Beilage 29

Beilage G

Bericht über das Treffen der Unterarbeitsgruppe Hydrologie am 5. Juli 2015

Report

of the Working Group on Hydrology for the

Drava River

2016

REPUBLIC OF SLOVENIA
MINISTRY OF THE ENVIRONMENT AND SPATIAL PLANNING
SLOVENIAN ENVIRONMENT AGENCY

LAND KÄRNTEN
Abt. 8 - Kompetenzzentrum
Umwelt, Wasser und Naturschutz

HYDRO grafie
Kärnten
... am Puls des Wassers.

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1 MINUTES

of the 2nd meeting of the sub-group for hydrology for the Drava River,

working group "Water Management"

Klagenfurt, Carinthia, July 05, 2016

1.1 Attendance

In accordance with paragraph 2.8 of the minutes of the 23rd session of the Permanent Slovenian-Austrian Commission for the Drava (15 to 16 May 2014) to establish a subgroup for the hydrology within the working group for Water Management, 2nd meeting was held at the department 8 of the Carinthian government. A list of attendance is enclosed.

DI Johannes Moser (Abt. 8 Hydrographie) chaired the session. Both sides agreed that the working language is English including the minutes of the meeting.

1.2 Adoption of the agenda

The agenda, which was previously agreed by email, was adopted:

- Climate change studies
- Hydrological data 2015
- Waterbalance 2015
- Flood forecasting model of the Drava River
- Exchange of experience and good practices
- Miscellaneous

1.2.1 Climate change studies

Austria:

Publications:

ÖWAV, Lebensministerium, 2008 Auswirkungen des Klimawandels auf die österreichische Wasserwirtschaft

ÖWAV, Lebensministerium: Österreichischer Wasserwirtschaftstag 2008; Klimawandel – Eine Gefahr für Österreichs Wasserwirtschaft?

ÖWAV, Lebensministerium, 2012 Auswirkungen des Klimawandels auf die österreichische Wasserwirtschaft; Anpassungsstrategien

Lebensministerium 2012, DIE ÖSTERREICHISCHE STRATEGIE ZUR ANPASSUNG AN DEN KLIMAWANDEL Teil 1 – Kontext

Lebensministerium 2012, Die österreichische Strategie zur Anpassung an den Klimawandel Teil 2 – AKTIONSPLAN Handlungsempfehlungen für die Umsetzung

Status quo oft the results:

10 thesis

1: Floods: The effect of climate change is very unsure to calculate. The variability of the statistic is maybe greater than the climate change effect. So in Austria we do not add a fix climate change contribution to the rated values. The statistical uncertainty of representative flood series we estimate 15 to 30%.

In small catchment areas floods will be more often and intensive.

2: The low flows in winter will be greater, because it will rain more then snowing. The low flows in the east and south of Austria will be less.

3: Glaciers melt more and intensive. So in the next time the flows of glacier rivers will rise (2020-2040) an then gets very lower.

4: Less groundwater because of more evapotranspiration.

5: Bedload will grow on.

6: Water temperature will also rise (1 degree)

7: The quality of the surface water in the east and south of Austria is falling, because the concentration of harmfull substances is greater when the discharges will be lower.

8: Quality of groundwater: falling

9: Water power: in winter more potential and in summer less. So there is no reason of changing.

10: Water supplier: we have much resources but in drought periods when water demand is rising, and flow of springs goes to minimum, we need additional available resources.

Slovenia:

In the beginning of this year The Slovenian Environment Agency (ARSO) has started to work on the project "Assessment of climate change in Slovenia by the end of the 21st century". Estimates of climate change will be prepared from model-based scenarios for temperature and precipitation conditions including extreme events such as heat waves, droughts, storms with strong winds, heavy rainfall, hail and floods. The estimates will be the basis for preparation of strategic documents for adaptation to climate change in Slovenia, updated risk assessment from various natural disasters in Slovenia etc. They will serve all sectors that are closely related to weather and climate and need to be adjusted to climate change.

1.2.2 Hydrological data 2015 (discharges, suspended load...)

Hydrography of Carinthia: gauging station Lavamünd MQ=220 m^3/s, Lavant / Pegel Krottendorf: MQ=10,3 m^3/s

Mean discharge of the Drava river in the year 2015 in Lavamünd at the border is:

MQ=231 m^3/s (measured by Hydrography of Carinthia).

DEM: HE Dravograd MQ=238 m^3/s.

Verbund: Drava at the powerplant Lavamünd (without Lavant): MQ= 222 m^3/s

Highest flood discharges in Drava Lavamüd Grenze: HQ=744 m^3/s ($HQ_{0,7}$; 23.05.2015)

ARSO has not performed the data processing yet and determination of mean annual discharge for the g.s. Črneče for 2015.

1.2.3 Waterbalance 2015

Carinthia:

Precipiation: -10,9% 2015: 1055 mm (1981-2010) 1198 mm

Flow rates: -6,8% 2015: 552 mm (1981-2010) 562 mm

Evapotranspiration: +3,8% 2015: 604 mm (1981-2010) 582 mm

Input of flow rate from the year 2014: 101 mm

1.2.4 Flood forecasting model of the Drava River

Last year ARSO presented the Slovenian hydrological forecasting system (HFS). In the HFS only the Drava River is not covered by the model.

HD Kärnten is not very interested to set up the new model for the Drava river basin because they use its own model. But they are ready to provide all necessary data and information if ARSO wants to establish the model for the Drava river catchment in AUT and SLO with MIKE technology. The potential model results will be distributed to HD Kärnten. In the case of some project they will be an end user.

Slovenia (ARSO) is planning to start the project in autumn 2016 and contact Hydrography of Carinthia for supporting necessary data of Carinthia (online data, catchment areas, historical flood data...). ARSO proposed a meeting in September 2016 dedicated to overview of available historical data and expanding the current real-time data transfer from meteo and hydro stations.

Slovenia will also involve data from the new built stations into the FTP data exchange. In July, seven meteo stations in the bordering region and one hydro station on Drava are going to be added. All the stations and their metadata involved in the data transfer are listed in the revised document – data exchange with partner institutions ARSO ARSO-KTN AT.

1.2.5 Suspended load of the Drava

Both sides presented the activities and analyses performed with the data of suspended load. ARSO doesn't have the monitoring of suspended load on the Drava River in the frame of national monitoring. The monitoring on the Drava River is performed by the DEM company on four measuring sites of hydropower plants. For 2015 ARSO did not analyze the DEM data of suspended load.

HD Kärnten calculates the yearly balance of suspended load for four stations on the Drava river and tributaries.

HD Kärnten could provide ARSO only the checked data on the yearly basis.

Suspended load for 2015 of Drava Lavamünd Grenze: 50.000 tons (small, because no greater floods happened in this year).

1.2.6 Exchange of experience and good practices

Mr. Moser informed Slovenian side about his method of determining of GF100 factors (GF100=HQ100 / A ^0,6) and that ARSO will send the Q100 for Slovenian side to make the comparison with Austrian catchments. Further discussion will follow at the next meeting.

1.2.7 Miscellaneous

Common hydrometric measurements on the border profile of the Drava River with profile measurements of suspended load haven't been realized yet. The Austrian side will inform the Slovenian side about the planned measurements on the border profile.

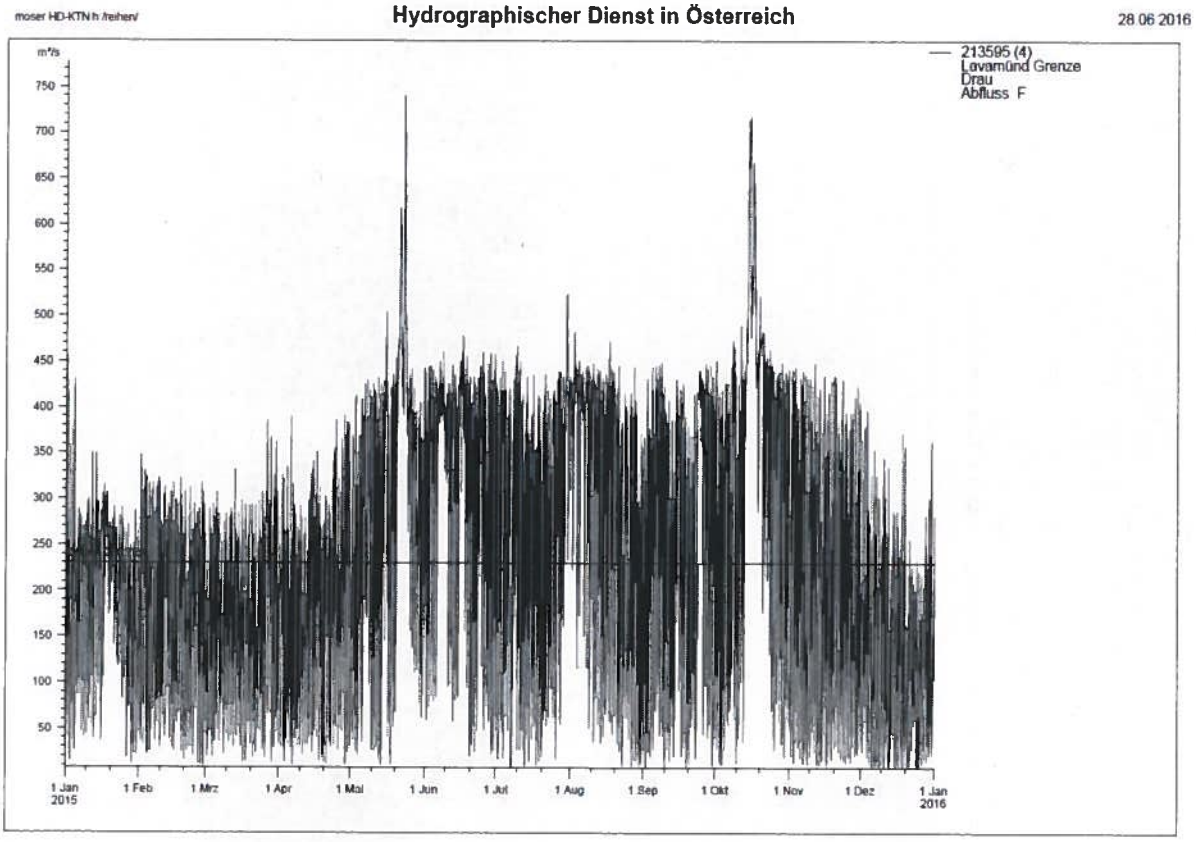
Submitted by:

Johannes Moser

2 DATA - HD KÄRNTEN

- Discharges 2015: Drava: Lavamünd with Lavant
- Suspended load 2015
- Suspended load 2009 – 2015
- Water balance of Carinthia

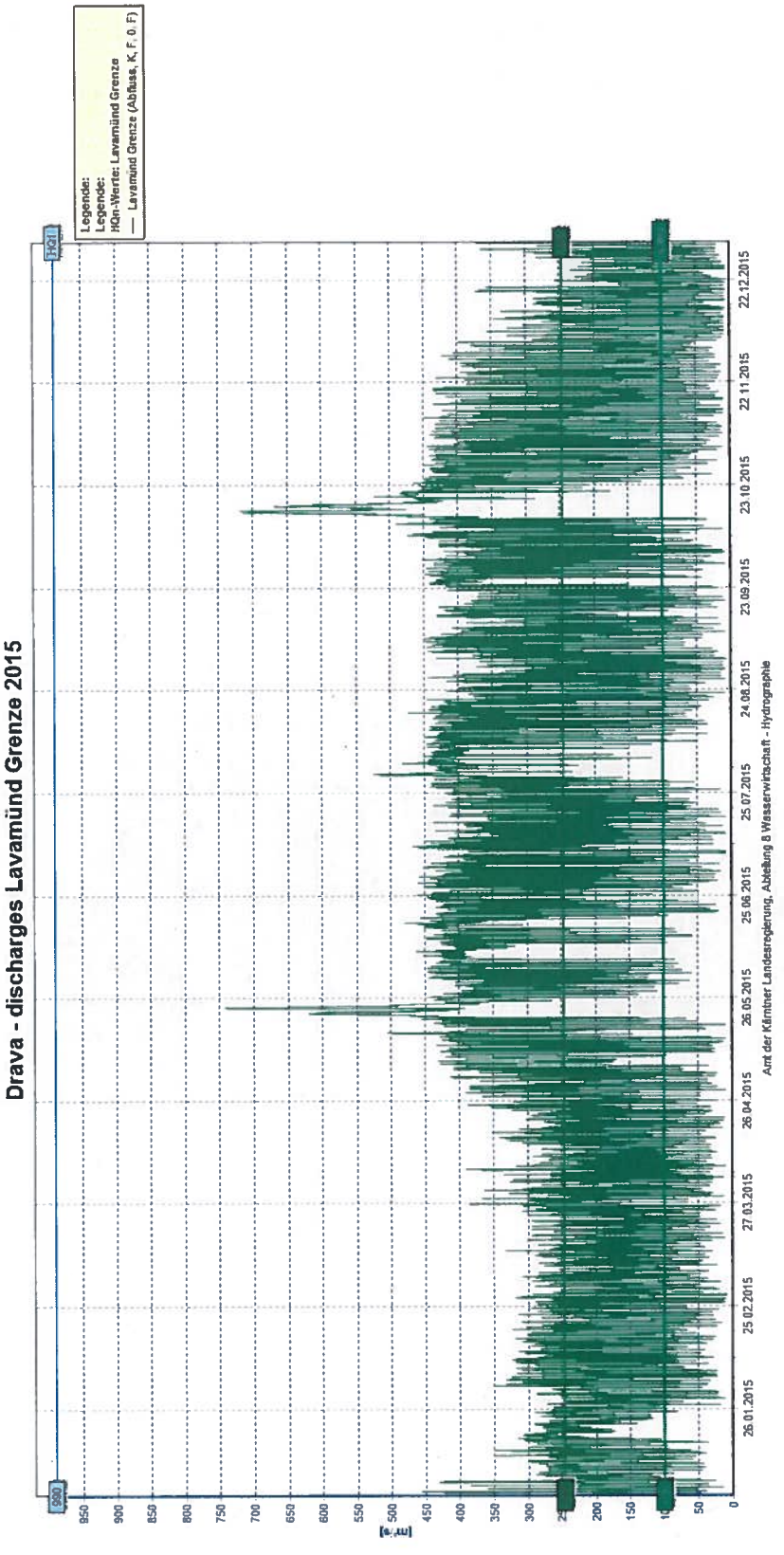
2.1 Discharges 2015 Drava River: Lavamünd with Lavant (Lavamünd Grenze)



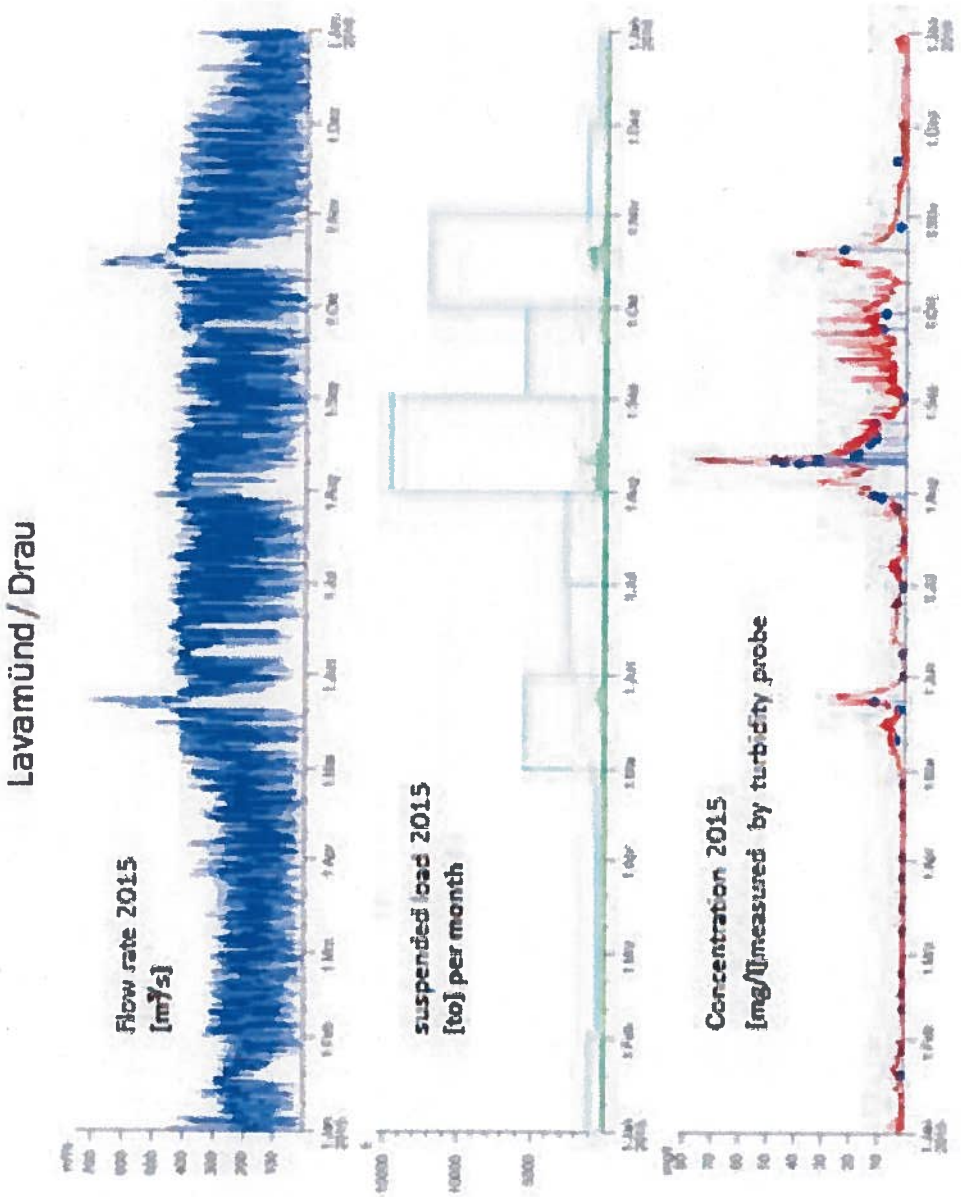
Gauging station Drava / Lavamünd Grenze

Mean value discharge 2015 : MQ = 231 m3/s

Highest discharge: HQ = 744 m3/s 23.05.2015 (HQ0,7)


Drava - discharges Lavamünd Grenze 2015
Legende:
Legende:
HQn-Werte: Lavamünd Grenze
Lavamünd Grenze (Abfluss, K, F, 0, F)
HQ1
HQ5
[m³/s]
950
900
850
800
750
700
650
600
550
500
450
400
350
300
200
150
50
0
26.01.2015
25.02.2015
27.03.2015
26.04.2015
26.05.2015
25.06.2015
25.07.2015
24.08.2015
23.09.2015
23.10.2015
22.11.2015
22.12.2015
Amt der Kärntner Landesregierung, Abteilung 8 Wasserwirtschaft - Hydrographie

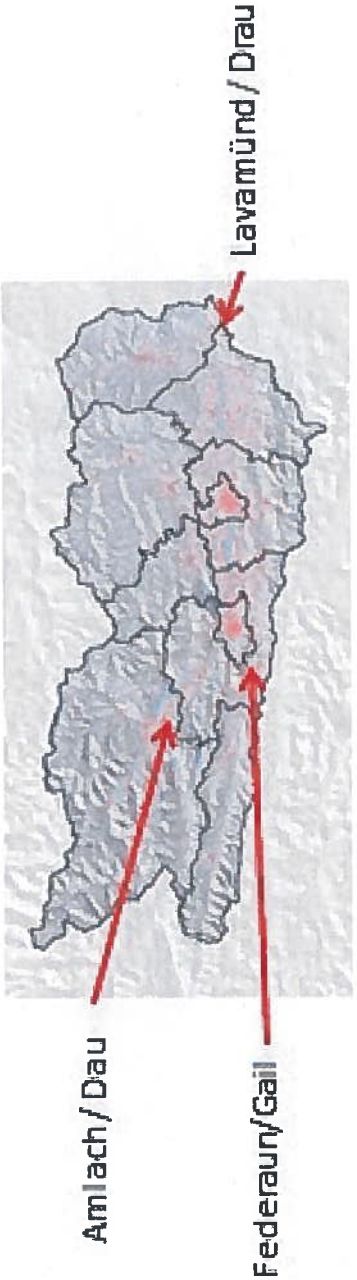
2.2 Suspended load 2015



2.3 Suspended load 2009-2015

suspended load [to]
2009 - 2015
along the Drava River
Amlach/Dau – Federaun/Gail – Lavamünd/Drau

Gaugin sation	River	Sum of suspended load	Sum of suspended load
Jahr		2015	2009 - 2015
Amlach	Drava River	0.40 mil	3.9 mil
Federaun	Gail River	0.05 mil	1.6 mil
Lavamünd	Drava River	0.05 mil	1.4 mil

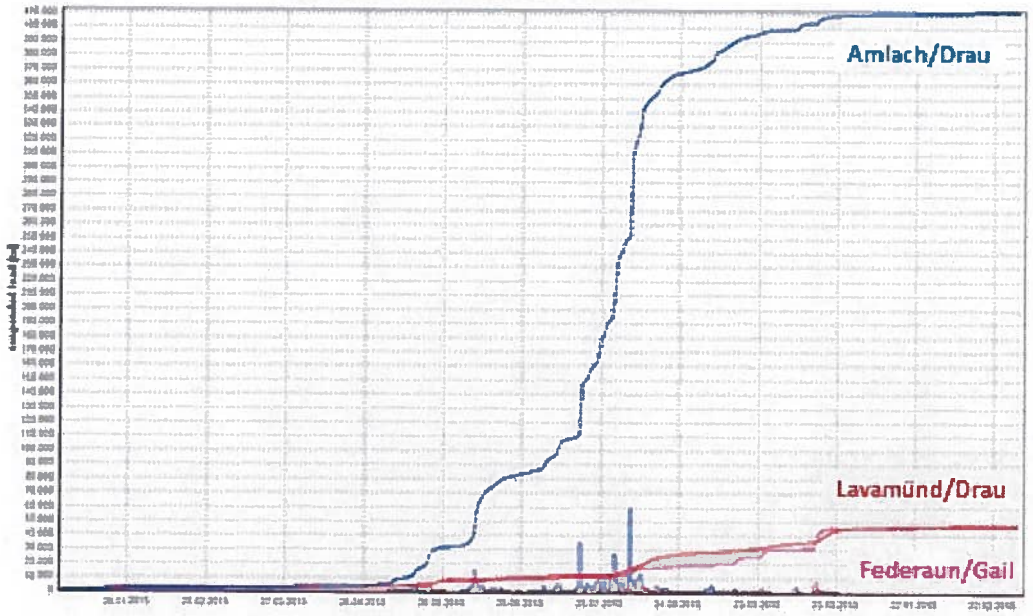


suspended load

along the Drava River

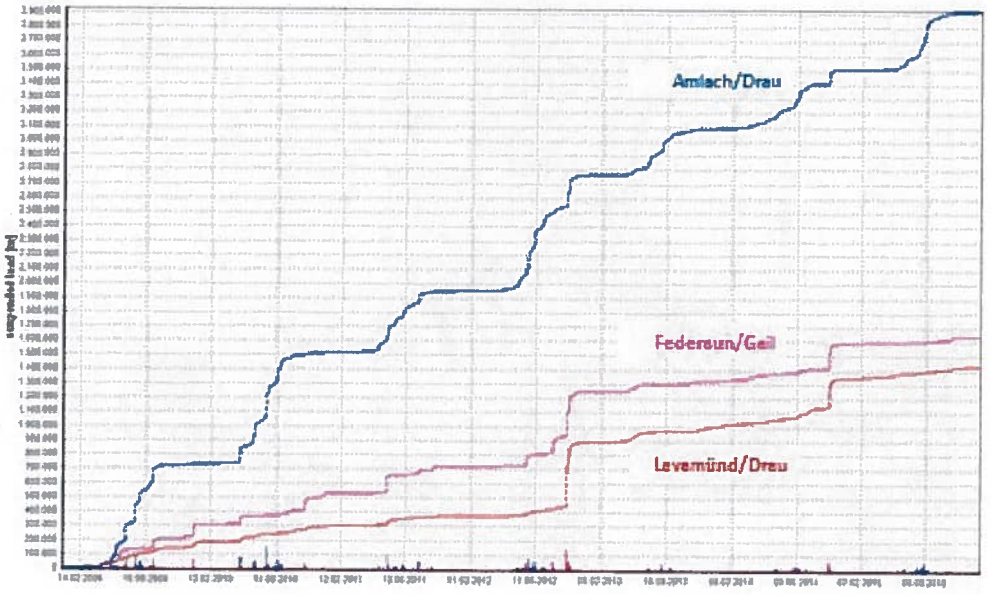
tonnes per year / cumulativ curve 2015

for Gauge Amlach, Federaun (Gail) and Lavamünd

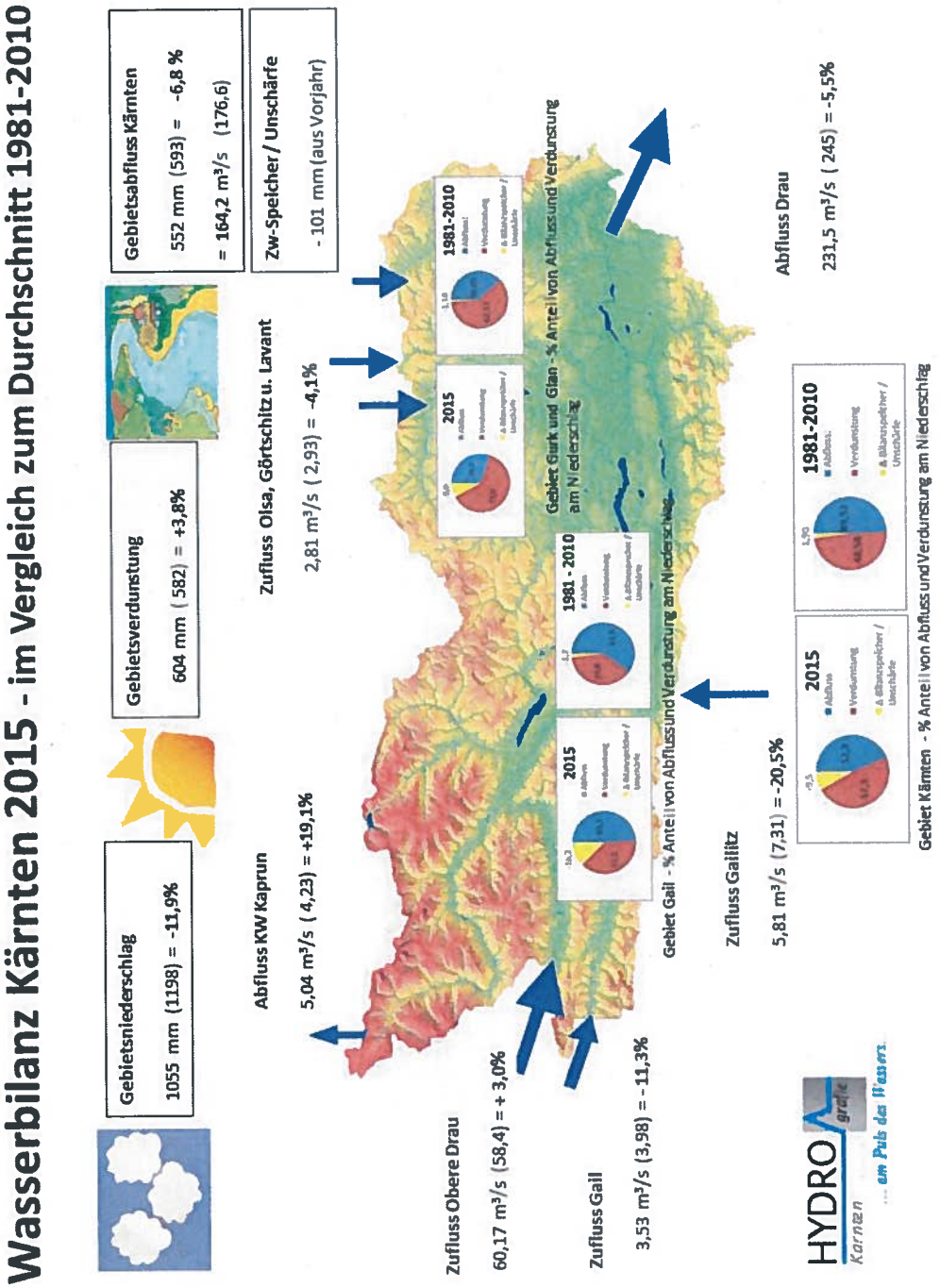


suspended load - cumulativ curve

1.1.2009 - 1.1.2016

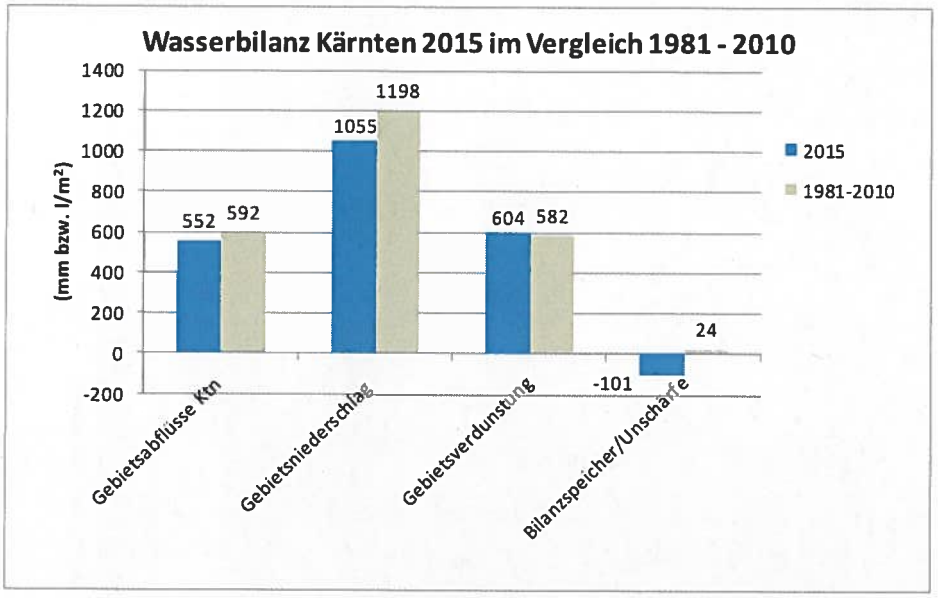


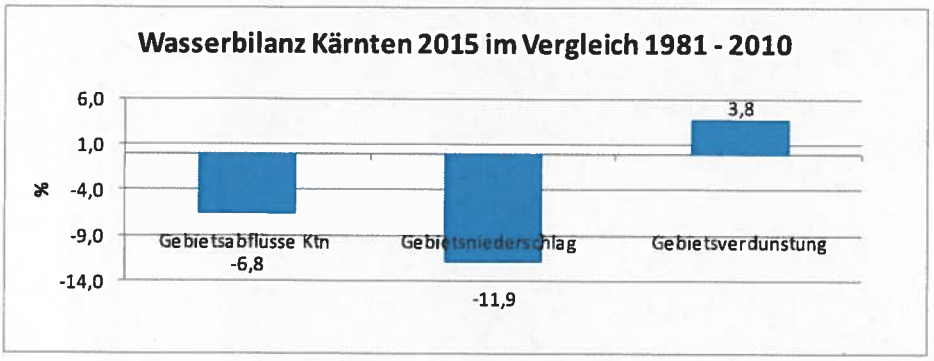
2.4 Water balance of Carinthia 2015



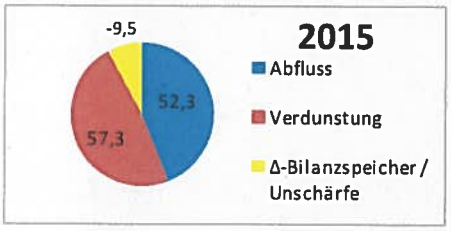
Wasserhaushalt Kärnten

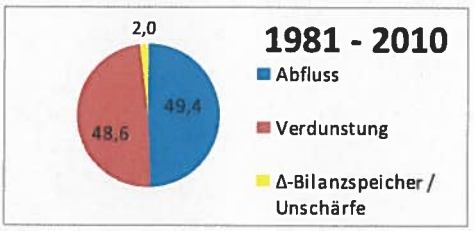
Bilanz 2015 im Vergleich zur Periode 1981 - 2010





% -Anteile des Abflusses und der Verdunstung am Niederschlag 2015 und der Periode 1981-2010





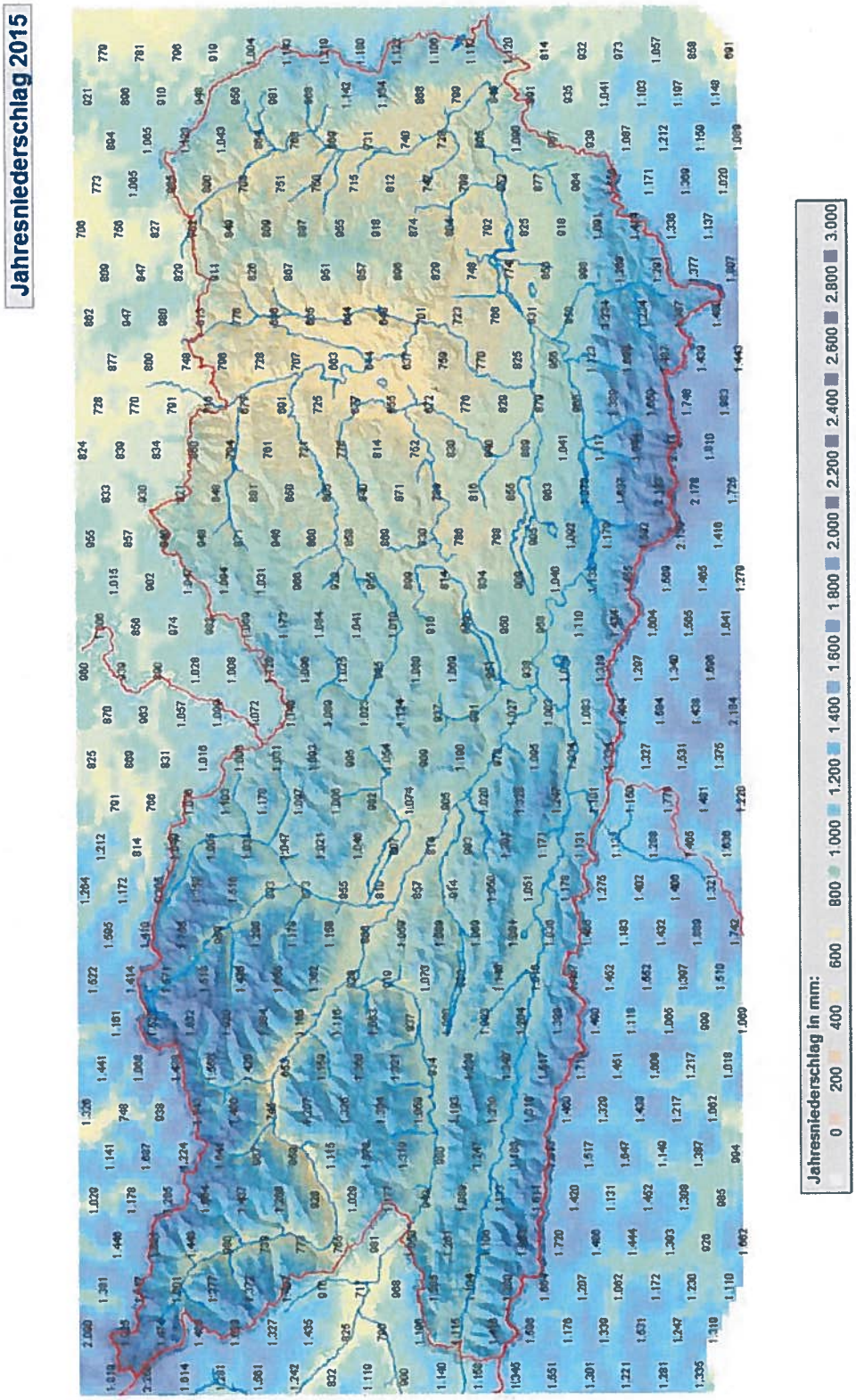
Zu- und Abflüsse (m^3/s):	2015	1981-2010
Ktn Zuflüsse MQ:	72,32	72,62
Ktn Abflüsse MQ:	236,5	248,8
Ktn Gebietsabfluss MQ:	164,2	176,2

Grenze Slo/Drau:	2015	1981-2010
NQt (m^3/s):		51
HQ (m^3/s):	744	1672

$HQ_{100} = 2800\ m^3/s$

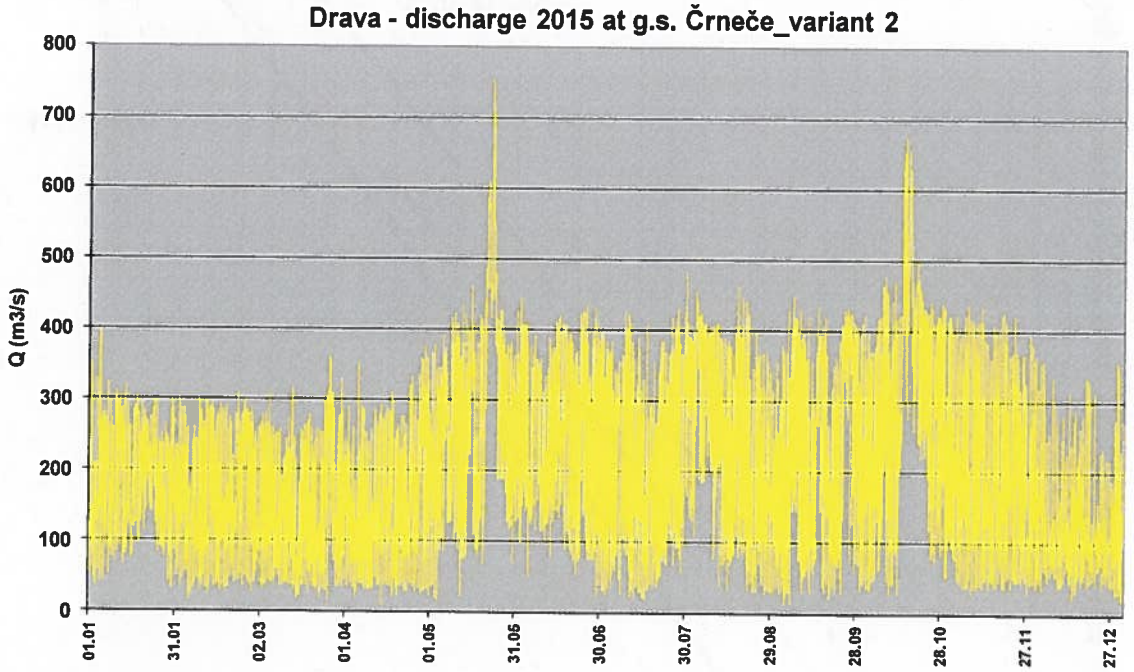
Ktn-Zuflüsse: Drau (Osttirol), Gail, Gailitz, Olsa, Görtschitz, Lavant **Ktn-Abflüsse:** Drau, Möll KW Kaprun

Δ - Bilanz Modell- u. Datenunschärfe bzw. Wasserzwischenspeicherung (- aus Vorjahr; + fürs nächste Jahr)


Jahresniederschlag 2015
Jahresniederschlag in mm:
0 200 400 600 800 1.000 1.200 1.400 1.600 1.800 2.000 2.200 2.400 2.600 2.800 3.000
Amt der Kärntner Landesregierung, Abteilung 8 / Wasserwirtschaft / Hydrographie

3 DATA - SLOVENIAN ENVIRONMENT AGENCY (ARSO)

3.1 Discharges 2015 for the Drava River: gauging station Črneče



Gauging station Drava / Črneče

The discharge calculation is done by tree variants because the correlation between measured velocities by fixed ADCP and ADCP on boat is not good.

Mean value discharge 2015 : MQ_v1 = 276 m^3/s

MQ_v2 = 201 m^3/s

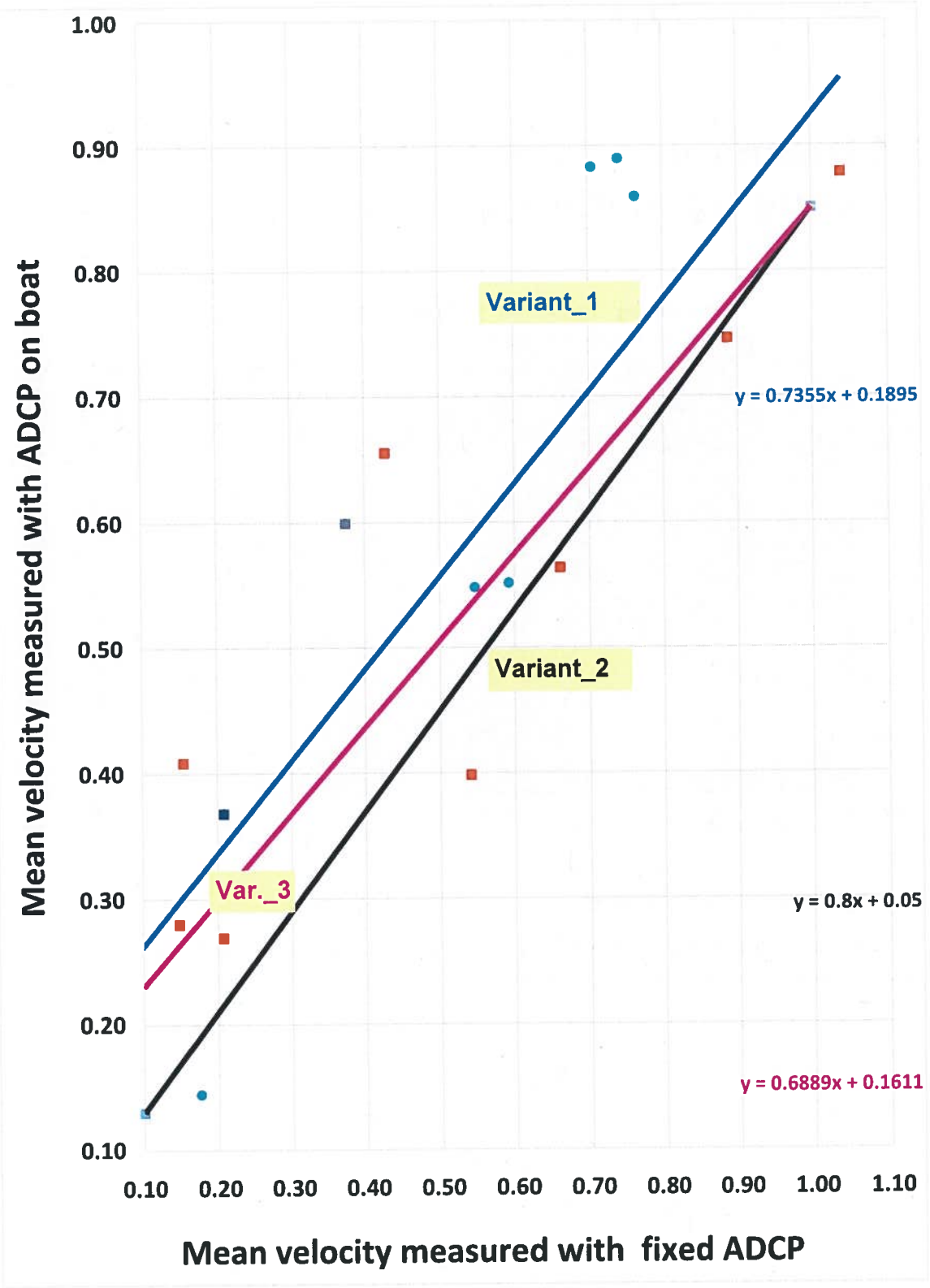
MQ_v3 = 260 m^3/s

Highest discharge 23.05.2015: HQ_v1 = 834 m^3/s

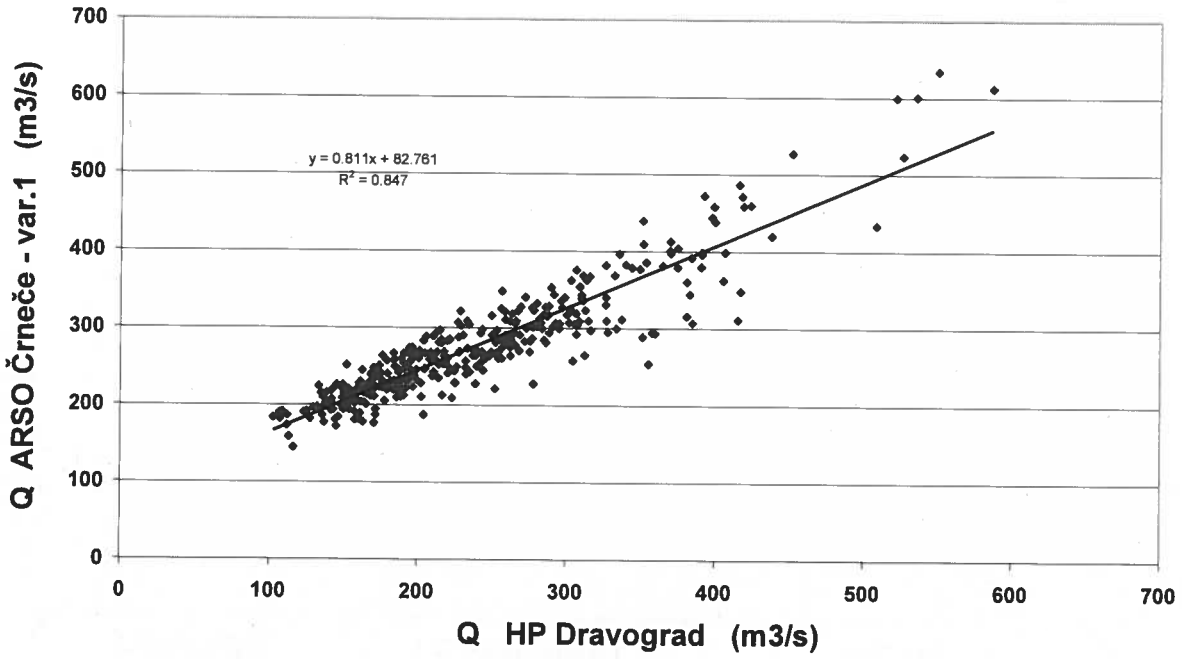
HQ_v2 = 794 m^3/s

HQ_v3 = 775 m^3/s

Gauging station Črneče: correlation between mean velocity measured with fixed ADCP and mean velocity measured with ADCP on boat (hydrometric measurement) is not good:



Due to the poor correlation between measured velocities the correlation between discharges on hydro powerplant (HP) Dravograd and gauging station Črneče is unsatisfied too:



4 ATTENDANCE LIST

2nd meeting of the sub-group for hydrology for the Drava river; workinggroup water-management; Drava commission

Klagenfurt, 5. July 2016

ATTENDANCE LIST

Name	Organization	Signature
Bogdan LALIĆ	ARSO	
MIRA KOBOLD	ARSO	
ANDREJ GOLOB	ARSO	
MARIO JAUFER	AKL / HYDROGRP.	
Elisabeth GUTSCHI	AKL / Abt 8 / Hydro	
CHRISTIAN KOPEINIG	AKL / HYDRO	
Johannes Moser	AKL / Hydro	