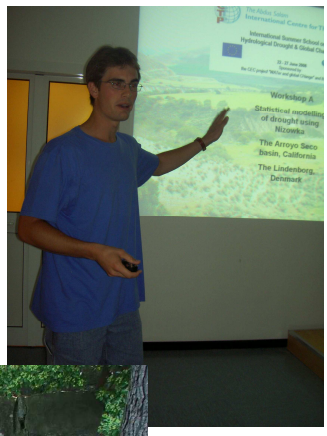
Technical Report No. 8

INTERNATIONAL SUMMER SCHOOL ON HYDROLOGICAL DROUGHT AND GLOBAL CHANGE TRIESTE, ITALY, 22-27 JUNE 2008



Henny A.J. van Lanen, Lena M. Tallaksen, Claudio Piani & Pandora Pieri

October 2008

WATCH is an Integrated Project Funded by the European Commission under the Sixth Framework Programme, Global Change and Ecosystems Thematic Priority Area (contract number: 036946).
The WACH project started 01/02/2007 and will continue for 4 years.

Title:	International Summer School on Hydrological Drought and Global Change, Trieste, Italy, 22-27 June 2008
Authors:	Henny A.J. van Lanen, Lena M. Tallaksen, Claudio Piani & Pandora Pieri
Organisations:	- Wageningen University - Hydrology and Quantitative Water Management Group (WUR) - University of Oslo – Department of Geosciences (UiO) - Abdus Salam International Centre for Theoretical Physics (ICTP)
Submission date:	October 2008
Function:	This summer school is an output from Work Block 7 Project management, training and communications, Work Package 7.2 Training. It contributes to Task 7.2.1 Summer Schools. The task particularly targeted postgraduates students in the hydrological sciences to build the future community capable of advancing research at interfacing of climate and hydrological modeling, applications and operations.
Deliverable	contributes to WATCH deliverable D 7.2.1

photos on the cover:

- students at the workshop on modeling human impacts and climate change (upper left)
- student presenting the outcome of the workshop on drought frequency analysis (upper right)
- students and lecturers in front of the ICTP building, Trieste, Italy (lower middle)

Table of Contents

1. Introduction

As part of a strategy to maximize the effective transfer knowledge from the WATCH project to users, several key groups at various levels will be trained, which are seen as pivotal in the development of a European skills base in climate-water science. Training modules will be developed to suit the following three groups:

- upper level schools children (with the objective of encouraging career development in science in general and climate-water science in particular);
- undergraduates (to educate students on the climate-water science and influence career development choices – and particularly to promote research as a career);
- postgraduates (more in a workshop mode to educate and promote dialogue about WATCH research – to speed up the advance of climate-water research).

The international summer school on Hydrological Drought and Global Change that was held in Trieste, Italy, 22-27 June 2008, addressed the postgraduate level. The summer school builds on previous courses on hydrological drought (Montpellier, France, 2003; Wageningen, the Netherlands, 2003; Kuala Lumpur, Malaysia, 2005; Agdal-Rabat, Morocco, 2006). Further information on these previous courses can be found at the European Drought Centre (EDC)[1] website.. For the WATCH summer school the textbook on Hydrological Drought - Processes and Estimation Methods for Streamflow and Groundwater (Tallaksen & van Lanen, 2004) has been used as course material as has been done in the previous courses.

General information on the summer school can be found in the flyer (Annex 1) that was sent out to the water and climate community and published on various websites (e.g. ICTP[2], EDC, FRIEND[3])

The Scientific Committee consisted of:

- Henny A.J. van Lanen, Wageningen University, the Netherlands
- Lena M. Tallaksen, University of Oslo, Norway
- Claudio Piani, Abdus Salam International Centre for Theoretical Physics, Italy

The Local Organising Committee consisted of:

- Claudio Piani, Abdus Salam International Centre for Theoretical Physics, Italy
- Pandora Pieri, Abdus Salam International Centre for Theoretical Physics, Italy

This report summarizes the course objectives, participants and selection procedure, and the course programme. This is followed by the main outcome from the course evaluation. A comprehensive set of annexes is attached (see Table of Contents).

2. Summer school objectives

The main objective of the WATCH international summer school on Hydrological Drought and Global Change
was

- to provide postgraduates a unique opportunity to advance their knowledge on hydrological drought and global change, through both basic and advanced techniques to detect and to

[1] www.geo.uio.no/edc
[2] Abdus Salam International Centre for Theoretical Physics, Italy
[3] UNESCO-International Hydrological Programme: FRIEND: Flow Regimes from International Experimental and Network Data http://ne-friend.bafg.de/servlet/is/7398/

analyze drought, including the impact of global change (anthropogenic impacts and climate change);

In addition the course aimed at

- supporting building the future community capable of advancing research at the interface of climate and hydrological models, applications and operations;
- speeding up the advancement of climate-water research;
- promoting discussions and dissemination of WATCH research outcome;
- network building, incl. encouragement to participate in the European Drought Centre;
- getting feedback on the content of the textbook on Hydrological Drought - Processes and Estimation Methods for Streamflow and Groundwater (Tallaksen & van Lanen, 2004), which might be relevant for a possible revised edition.

Means to reach the aims were:

- to send the textbook, including a CD with additional information, self-guided tours, data and tools, to participants about one month prior to the commencement of the summer school;
- to invite recognized experts in the field as lecturers, i.e. textbook authors and other WATCH experts on climate change issues (Annex 2);
- to briefly introduce the textbook chapters to the participant by lecturers/authors;
- to introduce impacts of global change on drought by invited lecturers;
- to invite participants to present their own research (oral or poster presentation);
- to let participants actively take part by carrying out and present a case study dealing with different aspects of drought and climate change;
- to reserve ample time for discussions, including a plenary closure session;
- to provide sufficient time (ice breaker, coffee/tea breaks, joint dinners, poster session, midweek excursion) for developing contacts and to build networks;
- to evaluate the content and the organization of the summer school.

3. Selection of participants

The course invitation was first sent out to WATCH partners, and PhD students and junior scientists from WATCH partners were given priority. The summer school was also announced at the ICTP website. The applicants were asked to submit the application form with a short CV. Only students and junior scientists from WATCH partners who could prove that they work on hydrological drought or associated climate topics were selected. In principle not more than one participant per WATCH partner was selected. Every participant also had to confirm their willingness to give a short presentation on her/his research on droughts, possibly linked to climate change. The participants were asked to give a preliminary title or their presentation.

In the second phase the network of the FRIEND project (UNESCO-IHP) and the European Drought Centre was used to circulate a flyer to European organizations with possible candidates. In addition the summer school was announced at the WATCH, FRIEND, (ICTP) and EDC websites (flyer and application form could be downloaded).

In the meantime the WATCH Project Steering Group had decided that 4-5 candidates from outside Europe would be invited. These candidates should come from the Indian Subcontinent or Africa (possible WATCH second regions). The FRIEND network was used to select these candidates in addition to some applicants who spontaneously replied to the website announcements.

The Scientific Committee evaluated 68 applications. Thirty applicants were invited to participate and five were put on a reserve list. Eventually, 31 participants were selected (Annex 4), which was the maximum number that could be handled in the PC workshops. Eleven participants came from WATCH partners (10 in Europe and one from the USA). Of the twenty non-WATCH participants, fifteen came from Europe, three from Africa and two from the Indian Subcontinent. In total about 20% of the participants were from outside Europe. Figure 1 provides the distribution of the participants across Europe.

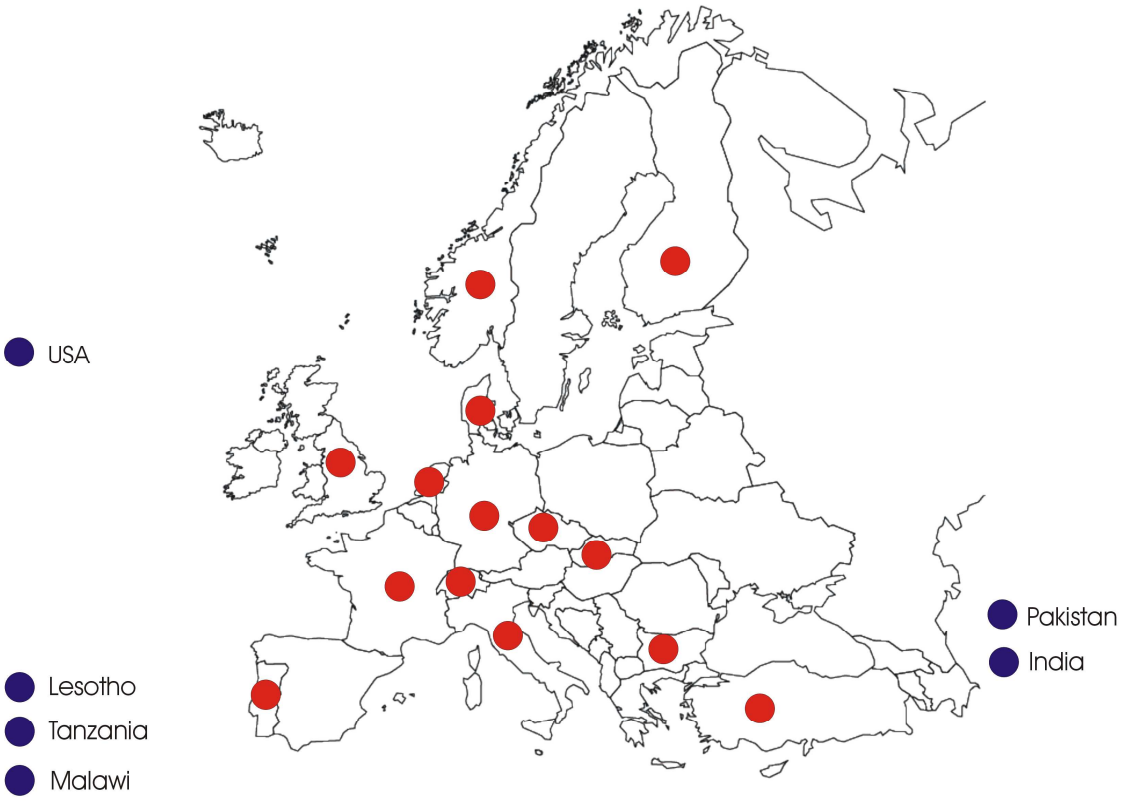


Figure 1 Countries where selected candidates study or are employed

About 25% of the selected participants were females. Most of the participants were PhD students and 23% already finished their PhD (postdoc positions). Unfortunately, no WATCH candidates were nominated from Spain and Poland. In the week prior to the summer school two selected participants had to cancel their participation. Some parts of the summer school, in particular the plenary sessions, were also attended by ICTP delegates.

4. Summer school programme

The summer school started on Sunday 22 June, late afternoon, with an introduction to the course objectives and programme (Annex 5). Lecturers and participants introduced themselves, and were all invited to an icebreaker event (buffet dinner). The welcome session introduced the participants to the following elements of the week programme (Monday-Friday):

- lectures;
- introduction to self-guided tours and worked examples;
- oral presentation by selected participants;
- poster presentation by other participants;
- midweek excursion;

- two parallel workshops;
- plenary presentations of the outcome of the workshops by participants;
- plenary evaluation;
- closing session with distribution of certificates.

Lecturers were given by authors of the textbook on hydrological drought (Tallaksen & van Lanen, 2004) and invited WATCH experts on climate change. Six participants were invited to give an oral presentation. These participants were selected on the basis of their short CV, motivation and title of presentation (Annex 6). The other participants gave a short plenary poster presentation (4 min) prior to going to the poster space. A midweek excursion to Venice was organized, including a visit to the UNESCO office. At UNESCO, the director Dr. Ruoss gave a presentation on the various dimensions of the water crisis and what UNESCO is doing. Afterwards a visit to the Doge's Palace was arranged. The main objective of the excursion was network building and to have an interruption in the intensive programme of the summer school.

In the second part of the week the participants could choose to take part in one of two parallel workshops. The first workshop focussed on frequency analysis of drought (statistical modelling) and the second on droughts, human impacts and climate change (physically-based modelling). Both workshops were attended by 15 participants. In the workshop the participants worked on time series of hydrological data and used tools that were provided on the CD (included with the textbook). Detailed programme of the workshops are given in Annexes 7 and 8. At the last afternoon a few students presented in a plenary session the outcome from both workshops. Eventually, the evaluation of the summer school was presented and discussed. The summer school was concluded with handing over the certificates (Annex 9).

5. Evaluation of summer school

The participants received a comprehensive questionnaire at the first day (Annex 10), which needed to be completed before Friday noon. This offered the opportunity to preliminary evaluate the summer school and to discuss the outcome with the participants during the course of the week.

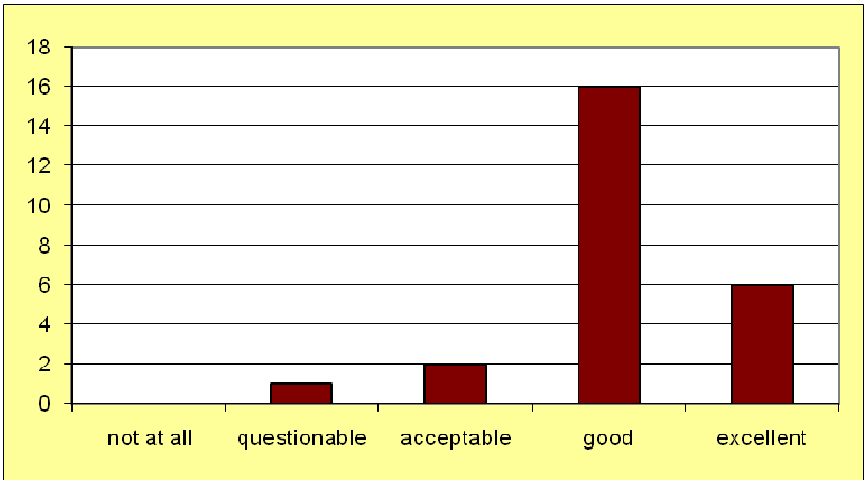


Figure 2 Response of students (y-axis: number of students) how they perceived the content (focus) of the course and if it matched their expectations

The questionnaire was completed by 86% of the participants, which is a very high score. About 90% of the students classified the summer school as good to excellent (Figure 2). They were very happy to be

invited to learn from recognized experts and to meet other young scientist working on drought, hydrology and climate.

5.1. Content and programme

Almost all students thought that the structure of the course (allocation of time for lectures, oral and poster presentations by the participants, workshops) was good (56%) to excellent (40%). Annex 11 provides more details of the evaluation.

More than half of the students thought that the time spent on lecturers, self-guided tours and worked examples, and contributions from students was acceptable (Table 1). If optional, it seems that more rather than less time, should have been spent on lectures and self-guided tours.

Table 1 Response of students (%) on the summer school programme

Question	less time	acceptable	more time
3. Should there have been less or more lectures?	8	68	24
4. Should we have spent less or more time on self-guided tours and worked examples?	16	52	32
5. Should we have spent less or more time on contributions from the participants (oral and poster presentations)?	12	72	16

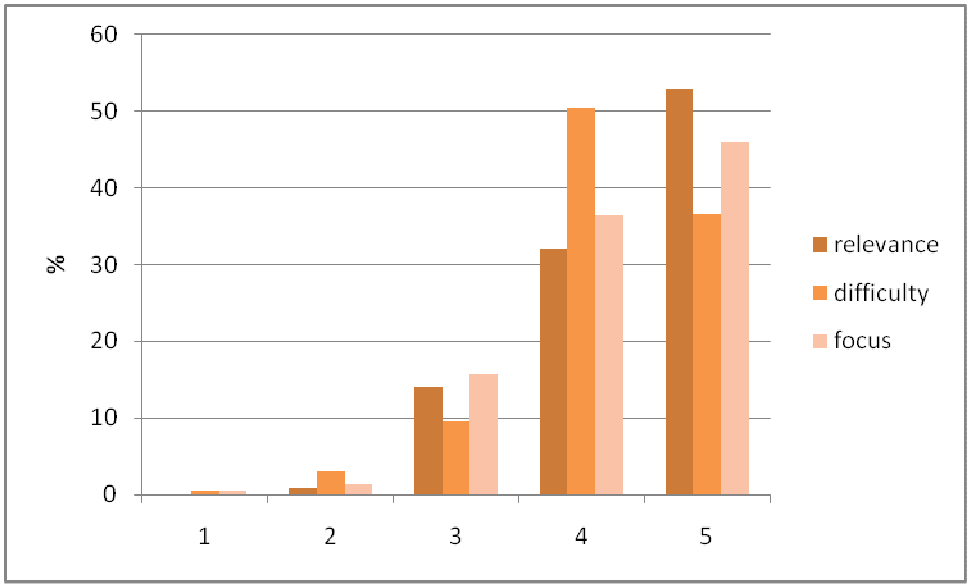
The vast majority of the students (96%) thought that it is acceptable to excellent to let the students give a brief poster introduction in a plenary session (Annex 11). The same applied to the time for discussion in the poster hall. Over 80% of the students appreciated the textbook on Hydrological Drought and the included CD as course material (Annex 11). The CD includes background information, data at different scales, tools, self-guided tours, and worked examples and provides the reader with a wide range of self learning tools.

More than 60% of the students thought that the time spent on the parallel workshops was acceptable (Table 2). About one quarter of the students wanted more time for the workshops. There was a mixed response on the organisation of two parallel workshop (students could only attend one workshop). For a lot of students (41%) it was hard to choose and actually they would like to have participated in both (Annex 11).

Table 2 Response of students (%) on the duration of the two parallel workshops (question 11)

Question	shorter	acceptable	longer
workshops A	0	70	30
workshops B	9	64	24

The students thought that the lectures were well tuned (Figure 3). About 85% of the students evaluated the relevance and the focus of the lectures to be good to excellent. Half of the students had the opinion that the lectures had the right level of difficulty.



LEGEND:

	relevance		**difficulty**		**focus**
1	not at all	1	very high	1	very poor
2	questionable	2	high	2	poor
3	acceptable	3	acceptable	3	acceptable
4	good	4	understandable	4	good
5	excellent	5	easy to understand	5	excellent

Figure 3 Response of students how they evaluated the relevance, difficulty and the focus of all lectures (question 10)

Table 3 Response of students (%) on the content and difficulty of the parallel workshops and if they enjoyed giving a plenary presentation (question 12)

Workshop	was the content of the workshop relevant? 1: not at all 2: questionable 3: acceptable 4: good 5: excellent	how was the level of difficulty? 1: very high 2: high 3: acceptable 4: understandable 5: easy to understand	did you enjoy giving an own presentation? 1: not at all 2: questionable 3: acceptable 4: good 5: excellent
A : Frequency analysis	1: 0 2: 0 3: 0 4: 67 5: 33	1: 0 2: 25 3: 33 4: 25 5: 17	1: 0 2: 0 3: 23 4: 77 5: 0
B: Human impacts & Climate Change	1: 0 2: 0 3: 27 4: 27 5: 46	1: 0 2: 9 3: 0 4: 64 5: 27	1: 0 2: 0 3: 30 4: 30 5: 40

Most of the students appreciated the content of the parallel workshops. Participants of workshop A gave a higher score (all respondents thought that it was good to excellent) than students of workshop B (Table 3). About two-thirds of the students of workshop B found the difficulty of the workshop satisfactory. The response of the students who attended workshop A were mixed (25% thought it was difficult). Most of the students (70-77%) liked to present the outcome from their workshop in a plenary session.

5.2. Organisation

Almost all students (92%) thought that the number of participants (n=29) was fine. Nobody would like to have a higher number.

Table 4 Response of students (%) on the facilities (question 14)

Question	questionable	acceptable	good	excellent
Plenary room	0	13	38	50
Computer labs	17	13	33	38
Poster space	8	13	50	29

The vast majority of the students (over 80%) was happy with the lecture room where the plenary sessions were held. The opinion on the computer labs was more mixed. The reason was not the computer room itself, these are spacious and for each participant there was a PC. The lower assessment was given by participants of workshop A, because the programs could not be installed. Own laptops overcame this problem, although this caused some delay. Most students (79%) were satisfied with the poster space. A few students thought that more space in between the posters for discussion is required.

Eighty percent of the students was happy with the accommodation offered either in the Galileo Guesthouse or the Adriatico Guesthouse (Annex 11). The course facilities like lecture room, poster space and computer labs, were all located in the Adriatico Guesthouse. The Adriatico Guesthouse was ranked higher than the Galileo Guesthouse. The students were less happy to stay in different guesthouses (37% ranked it as arguable, Annex 11), whereas most students (about 70%) had no problem to share a room with a colleague participant (Annex 11).

Most of the students thought that it was acceptable (40%) to start on Sunday, late afternoon, and 55% had no problem with it at all (Annex 11).

Table 5 Response of students (%) on the icebreaker and field trip

Question	questionable	acceptable	good	excellent
17. How did you find the icebreaker session the first day?	0	0	46	54
18. Is a mid-week field trip needed?	4	17	29	50
19. Did you find the purpose of the field trip of interest (topic, guided tour, free time)	17	13	46	25

All students were happy with the icebreaker on Sunday evening (Table 5). About 80% appreciated a mid-week excursion and were content with the purpose (over 70%). A few students preferred to have a more technically-oriented topic, whereas some others would like to have had more free time.

Clearly, students appreciated very much to receive the comprehensive textbook and CD on Hydrological Drought well in advance of the summer school (about 1 month). About 75% of the students thought it was excellent (Annex 11). Eighty percent of the students replied that they studied the textbook before arriving in Trieste.

6. Concluding remarks

- the evaluation showed that the summer course provided students a unique opportunity to advance their knowledge on hydrological drought and global change and to learn more about current techniques to detect and to analyze drought;
- the vast majority of the students thought that the summer school had a good content, programme and organisation, incl. the logistics;
- the mix of education forms (lectures, self-guided tours, excursion, workshops) was well received;
- comments on the evaluation forms, but also the group process showed that participants appreciated to meet other young scientist working on drought, hydrology and climate, which contributed to developing their network;
- although the students were prepared, they preferred to have more time for almost all education forms, which means a summer school lasting more than a week;
- a substantial number of students missed the opportunity to participate in both workshops, which were run in parallel;
- the opportunity should be offered to timely test the PCs, i.e. ensure that course-specific software is properly running and data installed;
- students should preferably stay in the same guesthouse;
- lecturers should stay in the same guesthouse;
- editors and authors appreciated to get feedback on the course material (textbook on Hydrological Drought - Processes and Estimation Methods for Streamflow and Groundwater) and implementation of the course

References

Tallaksen, L.M. & van Lanen, H.A.J. (Eds.) (2004) Hydrological Drought. Processes and Estimation Methods for Streamflow and Groundwater. Developments in Water Science, 48, Elsevier Science B.V., 579 pg.

Annex 1 Summer school poster

The Abdus Salam
International Centre for Theoretical Physics

International Summer School on Hydrological Drought & Global Change

22 - 27 June 2008
Sponsored by
the CEC project "WATer and global CHange" and the ICTP

The Abdus Salam International Centre for Theoretical Physics (ICTP), in collaboration with partners of, and with funding provided through, the CEC project "WATCH", are organizing the **International Summer School on Hydrological Drought & Global Change,** to be held from **22 to 27 June 2008 in Trieste, Italy**.

Introduction
Drought can be defined as a sustained and extensive occurrence of below average natural water availability. It affects precipitation, soil water, groundwater and stream-flow and other variables of the hydrological system. Drought is a recurring and worldwide phenomenon, with spatial and temporal characteristics that vary significantly from one region to another.
Drought has major impacts on society. These impacts affect the environment and economy and can lead to loss of life and, especially in developing countries, aggravation of poverty and mass migration. Impacts are likely to increase with time as societies' demands for water and environmental services increase. Prolonged dry and hot weather, stressing local water resources, has always been a challenging European issue, not only within southern Europe, but also in the wetter and colder Northern and Central Europe as society and nature have adapted to the greater water availability.
No relief is expected in the future with the predicted impacts of climate change suggesting a dryer and warmer Mediterranean region and a northward shift of European climatic regimes. As a result there will be a considerable enhancement of inter-annual variability in the summer climate, associated with higher risks of heat waves and droughts as experienced in recent years (2003, 2005 and 2006). A prerequisite for an adequate assessment and management of drought related impacts is the study of the genesis and space-time development of drought.
This Summer School provides you with a unique opportunity to advance your knowledge on hydrological drought and to learn both basic and advanced techniques to detect and analyze drought, including its response to global change (i.e. climate change and anthropogenic impacts). The course will be taught by recognized experts in the field.

Summer School description
This intensive five-day school will cover an introduction to drought (incl. terminology and its impacts) and hydroclimatology (incl. climate change), the significance of hydrological processes leading to drought, data needed, drought characterization, frequency analysis, regionalization (incl. prediction at the ungauged sites), human influences (incl. climate change) and operational applications. The textbook on Hydrological Drought - Processes and Estimation Methods for Streamflow and Groundwater, Developments in Water Sciences 48 (Elsevier, 2004) will be used as course material.

The first two days of the course will mainly consist of lectures combined with some time for hands-on training using self-guided tours. A mid-week field trip is planned. On the last two days participants will work in two parallel sessions. In the first session the participants get hands-on training on drought frequency analysis and in the second session the focus is on the assessment of the impact of climate change on drought using a physically based hydrological model. The course is concluded by a plenary presentation and discussion of the outcome of the sessions by the participants.

Participants will be asked to give a short presentation on drought, possibly linked with global change, to share knowledge. Participants are expected to study part of the course material prior to the course. Participants receive a certificate (3 ECTS) after completing the Summer School provided they have actively taken part in the course.

Who should attend?
The course is suitable for master and PhD students as well as junior scientists, primarily studying or conducting research within a WATCH partner organization, who are engaged in drought analysis and who are interested to increase their knowledge and learn more about recent tools to analyze hydrological drought. A restricted number of places are reserved for researchers from non-WATCH partner organizations within Europe. The activity will be conducted in English. Some funds are available for participants (under 45 years of age), however every effort should be made by candidates to securesupport for their travel expenses especially. There is no registration fee and no cost for course material.

The **Application Form** is available at: **http://agenda.ictp.it/smr.php?1949**
Applications should be sent via e-mail, no later than **21 January 2008**, to **smr1949@ictp.it.**

Hydrological Drought - smr1949
the Abdus Salam International Centre for Theoretical Physics
Strada Costiera 11, 34014 Trieste, Italy

Fax: **+39 040 2240449** **smr1949@ictp.it** ***Tel:*** **+39 040 2240374** **http://www.ictp.it/**

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Wallingford, United Kingdom

Dr. Kerstin STAHL
University of Oslo
Norway

Dr. Lena M. TALLAKSEN
University of Oslo
Norway

DEADLINE
21 January 2008

Annex 2 List of lecturers

name	organization	city	country
Stefan Hagemann	Max Planck Institute for Meteorology	Hamburg	Germany
Hege Hisdal	Norwegian Water Resources and Energy Directorate	Oslo	Norway
Henny van Lanen	Wageningen University	Wageningen	The Netherlands
Oldřich Novický	T.G. Masaryk Water Research Institute	Prague	Czech Republic
Claudio Piani	Abdus Salam International Centre for Theoretical Physics	Trieste	Italy
Gwyn Rees	Centre for Ecology and Hydrology	Wallingford	United Kingdom
Kerstin Stahl	University of Oslo	Oslo	Norway
Lena Tallaksen	University of Oslo	Oslo	Norway

Annex 3 Application form

The Abdus Salam
International Centre for Theoretical Physics

International Summer School on Hydrological Drought & Global Change

22 - 27 June 2008

Trieste, Italy

GUIDELINES FOR REQUESTING PARTICIPATION

GENERAL

- The Summer School is mainly intended for Masters and PhD students, as well as junior scientists and post-graduate fellows working in the area of drought analysis from institutes that are partners of the WATCH project. A restricted number of places are reserved for non WATCH partner organizations.
- Participants must have an adequate working knowledge of English.
- There is no registration fee to be paid and there are no costs for course material.
- The Request for Participation form and information on the Summer School is available at: http://agenda.ictp.it/smr.php?1949

FINANCIAL SUPPORT

- May be requested by candidates who are not more than 45 years old.
- Some funds are available for participants, however, every effort should be made by candidates to secure support, especially for their travel expenses.

REQUEST FOR PARTICIPATION

The **Application Form** is available at: **http://agenda.ictp.it/smr.php?1949**
Applications should be sent via e-mail to arrive no later than **26 October 2007** to **smr1949@ictp.it**

Hydrological Drought - smr1949
the Abdus Salam International Centre for Theoretical Physics
Strada Costiera 11, 34014 Trieste, Italy

***Fax:* +39 040 2240449 smr1949@ictp.it *Tel:* +39 040 2240374 http://www.ictp.it/**

REQUEST FOR PARTICIPATION

International Summer School on Hydrological Drought & Global Change

22 - 27 June 2008 Trieste, Italy

To be completed and sent to:
Hydrological Drought - smr1949
the Abdus Salam ICTP
Strada Costiera 11, 34014 Trieste, Italy

Please attach a recent photograph here.

Tel. +39 040 2240374 / Fax +39 040 2240449 / E-mail: smr1949@ictp.it

TO ARRIVE NO LATER THAN 26 OCTOBER 2007

SURNAME/FAMILY Name: | MAIDEN Name: For women only (if applicable) | First name: | Middle name(s): | Sex:

Please also indicate SURNAME, NAME as shown on passport (if different from above)

Place of birth (*City and Country*): | Present nationality: | Date of birth: *Day/Month/Year*

Full name/address of permanent Institution:

Institute: Tel. No. Telefax
Your Office: Tel. No. Telefax
E-mail: *

Full name/address of present Institution:
(only *if different from permanent*)

Institute: Tel. No. Telefax
Your Office: Tel. No. Telefax:
E-mail: *

until: Date _____

Mailing address - please indicate one: Permanent institute ☐ Present institute ☐

ALL APPLICANTS SHOULD ATTACH A CURRICULUM VITAE (max 2 pages) including education, possible work experience, area of research, and a list of latest scientific publications. Finally, your MOTIVATION (1/2 page) for attending the Summer School needs to be provided.

In addition, please provide the provisional title of your short presentation on drought, possibly linked with global change:

_____

_____

Important: Funding is limited, therefore, every effort should be made by applicants to secure support for their fare (or at least a partial contribution) from their home country.

Request for Financial Assistance: (**please tick one only**)

☐ Full Travel + Subsistence ☐ Subsistence only
☐ Half Travel + Subsistence ☐ No financial support requested

I certify that if granted funds for my travel, I shall attend the whole activity_____
Signature

* I agree that my e-mail address(es) may be made public on the ICTP website: YES ☐ / NO ☐

Annex 4 List of selected participants

31 candidates have been selected.

NAME	Gender	PRESENTATION	BORN	COUNTRY	AFFILIATION
WATCH PARTNERS - EU					
BERG, Peter	M	**oral**	Sweden	Denmark	Danish Met. Inst., Copenhagen
GUDMUNDSSON, Lukas	M	poster	Germany	Norway	University of Oslo
HOLMES, Thomas	M	**oral**	Netherlands	Netherlands	Vrije Univ., Amsterdam
HORACEK, Stanislav	M	poster	Czech Republic	Czech Republic	T.G. Masaryk Water Research Inst., Prague
LAVERS, David Anthony	M	**oral**	UK	UK	CEH, Wallingford
MARIOTTI, Laura	F	poster	Italy	Italy	ICTP, Trieste
STARKE MAZURKEWITZ, Eva	F	**oral**	Germany	Germany	Max Planck Inst. Meteorology, Hamburg
STOJKOVOVA', Michaela	F	poster	Slovak Republic	Slovak Republic	Comenius University, Bratislava
VAN LOON, Anne	F	poster	Netherlands	Netherlands	Wageningen University
WONG, Wai Kwok	M	poster	Norway	Norway	Norwegian Water Resources & Energy, Oslo
WATCH PARTNERS - NON EU					
SHUKLA, Shraddhanand	M	**oral**	India	USA	University of Washington, Seattle
NON-WATCH EU					
ANLI, Alper Serdar	M	poster	Turkey	Turkey	Ankara University
DIMITROV, Yordan Vasilev	M	poster	Bulgaria	Bulgaria	Nat'l. Institute of Hydrology & Meteo, Sofia
DUPEYRAT, Anne	F	poster	France	France	EDF R&D LNHE, Chatou
ERIS, Ebru	F	poster	Turkey	Turkey	Istanbul Tech. Univ., Maslak-Istanbul
FIALA, Theodor	M	poster	Czech Republic	Czech Republic	Czech Hydrometeorological Inst., Prague
GANORA, Daniele	M	poster	Italy	Italy	Politecnico di Torino
KAVAN, Jan	M	poster	France	France	CEMAGREF, Lyon
LAGUARDIA, Giovanni	M	**oral**	International	International	EC, DG Joint Research Centre, Ispra
LIPPONEN, Annukka	F	poster	International	International	UNESCO Division of Water Sciences, Paris
ROSSI, Simone	M	poster	Italy	Italy	EC, DG Joint Research Centre, Ispra
SALIS, Faize	F	poster	Turkey	United Kingdom	University of Birmingham

SENTURK, Kevser	F	poster	Turkey	Turkey	Gen. Directorates of State Hydraulics, Ankara
SLIVOVA, Valeria Bruskova	F	poster	Slovak Republic	Slovak Republic	Slovak Hydromet. Institute, Bratislava
TEULING, Adrian	M	**oral**	Netherlands	Switzerland	Inst. for Atmos. & Climate Science, Zurich
VIVAS, Eduardo	M	poster	Portugal	Portugal	Universidade do Porto
NON-WATCH PARTNERS - NON EU					
PULE, Stephen Molefi	M	poster	Lesotho	Lesotho	Hydrology Div, Dep of Water Affairs, Lesotho
AKHTAR, Muhammad	M	poster	Pakistan	Pakistan	University of the Punjab, Lahore
NGONGONDO, Cosmo	M	poster	Malawian	Malawi	University of Malawi, Zomba, Malawi/UiO
TUMULURU, Venkata Lakshmi Kumar	M	poster	India	India	Andhra University, Visakhapatnam
VALIMBA, Patrick	M	poster	Tanzanian	Tanzania	University of Dar es Salaam, Tanzania

Eva Starke Mazurkewitz and Muhammad Akhtar had to cancel in the last week before the course.

Annex 5 Detailed programme

International Summer School on Hydrological Drought & Global Change

The Abdus Salam International Centre for Theoretical Physics (ICTP), Strada Costiera, 11, 34014, Trieste, Italy
22 – 27 June 2008
EC WATCH project No 036946

Timetable

Sunday 22 June.	Monday 23 June	Tuesday 24 June	Wednesday 25 June	Thursday 26 June	Friday 27 June
	Registration 08:00-09:00 **Lectures** 09:00-10:30 Droughts and hydroclimatology (Ch. 2)(KS) 30 **Invited lecture** Projected climate change – impact on meteorological droughts (Stefan Hagemann) [4] 40 Hydrological drought impact of climate change (Ch. 2)(KS) 20	**Presentations Participants B** 09:00-10:00 Oral presentation (plenary) [5] Peter Berg, Ryan Teuling, Thomas Holmes (chair: ON) **Discussion** 10:00 – 10:30	**Field trip** 09:00-18:00 Venice UNESCO- Venice The various dimensions of the water crisis. What UNESCO is doing? Can I do something?" Sightseeing	**Presentations Participants D** 09.00 – 10.00 Oral presentation (plenary) [6] Giovanni Laguardia, Sharddhanand Shukla, David Lavers (chair: HH) **Workshops** [7] [8] 10.00 – 10.30 **Workshop A** Frequency analysis (LT,HH,KS) **Workshop B** Human impacts climate change (HvL,ON)	**Workshops** 09.00 – 10.30 **Workshop A** Frequency analysis (LT,HH,KS) **Workshop B** Human impacts climate change (HvL,ON)

[4] Max Planck Institute for Meteorology, Hamburg, Germany (visiting scientist ICTP)
[5] Participants will present their topic in a plenary session (15 min presentation and 5 min discussion).

	10.30 Break	10.30 Break	10.30 Break	10.30 Break
	Lectures 11.00 – 12.30 Drought generating processes (HvL) 30 Hydrological data for drought analysis (Ch. 4)(GR) 30 Hydrological drought characteristics – definition, estimation and recommendations, part 1 (Ch. 5)(HH) 30	**Lectures** 11:00-12:30 Regionalisation procedures and estimation at the ungauged sites, incl. introduction to self-guided tour (Ch. 8)(KS,HH) 60 Regional Drought Characteristics incl. introduction to self-guided tour, (Ch. 6)(LT) 30	**Workshops** 12.00 – 12.30 **Workshop A** Frequency analysis (LT,HH,KS) **Workshop B** Human impacts climate change (HvL,ON)	**Workshops** 11.00 – 12.30 **Workshop A** Frequency analysis (LT,HH,KS) **Workshop B** Human impacts climate change (HvL,ON)
	12.30 – 14.00 Lunchtime	12.30 – 14.00 Lunchtime	12.30 – 14.00 Lunchtime	12.30 – 14.00 Lunchtime
Opening 17.00-19.00 Opening address[9] (ICTP) 30[10] Well come and introduction to the Summer School Course programme (HvL[11]) 15 Introduction lectures and participants 30	**Lectures** 14.00 – 15.30 Hydrological drought characteristics – definition, estimation and recommendations, part 2 (Ch. 5)(HH) 30 Frequency analysis – at site analysis (Ch. 6)(LT) 60	**Lectures** 14.00 – 15.30 Human Influences, incl. impact of climate change, introduction to self-guided tour (Ch. 9)(HvL,ON) 60 Hydrological data and Operational Applications (Ch. 4, 11)(GR) 30	**Workshops** 14.00 – 15.30 **Workshop A** Frequency analysis (LT,HH,KS) **Workshop B** Human impacts climate change (HvL,ON)	**Workshop** [12] 14.00 – 15.30 Presentation by participants and discussion of Workshop A 45 Presentation by participants and discussion of Workshop B 45

[6] Participants will present their topic in a plenary session (15 min presentation and 5 min discussion).
[7] Participants choose for Workshop A or B (2 parallel workshops).
[8] A detailed programme for the two parallel workshops is given below.
[9] ICTP representative
[10] Estimated duration, e.g. 30 minutes
[11] HH: Hege Hisdal, HvL = Henny van Lanen, ON = Oldřich Novický, KS = Kerstin Stahl, GR = Gwyn Rees, LT = Lena Tallaksen
[12] Plenary session

Hydrological Drought (Ch. 1) - introduction (LT) 25 - impacts (HvL) 10 Domestic information (ICTP) 10					
	15.30 Break	15.30 Break		15.30 Break	15.30 Break
19.00 Icebreaker reception	**Presentations Participants A** 16.00 – 18.00 Short oral poster presentation (plenary) [13] Lukas Gudmundsson, Stanislav Horacek, Laura Mariotti, Michaela Stojkovova, Anne van Loon, Wai Kwok Wong, Stephen Molefi Pule, Patrick Valimba, Alper Serdar Anli, Yordan Vasilev Dimitrov, Anne Dupeyrat, Ebru Eris. (chair: KS) Visit posters and discussion (ALL)	**Presentations Participants C** 16.00 – 18.00 Short oral poster presentation (plenary) Theodor Fiala, Daniele Ganora, Jan Kavan, Annukka Lipponen, Simone Rossi, Cosmo Ngongondo, Venkata Lakshmi Kumar Tumuluru, Faize Salis, Valeria Bruskova Slivova, Kevser,Şentürk, Eduardo Vivas. (chair: GR) Visit posters and discussion (ALL)		**Workshops** 16.00– 18.00 **Workshop A** Frequency analysis (LT,HH,KS) **Workshop B** Human impacts climate change (HvL,ON)	**Closing Session** 16.00– 18.00 General discussion 30 (ALL,LT,HvL) 16.30 Summer School Review and close (ALL,LT,HvL)

[13] Participants will briefly present their poster in a plenary session (max. 5 slides and 4 min).

Thursday 26th and Friday 27th June two parallel workshops will be convened: Workshop A: Frequency analysis and Workshop B: Human impacts – climate change (BILAN).

DETAILED PROGRAMME

Workshop A Frequency analysis (LT, HH,KS)	**Workshop B Human impacts – climate change (HvL,ON)**
Thursday, 26 June	**Thursday, 26 June**
10:00-10:30 - Introduction and objectives of Workshop A - Presentation of the case -	10:00-10:30 - Introduction and objectives of Workshop B - Modelling concept of BILAN - Questions
10:30-11:00 Break	10:30-11:00 Break
11:00-12:30 - Presentation and demonstration of the NIZOWKA and DROSEL program - Discussion & Questions - Data preparation and selection of drought events using the NIZOWKA and DROSEL program - Exploratory data analysing using NIZOWKA and Excel	11:00-12:30 - Impact of climate change: approach - Catchment descriptions - Description of input file for BILAN - Compilation of input file (students; 1 PC per 2 students) - Model calibration - parameter optimization (groups of 2 students)
12:30-14:00 Lunchtime	12:30-14:00 Lunchtime
14:00-15:30 - Prepare summary of key drought characteristics for the given streamflow stations - Discussion of the results in the whole group	14:00-15:30 - Processing results for reference situation and interpretation (groups of 2 students) - Discussing results of reference situation (whole group, lead: HvL,ON)
15:30-16:00 Break	15:30-16:00 Break
15:30-18:00 - Statistical analysis of drought events using NIZOWKA and Excel - Discussion of the results in the whole group	15:30-18:00 - Climate change scenarios (whole group, lead: HvL,ON) - Adaptation of input file (groups of 2 students) - Start of processing of results scenario study (groups of 2 students)
Friday 28 June	**Friday 27 June**
09:00-10:30 - Finalising of results according to tasks defined in the case - Preparation for presentation of case	09:00-10:30 - Finalization of processing of results climate change study and interpretation (groups of 2 students)
10:30-11:00 Break	10:30-11:00 Break
11:00-12:30 - Preparation for presentation of case and compilation of powerpoint presentation	11:00-12:30 - Preparation for presentation, compilation powerpoint presentation Human Influence – climate change (students)

Annex 6 Title of contributions from participants (oral and poster)

Oral presentations:

1. Peter Berg (Danish Meteorological Institute, Copenhagen, Denmark): How well do regional climate models simulate the observed spectrum of dry days?

2. Thomas Holmes (Free University, Amsterdam, the Netherlands): Spatial-temporal dynamics of droughts as observed by satellites.

3. Giovanni Laguardia (EC, DG Joint Research Centre, Ispra, Italy): Integrating ground information, remote sensing and modeling tools for drought detection and monitoring.

4. David Lavers (CEH-Wallingford, United Kingdom): Seasonal Forecasting of Low Flows. An application using multi-model climate data in Wales, UK.

5. Sharddhanand Shukla (University of Washington, Seattle, USA): Role of large-scale hydrological models in drought monitoring and prediction.

6. Ryan Teuling (ETH, Zürich. Switzerland): Aspects of the land surface water and energy balance during recent

Poster presentations:

1. Lukas Gudmundsson (University of Oslo, Oslo, Norway): Synchronous Droughts? Relating spatio temporal patterns in US stream flow to low flow statistics.

2. Stanislav Horacek (T.G. Masaryk Water Research Institute, Prague, Czech Republic): Hydrologiocal extreme events: experiences with the BILAN model.

3. Laura Mariotti (International Centre for Theoretical Physics, Trieste, Italy): Effects of Saharan Dust on the West African Monsoon and the Niger and Volta River Basin.

4. Michaela Stojkovová (Comenius University, Bratislava, Slovkia): Influence of precipitation changes on groundwater drought development in Slovakia.

5. Anne van Loon (Wageningen University, Wageningen, the Netherlands): Propagation of droughts: research ideas.

6. Wai Kwok Wong (Norwegian Water Resources & Energy, Oslo, Norway): A statistical study of drought characteristics in Zhujiang region.

7. Stephen Molefi Pule (Hydrology Division, Department of Water Affairs, Lesotho): Recent drought occurrence in Lesotho.

8. Patrick Valimba (University of Dar es Salaam, Tanzania): Linking hydrological droughts to climatological droughts and climatic variations.

9. Alper Serdar Anli (Ankara University, Ankara, Turkey): Regional frequency analysis for dry periods in Tokat province, Turkey, through L-moments techniques.

10. Yordan Vasilev Dimitrov (National Institute of Hydrology and Meteorology, Sofia, Bulgaria): Conditions Determining Hydrological Drought in Bulgaria.

11. Anne Dupeyrat (EDF R&D LNHE, Chatou, France): Sensitivity to climate variation of catchments with strong stakes – case of the Garonne River, France.

12. Ebru Eris (Istanbul Technical University, Maslak-Istanbul, Turkey): SPI drought class transitions using Markov chains.

13. Theodor Fiala (Czech Hydrometeorological Institute, Prague, Czech Republic): Regime of the Spells of Drought in the Czech Republic.

14. Daniele Ganora (Politecnico di Torino, Turin, Italy): Assessment of low-flow in ungauged basins using a non-parametric regional model based on geomorphologic and climate data.

15. Jan Kavan (CEMAGREF, Lyon, France): Climate change impact of drought characteristics in the Saone and Vlatava River Basins.

16. Annukka Lipponen (UNESCO Division of Water Sciences, Paris, France): Groundwater management for mitigating impacts of droughts.

17. Simone Rossi (EC, DG Joint Research Centre, Ispra, Italy): Derivation of disciplinary (meteorological, soil moisture-based, hydrological) drought indices for the European Drought Observatory.

18. Cosmo Ngongondo (University of Malawi, Zomba, Malawi): Characteristics of some Malawian rivers and impacts on rural communities water supplies.

19. Venkata Lakshmi Kumar Tumuluru (Andhra University, Visakhapatnam, India): Water balance of India – global teleconnections.

20. Faize Salis (University of Birmingham, Birmingham, United Kingdom): Response of the hydrology to climate variability: initial assessments of the regional-based study of northeastern Turkey.

21. Valeria Brusková Slivová (Slovak Hydrometeorological Institute, Bratislava, Slovakia): Detection of drought in Upper part of Torysa river catchment.

22. Eduardo Vivas (Universidade do Porto, Porto, Portugal): Drought risk assessment. The Portuguese case.

23. Kevser Şentürk (Gen. Directorates of State Hydraulics, Ankara, Turkey): Prediction of flow duration curves at ungauged sub-catchments of Coruh River Basin.

International Summer School on Hydrological Drought

The Abdus Salam International Centre for
Theoretical Physics (ICTP)
Trieste, Italy

22 – 27 June 2008

Workshop A

Statistical modelling of drought using Nizowka

Lena M. Tallaksen, Hege Hisdal & Kerstin Stahl

Workshop A – Detailed time schedule

Thursday, 26 June 2008
10:00-10:30 Plenary - Introduction and objectives of Workshop 1 - Presentation of the case - Presentation and demonstration of the NIZOWKA program - Questions
10:30-11:00 Break
11:00-12:30 Groups - Data preparation and selection of drought events using the NIZOWKA program - Prepare the tasks defined for the case using NIZOWKA and Excel for the given streamflow stations
12:30-14:00 Lunchtime
14:00-15:30 Groups - Prepare the tasks, cont.
15:30-16:00 Break
15:30-18:00 Groups - Prepare the tasks, cont. - Discussion of results with other groups in Workshop A
Friday 27 June 2008
09:00-10:30 Groups - Finalising of results - Preparation for presentation of case based on the results of all groups involved in Workshop A
10:30-11:00 Break
11:00-12:30 All groups - Compilation of joint Workshop A PowerPoint presentation

List of participants

	Name	**Country**
	In total	

The participants are divided into subgroups, with 2-3 in each group working on either River A or B.

Relevant references to the Textbook:

- Table 4.3 (p.131) Global Data Set
- Worked example 5.4 (p.171) Threshold level method
- Worked example 6.2 (p.244) Drought deficit frequency analysis

DATA AND TOOLS

The following two stations have been selected from the global data set:

River A: Linden Borg, Denmark
River B: Arroyo Seco, US

Each group will primarily work on one of the two stations. If time allows you might also look briefly at station B. The groups are assumed to discuss and exchange results during the case study. The two rivers behave differently and therefore conclusions and recommendations might differ. To assist the analysis you have available:

- Excel
- The drought program NIZOWKA

We suggest that you start with extracting the drought events using the Nizowka program. PDS of drought deficit volume and duration from Nizowka can be save as text files that can be imported into Excel. So the calculations will partly be done in Excel and partly using Nizowka.

TASKS

As a hired expert for the local water authorities you are asked to provide information about the drought behaviour of the river chosen. River A provides fresh water to a fish breeding plant that depends on low temperature and high oxygen content inflow of water to the ponds regularly during the summer period. River B provides a local farmer with water for irrigation during the growing season. For River A the legislation does not allow any abstraction of water from the river when the flow falls below Q_{95}, and severe restrictions are imposed when it is below Q_{90}. The similar thresholds for river B are Q_{90} and Q_{70}. The tasks identified are:

i) Is there any visible trend in drought behaviour?

ii) How long does a drought period normally last in the river?

iii) Present an overview of key characteristics of drought for the river.

iv) What is the observed frequency that River A (River B) will be below Q_{90} (Q_{50}) respectively, Q_{95} (Q_{70}) for more than 10 respectively, 30 consecutive days?

v) What are the return periods for the drought durations estimated in iv) using Nizowka?

vi) What is the lowest observed flow (selected from the drought deficits) in the record and what is its return period using the Weibull plotting position?

vii) What is the deficit duration of the 100 year event? Compare the results using different distributions.

viii) What do you consider to be the best way of characterizing the most severe drought conditions in this river?

ix) Compare your results for the two rivers.

International Summer School on Hydrological Drought

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Trieste, Italy

22 – 27 June 2008

Workshop B

Exploration of the impacts of climate change on droughts using the hydrological model BILAN

Henny A.J. van Lanen & Oldřich Novický

Workshop B – Detailed time schedule

Thursday, 26 June 2008
10:00-10:30 Plenary - Introduction and objectives of Workshop B (HvL, 5) - Modelling concept of BILAN (ON, 20) - Questions (5)
10:30-11:00 Break
11:00-12:30 Plenary & Groups - Impact of climate change: approach (HvL, 5) - Catchment descriptions Metuje and Sungai Johor (ON, HvL, 5+5) - Description of input file for BILAN (ON, 10) - Compilation of input file for the two catchments (groups of 2 students; 1 PC per 2 students) - Model calibration - parameter optimization for the two catchments (groups of 2 students)
12:30-14:00 Lunchtime
14:00-15:30 Groups & Plenary - Introduction to the threshold method tool EXDEV (ON,10[14]) - Processing results for the current climate and interpretation for the two catchments (groups of 2 students) - Discussing results for the current climate for the two catchments (whole group, lead: HvL,ON)
15:30-16:00 Break
15:30-18:00 Plenary & Groups - Climate change scenarios (ON,5[15]) - Adaptation of input file for the two catchments (groups of 2 students) - Start of processing of results scenario study for the two catchments (groups of 2 students)
Friday 27 June 2008
09:00-10:30 Groups - Finalization of processing of results climate change study and interpretation for the two catchments (groups of 2 students)
10:30-11:00 Break
11:00-12:30 Whole group - Preparation for presentation, compilation powerpoint presentation Human Influence – climate change for the two catchments (students)

[14] Explanation of threshold method (brief reminder, already explained at the course by Hege Hisdal), some screendumps of EXDEV, explanation of recalculation of deficit due to the input of monthly values instead of the expected daily values.

[15] We will work with the "old" scenarios; the ones in the textbook. At the end there will be a remark on the new ones.

- Link of BILAN with other models: some recent experiences (ON,10)

List of participants

	Name	**Country**
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
	In total	

The participants are divided into two subgroups working on either the Metuje catchment or the Sungai Johor. Within a subgroup, students are working in groups of 2 students.

Relevant references to the Textbook:

- Ch. 4.5.3 Local Data Set (p. 135): Metuje catchment;
- Ch. 9.4 Impact of climate change (p. 367-382;
- Software (CD): BILAN.

DATA AND TOOLS

The following two catchments have been selected:

- Metuje (Czech Republic)(Local data set)
- Sungai Johor (Malaysia)

Each subgroup will primarily work on one of the two catchments. On Thursday, students work in small groups (2 students per PC) on one of the two catchments. The groups of 2 students are assumed to discuss and exchange results for the catchment on which they are working. On Friday, the two subgroups will jointly work on the two catchments, because eventually the results have to be included in one presentation. The two catchments behave differently and therefore conclusions and recommendations might differ.

To assist the analysis you have available:

- the hydrological model BILAN;
- the threshold programme EXDEV;
- Excel

TASKS

The tasks identified are:

x) simulate time series of monthly hydrological variables for: (1) the Metuje catchment for the period 1991-2002 (subgroup 1), OR (2) the Sungai Johor catchment for the period 1964-1996 (subgroup 2). Are there any droughts visible in the different hydrological variables?

xi) detect the droughts in the simulated streamflow time series for: (1) the Metuje catchment for the period 1991-2002 (subgroup 1), OR (2) the Sungai Johor catchment for the period 1964-1996 (subgroup 2). Make an overview of key characteristics of the droughts for the current climate;

xii) simulate time series of monthly hydrological variables for a CHANGED CLIMATE (scenarios) for: (1) the Metuje catchment for the period 1991-2002 (subgroup 1), OR (2) the Sungai Johor catchment for the period 1964-1996 (subgroup 2).

xiii) detect the droughts in the simulated streamflow time series for a CHANGED CLIMATE (scenarios) for: (1) the Metuje catchment for the period 1991-2002 (subgroup 1), OR (2) the Sungai Johor catchment for the period 1964-1996 (subgroup 2). Make an overview of key characteristics of the droughts for the climate change scenarios;

xiv) determine the impact of climate change for the different scenarios by comparing the outcome from items 2 and 4 for: (1) the Metuje catchment for the period 1991-2002 (subgroup 1), OR (2) the Sungai Johor catchment for the period 1964-1996 (subgroup 2);

xv) compare the impact of climate change in the Metuje catchment and the Sungai Johor catchment (both subgroups).

The Abdus Salam
International Centre for Theoretical Physics

IAEA

This is to certify that

Peter BERG

participated in and completed the

International Summer School on Hydrological Drought & Global Change

sponsored by the CEC project "WATer and global CHange" and the ICTP

22 - 27 June 2008
Miramare, Trieste - Italy

Directors: H.A.J. van Lanen, L.M. Tallaksen, C. Piani

K. R. Sreenivasan

Katepalli R. Sreenivasan, Director
Abdus Salam Research Professor

International Summer School on Hydrological Drought & Global Change
The Abdus Salam International Centre for
Theoretical Physics (ICTP)
Trieste, Italy

22 – 27 June 2008

Evaluation form

Please complete evaluation
before 27th June at 12:00 hour

We appreciate your critical comments very much, and we will try to respond to it in a next course.

The textbook on Hydrological Drought is meant as teaching material for MSc. and PhD courses on Hydrological Drought, but can also be used as self-study material.

1. How do you perceive the content (focus) of the course? Did it match you expectations?

   not at all, questionable, acceptable, good, excellent[16]

……
……
……
……

2. How did you find the structure of the course (allocation of time for lectures, oral and poster presentations by the participants, workshops)?

   questionable, acceptable, good, excellent

   please provide your brief comments.

……

[16] Encircle your answer, for example acceptable

3. Should there have been less or more lectures?

less lectures, acceptable, more lectures

……..

……..

4. Should we have spent less or more time on self-guided tours and worked examples?

less time, acceptable, more time

……..

……..

5. Should we have spent less or more time on contributions from the participants (oral and poster presentations)?

less time, acceptable, more time

……..

……..

6. How do you view the organization of the poster session
   a. Plenary introduction (4 min)

questionable, acceptable, good, excellent

……..

……..

   b. Sufficient time for discussion at the poster

questionable, acceptable, good, excellent

……..

……..

7. Is the textbook and CD suitable as course material?

very poor, poor, acceptable, good, excellent

……..
……..

8. Is it of value to receive the textbook beforehand

questionable, acceptable, good, excellent

……..
……..

9. Did you prepare for the course by studying the textbook and CD before coming to Trieste?

I did NOT, I did study

……..
……..

10. Evaluation of individual presentations:

Chapter	Is the content of the chapter/presen-tation relevant for you? 1: not at all 2: questionable 3: acceptable 4: good 5: excellent	How did you find the level of difficulty of the presentation? 1: very high 2: high 3: acceptable 4: understandable 5: easy to understand	What is your opinion about the focus of the presentation? 1: very poor 2: poor 3: acceptable 4: good 5: excellent
Hydrological Drought introduction (Ch. 1) (Lena Tallaksen)	[17])		
Droughts and Hydroclimatology (Ch. 2) (Kerstin Stahl)			
Projected Climate Change – impact of meteorological			

[17] Give 1, 2, 3, 4 or 5 (for meaning see top of table).

droughts (invited lecture) (Stefan Hagemann)			
Drought generating processes (Ch. 3) (Henny van Lanen)			
Hydrological data for drought analysis, incl. thematic data and catchment characteristics (Ch. 4) (Gwyn Rees)			
Hydrological drought characteristics – definition, estimation and recom-mendations (Ch. 5) (Hege Hisdal)			
Frequency analysis – at site analysis (Ch. 6) (Lena Tallaksen)			
Regionalisation procedures and estimation at the ungauged site (Ch. 8) (Kerstin Stahl, Hege Hisdal)			
Regional Drought Characteristics (Ch. 6) (Lena Tallaksen)			
Human Influences (Ch. 9) (Henny van Lanen, Oldřich Novický)			

If you have any specific comments on the lectures/invited lecture, please provide these below.

……

……

……

……

……

……

……

……

Did you participate in parallel workshop A (Frequency Analysis) or B (Human Influences & Climate Change? ( )[18]

11. Should the workshops A and B have been shorter or longer?

    shorter, acceptable, longer

……

……

12. What is your opinion about two parallel workshops A and B (so you cannot participate in both)?

    no parallel workshops, parallel workshops are okay

……

……

Workshop	was the content of the workshop relevant? 1: not at all 2: questionable 3: acceptable 4: good 5: excellent	how was the level of difficulty? 1: very high 2: high 3: acceptable 4: understandable 5: easy to understand	did you enjoy giving an own presentation? 1: not at all 2: questionable 3: acceptable 4: good 5: excellent
A : Frequency analysis	[19])		
B: Human impacts & Climate Change			

If you have any specific comments on the workshop A or B, please provide these below.

……

……

……

[18] Fill in A or B

[19] Give 1, 2, 3, 4 or 5 (for meaning see top of table).

ORGANISATION

13. How do you view the number of participants?

fine, too many, more would be fine

……..
……..

14. How did you find the facilities
    a. Plenary room

    questionable, acceptable, good, excellent

……..
……..

    b. Computer labs

    questionable, acceptable, good, excellent

……..
……..

    c. Poster space

    questionable, acceptable, good, excellent

……..
……..

Did you stay at Galileo Guesthouse [ ][20] or Adriatico Guesthouse[ ]?

15. How did find the accommodation ?
    a. How was your room

    questionable, acceptable, good, excellent

……..

[20] Please tic

b. Was is OK to stay at separate sites

questionable, acceptable, good, excellent

……
……

c. Is it acceptable to share rooms

yes, no, not relevant

……
……

16. Is it OK to start on Sunday afternoon?

questionable, acceptable, good, excellent

……
……

17. How did you find the icebreaker session the first day?

questionable, acceptable, good, excellent

……
……

FIELD TRIP

18. Is a mid-week field trip needed?

questionable, acceptable, good, excellent

……
……

19. Did you find the purpose of the field trip of interest (topic, guided tour, free time)

    questionable, acceptable, good, excellent

……..

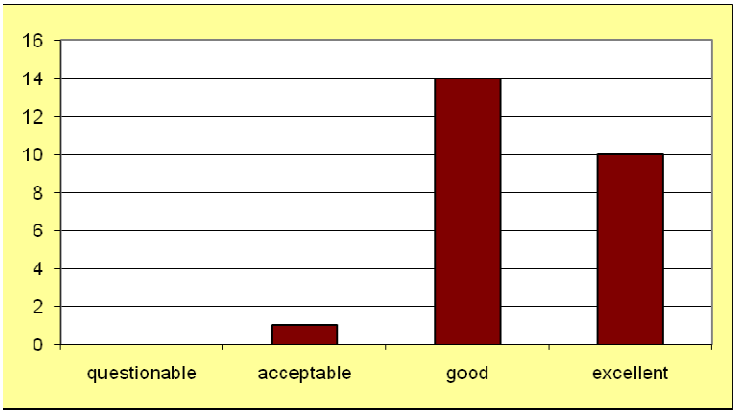
……..

We need to provide a short report for the WATCH project, incl. the NEWSLETTER and would be please if you could contribute with your general impression in one or two lines.

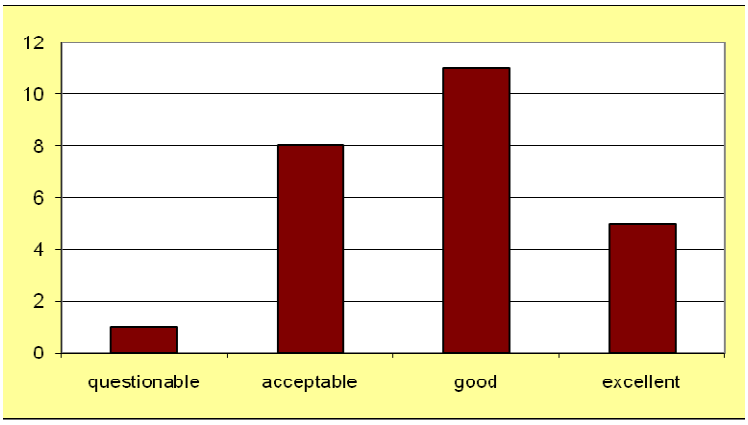
Thank you, for completing the evaluation form.

Annex 11 Evaluation outcome

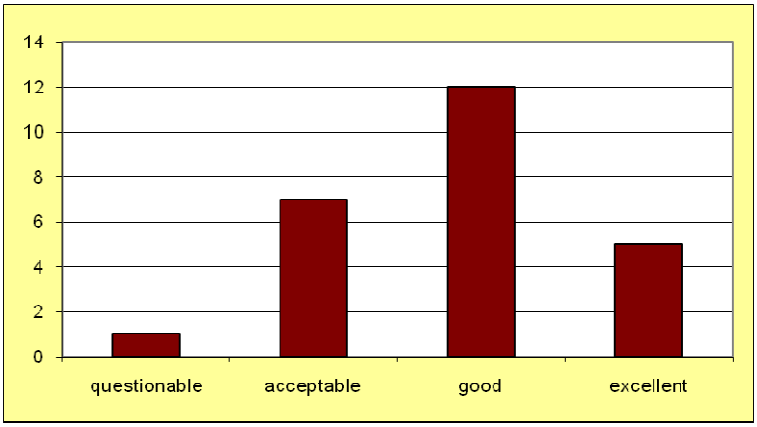
Question 2:
How did you find the structure of the course (allocation of time for lectures, oral and poster presentations by the participants, workshops)? (y-axis: number of students)



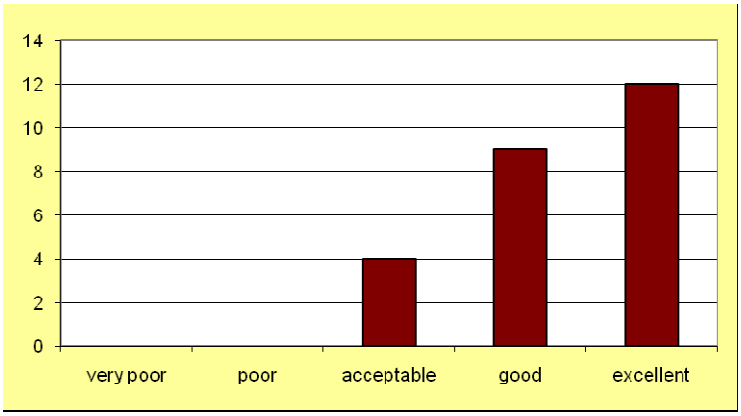
Question 6a:
How do you view the organization of the poster session: plenary introduction (4 min)? (y-axis: number of students)



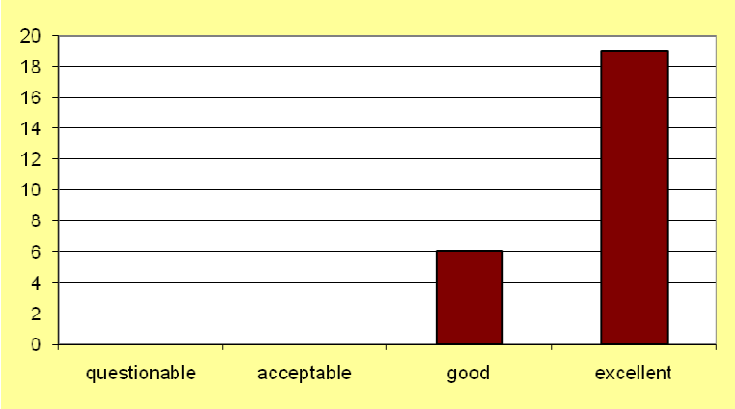
Question 6b:
How do you view the organization of the poster session: sufficient time for discussion at the poster? (y-axis: number of students)



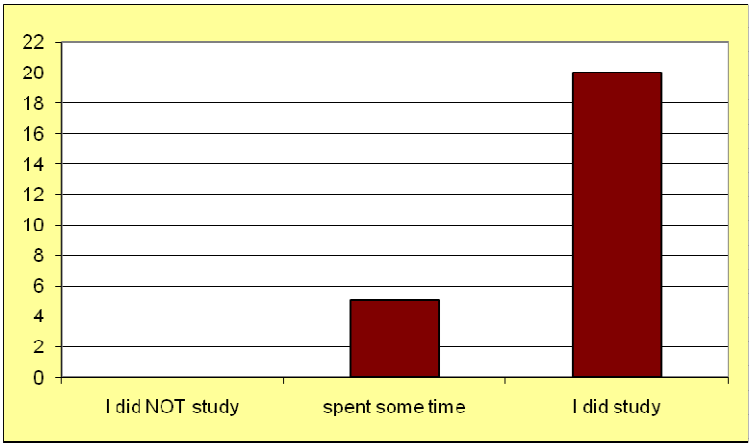
Question 7:
Is the textbook and CD suitable as course material? (y-axis: number of students)



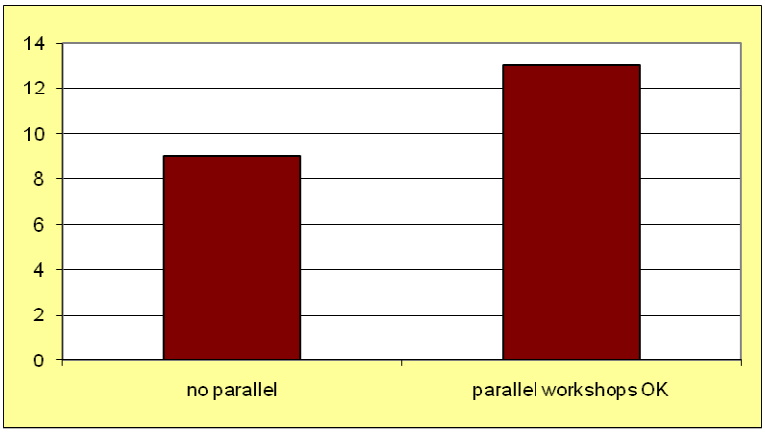
Question 8:
Is it of value to receive the textbook beforehand? (y-axis: number of students)



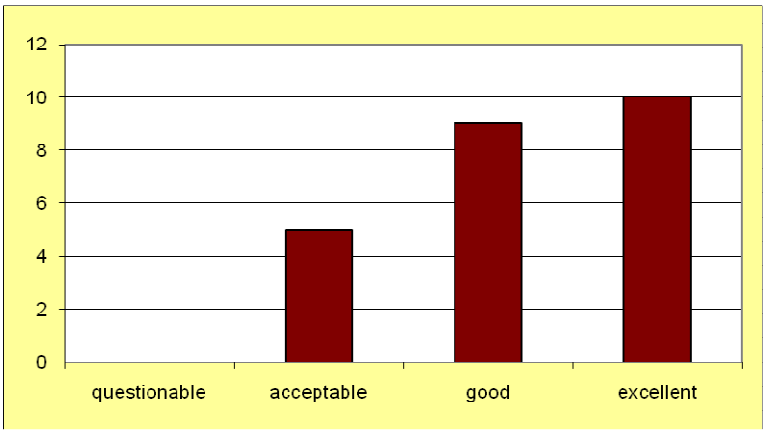
Question 9:
Did you prepare for the course by studying the textbook and CD before coming to Trieste? (y-axis: number of students)



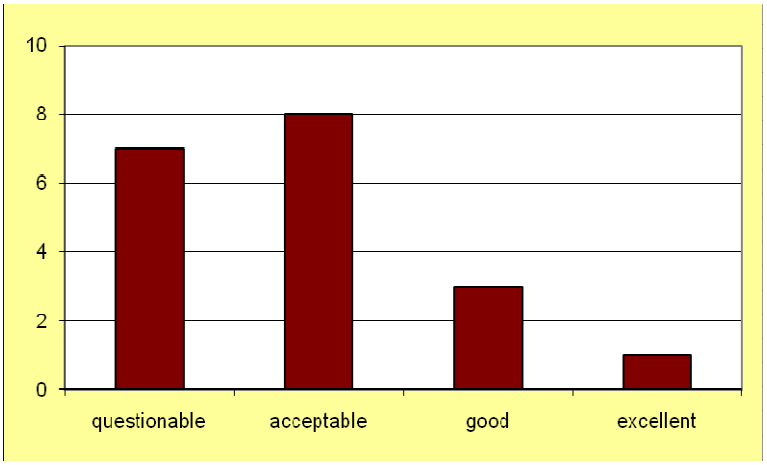
Question 12:
What is your opinion about two parallel workshops A and B (so you cannot participate in both)? (y-axis: number of students)



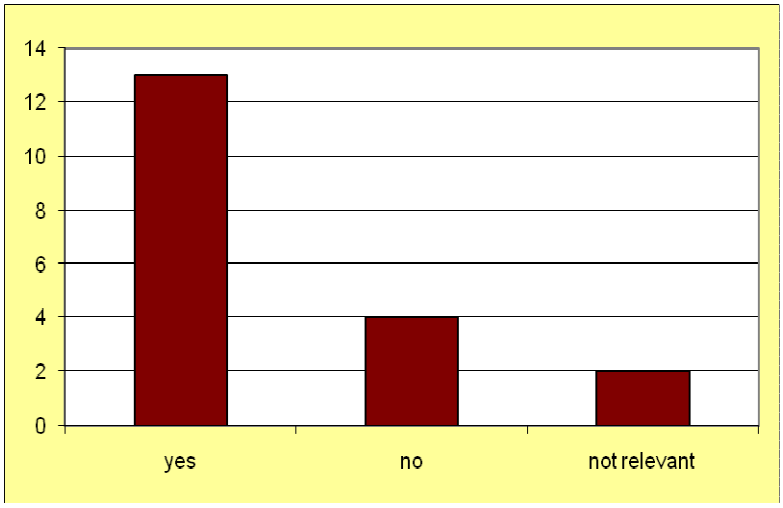
Question 15a:
How did you find the accommodation - How was your room? (y-axis: number of students)



Question 15b:
How did you find the accommodation – Was it okay to stay at different site? (y-axis: number of students)



Question 15c:
How did you find the accommodation – Is it acceptable to share rooms? (y-axis: number of students)



Question 16:
Is it OK to start on Sunday afternoon? (y-axis: number of students)