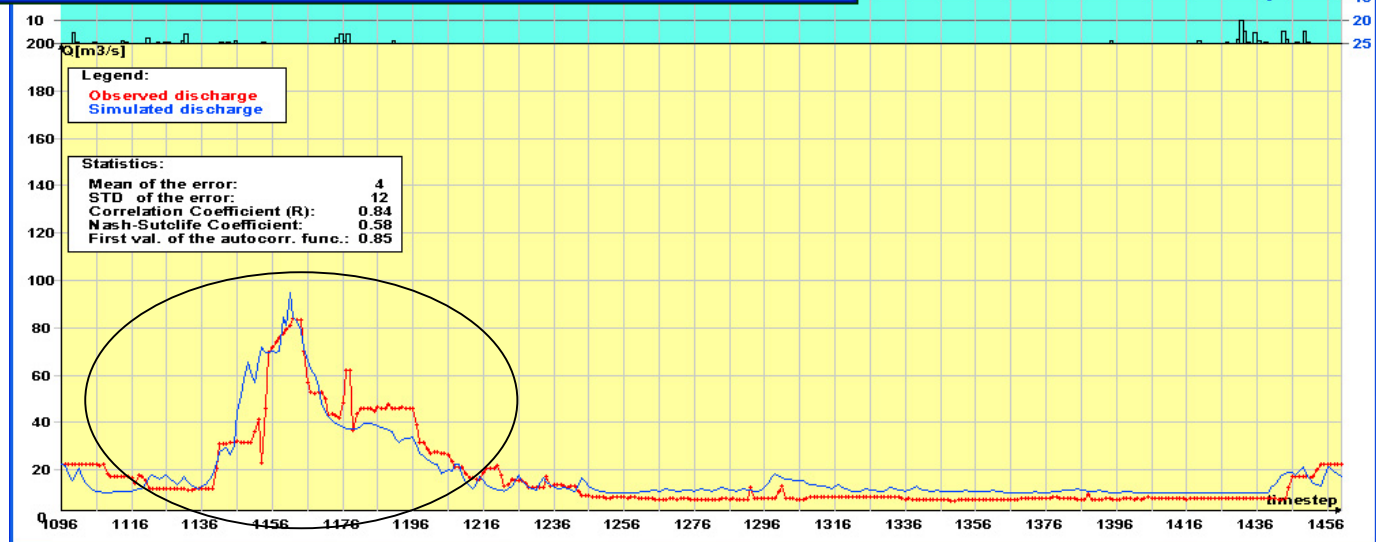
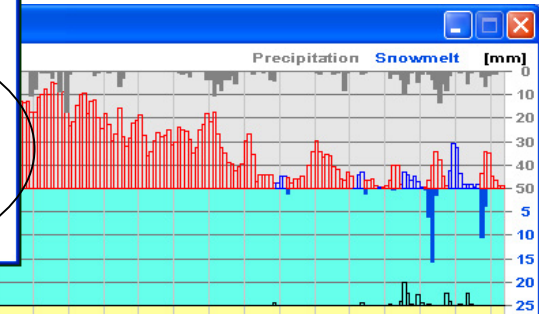
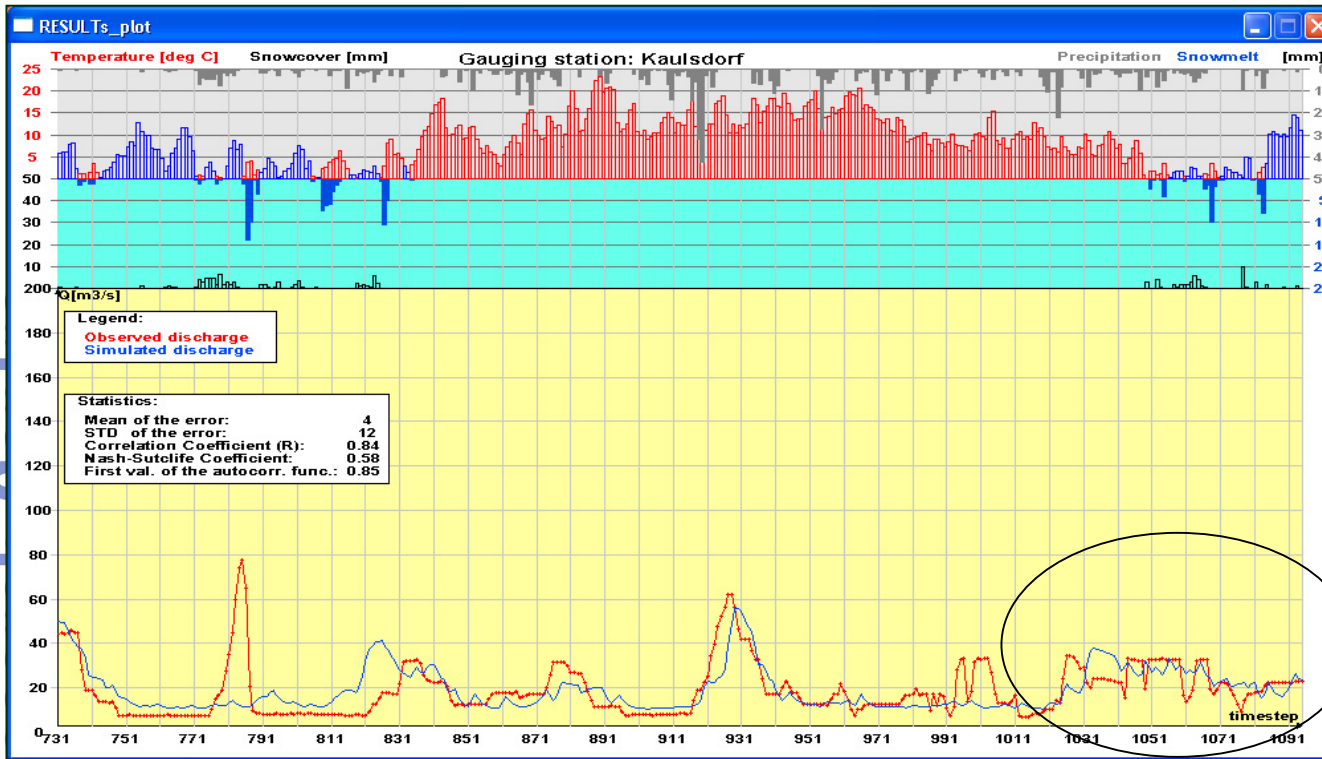
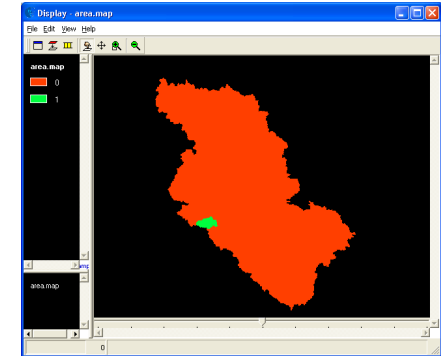


Joint Research Centre



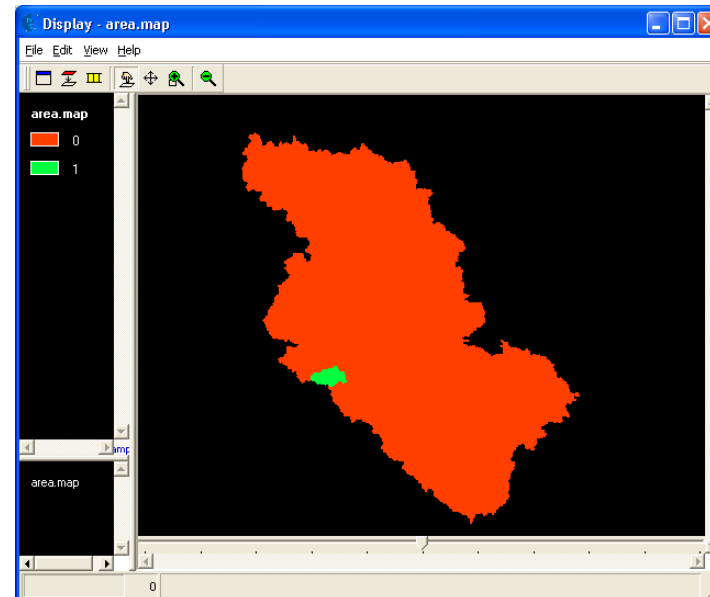


...zoom in



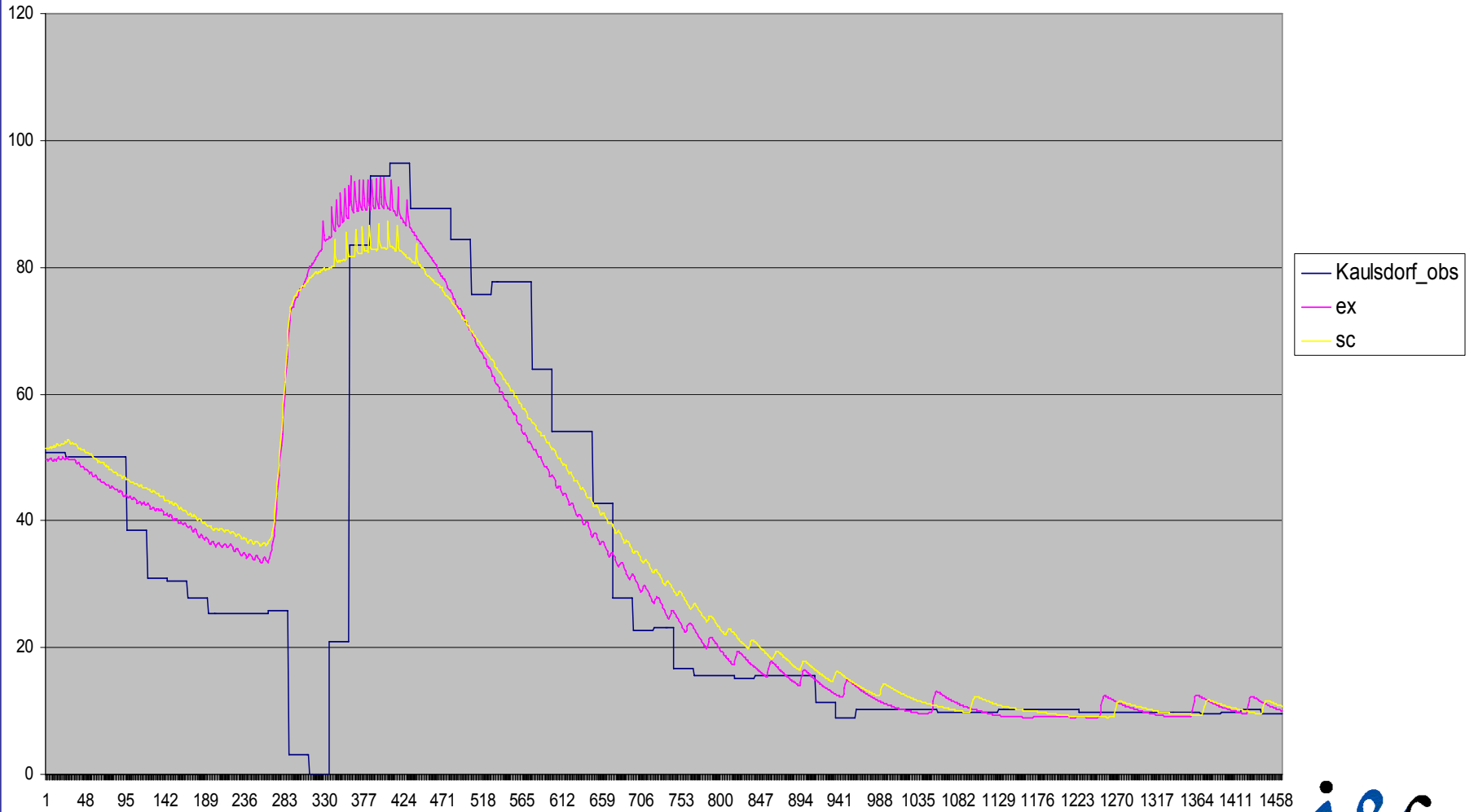


Preliminary Simulation Results flood event April 1994 (Saale)



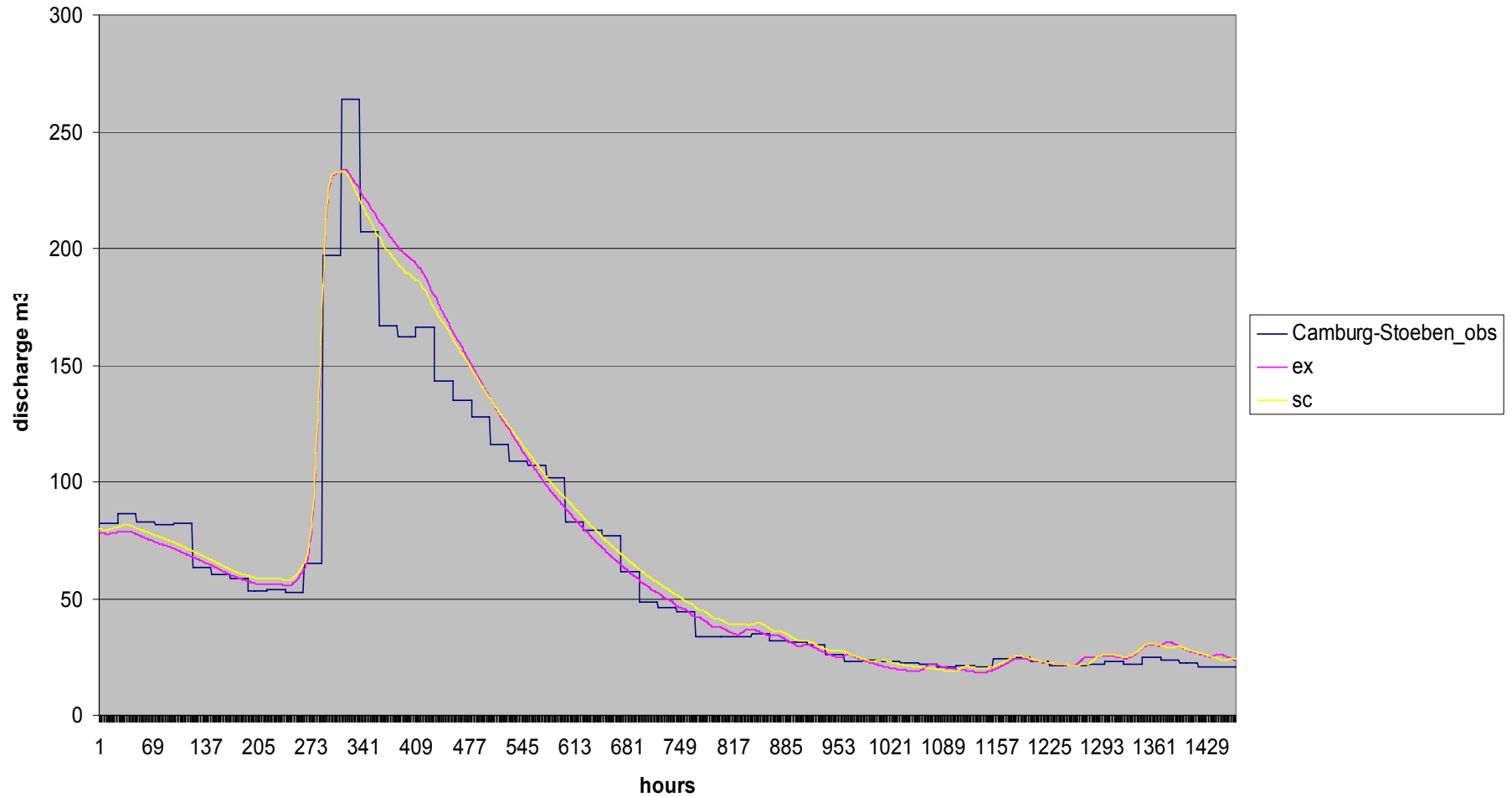


Gauge Kaulsdorf/Saale - Flood April 1994
Comparison between existing and planned regulation (01/04-31/05/1994)
Initial reservoir condition: normal storage



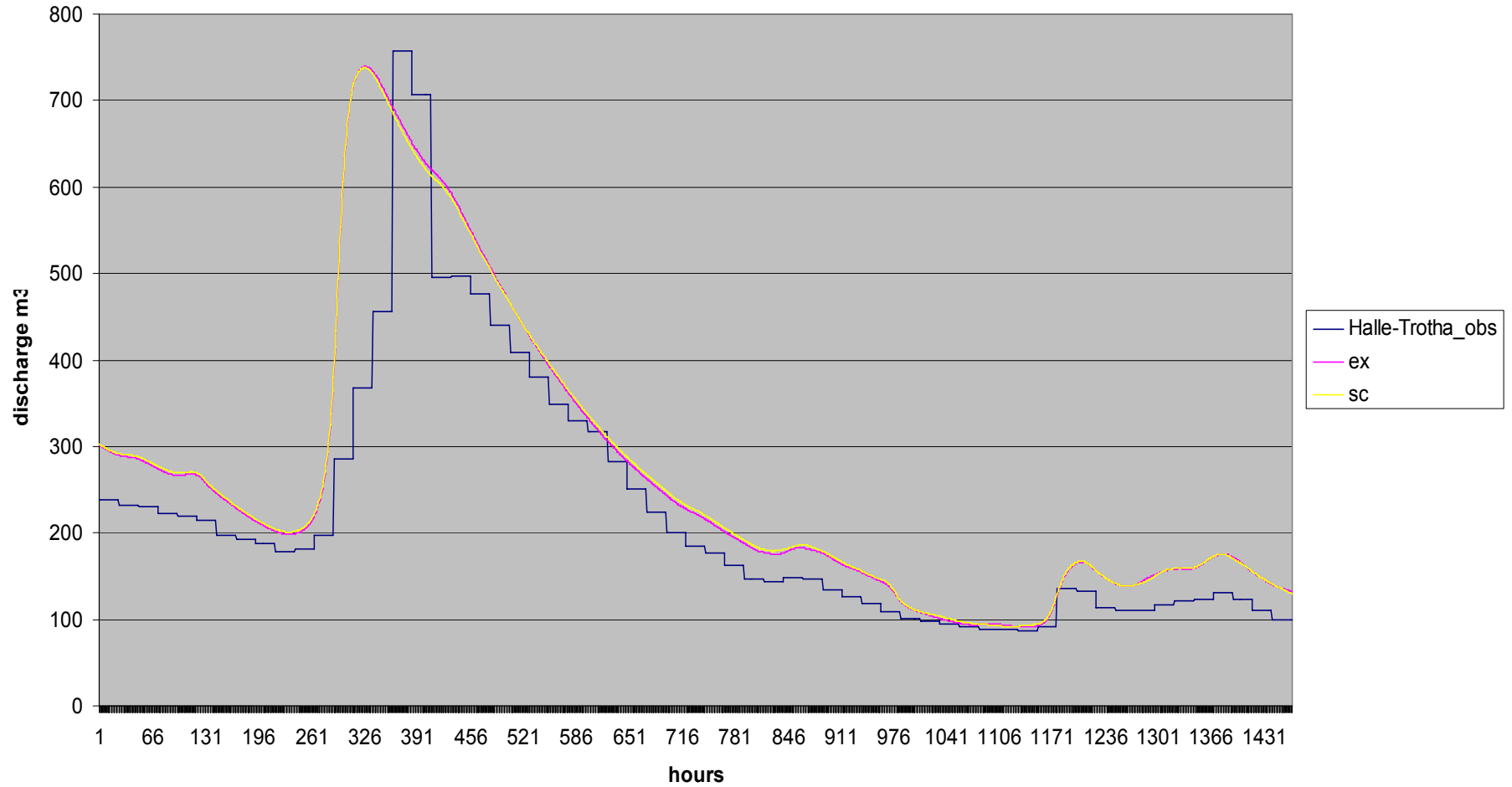


Gauge Camburg-Stoeben/Saale - Flood April 1994
Comparison between existing and planned regulation (01/04-31/05/1994)
Initial reservoir condition: normal storage



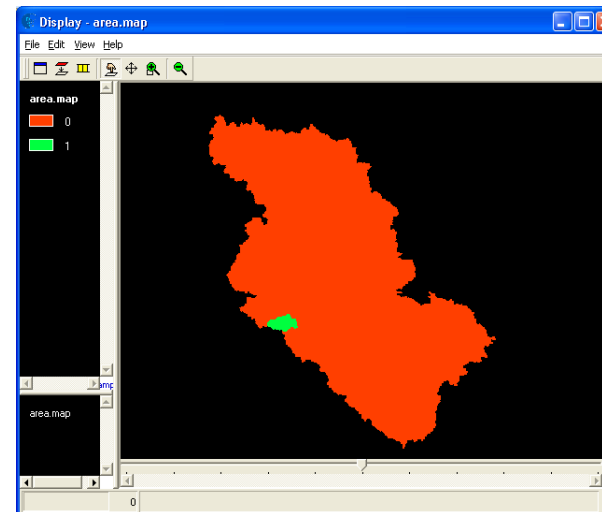


Gauge Halle-Trotha/Saale - Flood April 1994
Comparison between existing and planned regulation (01/04-31/05/1994)
Initial reservoir condition: normal storage



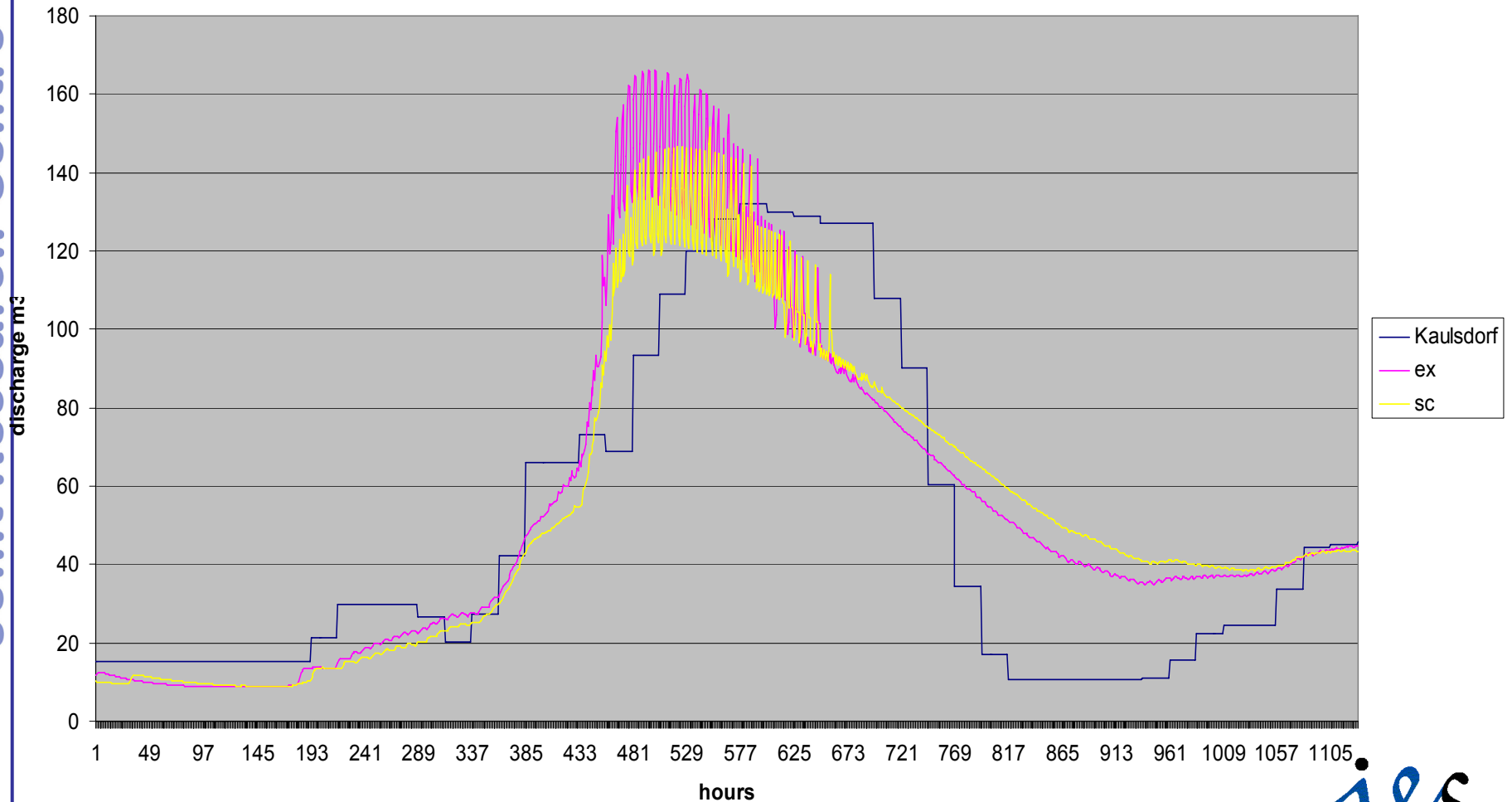


Preliminary Simulation Results flood event January 2003 (Saale)



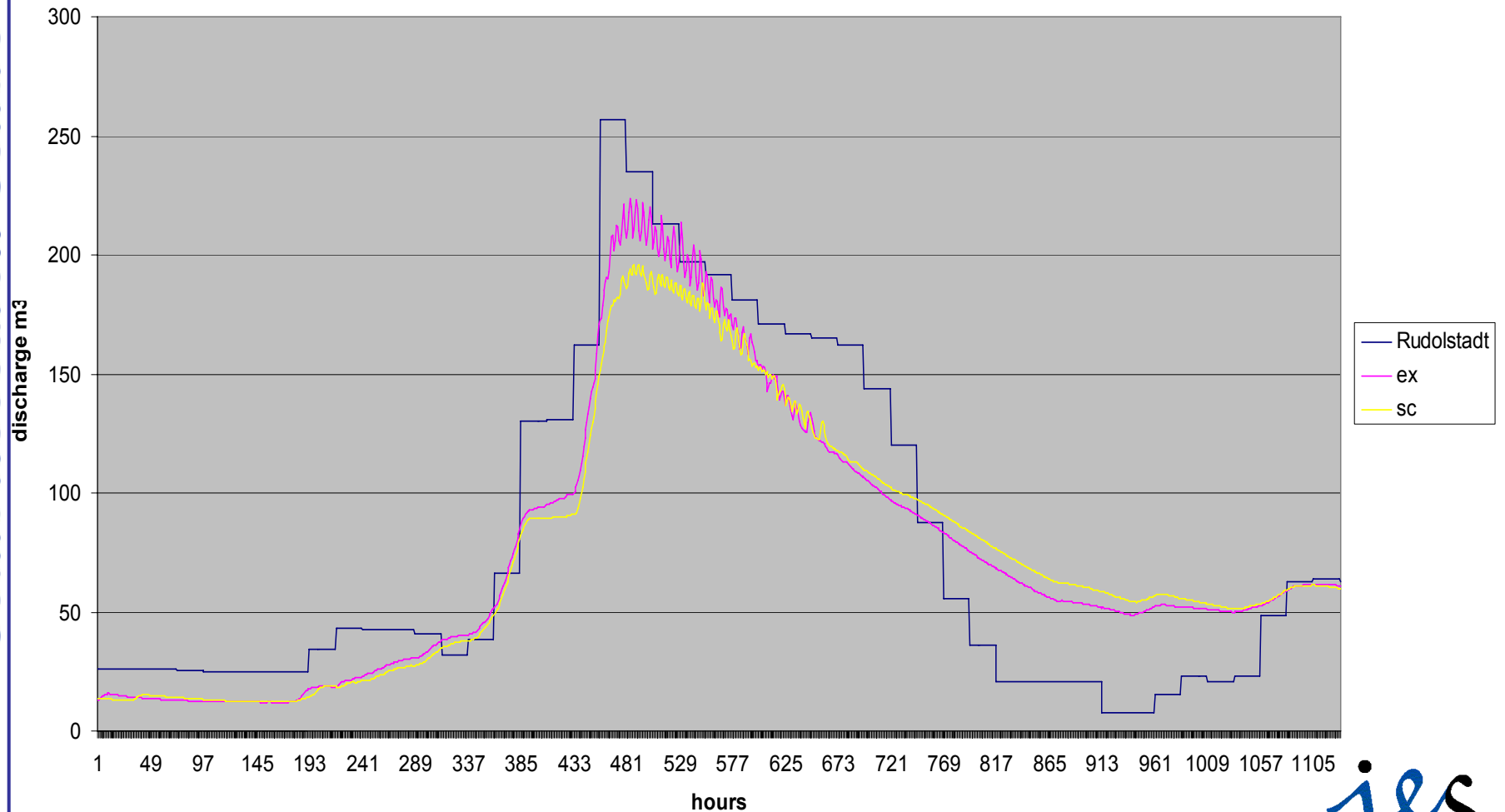


Gauge Kaulsdorf/Saale - Flood December 2002/January 2003
Comparison between existing and planned regulation (15/12/2002 - 31/01/2003)
Initial reservoir condition: normal storage



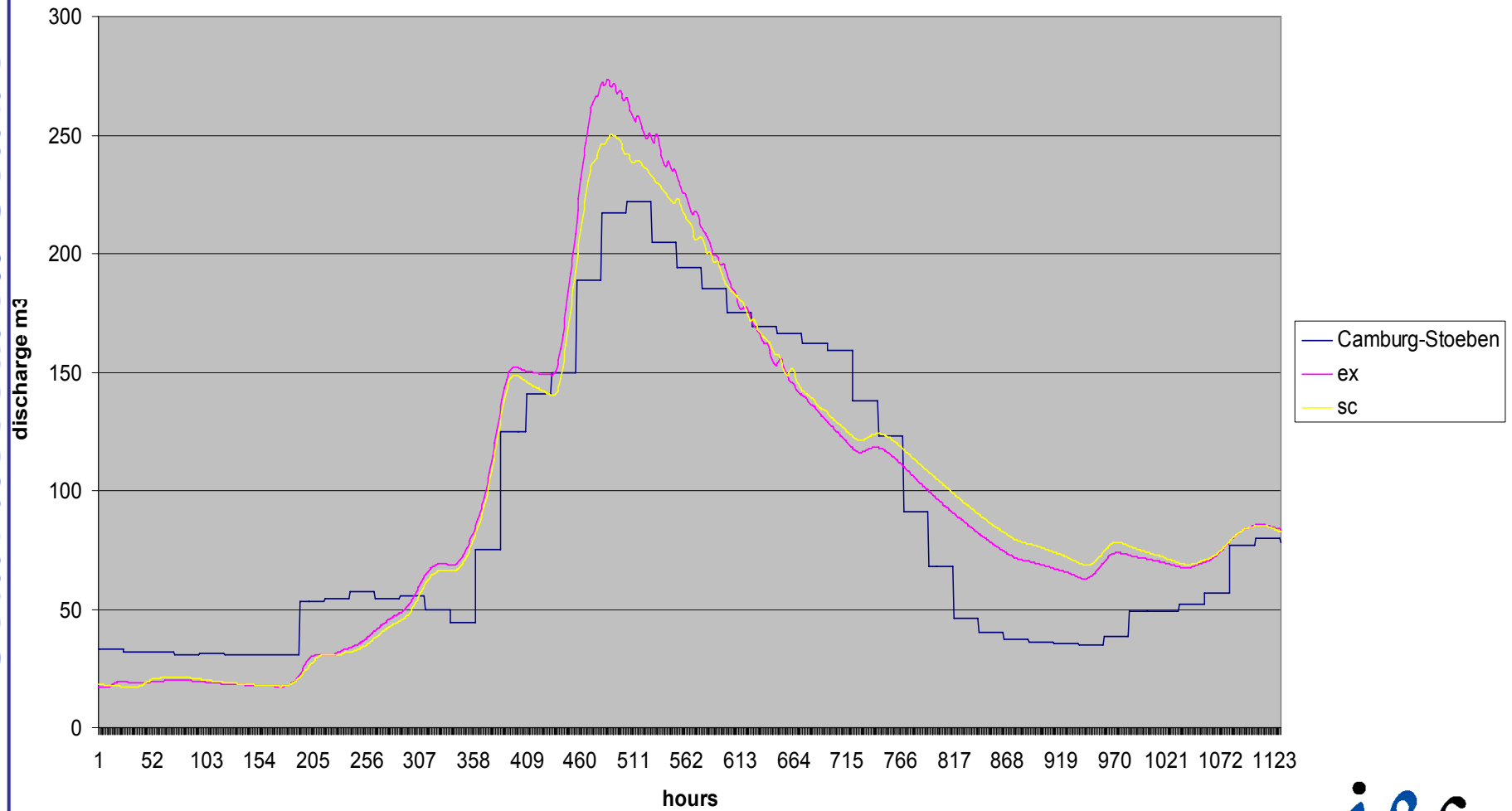


Gauge Rudolstadt/Saale - Flood December 2002/January 2003
Comparison between existing and planned regulation (15/12/2002 - 31/01/2003)
Initial reservoir condition: normal storage



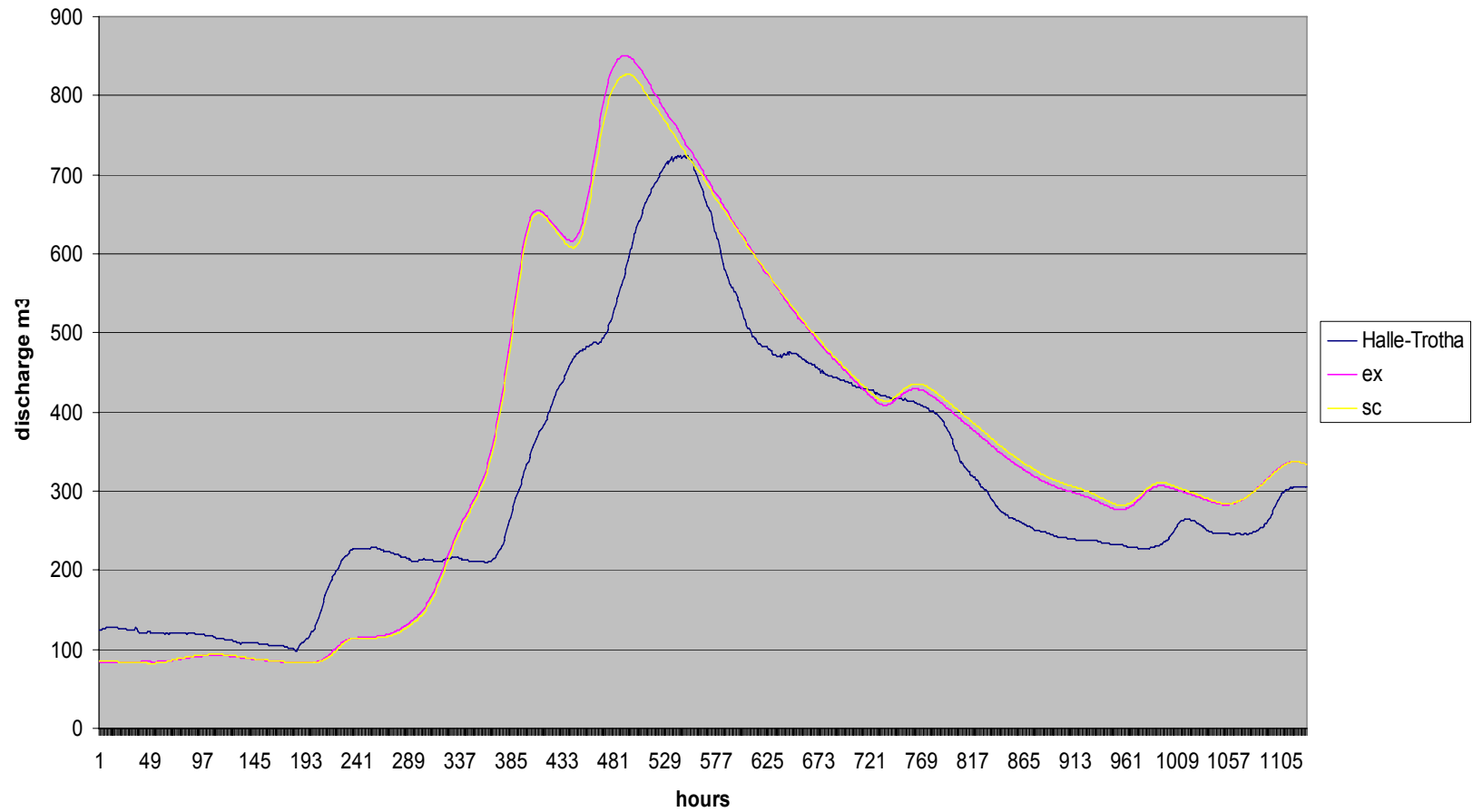


Gauge Camburg-Stoeben/Saale - Flood December 2002/January 2003
Comparison between existing and planned regulation (15/12/2002 - 31/01/2003)
Initial reservoir condition: normal storage





Gauge Halle-Trotha/Saale - Flood December 2002/January 2003
Comparison between existing and planned regulation (15/12/2002 - 31/01/2003)
Initial reservoir condition: normal storage





Preliminary Conclusion

INFLUENCE of Saale scenario on outflow within the Saale and Elbe river in comparison to current steering rules
(at the moment without Czech scenarios)

Joint Research Centre

INFLUENCE on outflow...	Rudolstadt	Camburg-Stoeben	Naumburg	Halle-Trotha	Calbe-Grieزهne
Saale 1994	little Infl.	little Infl.	little Infl.	no Infl.	no Infl.
Elbe August 2002	little Infl.	little Infl.	no Infl.	no Infl.	no Infl.
Elbe January 2003	higher Infl.	higher Infl.	little Infl.	little Infl.	little Infl.
Elbe August 2002 - 10 %					
Elbe August 2002 - 20 %					
Elbe August 2002 - 30 %					

INFLUENCE on outflow...	Elbe_Dresden	Elbe_Torgau	Elbe_Wittenberg	Elbe_Barby	Elbe_Magdeburg
Saale 1994	no Infl.	no Infl.	no Infl.	no Infl.	no Infl.
Elbe August 2002	no Infl.	no Infl.	no Infl.	no Infl.	no Infl.
Elbe January 2003					
Elbe August 2002 - 10 %					
Elbe August 2002 - 20 %					
Elbe August 2002 - 30 %					

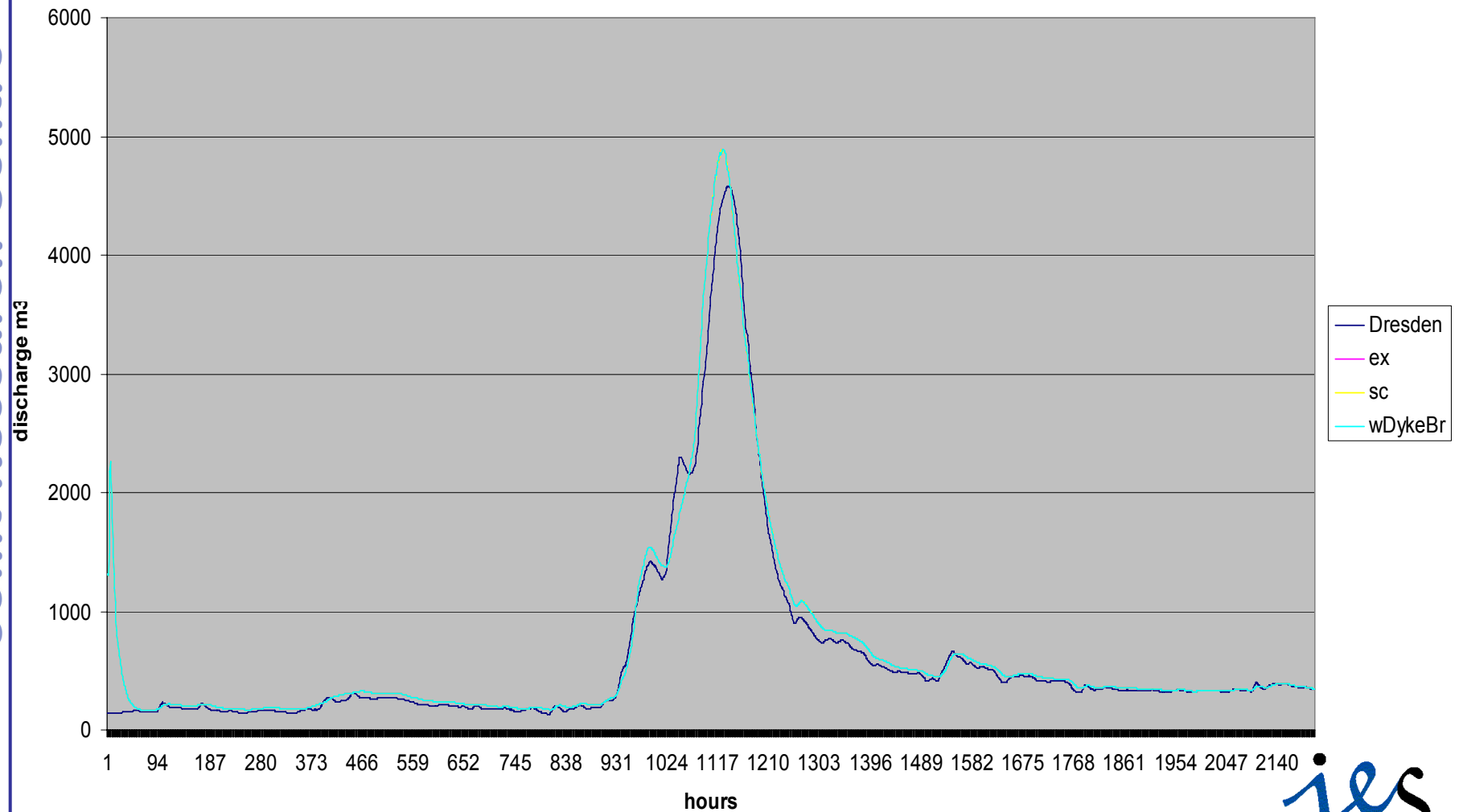
INFLUENCE on outflow...	Elbe_Wittenberge	Elbe_NeuDarchau	Elbe_Hohnstorf
Saale 1994	no Infl.	no Infl.	
Elbe August 2002	no Infl.	no Infl.	
Elbe January 2003			
Elbe August 2002 - 10 %			
Elbe August 2002 - 20 %			
Elbe August 2002 - 30 %			



- **Preliminary Simulation Results flood event
January 2003 (Elbe)**
- **Preliminary Simulation Results flood event
August 2002 (Saale)**
- **Preliminary Simulation Results flood event
August 2002 (Elbe)**
- ➔ **still ongoing**



Gauge Dresden/Elbe - Flood August 2002
Comparison between existing and planned regulation (01/07-30/09/2002)
Initial reservoir condition: normal storage



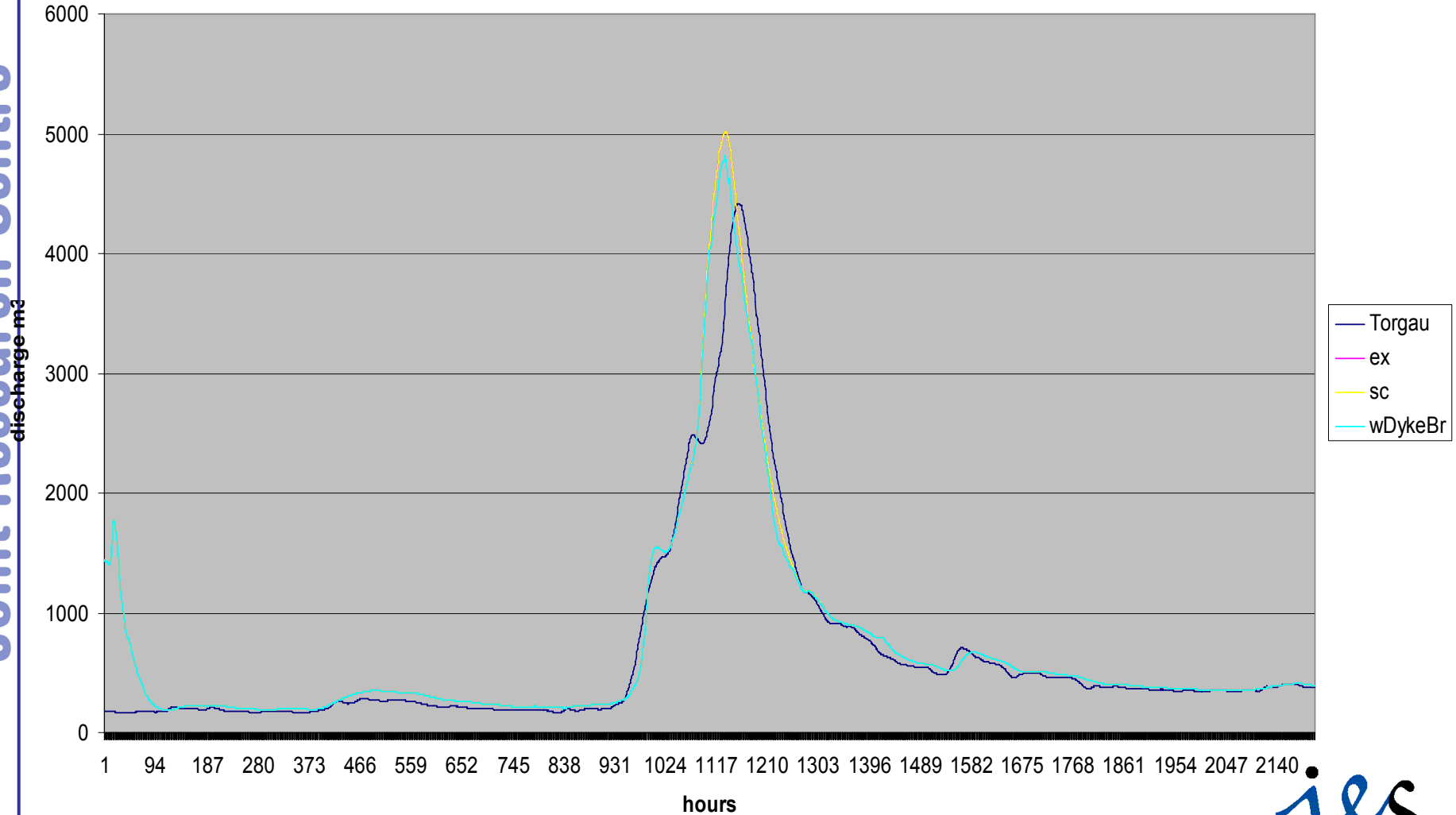


Gauge Torgau/Elbe - Flood August 2002

Comparison between existing and planned regulation (01/07-30/09/2002)

Initial reservoir condition: normal storage -

Joint Research Centre





Ongoing work

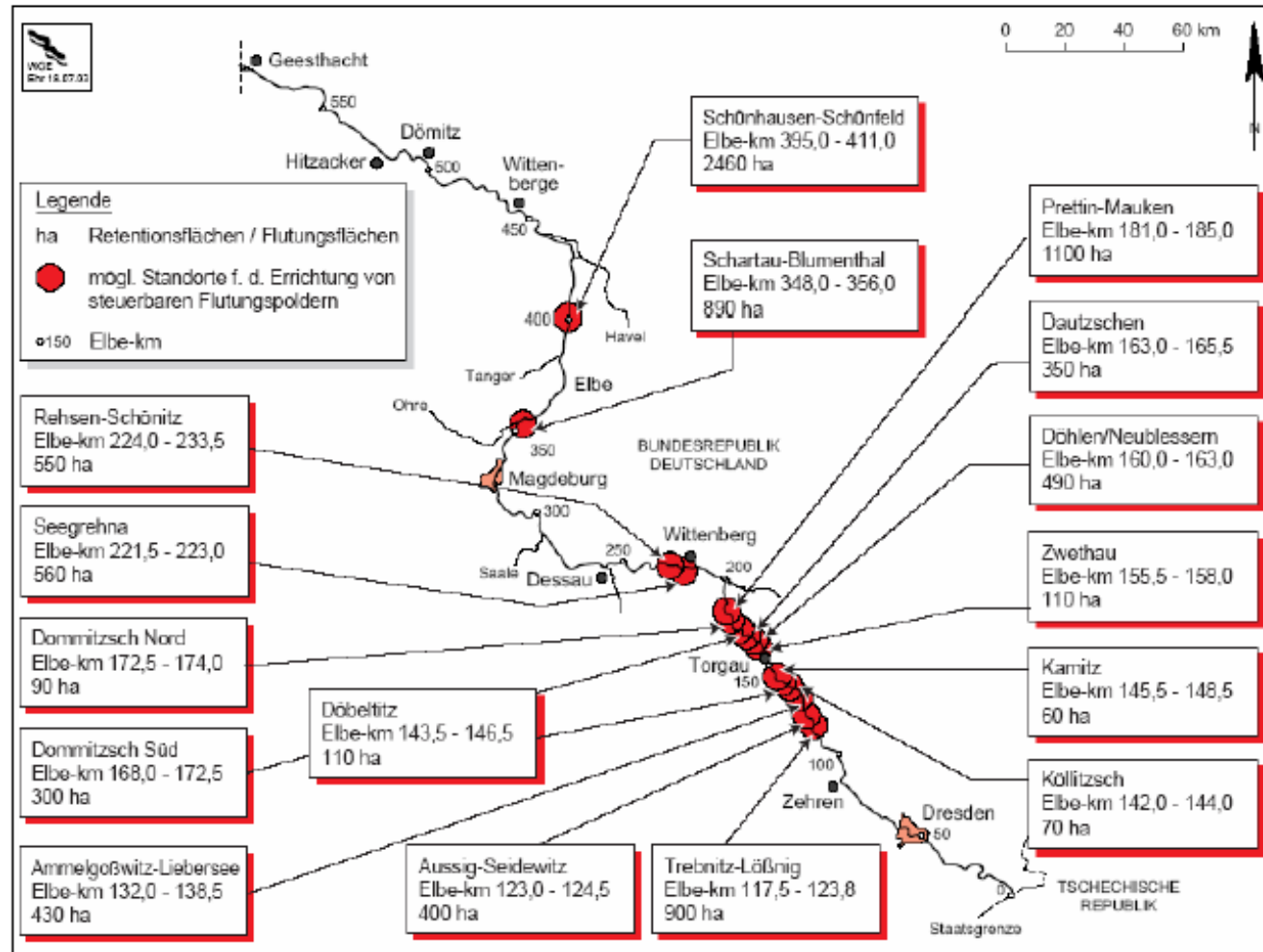
- Replacement of the daily calibration parameter set with an hourly parameter set
- Implementation of the full cross section data set
- Finetuning of the dynamic wave calibration
- Fix the reservoir oscillation
- Use of the 100 year czech inflow data (optimized reservoir steering and without reservoirs)



Polder Study



Possible locations for steered polders along the German Elbe



still ongoing, all data are prepared; will be done when the scenario study is finished



Further time schedule...

- **Until the end of June:**
Finishing of Reservoir Study
- **Until the end of September:**
Finishing of Polder Study for main Elbe
- **Carrying out final reports**
- **Preparation a Workshop Elbe**



Thank you for your attention



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