

# Abiotic and biotic data of the rivers Pinka and Lafnitz 2012 - 2014

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## Abiotic and biotic data of the rivers Pinka and Lafnitz 2012 - 2014

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<https://doi.org/10.15504/fmj.2017.22>

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### Keywords

stream temperature, riparian vegetation, Pinka, Lafnitz, simulations, benthic invertebrates, fish, climate change, Heat Source, observations

### Short description of the dataset/summary

During the project BIO\_CLIC abiotic and biotic data of the rivers Pinka and Lafnitz were collected from the year 2012 until 2014, in order to analyse the present state of river morphology, riparian vegetation, riparian microclimate, fish species and benthic invertebrate abundance and diversity. This data was produced to be able to predict the near stream microclimate and stream water temperature until the end of the century, estimate the stress on aquatic organisms and the ability of vegetation to mitigate this stress.

Initially only stream water observations, predictions of the river Pinka and corresponding input data for extreme heat wave events used in Trimmel et al. (2016a) are available for download. Other parts of the data set may be included later after they have been published.

### General information

dataset entry ID:	FWM_8
<b>name of the dataset:</b>	
full name of the dataset:	Abiotic and biotic data of the rivers Pinka and Lafnitz 2012 - 2014
dataset short name:	BIO_CLIC
<b>type of dataset:</b>	species (taxonomic group) per site database including environmental

information  
data type: point data/observation data  
**science keywords according to [GCMD](#):**  
topic: Atmosphere, Biosphere, Biological Classification, Climate Indicators  
**ISO topic category according to [ISO 19115](#):**  
Biota, Climatology/Meteorology/Atmosphere, Environment, Inland Waters

## Technical and administrative specifications

**data format:** others/specify  
others/details: different data formats: csv, txt, Access, Excel  
**operating system:** all operating systems  
others/details: some data is only available for Windows  
**data language:** English  
**current access level:** web (public)  
web address: [http://data.freshwaterbiodiversity.eu/data/FWM\\_8-Pinka\\_Lafnitz/](http://data.freshwaterbiodiversity.eu/data/FWM_8-Pinka_Lafnitz/)  
others/details: data are deposited in the repository of the Freshwater Biodiversity Data Portal  
currently available through [GBIF](#): no  
exchange planned: no  
data in data repository: yes  
specify repository: Initially only stream water observations, predictions of the river Pinka and corresponding input data for extreme heat wave events used in Trimmel et al. (2016a) are available for download. Other parts of the data set may be included after they have been published.

### Do you plan to publish the data on the Freshwater Biodiversity Data Portal:

already published through the Freshwater Biodiversity Data Portal

**update level:** completed, others/specify  
others/details: some data are not analyzed yet

**documentation:**  
type: scientific paper, others/specify  
others/details: <http://bioclic.boku.ac.at>  
language: English  
specify: final report

### contact details:

#### metadata contact person:

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**comments:** other related websites:  
<http://bioclic.boku.ac.at/>  
<http://www.wau.boku.ac.at/met/forschungsthemen/atmosphaerische-strahlung/forschungsbereich-strahlung-energiebilanz-und-bodengebundene-fernerkundung/forschungsschwerpunkte/strahlungstransport-und-energiebilanz-in-gewaessern>

## Intellectual property rights and citation

**dataset publisher:** Heidelinde Trimmel  
**dataset creator (data compiler):**  
   contact name: Heidelinde Trimmel  
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   contact institution: Institute of Meteorology, University of Natural Resources and Life Sciences  
**data contributors to/owners of this dataset:**  
   multiple  
   number: 6  
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   contact institute: Institute of Soil Bioengineering and Landscape Construction, Univ. of Nat. Res.  
   criteria for using this part of the dataset:  
     The dataset needs to be requested from dataset creator with specific conditions of use.  
   comments: river morphology, field study  
               riparian vegetation, field study  
**data contributor/owner 2:**  
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   contact institute: Institute of Meteorology, University of Natural Resources and Life Sciences  
   criteria for using this part of the dataset:  
     The dataset needs to be requested from dataset creator with specific conditions of use.  
   comments: stream water temperature, measurements  
               near stream microclimate, measurements  
**data contributor/owner 3:**  
   contact name: Heidelinde Trimmel  
   contact email: heidelinde.trimmel@boku.ac.at  
   contact institute: Institute of Meteorology, University of Natural Resources and Life Sciences  
   criteria for using this part of the dataset:  
     The dataset is publicly available (data portal, data archive) and can be used

without restrictions, but dataset creator/data contributors must be informed prior to publication. Data must be acknowledged and cited correctly.  
comments: stream water temperature, numerical predictions

**data contributor/owner 4:**

contact name: Andreas Melcher  
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contact institute: Institute of Hydrobiology and Aquatic Ecosystem Management, Univ. of Nat. Res.

criteria for using this part of the dataset:  
The dataset needs to be requested from dataset creator with specific conditions of use.

comments: fish species and assemblages, sampling

**data contributor/owner 5:**

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contact institute: Institute of Hydrobiology and Aquatic Ecosystem Management, Univ. of Nat. Res.

criteria for using this part of the dataset:  
The dataset needs to be requested from dataset creator with specific conditions of use.

comments: benthic invertebrate abundance and diversity, sampling

**data contributor/owner 6:**

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contact institute: Institute of Meteorology, University of Natural Resources and Life Sciences  
criteria for using this part of the dataset:

The dataset needs to be requested from dataset creator with specific conditions of use.  
comments: near stream microclimate, numerical predictions

**citation of this dataset:**

author(s): Kalny, G., Dossi, F., Formayer, H., Graf, W., Rauch, H.P, Trimmel, H., Weihs, P., Melcher, A.

title and journal (name, number, pages):  
Abiotic and biotic data of the rivers Pinka and Lafnitz 2012 - 2014

year: 2016  
doi: <https://doi.org/10.13148/BFFWM8>

**citation of the metadata:**

author(s): Trimmel H., Kalny G., Dossi F., Formayer H., Graf W., Leitner P., Leidinger D., Nadeem I., Rauch H. P. , Weihs P. & Melcher A.

title and journal (name, number, pages):  
Abiotic and biotic data of the rivers Pinka and Lafnitz 2012 - 2014. Freshwater Metadata Journal 22: 1-12

year: 2017  
doi: <https://doi.org/10.15504/fmj.2017.22>

**dataset related references:**

reference 1:  
author(s): Trimmel, H., Gangneux, C., Kalny, G., Weihs, P.  
title: Application of the model "Heat Source" to assess the influence of meteorological components on stream temperature and simulation accuracy under heat wave conditions. Meteorologische Zeitschrift, 25/4, 389-406

- year: 2016b  
doi: <https://doi.org/10.1127/metz/2016/0695>
- reference 2:  
author(s): Melcher, A., Kalny, G., Dossi, F., Formayer, H., Graf, W., Pletterbauer, F., Schaufler, K., Trimmel, H., Weihs, P., Rauch, H.P.  
title: Der Einfluss der Ufervegetation auf die Wassertemperatur unter gewässertypspezifischer Berücksichtigung von Fischen und benthischen Evertebraten am Beispiel von Lafnitz und Pinka. Journal Österreichische Wasser- und Abfallwirtschaft, 68(7), 308-323
- year: 2016  
doi: <https://doi.org/10.1007/s00506-016-0321-8>
- reference 3:  
author(s): Trimmel, H., Weihs, P., Leidinger, D., Formayer, H., Kalny, G.  
title: Can riparian vegetation shade mitigate the expected rise in stream temperature during heat waves in a pre-alpine river? Hydrology and Earth System Sciences, Discussion
- year: 2016a  
doi: <https://doi.org/10.5194/hess-2016-230>
- reference 4:  
author(s): Holzapfel, G., Rauch, H.P.  
title: Der Einfluss der Ufervegetation auf die Wassertemperatur der Lafnitz und Pinka. Mitteilungsblatt für die Mitglieder des Vereins für Ingenieurbilogie, Ingenieurbilogie: Neue Entwicklungen an Fließgewässern, Hängen und Böschungen, 1/2015, 4-10
- year: 2015

## General data specifications

### regional coverage of the dataset:

spatial extent of the dataset: catchment  
continents: Europe

### spatial extent (bounding coordinates):

southernmost latitude [°]: 46.9766  
northernmost latitude [°]: 47.5153  
westernmost longitude [°]: 15.8115  
easternmost longitude [°]: 16.4939  
minimum altitude: 240 metres  
maximum altitude: 1480 metres  
countries: Europe: Austria

### world climatic regions according to Köppen:

Group D: continental/microthermal climate

freshwater ecoregions of the world (FEOW) according to WWF:

Europe: Upper Danube

### European ecoregions according to Illies (WFD):

Alps (ER4), Hungarian Lowlands (ER11)

ecosystem type: rivers

covered timeframe: 2012 - 2014

## Site specifications

<b>coordinate system/grid data:</b>	projected, others others: MGI_Austria_GK_M34, Transverse Mercator
datum (e.g. WGS84):	Bessel_1841
<b>site coding:</b>	
site coding available:	yes, alphanumerical
number of digits:	12
example:	L_ROHR_26,08
<b>number of sites:</b>	<100
exact number of sites:	64
<b>comments:</b>	There are two different site codings used: (1) The water temperature simulation dataset uses the side coding distance from mouth (km 89-38, each 500m). Here only the river Pinka is included. (2) In the additional datasets of each research group the data is sorted according to an alphanumerical code denoting the river distance from source of the field survey sample points.

## Climate and environmental data

### climate related data:

spatial resolution of the data (if not catchment/site related):

others/specify

others: at reference station

available parameters per catchment:

hourly air humidity, air temperature, wind, global radiation

**data source:** own measurements / regional climate scenarios

comments:

The following data are included in the downloadable data set: (1) hourly air humidity, air temperature, wind, global radiation was recorded at our reference station at an unobstructed site at Pinka DFS 39 (Trimmel et al. 2016a+b); (2) INCA data (Haiden et al. 2011) were compared and adjusted to fit the local site; (3) for future scenarios data was extracted from regional climate scenarios (Radu et al. 2008). The full methodology is described in Trimmel et al. 2016a.

Additional continuous and campaign meteorological measurements were made to characterize the near stream microclimate and energy balance at the river surface, which are not included in the downloadable data (air temperature/air humidity/global radiation/PAR within the riparian vegetation buffer, radiation balance at the river).

Haiden, T., Kann, A., Wittmann, C., Pistotnik, G., Bica, B., and Gruber, C., 2011. The Integrated Nowcasting through Comprehensive Analysis (INCA) System and Its Validation over the Eastern Alpine Region, *Weather Forecast.*, 26, 166-183, doi:10.1175/2010WAF2222451.1

Radu, R., Déqué, M., Somot, S., 2008. Spectral nudging in a spectral regional climate model, *Tellus A Dynamic Meteorology and Oceanography*, 60 Issue: 5 Pages: 898-910.

### environmental data:

available parameters per catchment:

catchment land cover/land use

**data source:** own measurements/field study



river morphology, riparian vegetation, water temperature measurements  
 data source: own measurements/field study/simulations

available parameters per site:

- river length  
 data source: field study/ part of simulation input
- distance to source  
 data source: field study
- distance to mouth  
 data source: field study/ part of simulation input
- stream order (according to Strahler)  
 data source: field study
- slope  
 data source: part of simulation input, calculated with TTools
- altitude  
 data source: part of simulation input, calculated with TTools
- hydrological regime/flow regime  
 data source: own measurements/field study
- discharge  
 data source: part of simulation results
- current velocity  
 data source: part of simulation results
- maximum depth  
 data source: part of simulation results
- mean depth  
 data source: part of simulation results
- substrate composition  
 data source: part of simulation results
- water temperature

**physico-chemical data:**

**stressors influencing the sites:**

reference sites available: yes

stressor	restored sites available	data before/after restoration available	stressor gradient available	comments
thermal stress	yes	no	yes	

**Biological data**

**biological data origin:**

from sampling,  
 BIO\_CLIC, Austria

organism group addressed: fish, macro-invertebrates (Mollusca, Ephemeroptera, Odonata, Plecoptera, Coleoptera, Trichoptera, Chironomidae), angiosperms (riparian vegetation), invasive species

**Sample specifications/sample resolution**

**fish:**

**sample information:**

covered timeframe: 1991 - 2013  
 historical data: yes  
 palaeo data: no  
 season: spring, summer, autumn  
 temporal resolution/frequency of sampling:  
 once pro site  
 time series data: no  
 comments: Historical data (not sampled during the project BIO\_CLIC) received from BAW Scharfling for the time period: 1991 - 2012.

**taxonomic resolution:**

level:  
 percentage of species level data: 100

**taxonomic coding:**

taxalist according to: BMFLUW 2010  
 reference(s): BMLFUW, Federal Ministry of Agriculture, Forestry, Environment and Water Management (Publisher). 2010: Leitfaden zur Erhebung der biologischen Qualitätselemente Teil A1 - Fische. Vienna

**sample specifications:**

replicate samples: yes  
 number of samples: 626  
 specification of method(s) used for sampling and sorting:

Allover, several transects at a total of 17 stretches (626 sampling points in the Lafnitz and 271 in the Pinka) were recorded to characterize the abiotic meso habitats. Beside the abiotic characterization of the habitats, point-abundance electric fish samplings (n = 35) were performed to record the occurring fish species and their life stages in 2012 and October 2013.

To describe and analyze temporal trends of fish communities datasets were assembled from different sources (IHG DB) and ATFIBASE database (BAW Scharfling). Additionally, fish data from the river Lafnitz was provided by Gerhard Woschitz and Georg Wolfram. Altogether, 52 fish sampling events from external sources were included in the dataset for this study, covering the period from 1991 to 2013 (Guldenschuh 2014).

reference(s): Guldenschuh M., 2014. Longitudinal zonation of habitat parameters and fish species assemblages in the Austrian lowland rivers Lafnitz and Pinka. Masterthesis at the University of Natural Resources and Life Sciences, Vienna.

sample type (e.g. habitat specific samples, composite samples etc.):  
 Habitat sampling 2012 and 2013, additional historic quantitative and qualitative data from 1991 on.

specific sample location (e.g. littoral, profundal, transect, shoreline, hyporheic zone, etc.):  
 All river, from upstream down to the Hungarian border.

**macro-invertebrates:**

**sample information:**

covered timeframe: 2012 - 2014  
 historical data: no  
 palaeo data: no  
 season: spring, summer, autumn  
 temporal resolution/frequency of sampling:  
 4 times in three years  
 time series data: no  
 comments: Samples were taken in: May 2012; August 2012; October 2012; March 2014.

**taxonomic resolution:**

level:

percentage of species level data: 70

comments:

Identification was mainly based on the Screening-Taxa List according to Ofenböck et al. (2010). However, in many cases Ephemeroptera, Plecoptera and Trichoptera taxa could be identified to a lower level, whereas Diptera taxa were mainly identified to family level. The taxonomic composition of each site was quantified using the Regional Zonation Index (RZI) calculated by the software Ecoprof 4.0 (Moog et al., 2013).

**taxonomic coding:**

taxalist according to:

Ofenböck et al. (2010)

reference(s):

Ofenböck, T., Moog, O., Hartmann, A., & Stubauer, I., 2010. Leitfaden zur Erhebung der biologischen Qualitätselemente Teil A2-Makrozoobenthos. Bundesministerium für Land- und Forstwirtschaft, Umwelt- und Wasserwirtschaft, S. 1-103.

**sample specifications:**

replicate samples:

no

number of samples:

406

specification of method(s) used for sampling and sorting:

- In May and August 2012 lithal substrates were sampled according to the Multi-Habitat-Sampling approach (AQEM-Consortium, 2002) (19 samples Lafnitz and 16 samples Pinka). Twenty pooled samples were taken at each investigation site, whereby each sample represents a 5% share of available habitats in the river section.
- In October 2012 and March 2014, single-habitat-samples per transects were taken (290 samples Lafnitz). At least 20 sampling units were taken at each site. Choriotope type as well as flow velocity (bottom; near and at 40% of water depth) was documented for each sample.
- Habitat structures directly linked to the riparian vegetation such as large wood (LW) were sampled separately at all dates if present (58 LW samples Lafnitz and 6 LW samples Pinka). Length, width and volume of each large wood piece were measured to calculate macro-invertebrate densities (Ind/m<sup>2</sup>) and biomass per square meter.
- In addition, adults were collected with light traps and sweeping net to support the identification of Ephemeroptera, Plecoptera and Trichoptera species (11 sampling dates Lafnitz and 6 sampling dates Pinka).
- The screening taxa list according to Ofenböck et al. (2010) was used as reference species list.

reference(s):

- AQEM consortium, 2002. Manual for the application of the AQEM system. A comprehensive method to assess European streams using benthic macroinvertebrates, developed for the purpose of the Water Framework Directive. Version 1.0, February 2002.
- Moog, O., Hartmann, A., Schmidt-Kloiber, A., Vogl, R., & Koller-Kreimel, V., 2013. ECOPROF Vers. 4.0, [www.ecoprof.at](http://www.ecoprof.at).
- Ofenböck, T., Moog, O., Hartmann, A., & Stubauer, I., 2010. Leitfaden zur Erhebung der biologischen Qualitätselemente Teil A2-Makrozoobenthos. Bundesministerium für Land- und Forstwirtschaft, Umwelt- und Wasserwirtschaft, S. 1-103.

sample type (e.g. habitat specific samples, composite samples etc.):

- MHS sampling according to AQEM (2002) in May and August of 2012
- Single habitat sampling in October 2012 and March 2014

- Large wood sampling: May 2012; August 2012; October 2012; March 2014

**angiosperms:**

**sample information:**

covered timeframe: 2013 - 2013  
 historical data: no  
 season: summer  
 time series data: no  
 comments: Area-wide from source to the Austrian border in a 50m buffer of the river banks.

**taxonomic resolution:**

level:  
 percentage of species level data: 75  
 comments: Available in an additional data set.

**taxonomic coding:**

taxalist according to: Cejka et al. (2005)  
 reference(s): Cejka, A., Dvorak., M., Fortmann, I., Knogler, E., Korner, I., Schlögl, G., Wendelin, B., Wolfram, G., Zechmeister T.C., Das Lafnitztal: Flusslandschaft im Herzen Europas, Federal Environment Agency - Austria, Vienna, 2005.

**sample specifications:**

replicate samples: no  
 number of samples: 1  
 specification of method(s) used for sampling and sorting:  
 Definition of areas of same vegetation composition by aerial photographs. Overall height, density and dominating species were recorded in field. Reference species lists were used from Cejka et al. (2005)  
 reference(s): Cejka, A., Dvorak., M., Fortmann, I., Knogler, E., Korner, I., Schlögl, G., Wendelin, B., Wolfram, G., Zechmeister T.C., Das Lafnitztal: Flusslandschaft im Herzen Europas, Federal Environment Agency - Austria, Vienna, 2005.  
 specific sample location (e.g. littoral, profundal, transect, shoreline, hyporheic zone, etc.):  
 Riparian vegetation in a 50 m buffer orographically left and right of the river bank from source to the Austrian border.

**invasive species:**

**sample information:**

covered timeframe: 2013 - 2013  
 historical data: no  
 season: summer  
 time series data: no

**taxonomic resolution:**

**taxonomic coding:**

**sample specifications:**

comments: Invasive species are included in the angiosperm data set; rough estimation.

**Other specifications**

**GIS layers, shape files related to the dataset:**

others/specify  
 others/details: measurement points and sampling habitats

**availability of photos:** yes  
**availability of maps:** yes  
**quality control procedures:**  
 Were any quality control procedures applied to your dataset?  
 yes  
 quality control protocols and comments:  
 data mining analyses

## Acknowledgements

This research was part of the project BIO\_CLIC and LOWFLOW+ both funded within the Austrian Climate Research Programme (ACRP) by the Klima und Energiefond. The regional climate model data sets used to produce the climate episodes were developed in the ENSEMBLES project supported by the European Commission. The INCA data set was created by the national weather service (ZAMG). Hydrological data and the digital elevation model were provided by hydrographic services, which are part of the Federal Ministry of Agriculture, Forestry, Environment and Water Management and the federal state governmental geoinformation service authorities of Styria and Burgenland. Fish data were provided by Gerhard Woschitz, Georg Wolfram, BAW Scharfling, and federal states Styria and Burgenland. Special thanks are given to the Oregon Department of Environmental Quality, who maintain the model Heat Source and opened the source code for scientific use.

## References

- AQEM consortium, 2002. Manual for the application of the AQEM system. A comprehensive method to assess European streams using benthic macroinvertebrates, developed for the purpose of the Water Framework Directive.
- BMLFUW, Federal Ministry of Agriculture, Forestry, Environment and Water Management, 2010. Leitfaden zur Erhebung der biologischen Qualitätselemente Teil A1 - Fische. Vienna
- Boyd, M., Kasper, B., 2003. Analytical methods for dynamic open channel heat and mass transfer: Methodology for heat source model Version 7.0.
- Cejka, A., Dvorak, M., Fortmann, I., Knogler, E., Korner, I., Schögl, G., Wendelin, B., Wolfram, G., Zechmeister T.C., 2005. Das Lafnitztal: Flusslandschaft im Herzen Europas, Federal Environment Agency - Austria, Vienna
- Guldenschuh, M., 2014. Longitudinal zonation of habitat parameters and fish species assemblages in the Austrian lowland rivers Lafnitz and Pinka. master thesis at the University of Natural Resources and Life Sciences, Vienna.
- Haiden, T., Kann, A., Wittmann, C., Pistotnik, G., Bica, B., Gruber, C., 2011. The Integrated Nowcasting through Comprehensive Analysis (INCA) System and Its Validation over the Eastern Alpine Region. *Weather Forecasting*, 26, 166-183. <https://doi.org/10.1175/2010WAF2222451.1>
- Holzapfel, G., Rauch, H.P., 2015. Der Einfluss der Ufervegetation auf die Wassertemperatur der Lafnitz und Pinka. *Mitteilungsblatt für die Mitglieder des Vereins für Ingenieurbiologie, Ingenieurbiologie: Neue Entwicklungen an Fließgewässern, Hängen und Böschungen*, 1/2015, 4-10.
- Melcher A., G. Kalny, F. Dossi, H. Formayer, W. Graf, F. Pletterbauer, K. Schaufler, H. Trimmel, P. Weihs, Rauch, H.P., 2016. Der Einfluss der Ufervegetation auf die Wassertemperatur unter gewässertypspezifischer Berücksichtigung von Fischen und benthischen Evertebraten am Beispiel von Lafnitz und Pinka. *Journal Österreichische Wasser- und Abfallwirtschaft*, 68(7), 308-323. <https://doi.org/10.1007/s00506-016-0321-8>
- Moog, O., Hartmann, A., Schmidt-Kloiber, A., Vogl, R., Koller-Kreimel, V., 2013. ECOPROF Vers. 4.0 Software zur Bewertung des ökologischen Zustandes von Fließgewässern nach WRRL.
- Ofenböck, T., Moog, O., Hartmann, A., Stubauer, I., 2010. Leitfaden zur Erhebung der biologischen Qualitätselemente Teil A2-Makrozoobenthos. Bundesministerium für Land- und Forstwirtschaft, Umwelt- und Wasserwirtschaft.

Radu, R., Déqué, M., Somot, S., 2008. Spectral nudging in a spectral regional climate model, *Tellus A Dynamic Meteorology and Oceanography*, 60 Issue: 5: 898-910.

Trimmel, H., Gangneux, C., Kalny, G., Weihs, P., 2016b. Application of the model "Heat Source" to assess the influence of meteorological components on stream temperature and simulation accuracy under heat wave conditions. *Meteorologische Zeitschrift*, 25/4, 389-406. <https://doi.org/10.1127/metz/2016/0695>

Trimmel, H., Weihs, P., Leidinger, D., Formayer, H., Kalny, G., 2016a. Can riparian vegetation shade mitigate the expected rise in stream temperature during heat waves in a pre-alpine river? *Hydrology and Earth System Science, Discussion*. <https://doi.org/10.5194/hess-2016-230>