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For Poster presentation entitled :

Comparison of methods used in estimating missing precipitation data : Case of the Macta Basin in North Algeria

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Faculty of Engineering

Comparison of methods used in estimating missing precipitation data :

Case of the Macta Basin in North Algeria

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Abstract. In the practice, the precipitations records are linked to the problem of missing data caused by fault in the rain gaging station. In hydrology, estimating missing precipitation data is a crucial task due to the spatiotemporal variability of precipitations, also the complexity of physical processes involved.

We have done a comparative study between missing precipitations data estimation methods as next: classical methods: Inverse distance weighting method (IDWM) ,Correlation Coefficient Weighting Method (CCWM), principal component analysis (PCAM) ; Method based on genetic algorithms : fixed functional set genetic algorithm method (FFSGAM), as a target to judge, which methods are better to assess missing precipitation data. The application of these methods has been done using data of five rain gaging stations situated in the Macta watershed. We have tested the methods using the most recommended criterions of comparison. With the end we have noted that all the methods used, gave good results of estimate. And all FFSGAM models gave results more powerful than all the other methods.

 Keywords: Missing precipitation data, Genetic algorithms, Correlation, Weighing methods, PCA.

1.   Introduction

Estimating missing precipitation data is generally achieved by traditional weighting and data driven methods(Smith, 1993), distance based weighting methods (Simanton andOsborn, 1980; Wei and McGuinness, 1973), nonlinear deterministic and stochastic interpolation methods (e.g., kriging), and regression and time series analysis methods (Salas, 1993). Inverse distance weighting method (IDWM) is most commonly used method for estimating missing data in the fields of hydrology and geographical sciences. More recently, empirical models derived using evolutionary and biological principles, namely, genetic algorithms (GAs), artificial neural networks (ANNs), and genetic programming (GP) have found numerous applications in the development and application of inductive models. A new evolutionary method based on GAs referred to as a fixed functional set genetic algorithm method (FFSGAM) was developed for functional approximation of response functions from a given data set (Teegavarapu et al., 2009).

The present study aims to compare different missing precipitations data estimation methods. The application of these methods has been done using data of five rain gaging stations situated in the Macta watershed in Algeria. The techniques employed in this study include classical methods: Inverse distance weighting method (IDWM) ,Correlation Coefficient Weighting Method (CCWM), principal component analysis (PCAM) ; Method based on genetic algorithms : fixed functional set genetic algorithm method (FFSGAM).The standard statistical performance measures are employed to evaluate methods performance.

2.   Materials and Methods

2.1   FFSGAM for estimating missing precipitation data

The optimal functional form for estimating missing precipitation data using the model inputs (i.e., distance and correlation coefficient) and the fitness function based on the mean squared error (MSE) as a performance measure is optimized in FFSGAM (Teegavarapu et al., 2009). Four optimal function forms obtained using the FFSGAM provided in Eqs. 1 to 4 (Table1).

Table1. FFSGAM models

	Model
FFSGAM1	$$P_m = \frac{\sum_{i=1}^{n} P_i C_i [R_{mi} \log_{10}\left(\frac{1}{R_{mi}}\right) - \left(\frac{1}{R_{mi}}\right) \log_{10} R_{mi}][\log_{10}\left(\frac{1}{d_{mi}}\right)/\log_{10}(d_{mi})]}{\sum_{i=1}^{n} C_i [R_{mi} \log_{10}\left(\frac{1}{R_{mi}}\right) - \left(\frac{1}{R_{mi}}\right) \log_{10} R_{mi}][-\log_{10}\left(\frac{1}{d_{mi}}\right)/\log_{10}(d_{mi})]}$$
FFSGAM2	$$P_m = \frac{\sum_{i=1}^{n} P_i C_i \left[\left[\frac{\exp(R_{mi})}{\left(\frac{1}{R_{mi}}\right)\log_{10}\left(\frac{1}{R_{mi}}\right)}\right] + [\sqrt{d_{mi}}\log_{10}\left(\frac{1}{d_{mi}}\right)]\right]}{\sum_{i=1}^{n} C_i \left[\left[\frac{\exp(R_{mi})}{\left(\frac{1}{R_{mi}}\right)\log_{10}\left(\frac{1}{R_{mi}}\right)}\right] + \left[\sqrt{d_{mi}}\log_{10}\left(\frac{1}{d_{mi}}\right)\right]\right]}$$
FFSGAM3	$$P_m = \frac{\sum_{i=1}^{n} P_i C_i \left[\left[\frac{(\log_{10}\left(\frac{1}{R_{mi}}\right))^2}{R_{mi}}\right][\log_{10}\left(\frac{1}{R_{mi}}\right)]\right]^2}{\sum_{i=1}^{n} C_i \left[\left[\frac{(\log_{10}\left(\frac{1}{R_{mi}}\right))^2}{R_{mi}}\right][\log_{10}\left(\frac{1}{R_{mi}}\right)]\right]^2}$$
FFSGAM4	$$P_m = \frac{\sum_{i=1}^{n} P_i C_i \frac{R_{mi}\log_{10}\left(\frac{1}{R_{mi}}\right)\log_{10}(R_{mi})}{\left[\left(\frac{1}{R_{mi}}\right)\ln(R_{mi})\Big/\left(\frac{1}{d_{mi}}\right)\ln(d_{mi})\right]}}{\sum_{i=1}^{n} C_i \frac{R_{mi}\log_{10}\left(\frac{1}{R_{mi}}\right)\log_{10}(R_{mi})}{\left[\left(\frac{1}{R_{mi}}\right)\ln(R_{mi})\Big/\left(\frac{1}{d_{mi}}\right)\ln(d_{mi})\right]}}$$

2.2   Inverse distance (reciprocal-distance) weighting method

(IDWM) (Wei and McGuinness, 1973) is most commonly used for estimating missing data. This weighting distance method for estimating missing value of an observation, P_m, using the observed values at other stations is given by

$$P_m = \frac{\sum_{i=1}^{n} P_i d_{mi}^{-k}}{\sum_{i=1}^{n} d_{mi}^{-k}}$$

where P_m is the observation at the base station m; n is the number of stations; P_i is the observation at station i, dmi is the distance from the location of station i to station m.

2.3   Coefficient of correlation weighting method (CCWM)

In CCWM, the weighting factors are replaced by the correlation coefficients and the estimation method is given by

$$P_m = \frac{\sum_{i=1}^{n} P_i R_{mi}}{\sum_{i=1}^{n} R_{mi}}$$

where Rmi is coefficient of correlation obtained by using the data at station m and any other station i.

2.3   Pprincipal component analysis method

The PCAM proposed by Laborede 2002, using Hydrolab software was used in this study.

2.4   Used data

All methods are used to estimate missing rainfall data at a base station (i.e. Sifisef). Data at the base station are assumed to be missing for the purpose of testing these estimation methods. Historical monthly rainfall data of 25 years available at 5 rainfall gauging stations (see fig.1) in the Macta watershed in Algeria, are used for analysis, approximately 70% of the historical data (204 months) are used for model training and 30% of data (96 months) are used for validation.
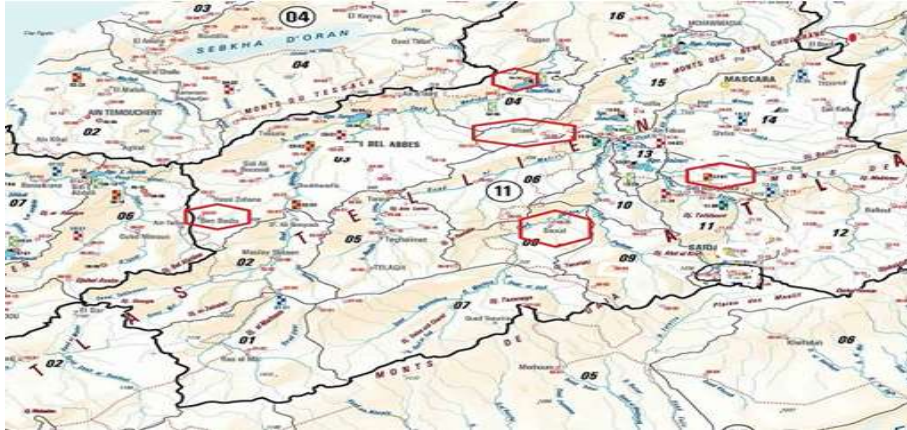

Fig.1. Location of the Precipitation Stations

3.   Results

The performance of the methods are compared using widely recognized and commonly used error measures, root mean squared error (RMSE), mean absolute error (MAE), coefficient of determination (R2), based on actual and estimated rainfall values at the base station. All estimating results are presented in table 2.

Table2. Estimating results

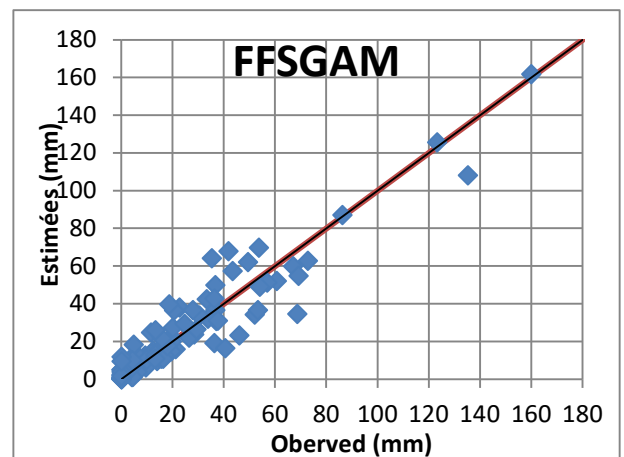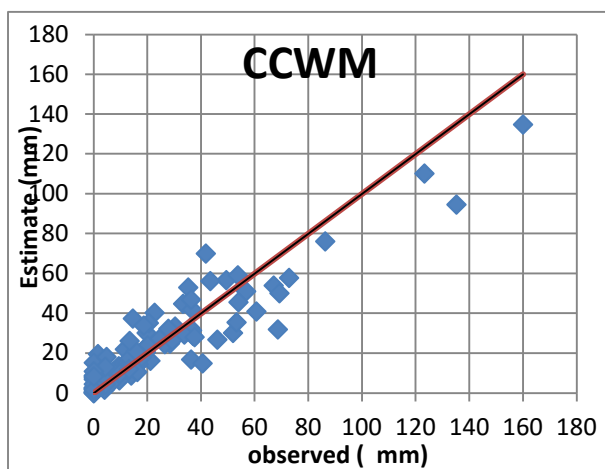|	CCWM	IDWM	ACP	FFSGAM6	FFSGAM7	FFSGAM8	FFSGAM9
RMSE	11.43	13.14	17.37	9.83	9.83	9.83	9.83
MAE	8.07	8.34	10.75	6.60	6.60	6.60	6.60
R2	0,86	0,79	0,86	0,89	0,89	0,89	0,89

Fig.2. Scatter plot for all used methods

4.   Discussion

The figure 1 shows that for CCWM methods the points are closer to the trend line more than the PCAM and IDWM, , also from table 1 the CCWM gives best estimating results with RMSE and MAE equal respectively 11.43 mm, 8.07 mm and R^2 equal 0.86. So for the classical methods CCWM gives the best results.

For the FFSGAM methods the points are closer to the trend line more than the CCWM, and from table table1 All FFSGAM gives the same estimating results with RMSE and MAE equal respectively 9.83 mm, 6.60 mm and R^2 equal 0.89.So FFSGAM is more powerful than the classical methods.

5.   Conclusions

Precipitation is often the most important input data in hydrological models, however, in the practice precipitation is always related to the problem of missing values. To overcome this problem we must investigate all methods used in estimating missing precipitation data in order to chose the best method. In this paper we have done a comparative study between missing precipitations data estimation methods.

The application of these methods has been done using monthly data of five rain gaging stations situated in the Macta watershed. We have tested the methods using the most recommended criterions of comparison. With the end we have noted that all the methods used, gave good results of estimate. Based on the obtained results it can be concluded that All used methods gave good estimation results. The   FFSGAM method performed better than the other methods ,this may be justified by the fact that these methods use as a weighting factor the distance and the correlation coefficient not just a single parameter like the distance for IDWM or the correlation coefficient for the CCWM.

References

1. Salas, J.: Analysis and modeling of hydrological time series. In: Maidment, D.R. (Ed.), Handbook of Hydrology, vol. 19. McGraw-Hill, New York (1993).
2. Simanton, J., Osborn, H.: Reciprocal-distance estimate of point rainfall. Journal of Hydraulic Division 106(7),1242–1246 (1980).
3. Smith, J.: Precipitation. In: Maidment, D.R. (Ed.), Handbook of Hydrology, vol. 3. McGraw Hill, New York (1993).
4. Teegavarapu, R. Tufail, M. Ormsbee, L.; Optimal functional forms for estimation of missing precipitation data. Journal of hydroloy, 374, 106-115(2009).

MINISTRY OF HIGHER EDUCATION AND SCIENTIFIC RESEARCH
Badji Mokhtar-Annaba University
Faculty of Engineering
Hydraulic Department

The First International Conference on Water and Climate

Conference Program

08h00 – 09h00: Registration and welcoming of participants

09h00–09h30: Official opening ceremony

09h30-10h15:Keynote Speech: Pr. ABIDA Habib:Hydrological extremes: methods of analysis and controls

10h30-11h15:Keynote Speech: Pr. SaeidEslamian**:** Noveltis in Flood Management

10h30-11h15:Keynote Speech: Pr. DEROUICHE N.**:** Integrated Approach for Solving Water Scarcity Problems in North Africa.

12H00 – 13H00: Lunch

ORAL PRESENTATIONS

Session 1: 13H00-14H45

SALLE 1: Thèmes: 1,2 & 3

Session president :   Assessor :

ID	Authors	Title	Time
T01_03	Faregh Wail, Benkhaled Abdelkader	Assessment and mapping of flood risk in urban zones using multicriteria analysis method	13h00-13H15
T01_04	Tayeb Boulmaiz, Hamouda Boutaghane	Innovative trend analysis of daily rainfall in north-eastern Algeria	13H15-13H30
T01_05	Sabri Berhail	Comparison of two methods to split the total discharge into its component parts	13H30-13H45
T02_03	Dalila Smadhi, Lakhdar Zella	Trend in annual rainfall in the cereal regions of Algeria	13H45-14H00
T02_05	Abdellouadoud Mahfoudi, Wacila Khoualdia et Nouredine Gaaloul	Management of drought in the watershed of medjerda north east of Algeria	14H00-14H15
T02_07	Zied Haj-Amor, Salem Bouri	Development of a regional risk assessment methodology for evaluating effects of climate changes on soil and water management	14H15-14H30
T03_01	AbdelhalimYahiaoui	Using the halphen's system distributions in frequency analysis of extreme floods of Oued mina catchment in Wilaya of Relizane, Algeria	14H30-14H45

SALLE 2: Thèmes: 4 & 9

Session president :   **Assessor :**

ID	AUTHORS	TITLE	TIME
T04_09	El-Khamssa Guechi, Oualid Hamdaoui, Soulef Benabdesselam	Removal of a toxic cationic metallic ion by biosorption in aqueous media: modeling	13h00-13H15
T04_11	MamineNedjma, GraraNedjoud, KhaldiFadila, KhawlaMenaiaia	Survey of the physico-chemical and bacteriological quality of the wastewaters of souk-ahras city rejected in medjerdawadi (north-east Algeria).	13H15-13H30
T04_12	Messaoud Ghodbane, Omar Adjissi, AbderrahmaneBoudoukha	Assessment of groundwater pollution in the chemora area, eastern Algeria	13H30-13H45
T04_18	Hadj-OtmaneChahinez, OuakouakAbdelkader, Youcef Leila, Hai Nguyen Tranc	Synthesis and characterization of biochar from agricultural wastes: application for cationic dye removal in aqueous medium	13H45-14H00
T04_23	KhalfallahWael , Mekkakia Mehdi Mokhtaria, LounisZoubida	Comparative analysis between two methods of leachate treatment by adsorption using bentonite and zeolithe (case of hassibounif landfill in the wilaya of oran)	14H00-14H15
T09_01	HadjiraBenhedid, Mustapha DaddiBouhoun, MessaoudHacini, Ibrahim Recioui	Mapping of nitrogen pollution of groundwater at Ouedm'zab (Algeria)	14H15-14H30
T09_04	Olfa Hajji, Sahar Abidi, EmnaSilini and Ahmed Ezzine	Potential of remote sensing on flood mapping of Medjerdahigh valley	14H30-14H45

SALLE 3: Thèmes: 5,6,8 & 10

Session president :   **Assessor :**

ID	AUTHORS	TITLE	TIME
T05_05	Ichrak Khammessi, Jalel Aouissi and Hamadi Habaieb	Risk of overflow flooding of the Medjerdariver (Ghardimaou-Jendouba-Bou Salem section)	13h00-13H15
T06-01	Araibia Akram, Araibia Mohamed Salah, Mrad Dounia, Bourouina Hichem, DjebbarYassine, and Abida Habib	Designing collection system for the future, lessons of the past : caseof the town of Mostaganem(Nord-OuestAlgérien)	13H15-13H30
T06-02	Fares Laouacheria, Abdelaziz Lakehal, Said Kechida And MoncefChabi	Modelling the performance of the drainage network of the 672 logtsaadlazzaba city by sewercad	13H30-13H45
T08_01	M. Amitouche, A. Lefkir, B. Remini, M.S. Sebki, L. Aissaoui	Diagnosis and improvement of the performance of the fouka desalination plant diffuser (Algeria)	13H45-14H00
T08_06	ZAIBAK Issam1, MEDDI Mohamed2. SAUVAGE Sabine	Use of the swat model in the determination of the water balance in the cheliff watershed (case of the Sidim'hamed ben Aoudadam)	14H00-14H15
T10_01	HassibaTeghidet, Lila Chaal, Boualem Saidani	A fundamental study of scaling inhibition process: between green chemistry and conventional phosphate	14H15-14H30

3

		inhibitors	
T10_03	Toumi Abir, Berredjem Amira, Mouissi Samia, Alayat Hacéne and Houhamdi Moussa	Study of the water quality of a lake hedrosysteme (lake of birds- Algeria)	14H30-14H45

Coffee Break / Poster session14H45-15H15

Poster Session I

Session president :   **Assessor :**

ID	AUTEURS	TITLES
T02_02	BounaadjaZoulikha	Climate change and their impact on water resources in Algeria
T02_04	YaaqoubAliouche, OuahibaAziez	Impact of climate change on the piezometric fluctuation of the Mitidja aquifer (static approach)
T02_06	SofianeBoukhari1, SeifelislamBenabboud, DouniaMradand SabriDairi	The influence of climate change on the financial situation of drinking water services: case of the city of souk-Ahras (Algeria)
T03_02	Salim Djerbouai, Ahmed Ferhati, MeriemArabi	Comparison of methods used in estimating missing precipitation data : case of the macta basin in north algeria
T03_05	WahibaMokrane, Ahmed Kettab	Solid deposit influence on transition from free surface to pressurized flow through closed pipes
T03_07	Ahmed Belmokre, Mihoubi Mustapha kamel and David Santillan	Study of water temperature variation in the deep reservoirs using statistical and analytical models
T03_15	RafikSiad, Mahmoud Debabeche	Flow description within hydraulic jump in trapezoidal abruptly expanding channel
T03_16	SiadRafik, Debabeche Mahmoud	Theoretical study of the spatial hydraulic jump in trapezoidal non-prismatic channel
T05_02	Kaddouri Mohammed, Alkama Djamel	Urban resilience of a saharan city facing the risk of flooding case: Bechar's city
T05_03	BekhiraAbdelghani, Habi Mohammed, MorsliBoutkhil , BenkandilAbdeldjalil and BadaouiImane	Management and mapping of extreme events case of the flooding in wadiBechar watershed (south west of Algiers)
T05_04	HafsaKarahacane Mohamed MeddiFatehChebana)	Flood frequency analysis in Algiers basin (Algeria)
T06-03	KechidaSaid, LaouacheriaFares and ChabiMoncef	Two-dimensional numerical modeling of the loading effect of circular tunnel in the presence of flow
T06-04	Merrouchi Farida, Fourar Ali and FawazMassouho	Numerical modeling of solid particles of turbulent flows in the sewer pipe

Session 2: 15H15-16H30

SALLE 1: Thèmes: 1,2 & 3

Session president :   Assessor :

ID	Author Name	Title	Time
T03_04	FareghWail, Benkhaled Abdelkader	Hydrologic modeling using hec-geohms in sigus watershed	15H15-15H30
T03_06	Imed Loukam, Bachir Achour Messaoud Djeddou.	Manning's resistance coefficient in an egg-shaped conduit	15H30-15H45
T03_09	Bedjaoui Ali, KherroubiAhlem	A new method to determine manning-strickler and chezy's coefficients using the rough model method	15H45-16H00
T03_10	A. Berreksi, T. Ikni, S. Benmamar, L. Amara, M. Benmebarek, F. Lebdiri1, B. Remini, A. Kettab	Beam and warming scheme for the calculation of the flow pattern in open channel flow transition	16H00-16H15
T03_11	Kaouachi Anouar, Rita F.Carvalho, Pedro Lopes, Benmamr Saadia and Gafsi Moustefa	Experimental and numerical investigation for alternating skimming properties flow over a stepped spillway	16H15-16H30

SALLE 2 Thèmes: 4 & 9

Session president :   Assessor :

ID	AUTHOR NAME	TITLE	TIME
T04_24	Mahdi Chiha, Fatiha Ahmed chekkat, Hayet Chamekh	Sonophotocatalytic degradation of 4-cumylphenol in aquoeus solution: effect of the periodate and persulfate ionorganic oxidants.	15H15-15H30
T04_26	Messaoud Ghodbane,Omar Adjissi, Abderrahmane Boudoukha	Assessment of groundwater pollution in the Chemoraarea, eastern Algeria	15H30-15H45
T04_27	Nacéra Zabat	The removal of heavy metal effluent from wastewater by nanoparticles based on polyoxometalates	15H45-16H00
T09_05	Djihed Rezagui, Mustapha Daddi Bouhoun, Abdallah Siboukeur, Messaouda Haddou, Amina Belabbes and Samia Kemassi.	Study of the characteristics and spatial variability of hydro-mechanical constraints in a Shariansoil (case of a palmeraie in Ouargla)	16H00-16H15
T09_06	Sahar Abidi, Olfa Hajji, Ahmed Ezzine and Taoufik Hermassi	Coupled approach of remote sensing and hydrologic modeling for runoff simulation and floodplain mapping: a case study of medjerda river subwatershed -Tunisia	16H15-16H30

SALLE 3: Thèmes: 5,6,8 & 10

Session president :   **Assessor :**

ID	AUTHOR NAME	TITLE	TIME
T08_07	M. Amirouche, D.Smadhiand L.Zella	Simulating crop water requirements of potato in arid conditions in south Algeria of different scenarios using aquacrop model	15H15-15H30
T08_12	Jihen Hamdi, Najiba Chkir	Comparative study of pan evaporation and different methods of estimating free water surface evaporation in arid and semi-arid zones	15H30-15H45
T10_04	Bentalha Chakib	Numerical evaluation of water surface profile upstream of the inception point in stepped spillway	15H45-16H00
T10_07	Kateryna V. Andrusevich, Galina O.Zadorozhna,A.Benselhoub	Characteristics of floralerstic diversity of remediated soil	16H00-16H15
T10_09	Missoum Amina	Assessment of ambient ozone effects on vegetation: application in plant bio-monitoring	16H15-16H30

Poster session16H30-17H00

Poster Session II

Session president :   **Assessor :**

ID	Auteurs	Titles
T04_04	Khelfaoui Malika, MS. Medjram, Tahar djareddir	Assessment of water pollution by heavy metal of es-souk river and Guénitra dam, downstream from the abandoned Sidikamber mine in Skikda, Algeria
T04_05	Natija Charfeddine, Ckhir Najiba Ben Jemaa	Geochemical study of the waters of the groundwater of Sfax
T04_07	Widad CHAOUI, Moussa BENHAMZA and Kamel CHAOUI	Impact of industrial water on water quality in OuedSeybouse (Edough dairy, w. Annaba)
T04_08	Bouchemal F, Achour S.	Physicochemical parameters of groundwater resources from biskra area (southeastern algeria)
T04_10	Fatima Naili and BoualemMayache	Evaluation of the effect of the lettuce variety on the accumulation of certain heavy metals
T08_03	Rabia. Malkia, M.F. Semmar, Mr. F. Hadjaj	Estimation of medium and long-term reference evapotranspiration for the annaba region (algeria) using the dssat4.5 model
T08_04	Attoui Badra, Benrabah Samia Sayad Lamine, DaoudRabia	Study of the vulnerability to groundwater pollution by application of the drastic method case: Boumaizaplain w .Skikda(N-E Algerian)
T08_08	Bourouina Hichem, Araibia Akram, Mrad Dounia, Djebbar Yassine,	North-EasternAlgeria : water demand and resources between challenges and opportunities
T08_09	Dhikrane Nafaa, Keblouti Nafaa	Environmental eco impact of the reuse of treated wastewater in the mediterranean environment; case of the irrigated perimeter of allalik-Annaba
T08_10	Fareh Fouzia, -Alkama Djamel	The transition from rare water to abundant water, an exogenous factor impacting the oasis balance in the lower

		Algerian Sahara
T08_11	Sofiane Saggaï, Oum Elkheir Bachi, Djamel Boutoutaou	Determination of water plans evaporation in Algerian arid zone : difficulties and proposed solutions
T09_02	Ibrahim Recioui, Mustapha Daddi Bouhoun and Hadjira Benhedid	Spatio-temporal variation of groundwater salinity in the valley of ouargla (South-East Algerian)
T09_03	HouariaNamaoui	Homogenization of GPS water vapour time series.
T10_02	Semmoud Rahmouna, Didi Mohamed Amine	A coacervate extraction study of a cationic dye using an imidazolium ionic liquid.
T10_06	Dalila Benlarbi, Fatima ChaliAli and Remykia-KafiaBenlarbi	Study of purification performance by a bed of plant (sodom apple tree) in arid region
T10_13	RafikOulebsir, Abdelouahab Lefkir, Abdelhamid Safri, Abdelmalek Bermad, Sofiane Bennaceur	Reduction of energy consumption in activated sludge process using decision trees model coupled with k-means

Thursday, November 14, 2019

ORAL PRESENTATIONS

Session 1:08H30-10H30

SALLE 1: Thèmes: 3, 8&10

Session president :   **Assessor :**

ID	AUTHORS	TITLE	TIME
T03_12	Mohamed Amireche , Tarek Merabtene and Abdelmalek Bermad	Rainfall-runoff modeling by tank model using adaptive extended kalman filter applied to semi-arid Algerian watersheds	08H30-08H45
T03_17	Tahar Ikni , Ali Berreksi, Mohamed Belhocine	Robust schemes for the study of unsteady free-surface flows	08H45-09H00
T03_18	Berghout Ali, MOKHTARI El-Hadj	Estimation of the curve-number CN parameter for the SCS curve number production function in rain-flow modeling using NDVI watershed case Chemora Waterchead Algeria	09H00-09H15
T03-19	Taye bBoulmaiz, Kacem Gairaa, Mawloud Guemoui, Hamouda Boutaghane	Streamflow forecasting using Gaussian process regression methodology	09H15-09H30
T08_14	Ali Taleb Bahmed,Youcef Hakimi, Philip Orban , Serge Brouyère, Souad Bouzid-Lagha	A multiscale groundwater flow modelling for assessment of the effect of managed aquifer recharge from an infiltration basin in the Mzab valley – North Africa	09H30-09H45
T10_12	Seif El-Islam Benabboud, Sofiane Boukhariand Dounia Mrad	Application of the "polluter pays" principle to minimize Mth cases: the case of the city of Souk-Ahras	09H45-10H00

Session president :   **Assessor :**

ID	Authors	Title	Time
T04_28	Nasma Bouchelkia, Lotfi Mouni, Hayet Belkacemi	Preparation of an activated carbon from jujube stone and its efficient application for removal of cadmium from aqueous solution.	08H30-08H45
T04_30	Ounoki Samira, Lahiouel Salih, Achour Samia	Effectiveness of powdered activated carbon for the retention of an antidiabetic (metformin) in an aqueous solutions.	08H45-09H00
T04_31	Radia Hafsi, Hamouda Boutaghane	Urban river water quality assessment using self-organizing map (WadiBoudjemaa- Eastern Algeria)	09H00-09H15
T04_32	Sarah Goudjil, Saadia Guergazi, Samia Achour	Influence of polymer and activated carbon on the elimination of Congo red by coagulation-flocculation	09H15-09H30
T04_42	Houria Ghodbane, Nawel Nadji And Oualid.Hamdaoui	Use of marine biosorbent for the removal of brilliant green dye from aqueous solution	09H30-09H45

SALLE 3: Thèmes: 7

Session president :   **Assessor :**

ID	AUTHORS	TITLE	TIME
T07_01	Abderzak Moussouni, Aziz Maaliou, Liatim Mouzai And Malek Bouhadef	Laboratory experiments: effect of shear stress on sediments concentration	08H30-08H45
T07_04	Faregh Wail, Siad Rafik	Determination of the optimal stable cross-section in BoulhiletWadi	08H45-09H00
T07_06	Dounia Mrad , Azedine Mansour , Sabri Dairi, Sofiane Boukhari And Yassine Djebbar	Application of swat model to estimate the sediment yield: case of northeastern watershed in Algeria	09H00-09H15
T07_08	Abdeldjalil Belkendil, Mohammed Habi , Boutkhil Morsli, Abdeldghani Bakhira	Characterization of erosion phenomena in arid zones using multi –criteria analysis (MCE) and analytical hierarchy process (AHP)- a case study of upper Guir watershed , South –West of Algeria	09H15-09H30
T07_09	Brahimi Samiha ,Meddi Mohammed ,HallouzFaiza	Solid transport and siltation of the dam:stady and analysis in the watershed of the Oued sly(Algerian North-West).	09H30-09H45
T07_11	Hallouz Faiza, Meddi Mohamed, Ali Rahmani Salah.Eddine, Karahacane Hafsa, Guettar El Mekedem., Korieb Hamza.	Evolution of sedimentary transport in wadiCheliff (North-West Algeria)	09H45-10H00
T07_12	Zahira Souidi1 And DjaziaBouderbala	Soil erosivity in semi-arid regions: case of the macta watershed	10H00-10H15
T07_13	Elhadj Mokhtari , Ali Berghout	Estimation of c-factor for soil erosion modeling using NDVI in Boussellam watershed Algeria	10H15-10H30

Coffee Break / Poster session10H30-11H15

Poster Session

Session president :   **Assessor :**

ID	AUTEURS	TITLES
T04_14	Ali Alouache, Ammar Selatnia and Boubekeur Nadjemi	Study of Congo red biosorption onto wood chips
T04_17	Badreddine Saadali1, El Fadel Derradji, Hicham Zerrouki, Nabil Bougherira, Abdelkader Khiari	Organic pollution identification of waters using opi, li and ihe methods. Case study of el kala wetlands
T04_19	Hadjer.Zeghache, Said.Hafsi	Experimental study of the removal of two organic dyes from aqueous solutions by adsorption using activated carbon
T04_20	Hayet Chamekh, Mahdi Chihaand Fatiha Ahmed chakkat	Degradation of azo dyes mixture solutions orange g and acid yellow 99 by uv/persulfate system
T04_21	Benrabah Samia, Attoui Badra, Hannouche Mani,	Supply state of drinking water in the wilaya of khenchela and its reinforcement by the hydraulic transfer of babar dam water
T04_22	Imene Chaabna, Chahrazed Boukhalfa	Cr (vi) removal by reduction-precipitation application to chrome-plating waters
T04_25	Mehdi Belhani, Hamouda Boutaghane and Rym-Asma Boufas	Effect of the regulation amendment of phosphorus discharge on life cycle impact assessment of wastewater treatment plant of guelma city - algeria
T04_29	Nassima Benyoub, Abdellah BENHAMOU And Abdelkader DEBAB	Functionalized mesoporous materials for the adsorption of pharmaceutical micropollutants
T04_33	Walid Rezig, Mohammed Hadjel, Radia Gacem; Souhir Hamitou	Water quality assessment in the tafna river basin
T04_34	Youcef Sara, SeghairiNora	The evolution of nitrates in constructed wetlands
T04_35	Youcef Soufiane, Guergazi Saadia, Youcef Leila, Achour Samia	Study of zinc retention by adsorption on activated carbon
T04_36	Nawel Benouara, Lamia Hachemi Rachedi, Abdelaziz Laraba	Assessment of spring water quality for irrigation purposes in seraidi region – northeast algeria
T04_37	Hellal A. Achour S	Study of the reactivity of an amino acid with chlorine in variable dilution media
T04_38	Zenati N, Gheid A, Belahcene N, Bensadoune M and Berrouk S	Influence of geology and anthropic activities on the concentrations of trace elements in the surface water of the medjerda basin.
T04_39	Zoulikha Bellalia, Abdelkader Bouderbala and Abdelamir Saaed Hamoudi	Assessement of surface water quality for irrigation in the middle Cheliff
T04_41	Sedrati Nassima, Major Habiba	Assessment of Ouargla treatment plant efficiency
T04_43	Derradji El Fadel	Impact of hadjarsoud's cement plant on the environment and water resources (Northeast Algeria)
T4_44	WahidaKherifi ,Linda Hecini ,HouriaKhericiBousnoubra	Study of the quality of water in lake mellah and its catchment area (North-Eastern Algeria)
T04_45	Mohamed Amine Bensoltane, Lotfi Zeghadnia, Lakhdar Djemili, Abdelkrim Guebail, Ahmed Salah Araibia	Control of the water supply quality: case study of Souk Ahras city
T07_02	Ahmed Chetti, Ahmed Benamar and Khaled Korichi	3d numerical modeling of soil suffusion
T07_07	Boucherit Hafidha, Benaradj Abdelkrim et Bougherira Nabil	Water and soil conservation measures in the region of Naâma (South-West Algeria)

11:15- 11:45

Conference Closing Ceremony and Award distribution for:

- Best Oral Presentation,

- Best Posster presentation

- Best Young PhD or Master student paper

12:00 –13:00 Lunch

13:00 –17:00 Visit to Seraidi

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8. Water resource management, desalination and Water use
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10. Eco-hydrology and hydro-ecology

Important dates

- Abstract submission: 15 th March~~June 30th, 2018 Extension of Abstract submission deadline: July 15th, 2018~~
- Acceptance of abstract : 15 th May~~July 15th, 2018 Extension of Acceptance of abstract deadline: July 30th, 2018~~
- Camera readypapers due : 15 th June
- Conference : December 8th – 9th, 2019

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~~Online abstract submission system is now open!~~Authors are requested to submit abstracts electronically in WORD format to **thislink**. If you have usedthis system before, you can use the sameusername and password. If thisisyour first time usingEasyChair, youwillneed to register for an account by clicking "I have no EasyChairaccount" button. Uponcompletion of registration, youwillget a notification email from the system and you are ready for submittingyourpaper. You can upload and re-upload the paper to the system by the submission due date.

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- Registration is **required**for all participants of ICWC 2019.
- To bepublished in the ISFF 2018 ConferenceProceedings at least one of the authors of the
paperis **required** to **register** for the conference and the paper must bepresentedduring the conferencedays.

- **Registration feesinclude**conference sessions, conferenceproceedings, lunches and coffee breaks and Excursion.

PAYMENT METHOD

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