PACC-RRC TRAINING PROGRAMME

CLIMATE CHANGE ADAPTATION AND DISASTER RISK REDUCTION IN AGRICULTURE

WMO Regional Training Center Italy

INTERNATIONAL TRAINING COURSE
CLIMATE SERVICES FOR DISASTER PREVENTION

Distance Learning
23 October | 10 November 2017

Workshop
20 November | 1 December 2017

REPORT 2017

WORLD METEOROLOGICAL ORGANIZATION

Ibimet Istituto di Biometeorologia Consiglio Nazionale delle Ricerche

AGENZIA ITALIANA PER LA COOPERAZIONE ALLO SVILUPPO

PAC-RRC TRAINING PROGRAMME
CLIMATE CHANGE ADAPTATION AND
DISASTER RISK REDUCTION IN AGRICULTURE

Training Program on Climate Change Adaptation and Disaster Risk Reduction in Agriculture

International Training Course on

Climate Services for disaster prevention

Course Report

23 October – 10 November 2017 (Distance Learning)

20 November – 1 December 2017 (Classroom Learning)

11 January 2018

WORLD METEOROLOGICAL ORGANIZATION

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Table of Contents

1. Background

The Training Program on Climate Change Adaptation and Disaster Risk Reduction in Agriculture (PACC/RRC), financed by the Italian Agency for Development Cooperation (AICS) is led by the World Meteorological Organization in collaboration with two WMO Regional Training Centers, the Institute of Biometeorology of the Italian National Research Council (CNR-IBIMET) and the AGRHYMET Regional Centre, which operate with technical and financial support of WMO.

The World Meteorological Organization, IBIMET–CNR and AGRHYMET Regional Centre have been collaborating since the '70s to support National HydroMeteorological Services in the transfer of technological innovations.

In 2015, WMO, IBIMET-CNR and AGRHYMET decided to propose a Regional Training Programme to support CILSS/ECOWAS countries on Climate Change Adaptation and Disaster Risk Reduction in Agriculture.

On 23rd October 2015, WMO proposed to the Italian Ministry of Foreign Affairs and International Cooperation, Directorate General for Development Co-operation, to fund a multi-lateral aid proposal addressing Climate Change Adaptation and Disaster Risk Reduction in Agriculture in West Africa.

On November 19th 2015, with the resolution n.165 the Italian Ministry of Foreign Affairs and International Cooperation, Directorate General for Development Co-operation, decided to make a contribution of 822.843,27 to support the Initiative.

On December 24th 2015, the Third-party cost-sharing agreement between the WMO and the MAECI-DGCS for the implementation of the project was signed.

WMO organised the kick-off meeting of the project on 10-12 April 2017 in Geneva at its headquarters.

The inaugural ceremony took place on Monday 10 April with the presence of the WMO Secretary-General, Prof. Petteri Taalas and his Excellency Ambassador Maurizio Serra, Permanent Representative of Italy to the UN. The two WMO Regional Training Centers partners for the project were represented by the Director of IBIMET-CNR, Dr Antonio Raschi and Dr Moussa Waongo from AGRHYMET.

On 07 June 2017 a letter of Agreement was signed between WMO and IBIMET-CNR for the implementation of the project.

The Program consists of four high training courses, two organized by the Regional Centre AGRHYMET in Niamey (Niger) and two by IBIMET-CNR in Florence (Italy), and a final conference in Rome

The four training courses are:

- Climate services for disaster prevention (IBIMET-CNR, November 2017),

- Agrometeorological Services for agriculture and water use (AGRHYMET, February 2018),
- Methodologies for Climate Change impact assessment (IBIMET-CNR, June 2018),
- Agrometeorological Services for rainfed crops (AGRHYMET, October 2018)

The international training course on “Climate Services for disaster prevention” is the first event of the PACC/RRC project. The general goal of this first training course is to strengthen the capacities of CILSS/ECOWAS Member Countries in developing effective climate services for Disaster Risk Reduction and Climate Change Adaptation.

Project	**Training Program on Climate Change Adaptation and Disaster Risk Reduction in Agriculture**
Partnership	WMO (World Meteorological Organization), IBIMET-CNR (Italy), AGRHYMET Regional Centre (CILSS/ECOWAS),
General objective	To reduce the impacts of Natural Disaster and Climate Change on agricultural sector in West Africa.
Specific objective	To improve the capacity of West African governments through their national technical services to support government actions in sustainable development and food security, in response to climate change, natural disasters and their associated risks.
Project's duration	20 months
Target Countries	Western Africa CILSS/ECOWAS states Members
Target groups	Experts of National Agriculture, Agro-Meteorological, Hydrological and Early Warning Services.
Project's typology	Capacity Building (Art. 18)
Budget	€ 822,843.27
UN Millennium Goals	Goal 1 : Eradicate extreme poverty and hunger Goal 7 : Ensure environmental sustainability

Table 1, General overview of the Training Program on Climate Change Adaptation and Disaster Risk Reduction in Agriculture (PACC/RRC)

2. Objectives and Expected Learning Outcomes

Extreme weather events are recognized to be a significant cause of loss of life and livelihoods, particularly in vulnerable countries and communities in Africa. The general characteristics of these events, i.e. intensity, duration, and probability of occurrence are shifting due to climate change, with consequent changes in the associated risks. To adapt to, or to address loss and damage from, this changing risk it is necessary to understand the effects of climate change on extreme weather events and their impacts.

The specific objective of the Course is the capacity building of national technical services on extreme weather events analysis and the consolidation of a network among scientific and technical institutions to work on shared methodologies and to create an objective and

harmonized base of information. The aim is to transfer and share the know-how, to expand cooperation in sensitive areas to national and regional levels and to promote exchanges and collaboration through the application of research products and operational tools.

The course was specifically designed for meteorologists, climatologists, agro-meteorologists and hydrologists by creating an environment where climate, hydrology and agriculture actors could share a common view and develop a common language. Target countries are the CILSS/ECOWAS Member Countries.

The training course has two parts:

- Distance learning module (mandatory) lasting 3 weeks from 23rd October to 10th November 2017;
- Workshop in Florence lasting 2 weeks from 20th November to 1st December 2017.

The distance learning module has been carried out using the platform Moodle as a learning management system. Moreover, students and teachers of the course used the same platform to share educational material and fulfil training assessment procedures.

Through the course, participants acquired theoretical and practical knowledge on current approaches to create and apply climate services in West Africa, with particular emphasis on:

- General aspects of the climatic analysis of extreme events (extreme rainfall and drought)
- Fundamentals of detection, monitoring and forecasting deep convective systems and supercells
- Fundamentals of detection, monitoring and forecasting dry spells
- Operational application of geo-statistical and spatial analysis tools for climatic risk analysis and assessment.

3. Training approach

The training approach adopted for this course was based on the 50-50 ratio between theoretical and practical sessions. Therefore, the course included other activities expanding theoretical knowledge and practical exercises and allowing the direct application of theoretical concepts through the analysis of case studies. Moreover, practical sessions have been designed to foster the active participation of the trainees in collaborative exercises, necessary for the realization of an interregional partnership among technicians and scientists.

A blended solution of distance learning and classroom workshops was adopted for the course.

The Training was conducted in English. Tutoring in French was guaranteed for theoretical and practical sessions. Training material was available in both languages as far as possible.

Trainers were provided with guidelines for developing their training materials, and layout of presentations.

Trainers were asked to provide in advance the training resources including presentation with summary and annotations translated as fully as possible to allow bilingual participation. Training resources will be made available with open access after the core training events, as well as shared via the WMO Global Campus for other users.

3.1 Didactical approach

To enhance the networking of the technical services' community involved in the CCA and DRR to increase collaboration and strengthen the technical and scientific cooperation among the Hydrometeorological Services, the National Technical Services and other regional and international institutions, we asked participants from different countries to work in groups, clustered on the basis of homogeneous geographical area. This allowed a productive exchange of information among participants from neighboring Countries, and a collaborative effort in analyzing climatic risks which are trans-disciplinary and trans-boundaries.

A learner-centered and a participatory training method was adopted. Indeed, learning occurred through active involvement of the trainees, stimulating their own questions and answers. Learning opportunities were thus created by sharing with trainees new information together with analytical methodologies to be discussed in light of their own work experiences.

In this course we focused the attention on the learners needs, in particular on some practical lessons and practical exercises aiming to learn by thinking, understanding and applying new concepts. In particular:

- To learn by thinking, because trainees demand to have responsibility to work out their own conclusions.
- To learn by understanding, because trainees demand to relate the learning experience to their own knowledge and previous experiences.

- To learn by applying, because trainees demand to use and test a new skill achieved and receive feedback on their performance on practical case studies.

3.2 Training tools

The main training tool developed for the course is the distance learning platform on Moodle. In order to improve the usability of the Moodle platform, the DLC layout setting and font styles have been modified.

The distance learning platform developed on Moodle was used for multiple purposes:

- pre-workshop activities in order to ensure a common background knowledge for all participants and basic skill in the handling of tools and software that will be used in the workshops.
- preliminary assessment of the specific skills of the students and preliminary distance training activities;
- sharing with students training materials and technical and scientific documentation on the topics and practical exercises covered during the workshop;
- sharing of course materials during and after the course, and to staff members of target countries who cannot attend the course;
- assessment of students and workshops using online questionnaires;
- sharing of multimedia material produced for the course;
- monitoring and evaluating trainees after the workshop.

Course resources have been translated as much as possible to allow bilingual participation. They have been published on the Moodle platform in order to make them available to trainees.

4. Distance learning

The overall goal of the distance learning is to give the participants tools and knowledge so to facilitate the face to face course. The DLC should allow to balance the different levels of knowledge and competences of the participants.

The CSDP-DLC was delivered through a dedicated Moodle platform from the 23 October to the 10 November 2017.

The course was divided into a number of consequential lectures activated following a specific time schedule.

1-2 INTRODUCTION TO CLIMATE DATA ANALYSIS WITH R (Part 1 and 2)

Trainer: Edmondo Di Giuseppe, CNR-IBIMET

Contents: R software installation and first steps of R language, RStudio IDE (integrated development environment) for R Lesson, Data import and Time Series analysis

Exercise: Plot the time series of yearly precipitation anomaly with respect to 1981-2010 climatology

3 SEASONAL PREDICTABILITY

Trainer: Valentina Pavan, ARPAE-SIMC

Content: Seasonal predictability and its relation to ENSO

4 IRI/LDEO CLIMATE DATA LIBRARY TUTORIAL

Trainer: Massimiliano Pasqui, CNR-IBIMET

Content: IRI/LDEO Climate data Library Tutorial

Exercise: IRI/LDEO EXERCISE Assignment demand to produce maps to be uploaded

5 BASIC FORECAST VERIFICATION PRINCIPLES

Trainer: Daniele Mastrangelo

Contents: Basic forecast verification principles

6 GENERAL CIRCULATION MODELLING

Trainers: Daniele Mastrangelo and Piero Malguzzi, CNR-ISAC

Contents: The GLOBO model: basic highlights,

Trainer: Stefano Materia, CMCC

Contents: Coupled General Circulation Models: methodology, outcomes, biases

7 INTRODUCTION TO CLIMATE DATA ANALYSIS WITH R - PART 3

Trainer: Edmondo Di Giuseppe, CNR-IBIMET

Contents: how to save and load the workspace from and into R, Conditional statements, Loops and Function creation, Introduction to analysis of gridded datasets,

Exercises: Final Exercise-Part 3

Questionnaire: Acquaintance with R language to help teachers to tailor the practical

training lessons to trainee' needs.

8 INTRODUCTION TO QGIS SOFTWARE

Trainer: Edoardo Fiorillo, CNR-IBIMET

Contents: GIS basics, QGIS software download and install Lesson

Links: INTRODUCTION VIDEOS AND MANUALS

Exercises: Getting Started with QGIS

Quiz: GIS Quiz

9 FURTHER READINGS

WMO Climate Data and Monitoring (Publication) Page

Guidelines on Analysis of extremes in a changing climate in support of informed decisions for adaptation

Climate Change Detection and Indices Page

Documentation by the joint CCl/Clivar/JCOMM Expert Team

10 QUESTIONNAIRES

Questionnaire on programming skills: this questionnaire is proposed for a better organization of the face-to-face training course. Results will not be published.

Trainee DLC Evaluation: for the evaluation of the DLC (see annex 2)

In terms of participation, 28 people subscribed the CSDP Course, but only 14 completed it and took the final survey and just 4 among them obtained the badge. Further investigations should be encouraged to understand the reason of the low participation level, particularly why only few of the trainees completed the course. The Fig. 1 shows the activity completion (Moodle data source), where the value represents the percentage of users that completed each set of lessons.

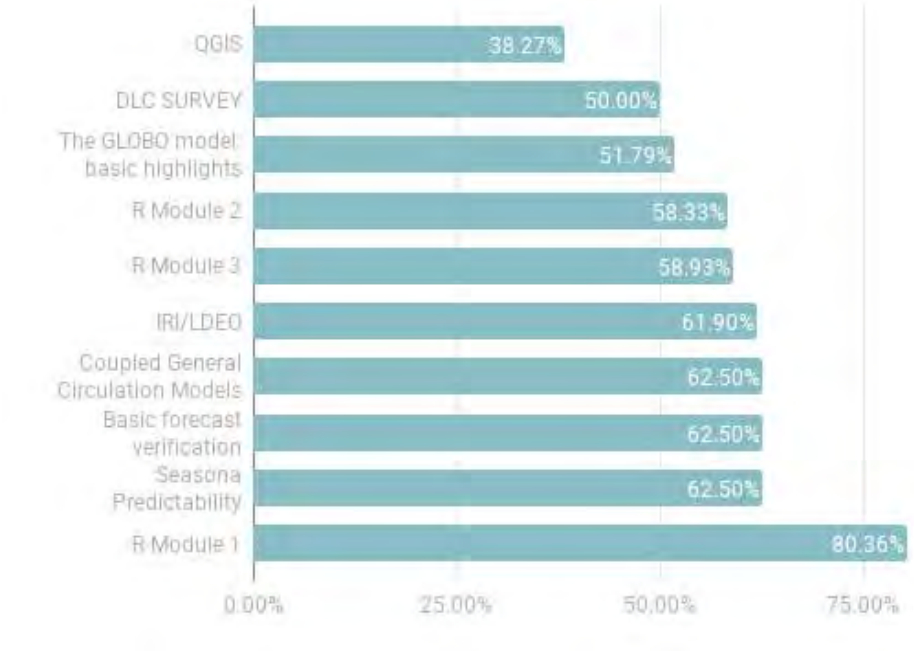

Figure 1, Activity completion by lesson sections

Most of participants declared that the course was overall positive and the majority think that the programme met the expressed objectives. The 100% of the respondents affirms that the DLC allows the improvement of trainees knowledge that will help in the face-to-face course. However, the ones that found the course ineffective highlighted issues not related to the course structure or content, but to external factors such as the internet connection or the need for a different timing of the course plan.

In addition, from email exchange, we know that few participants were not able to complete the DLC, because travelling to other Countries in order to get their Visa.

DLC evaluation is presented in Annex 2.

5. Workshop in Florence

The workshop lasted 2 weeks, from 20 November to 1st of December. It was organized at the CNR Research Area of Sesto Fiorentino. The objective of the training course was to strengthen the capacities of National Technical Services for disaster risk reduction, through the application of research products and operational tools. The workshop was conceived as a 50-50 balance of theoretical and practical sessions.

The topics covered by the workshop include:

1. Climate Services for Disaster Risk Reduction
2. Climatic analysis of Extreme events

3. Detection, monitoring and forecasting deep convective systems and supercells
4. Detection, monitoring and forecasting Dry Spells
5. Practical exercitation (afternoons)

Students and teachers of the course benefit from the use of the same Moodle platform through which educational material was shared and assessment procedures ensured.

Only 3 participants, out of the 28 registered, could not attend the course, which finally gathered 25 trainees from 14 different countries.

First Name	Last Name	Organization
AURELIEN AHONAKPON		
YASSEMOAN	TOSSA	SMN - Benin
GUILLAUME	NAKOULMA	DMN - Burkina Faso
DJERGO	GAYA	DREM - Tchad
YEFFE BENJAMIN ARISTIDE	AGUIA	SODEXAM Côte d'Ivoire
BOMO VERONIQUE	MANOUAN	SODEXAM Côte d'Ivoire
OBED AMANKWAH	MINKAH	GMET - Ghana
PATRICK NII LANTE	LAMPTEY	GMET - Ghana
MAORO	BEAVOGUI	DMN - Guinea
EUGENE V.S.	GAR-GLAHN	LMS - Liberia
HENRY ADAMA	SIMPSON	LMS - Liberia
AISSATA	SAO	ANM - Mali
KOUMARE	ISMAHILA	ANM - Mali
HAMIDOU	COULIBALY	ONM - Mauritania
SID ELEMINE	SALECK	ONM - Mauritania
NAZIROU	TOUNE	DMN - Niger
JOYCE WAHA	OGUNLEYE-MACHOKO	NMA - Nigeria
AHMAD ABOKI	USMAN	NMA - Nigeria
FATOU	SIMA	DWR - The Gambia
PETER	GIBBA	DWR - The Gambia
LATIFOU	ISSAOU	DMN - Togo
ORLANDO	MENDES	INM - Guinea Bissau
PAPA NGOR	NDIAYE	ANACIM - Sénégal
AISSATOU	SITTA	DMN - Niger
AISSA	BOUBACAR A. DIALLO	DMN - Niger
LAWAN GAPTIA	KATIELLOU	DMN - Niger

Figure 2, Participants and trainers

The following is the list of the trainers, in alphabetical order, and their affiliation:

1. Maurizio Bacci, CNR IBIMET, Italy
2. Marina Baldi, WMO-RTC Italy
3. Michela Biasutti, Columbia University, USA
4. Luca Brocca, CNR IRPI, Italy
5. Federico Fierli, CNR ISAC, Italy
6. Edoardo Fiorillo, CNR IBIMET, Italy
7. Alessandra Giannini, Columbia University, USA
8. Manuela Grippa - GET, France, Italy
9. Ramona Magno, CNR IBIMET, Italy
10. Daniele Mastrangelo, CNR ISAC, Italy
11. Samantha Melani, CNR IBIMET, Italy
12. Tommaso Moramarco, CNR IRPI, Italy
13. Patrick Parrish, WMO, CH
14. Massimiliano Pasqui, CNR IBIMET, Italy
15. Alessandro Pezzoli, DIST - Politecnico di Torino, Italy
16. Lauro Rossi, CIMA RESEARCH FOUNDATION, Italy
17. Enrico Scoccimarro, CMCC, Italy
18. Vieri Tarchiani, CNR IBIMET, Italy
19. Maurizio Tiepolo, DIST- Politecnico di Torino, Italy
20. Moussa Waongo, AGRHYMET, Niger

5.1 Lectures and practical sessions program

The program has been developed in 10 lectures and 8 hands-on sessions:

Day 1

Lectures | Morning

Climate Services for Disaster Risk Reduction - Vieri Tarchiani, CNR IBIMET

WMO and Climate Risk Reduction - Patrick Parrish, WMO

Climate Risks typology (long and short term) - Marina Baldi, WMO-RTC Italy

Components of Risk (Hazard, Exposure, Vulnerability) - Maurizio Tiepolo, DIST

Hands-on / Afternoon

R Software installation and first steps: In this session, the trainee finds the step by step instruction to install the R software and receive a basic knowledge of the environment.

Day 2

Lectures | Morning

Mesoscale Convective Systems – Dynamics -Samantha Melani, CNR IBIMET

Drought monitoring and seasonal forecasting -Ramona Magno, CNR IBIMET

Remote sensing techniques for flood and drought monitoring - Manuela Grippa - *Géosciences Environnement Toulouse*, France

Hands-on / Afternoon

Data import and Time Series Analysis: In this session, the trainee learns how to import ASCII and Excel files into R and the tools of time series analysis.

Day 3

Lectures | Morning

Extreme events definitions and tools - Massimiliano Pasqui, CNR IBIMET

Sub-seasonal numerical forecasts - Daniele Mastrangelo, CNR ISAC

Hands-on / Afternoon

Computation of ETCCDI selected indices: In this session, the trainee learns how to compute climate change indices by means of climdex.pcic package.

Day 4

Lectures | Morning

Operational products for flood impact assessment and early warning - Lauro Rossi, CIMA RESEARCH FOUNDATION

Atmospheric dynamics and composition: implications for air quality and climate - Federico Fierli, CNR ISAC

Hands-on / Afternoon

Conditional statement", "loop" and "writing own functions": In this session, the trainee learns how to save and load the workspace from and into. Furthermore, he/she learns the conceptual as well as the syntax of "conditional statement", "loop" and "writing own functions".

Day 5

Lectures | Morning

GIS and Spatial analysis - Edoardo Fiorillo, CNR IBIMET

Mapping with QGIS - Maurizio Bacci, CNR IBIMET

Hands-on / Afternoon

Final exercise: Indexes calculation and preparation of data for geographic analysis

Day 6

Lectures | Morning

Monitoring soil moisture for operational applications: remote sensing and in situ techniques - Luca Brocca, CNR IRPI

Operational use of in situ and satellite soil moisture observations for improving hydrological applications - Luca Brocca, CNR IRPI

Hands-on / Afternoon

Installation and QGis basic commands: In this session, after a check of the installation of QGIS in all the laptops, trainees had a review the QGIS basic commands

Day 7

Lectures | Morning

Variability and Change in Weather Extremes: Dynamics, Methods of Analysis, and Projections – Michela Biasutti, Columbia University

Interactions and physical characteristics of extreme events – Alessandra Giannini, Columbia University

Hands-on / Afternoon

Importing data from R module and Spatialization of the case study ETCCDI indexes : In this session the trainee learns how to import data from R (.csv or .xls ETCCDI indexes) in GIS format. Furthermore, the trainee learns how to use the basic spatialization method (Inverse Distance Weightet (IDW) and Ordinary Kriging) to produce spatial information with his own data.

Day 8

Lectures | Morning

Extreme events analysis and their projections - Enrico Scoccimarro, CMCC

Hydrological applications - Alessandro Pezzoli, DIST - Politecnico di Torino

Hands-on / Afternoon

QGIS layout and Exporting maps: In this session the trainee learns some basic concepts to produce a map layout for each climate index and how to export the map layout in a common image format (.png or .jpg files)

Day 9

Lectures | Morning

Assessment of water balances and optimization based target setting across EU River Basins - Tommaso Moramarco, CNR-IRPI

Drought and Climate Change in central Italy: The SECLI project - Tommaso Moramarco, CNR-IRPI

Hands-on / Afternoon

Case study reporting*: In this session the trainee prepares a short Power Point presentation using outputs coming from data analysis (map + tables) for the final case study restitution.*

Day 10

Lectures | Morning

Participants - Case studies presentations

Closing session

A visit to the Ximeniano Meteorological Osservatory in Florence was organized during the course.

5.2 Practical Sessions

The primary goal of the practical sessions was to build a protocol for the analysis of dry spells and precipitation extreme events that trainees could use with their own dataset to produce a gridded map of these indexes using QGIS. We combined R and QGis in order to produce a map of several ETCCDI Climate Change Indices. Thus, the secondary goal of the training session was to give a basic knowledge of the open source R programming language and QGIS tool for spatial analysis.

In general, the main objective was to stimulate the trainees to broaden their programming knowledge and to develop the capability to perform a complete analysis of data, from the raw data to the final thematic map using real data.

Trainees had the possibility to download the pdf of the whole lessons as well as the R scripts used during the Distance learning module. Furthermore, they were noticed to download the pdf of the daily lesson and those script useful for the development of the daily lesson before the starting of the face-to-face training session. This was possible because of the Moodle platform.

Figure 3, Practical session

Before the training, most of the trainees had not the capability of manipulating dataset with tools other that spreadsheets (e.g. Excel). Few of them declared to be able to use advanced programming language such as Fortran. Their knowledge of GIS was inhomogeneous and only some of them regularly use the GIS for basic map production.

However, several of them was really interested in learning a data manipulating software such

as R and in map production using QGIS. 30% of them was able to learn basic commands and to improve their knowledge during the face-to-face sessions. In general, programming languages were quite challenging and the willing to learn strongly depends on the trainees' job duty.
Concerning QGIS the most of participants were able, after the training, to use the software and produce some basic maps. The training improved their abilities and skills in producing maps.

The trainees have learned the basic of a complex programming language. Their efforts to replicate the proposed analysis with their own data were appreciable, however a significant lack of pro-active approach, i.e. to find solution by themselves in the debugging phase by using the help locally or the web externally, was noticed.

5.3 Workshop evaluation

As a final task to complete the course the participants were asked to respond to the evaluation questionnaire on the Moodle platform and to pass the competency test. Participants were assessed through the test. As a result, participants evaluated positively the overall event and the programme. The results of the questionnaire are presented in annex 2.

6. Follow-on

Follow-on activities proposed for trainees are interlinked with the networking component of the project. All participants have been asked to share the knowledge gained during the course within their home institutions. They have been encouraged to organize local courses, short seminars or mentoring activities with colleagues. Participants have been asked to report to the project team and other participants the follow-on activities they will carry out.

Moreover, trainees have been asked to prepare a poster, a typical conference poster, describing an application of the acquired knowledge to a case study relative to their own country. Accepted posters will be exposed at the final conference in Rome.

7. Monitoring and evaluation

A monitoring and evaluation system has been developed and put in place in order to assess the efficiency of the learning process.

Participants have been awarded with badges for incremental competency development during the DLC and the presencial course and certificates for completion of the presencial course.

Distance learning: tests and quizzes have been used to evaluate participants' competencies. A badge has been awarded to participants completing the DLC.

Workshop in Florence: a final test has been proposed to participants' for the evaluation of their competencies. The final test is an 'Interactive with multiple tries" test, so the participants had three tries to get the right question, but this option has a penalty for each incorrect try. The penalty is a proportion of the total grade. Each question values three marks and the penalty for each incorrect try was 1/3. Example: the right answer on the first try is 3 scores, 2 on the second try, and 1 on the third try). The questions are "single choice" or true/false. The minimum grade needed to pass was 15, 60 the maximum number of points. The participants scored the average value of 42.82 grades, from a minimum of 27 to a maximum of 55.5.

A badge has been awarded to all trainees participating in the workshop.

Follow-on activities: a badge will be assigned to participants who, at a fixed deadline, will submit a poster and document the sharing activities carried on at their home Institutions:

- Preparation of a poster (typical conference poster) consists of presenting an application of acquired knowledge on a case study relative to their own country/area. Posters, uploaded by participants on the platform, will be evaluated and a grade assigned. Posters will be presented at the final conference.
- Sharing the course content in the participant's local institution. This will be evaluated based on evidence documented in multiple formats (videos, photos, presentations) to be uploaded on the platform.

Badges are cumulative. An award will be granted to the participant that got the three badges (DLC, workshop and post-workshop) and best performed in terms of grades in each PACC-RRC training course. The 4 best performing participants, one for each course, will be invited to the final conference in Rome, to present with a speech their poster and training experience.

7. Conclusions and recommendations

The surveys, distributed via the Moodle allowed to collect participants' opinions and impressions on the two phases of the course, DLC and face-to-face. The surveys' questions were focused on the effectiveness of the course, tools used and subject matters, duration, courses' structure, and suggestions for future courses and distance learning.

Generally speaking, the overall feedback was positive for both courses. The whole initiative is perceived as an important step to improve knowledge and skills so to be more effective in supporting farmers and reduce the impacts of risks.

The participation to the DLC decreased following the different lectures and only few of the trainees completed the course. The majority of the participants that completed the DLC evaluated the course format as effective; the others found main limitations in time and internet access. The lack of fast and stable internet connection is an issue to be taken into

account, as it that could prevent a better use of the DLC. In this perspective, some solutions could be implemented in the future to have off-line lessons and increase the online tests for verification. (eg. MIT Open Course Ware, where the students can download a package containing the same content as the online version of the course, except for any audio/video materials and other interactive file types).

Other recommendation for the DLC are the need to have more time, to practice more and to have video tutorials support for R lessons.

Concerning the learning tools, Moodle platform showed some limits. Although Moodle is a well known and widely used e-learning platform, with plenty of functions and features specifically design for eLearning, in the last years news standards and web approaches to Learning Management Systems (e.g. Coursera, EdX) are gaining importance and becoming new standards. In this perspective the acknowledged lack of usability of the Moodle platform represent a weakness. Knowing this, the DLC layout setting and font styles have been modified to make some improvements, but some better usability solutions should be evaluated for future deployments.

The workshop in Florence was very successful. All the participants rated the knowledge acquired an important asset to contribute more effectively to the activities of their institutions and relevant for their job. This is probably due the fact that all participants were well motivated to participate, as we had the opportunity to verify before the start of the course, reading the emails they sent us.

A crucial point, highlighted by the practical exercises was the knowledge background level of the participants. The evaluation questionnaire investigated two dimensions of the background level: the language and the specific competence.

About the language, some participants declared to have some difficulties with English. While, the majority of the participants affirm that the educational background level well suits the level of the training course.

The “more practice” issue is recurring across participants comments; although it is an issue for a minority, it could be useful to understand if the motivation could be rooted in the need to have more time and more support to practice and experience what they learnt, particularly the R software tool. Considering the answers given throughout the questionnaire, we could say that the “more practical” request could be interpreted as a request of more “applied knowledge”.

The hands-on afternoons were perceived as helpful and truly valuable, the 56% of the respondents spontaneously refer to R and QGIS, underlining the importance and the benefit for their work of these two tools. We are comforted to continue in this process of knowledge transfer using some tailored case studies on real data from the participants. This could represent a real advantage for the trainees, which could apply what they learn in the course in their daily activity.
To achieve more effective results in future, we will give more attention on the preparation of the participants to the course and especially in installing the software on their machines at home. This could benefit the whole development of the training giving more attention to the

course content instead of practical problems.

The majority of the respondents evaluate the training materials both for theoretical and practical lectures to be exhaustive.

The coding of the comments to the question (Q.23) highlights a really positive outcome of the course: the networking. During the course, around the 40% experienced the networking and sharing with other colleagues, both formally and informally, and also to receive support from the colleagues during the learning process.

Figure 3 shows the results of the open-ended question Q.30 on topics for future courses in a visual overview.

Figure 4, future topics and expectations

ANNEXES

Annexe 1, Training course programme

Annexe 2, Results of the training evaluation

ANNEX 1

INTERNATIONAL TRAINING COURSE
CLIMATE SERVICES FOR DISASTER PREVENTION

Training Course Programme

Consiglio Nazionale delle Ricerche

World Meteorological Organization

AGRHYMET Regional Center

International Training Course on

Climate Services for disaster prevention

PACC RRC TRAINING PROGRAMME

Climate Change Adaptation and Disaster Risk Reduction in Agriculture

Course Program

20 November – 1 December 2017 (Classroom Learning)

Area di Ricerca CNR,

via Madonna del Piano, 10

50019 - Sesto Fiorentino (Florence) - ITALY

Day 1: Monday 20th November 2017

09:00 **Participants registration**

09:30 **Opening Session**

- Marina Baldi, IBIMET RTC
- Francesco Loreto, Director DiSBA-CNR
- Patrick Parrish, WMO representative
- Italian Air Force representative (TBD)
- Tiberio Chiari, AICS representative
- Moussa Waongo, AGRHYMET representative
- Bernardo Gozzini, Director LaMMA (Tuscany Region Meteorological Service)
- Antonio Raschi, Director IBIMET-CNR

11:00 **Coffee Break**

11:30

- V. Tarchiani – Climate Services for DRR
- P. Parrish – WMO and Climate Risk Reduction
- M. Baldi - Climate Risks typology (long and short term)
- M. Tiepolo - Components of Risk (Hazard, Exposure, Vulnerability)

13:30 **Lunch**

14:30

- E. Di Giuseppe - R software environment: an introduction to a powerful analysis tool

16:00 **Coffee Break**

16:30

- E. Di Giuseppe : “Introduction to R” (Practical Session)

Day 2: Tuesday 21st November 2017

09:00

- S. Melani - Mesoscale Convective Systems – Dynamics
- R. Magno – Drought monitoring and seasonal forecasting.

11:00 **Coffee Break**

11:30

- M. Grippa - Remote sensing techniques for flood and drought monitoring - Practical case studies

13:30 **Lunch**

14:30

- E. Di Giuseppe : “Analysis of precipitation extreme events with R” (Practical Session)

16:00 **Coffee Break**

16:30

- E. Di Giuseppe : “Analysis of precipitation extreme events with R” (Practical Session)

19.30 Social Dinner, Osteria la Toscanella (see the social events programme)

Day 3: Wednesday 22nd November 2017

09:00

- M. Pasqui - Extreme events definitions and tools;

10:00

11:00 **Coffee Break**

11:30

- D. Mastrangelo – Sub-seasonal numerical forecasts

13:30 **Lunch**

14:30

- E. Di Giuseppe : "Analysis of precipitation extreme events with R" (Practical Session)

16:00 **Coffee Break**

16:30

- E. Di Giuseppe : "Analysis of precipitation extreme events with R" (Practical Session)

Day 4: Thursday 23rd November 2017

09:00

- L. Rossi - Operational products for flood impact assessment and early warning.

11:00 **Coffee Break**

11:30

- F. Fierli - Atmospheric dynamics and composition: implications for air quality and climate

13:30 **Lunch**

14:30

- E. Di Giuseppe : "Analysis of precipitation extreme events with R" (Practical Session)

16:00 **Coffee Break**

16:30

- E. Di Giuseppe : "Analysis of precipitation extreme events with R" (Practical Session)

Day 5: Friday 24th November 2017

09:00

- E. Fiorillo – GIS and Spatial analysis

11:00 **Coffee Break**

11:30

- M. Bacci - Mapping with QGIS

13:30 **Lunch**

14:30

- E. Di Giuseppe : "Analysis of precipitation extreme events with R" (Practical Session)

***Saturday 25 November**, 09.00 Visit to Ximeniano Observatory (see the social events programme)*

Day 6: Monday 27th November 2017

09:00
- L. Brocca - Monitoring soil moisture for operational applications: remote sensing and in situ techniques

11:00 **Coffee Break**
11:30

- L. Brocca - Operational use of in situ and satellite soil moisture observations for improving hydrological applications

13:30 **Lunch**
14:30

- M. Bacci, E. Fiorillo: "Spatial analysis and mapping with QGIS" (Practical Session)

16:00 **Coffee Break**
16:30

- M. Bacci, E. Fiorillo: "Spatial analysis and mapping with QGIS" (Practical Session)

Day 7: Tuesday 28th November 2017
09:00

- M. Biasutti - Variability and Change in Weather Extremes: Dynamics, Methods of Analysis, and Projections

11:00 **Coffee Break**
11:30

- A. Giannini - Interactions and physical characteristics of extreme events

13:30 **Lunch**
14:30

- M. Bacci, E. Fiorillo: "Spatial analysis and mapping with QGIS" (Practical Session)

16:00 **Coffee Break**
16:30

- M. Bacci, E. Fiorillo: "Spatial analysis and mapping with QGIS" (Practical Session)

Day 8: Wednesday 29th November 2017
09:00

- E. Scoccimarro - Extreme events analysis and their projections

11:00 **Coffee Break**
11:30

- A. Pezzoli - Hydrological applications

13:30 **Lunch**
14:30

- M. Bacci, E. Fiorillo: "Spatial analysis and mapping with QGIS" (Practical Session)

16:00 **Coffee Break**
16:30

- M. Bacci, E. Fiorillo: "Spatial analysis and mapping with QGIS" (Practical Session)

Day 9: Thursday 30th November 2017

09:00
- T. Moramarco - Assessment of water balances and optimization based target setting across EU River Basins

11:00 **Coffee Break**
11:30
- T. Moramarco - Drought and Climate Change in central Italy: The SECLI project.

13:30 **Lunch**
14:30
- M. Bacci : "Case study reporting" (Practical Session)

16:00 **Coffee Break**
16:30
- M. Bacci : "Case study reporting" (Practical Session)

Day 10: Friday 1st December 2017
09:00
- Participants - Case studies presentation

11:00 **Coffee Break**
11:30
- Participants - Case studies presentation
- Final remarks and conclusion

12:30
- Learning assessment (Test)

13:30 **Lunch**
14:30
- Training Course Evaluation
- Delivery of Certificates of Attendance
- Closing and Thanks

Training Practical Session Program

Florence November, 20 - December, 1 2017

Analysis of dry and precipitation extreme events with R

Monday 20th

- Selecting and exporting data from CHIRPS (1 hour);
- Review of R language basic concepts and usage of internal editor for coding (2 hours).

Tuesday 21st

- Importing in R precipitation time series both extracted from CHIRPS and one's own data (2 hour);
- Installation of **climdex.pcic** R package and selection of main ETCCDI precipitation-related indices (1 hours).

Wednesday 22nd

- Computation of ETCCDI selected indices (1 hour);
- Analysis of climdex indices in R: plot, table, trend (2 hours).

Thursday 23rd

- Exporting time series in .csv or .xls files (1 hour);
- Loop and IF statements concepts in R (2 hours).

Friday 24th

Final exercise:

1) Import in R your own precipitation time series;
2) extract from CHIRPS 10 time series of precipitation in the zone of your interest (adjacent to your own data location);
3) compute for each time series the following ETCCDI indexes (use the loop technique):
   - 19. SDII *Simple pricipitation intensity index*: Let RR_{wj} be the daily precipitation amount on wet days, *w (RR ≥ 1mm)* in period *j*. If *W* represents number of wet days in *j*, then:

$$SDII_j = \frac{\sum_{w=1}^{W} RR_{wj}}{W}$$

   -
   - 22. Rnnmm *Annual count of days when PRCP≥ nnmm, nn is a user defined threshold*: Let RR_{ij} be the daily precipitation amount on day *i* in period *j*. Count the number of days where: $RR_{ij} \geq nnmm$
   - 23. CDD. *Maximum length of dry spell, maximum number of consecutive days with RR < 1mm*: Let RR_{ij} be the daily precipitation amount on day *i*in period *j*. Count the largest number of consecutive days where: $RR_{ij} < 1mm$
   - 27. PRCPTOT. *Annual total precipitation in wet days*: Let RR_{ij} be the daily precipitation amount on day *i* in period *j*. If *I* represents the number of days in *j*, then

$$PRCPTOT_j = \sum_{i=1}^{I} RR_{ij}$$

   -

4) for each index at item 3), calculate the anomaly as difference of a period of your interest (e.g. 1-year, 5-years, etc.) and the reference period 1981-2010;

5) export the results obtained in at least 4+4 (the anomaly files can be more than one for each index if you want) files of type .csv where each geographical location is in column and the rows report LAT, LON, VALUE of computed index. (Please, name each file with the index name, the period selected for the index computation -if any- and the chosen period in the anomaly computation).

Spatial analysis and mapping with QGIS

Monday 27th

- Installation and check of QGis in students laptops (1 hour);
- Review of QGIS basic command (open file, edit palette, visualization tools, query, etc.) (2 hours).

Tuesday 28th

- Importing data from R module (.csv or .xls ETCCDI indexes), saving and exporting data in GIS format (.shp) (1 hour);
- Spatialization of the case study ETCCDI indexes (2 hour).

Wednesday 29th

- QGIS layout (basic concepts) (1 hour);
- Creation of the map layout for each climate index (1 hours).
- Exporting maps in .png or .jpg files (1 hour)

Thursday 30th

- Case study reporting: preparation of a brief note using outputs coming from data analysis (map + tables) and a short Power Point presentation for the final case study restitution (3 hours);

Friday 1st December (morning)

- Case studies final restitution (3 hours);
- Final remarks and conclusion (1 hour).

ANNEX 2

INTERNATIONAL TRAINING COURSE
CLIMATE SERVICES FOR DISASTER PREVENTION

Courses Evaluation

FOREWORD

This report illustrates the results of two surveys distributed to the participants of the Distance Learning Course (DLC) and the International Training Course (RTC) on Climate Services for Disaster Prevention in the framework of PACC-RRC (CLIMATE CHANGE ADAPTATION AND DISASTER RISK REDUCTION IN AGRICULTURE) project.

The surveys, distributed via the Moodle training courses deployments, allowed to collect participants' opinions and impressions on the two courses. The surveys' questions were focused on the effectiveness of the course, tools and subject matters, duration, courses' structures, and suggestions for future courses and distance learning.

Generally speaking, the overall feedback was positive for both courses. The whole initiative is perceived as an important step to improve knowledge and skills so to be more effective in supporting farmers and reduce the impacts of risks.

Methodological note

As in small groups surveys, the percentages values could be misleading, most of the graphs, here presented, display the absolute values, to better show the real proportion of the results. For example, in a group of 25, 1 respondent represents the 4%.

The open-ended questions collect qualitative data. In order to summarise and analyse the results, each response was coded into categories.

THE DLC TRAINING COURSE

The Distance Learning Course (DLC) is the first step of the Training Program on Climate Change Adaptation and Disaster Risk Reduction in Agriculture (PACC/RRC). The overall goal of the distance learning is to give the participants tools and knowledge so to facilitate the face to face course. The DLC should allow to balance the different levels of knowledge and competences of the participants. The CSDP-DLC was delivered through a dedicated Moodle deployment from the 23 October to the 10 November 2017.

The course was divided into a number of lectures activated following a specific time schedule.

Two set of activities have been defined to meet the criteria completion of the course:

- completing all the lessons
- take the DLC evaluation survey.

When the trainee completes the course, the Moodle system automatically gives a Badge. (Moodle Badges function).

Fig. 1 The CSDP (DLC) badge

Differently from previous editions, participants are evaluated with grades at the end of each lesson. The final score (average on all the lessons including also the ones that were not done) is not represent an evaluation criteria for the admission to the Workshop in Florence, but it will be used to have a total rank in order to reward the most active and successful participants.

In terms of participation, 28 people subscribed the CSDP Course, but only 14 took the final survey and just 4 amongst them obtained the badge. Further investigations should be encouraged to understand the reason why of the low participation level, particularly why only few of the trainees completed the course. The Fig. 2 shows the activity completion (Moodle data source), where the value represents of the percentage of users that completed each set of lessons.

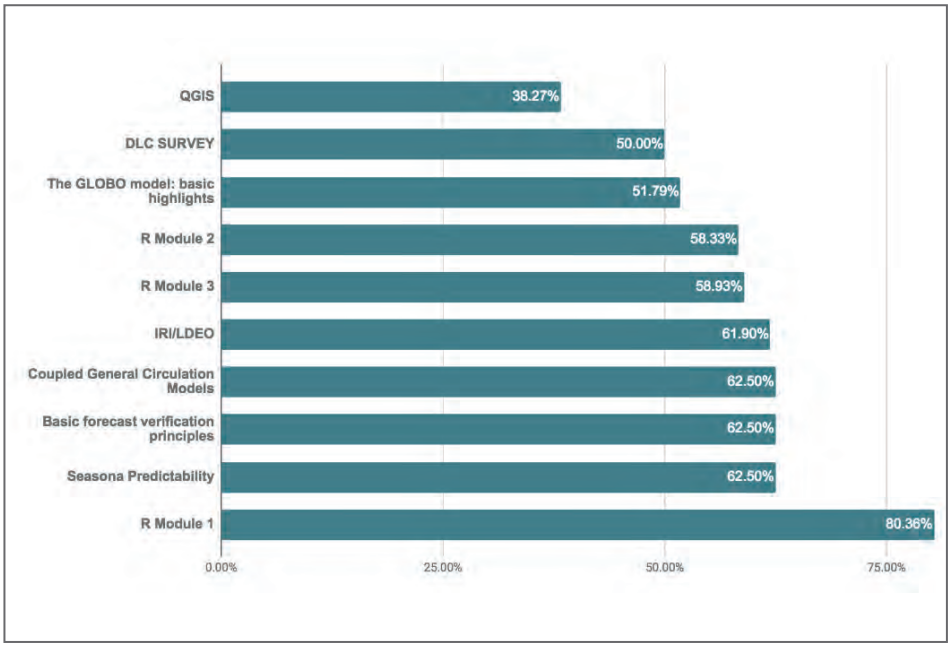

Fig. 2 Activity completion by lesson sections

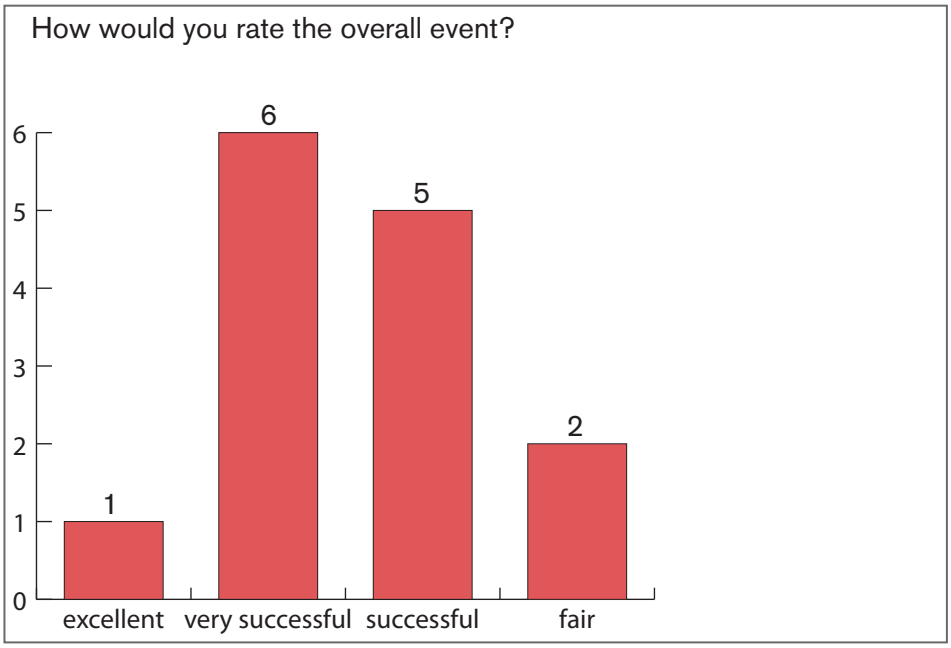

Fig. 3 Q.18

The graphs Fig.4 and Fig.5 clearly show that the trainees consider the whole

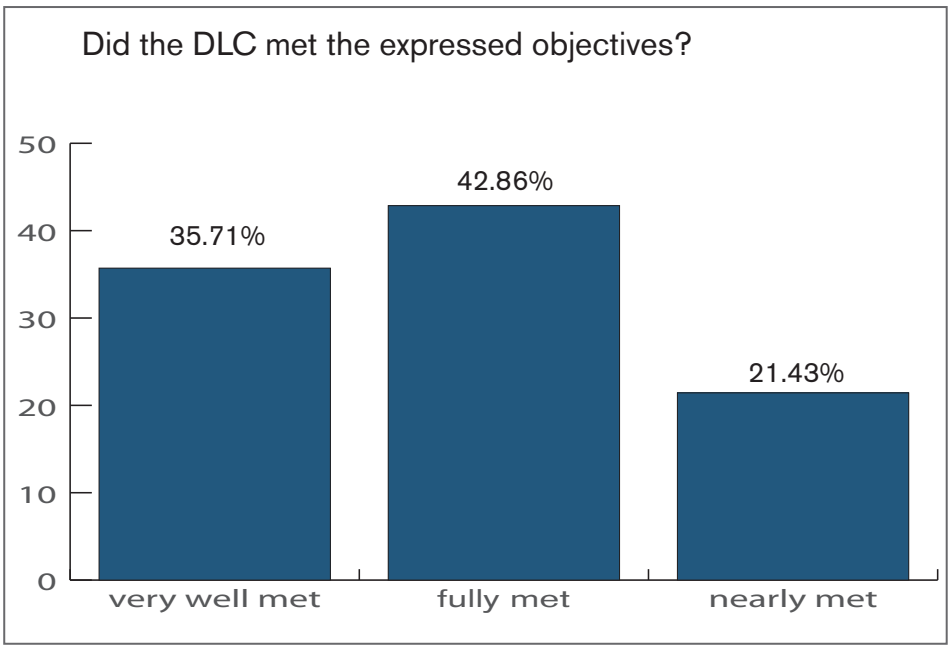

Fig. 4 Q.2 - Do you think the programme of the DLC met the expressed objectives?

course positive and the majority think that the programme met the expressed objectives. The 100% of the respondents affirms that the DLC allows to ameliorate trainees knowledge that will help in the face-to-face course.

The coding of the open-ended question n. 8 shows that the majority of the participants evaluated the course format as effective. However, the ones that find it ineffective highlighted issues that are not related to the course structure or content, but to external factors such as the internet connection or the need for a different timing of the course plan.

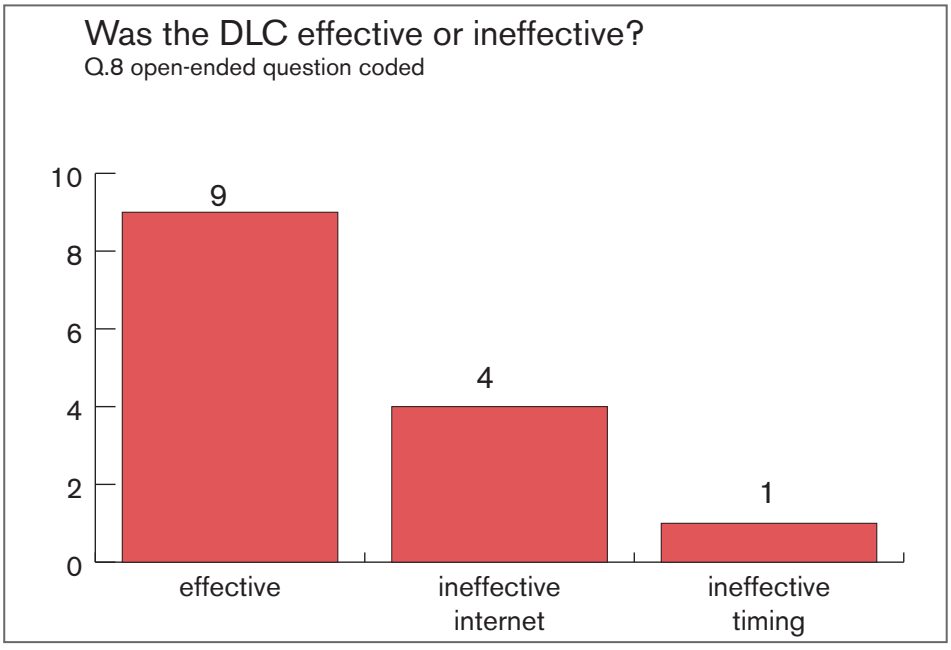

Fig. 5 Q.8 open-ended question coded

As a matter of fact, the 23% of the respondents declare that they had problems to connect to the internet.

Moreover in other open questions (Q8, Q20, Q21), the internet issue is underlined as a weak point due to country/region infrastructure.

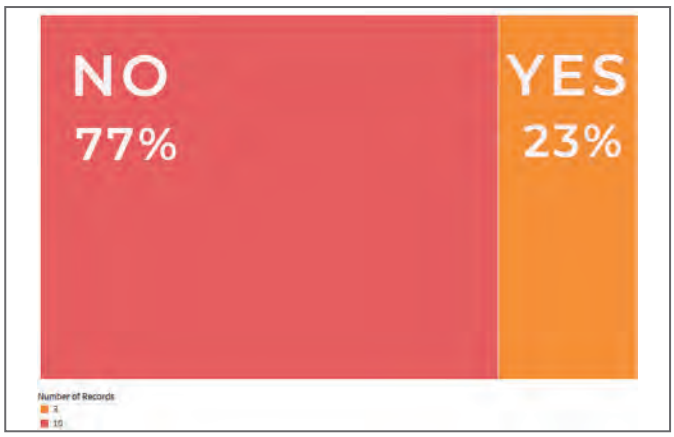

Fig. 6 Q1 - Did you have problem with internet connection?

"Take into account the problems of web access in our regions. Some lessons could be completed offline."

The lack of fast and stable internet connection is an issue to be taken into account, as it that could prevent a better use of the DLC. In this perspective, some solutions could be implemented to have off-line lessons and increase the online tests for verification. (eg. MIT Open Course Ware, where the students can download a package containing the same content as the online version of the course, except for any audio/video materials and other interactive file types.)

The "time for training" it is a cross topic perceived as a need, although with some differences.

Question n. 5 (Fig.7) explicitly asked "*How was the length of the training course*"

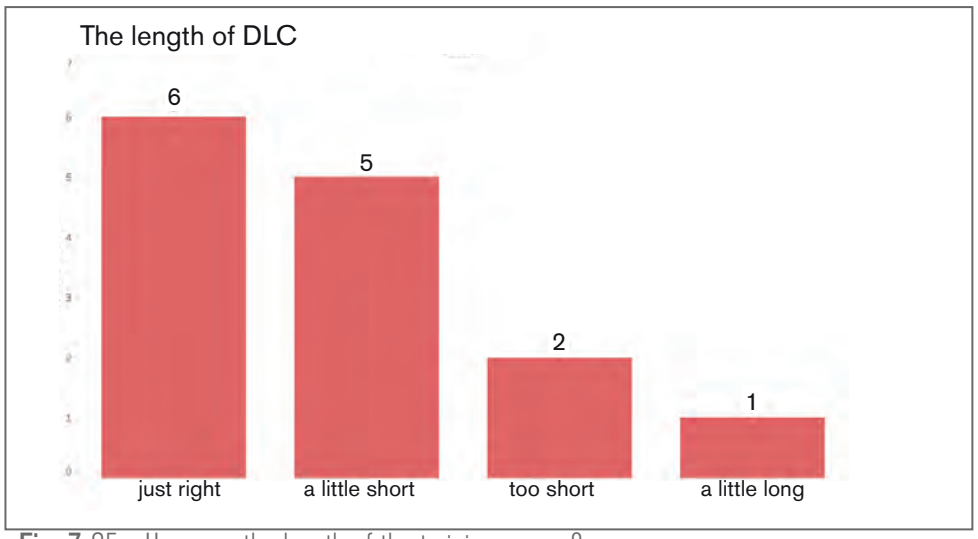

Fig. 7 Q5 - How was the length of the training course?

Almost half of the respondents considered the course in some ways short (little short and too short).

This "time issue" arises also in other comments and suggestion of the participants, highlighting the need for:

- continuous learning
- longer time to complete the course
- training during working hours.

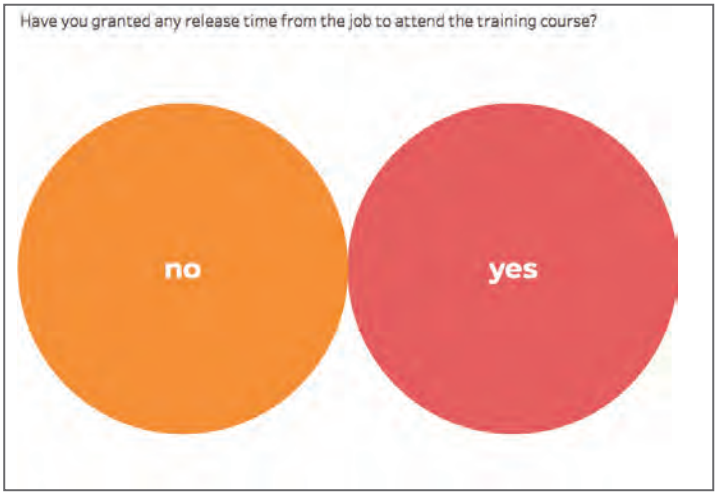

Fig. 8 Release time granted (coded)

The graph Fig.8 shows that half of the respondents could grant of some release time during their working hours to attend the course. In some cases it was granted a fixed time (around 3 hours per day), in another case the internet connection problems obliged the participant to attend the course during the night.

The graph Fig.9 illustrates the question Q5 (where values "too short" and "little short" have been aggregated) combined with question Q21 ("Additional Comments", open-ended question coded). This graph shows that "continuous learning" is requested by one respondent that perceived the DLC as "short".

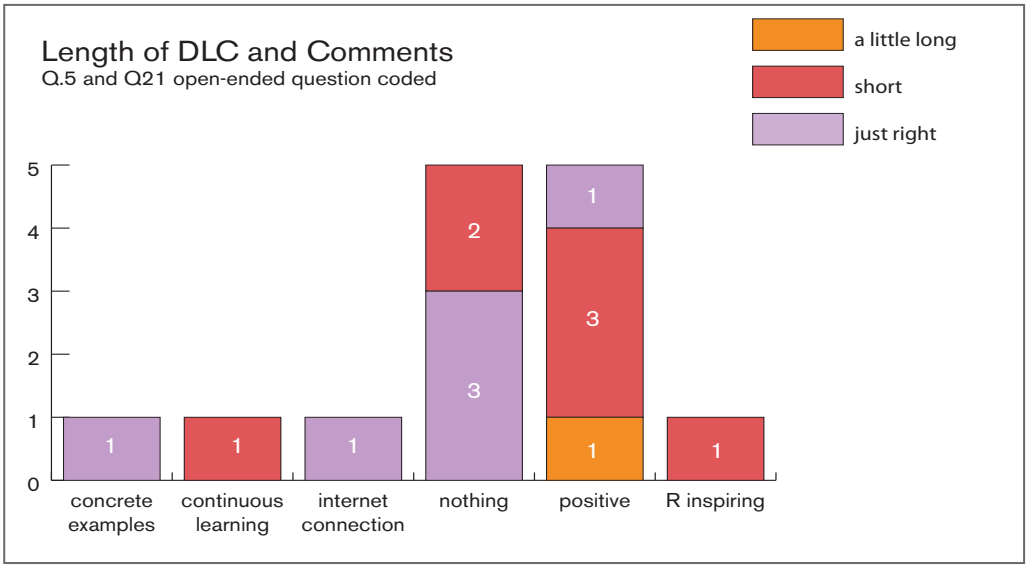

Fig. 9 Q.5/Q.21

The graph Fig.10 “Length vs Engagement” combines the Q5 question with the open-ended question Q9. The graph shows that the participants who express the need of more time for training are the ones that feel more engagement in the

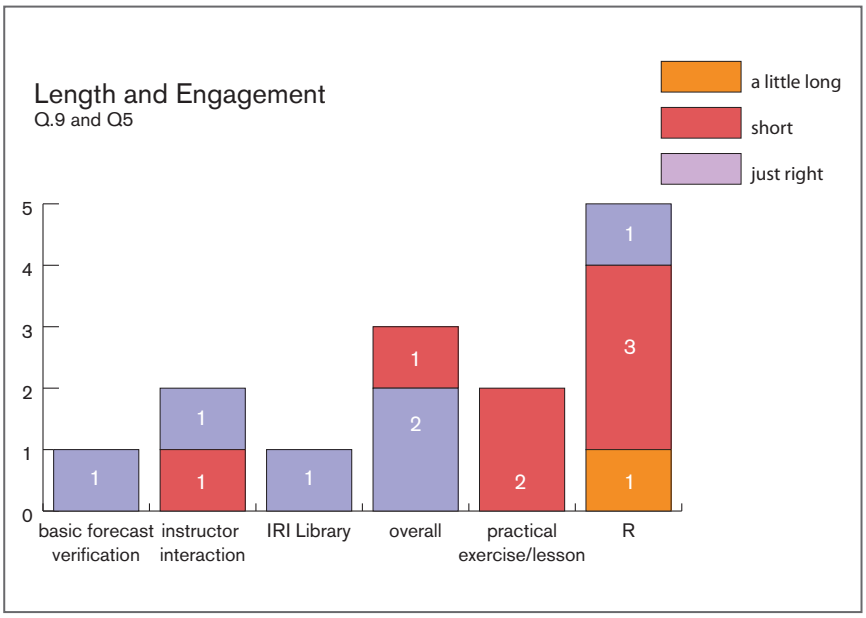

Fig. 10 Length of DLC and engagement

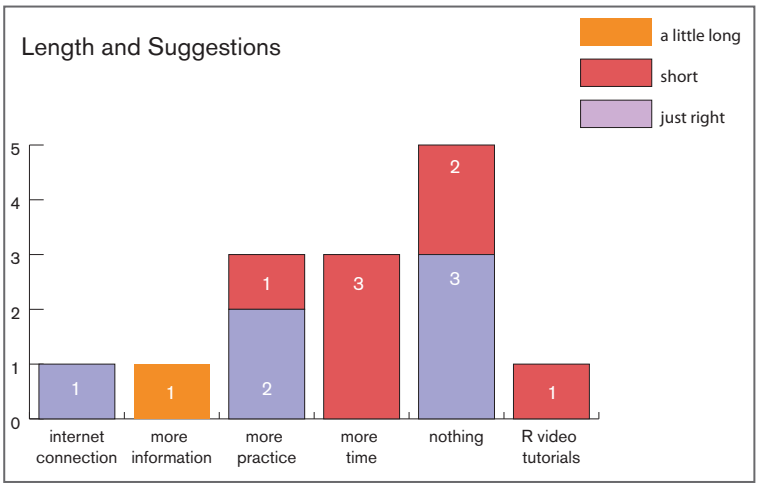

Fig. 11 Course Length and Suggestions

practical lessons, particularly R lessons and that appreciated the interaction with the instructor.

The graph “Fig. 11 - Course length and Suggestions” combines question Q5 with the open question Q20 (Suggestions), underlining once more the need to have more time, to practise more and to have video tutorials support for R lessons.

The graph Fig.12 “Q.6 Time dedicated to the DLC” gives further information related to the “time issue”: around half of the respondents dedicated 2/3 hours per day to the course.

The Fig.13 “Effort in terms of time and Release time from job” shows that people without release time from job are concentrated in two categories “between 2/3 hours” and “more than 4 hours” effort time.

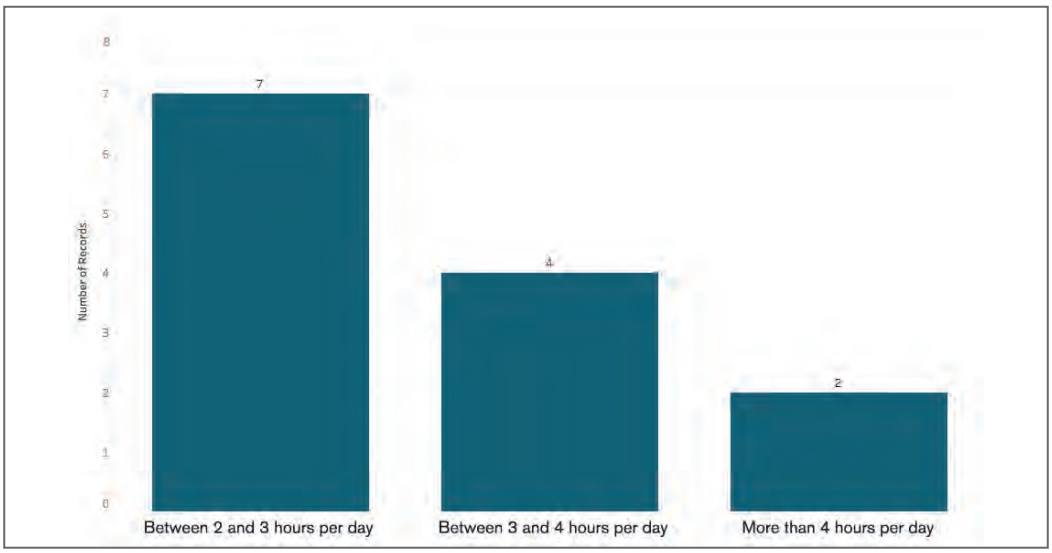

Fig. 12 Q.6 Time dedicated to the DLC

On the basis of these results, it can be assumed that some participants perceive this initiative as engaging and acknowledge that tools such as R software and practical lessons could widen and improve their competences, but more learning

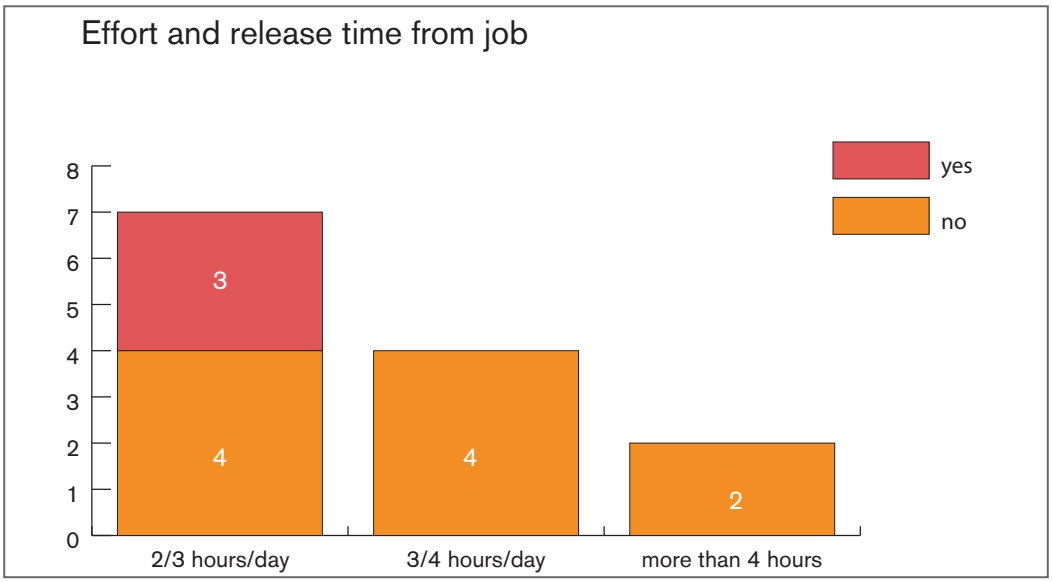

Fig. 13 Effort and release time

time, also during the working hours, it would also be desirable.

Generally speaking, the course meets thoroughly the expectations of the participants. The graph Fig.15 highlights that the content of the course well met the expectations (4.4 over 5), and the resources were considered effective (4.0).

Only the Moodle platform has the lowest rank:

"The Moodle site is not user friendly"

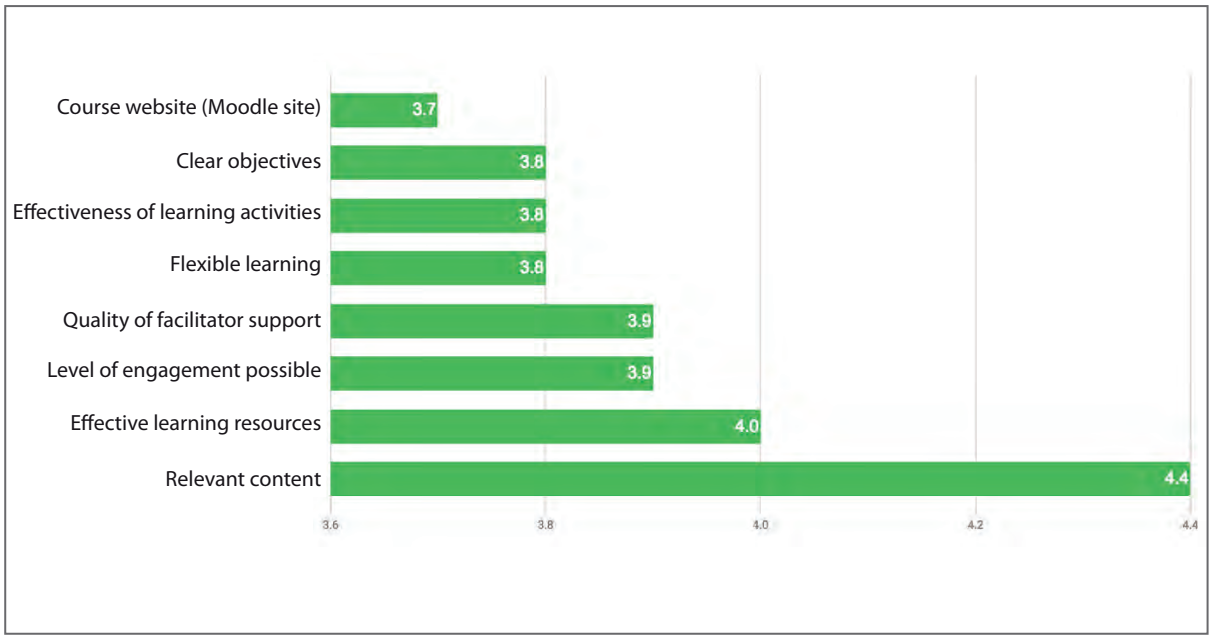

Fig. 14 Expectations

Although Moodle is a well known and widely used e-learning platform, with plenty of functions and features specifically design for eLearning, in the last years news standards and web approaches to Learning Management Systems (e.g. Coursera, EdX) are gaining importance and becoming new standards. In this perspective the acknowledged lack of usability of the Moodle platform does not represent a strength point. (Martin, L., Martínez, D. R., Revilla, O., José, M., Santos, O. C., & Boticario, J. G. (2003). Usability in e-Learning Platforms : heuristics comparison between Moodle , Sakai and dotLRN. Artificial Intelligence, 509(LII), 75–84.). Knowing this issue, the DLC deployment layout and font styles have been modify to make some improvements, but some better usability solutions should be evaluated for future deployments.

From the content perspective the participants rate all the lessons more than "moderately effective". Particularly, the first two modules of R Lessons have a high rank (4.1) whilst the third module has the lower one.

It should be pointed out that the lower rank of the third Module of R, is not strictly related to the course, but to a lack of programming skills on such type of software,

Rate the overall quality of each lesson of the Distance Learning Course
(1= Not effective, 3=Moderately effective, 5=Very effective)

	Average Rank
R Module 1 - Installation and first steps of R Software	4.1
Seasonal predictability and its relation to ENSO	4.1
R Module 2 -Data import and Time Series analysis	4.1
IRI/LDEO Climate Data Library Tutorial	3.9
Basic forecast verifica on principles	3.8
The GLOBO model: basic highlights	3.7
Coupled General Circula on Models: methodology, outcomes, biases	3.7
R Module 3 -Introduction to analysis of gridded datasets	3.7

Fig. 15 Overall Quality ranking

as states one of the participants.

> *The course on Software R was a failure for me. But the problem stems from my inexperience with this software. Considering that it was my first contact with this R, I was not able to assimilate effectively the content of the course. On the other hand I have no programming Skill. I hope to beer understand and move forward during the face-to-face course in order to improve my performance in using R.*

Besides this, most of the participants perceive that the level of the training course suits their education background. (Fig.17)

Theory vs. Practice is another important issue that could help to define the best ratio for a training course. Question Q.14 asked explicitly
"*What is your opinion of the balance between theory and practice?*"
The majority of the respondents are satisfied of the theoretical/practical balance of the course. However, "more practice" is a need for 3 other respondents that in the Q.20 open-ended question on suggestions state:

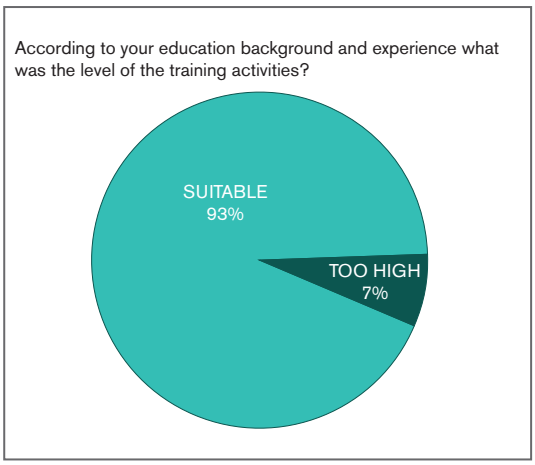

Fig. 16 Q.10 - Education Background

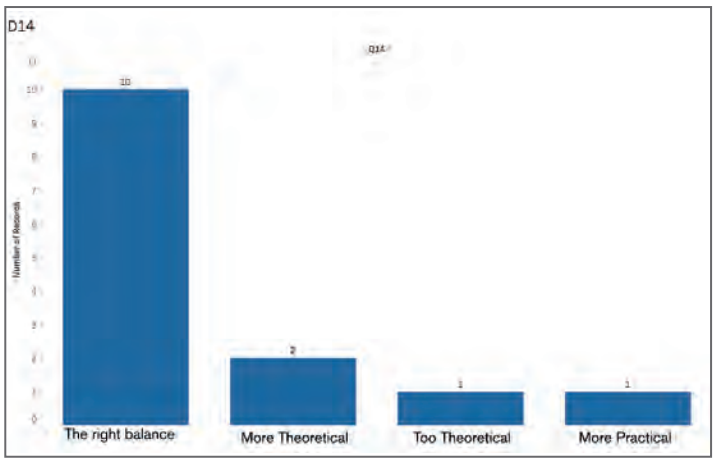

Fig. 17 Q.14 Ratio Theory/Practice

Focus the course on more practise.

Give more tips to help trainees to solve quizzes, exercises and other type of assignments

More practical exercises

The "more practical" is a recurring issue both in the DLC and in the face-to-face class. The coding of open-ended question Q.20 and the Q.14 (Fig.18) shows that other three respondents suggested "more practice".

From a wider perspective the issue "more practice" is a recurring issue that should require further investigation, considering also how the participants interpret the meaning attributed to the "more practice" terms. In the next chapter the same issue will be analysed in view of the results of the RTC 2017 survey.

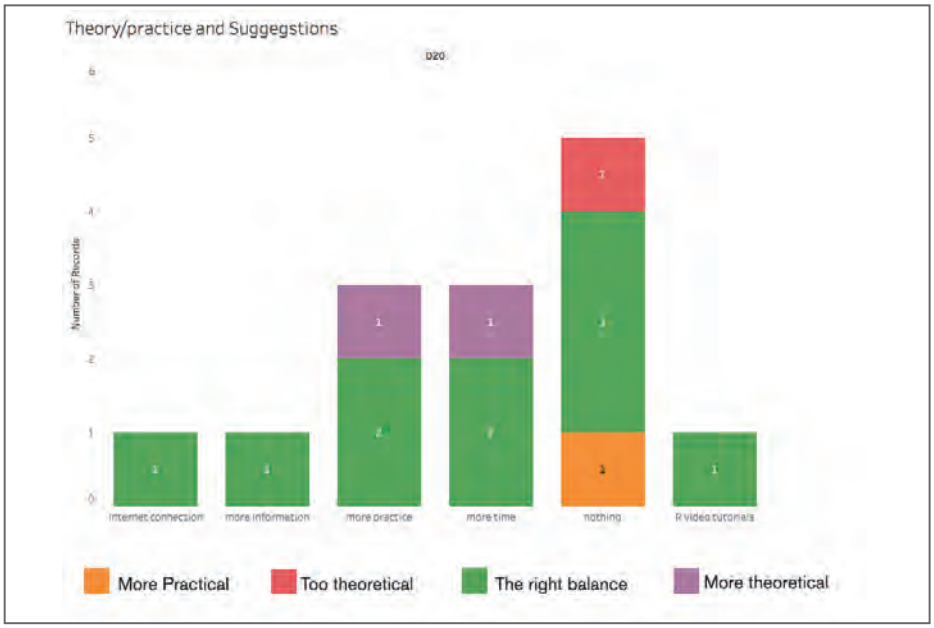

Fig. 18 Theory/Practice and Suggestions

SURVEY RTC 2017

The International Training Course on "Climate Services for Disaster Prevention" took place in Florence from November 20th to 1st December 2017. The first face-to-face course of the Training Program on Climate Change Adaptation and Disaster Risk Reduction in Agriculture (PACC/RRC), funded by the Italian Agency for Development Cooperation and realized by the World Meteorological Organization in collaboration with the Regional Training Center in Italy IBIMET-CNR and the AGRHYMET Regional Centre in Niger.

Twenty-five participants attended the two weeks course in Florence. The course was structured in theoretical lectures in the morning and "hands-on" afternoons. At the end of the course, to complete the course the participants were asked to take the evaluation questionnaire on the Moodle deployment RTC_2017 and to pass the competency test. Participants were assessed through the test.

The final test is an 'Interactive with multiple tries" test, so the participants have three tries to get the right question, but this option has a penalty for each incorrect try. The penalty is a proportion of the total grade. Each question values three marks and the penalty for each incorrect try is 1/3. Example: the right answer on the first try is 3 scores, 2 on the second try, and 1 on the third try). The questions are "single choice" or true/false. The minimum grade needed to pass is 15, 60 the maximum number of points. The participants scored the average value of 42.82 grades, from a minimum of 27 to a maximum of 55.5. (see the attached tables for the full grades report). Please Note that the survey evaluation questionnaire had no grades, but it was compulsory to complete the course. The trainee are automatically awarded with a badge on course completion (Final test

Fig. 19 CSDP RTC Badge

and Evaluation survey) through Badge Moodle function. All the 25 participants were awarded with the badge. The final grade will score two further assignments (in 2018) that will be evaluated by the scientific committee of the training course.

A POSITIVE INITIATIVE AND A SUCCESS

The participants evaluated positively the overall event and the programme.

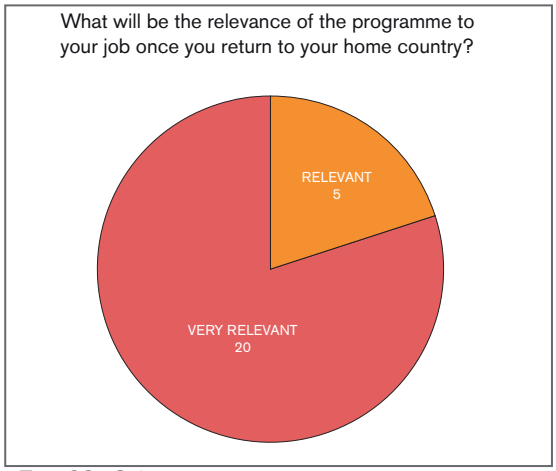

Fig. 20 Q.4

All the participants (100% Q. 2) consider the knowledge acquired an important asset to contribute more effectively to the activities of their institutions and relevant for their job (Q.4 - Fig.20). This type of initiatives is important to improve and update knowledge and techniques, and the seed to disseminate what participants learnt when returning back to their home countries. This step is extremely important as it could turn this training initiative into a virtuous trigger to empower a larger audience and kick a multiplier effect. In this perspective, the responses to the question Q.6 - Fig.21 "*How you will share what you learnt with your colleagues*" is encouraging and positive. Almost the majority of the participants will organize feed-back meetings, and training in diverse forms such as training on the job or courses; only few amongst them are planning to organize more structured initiatives. The next assignment focused on

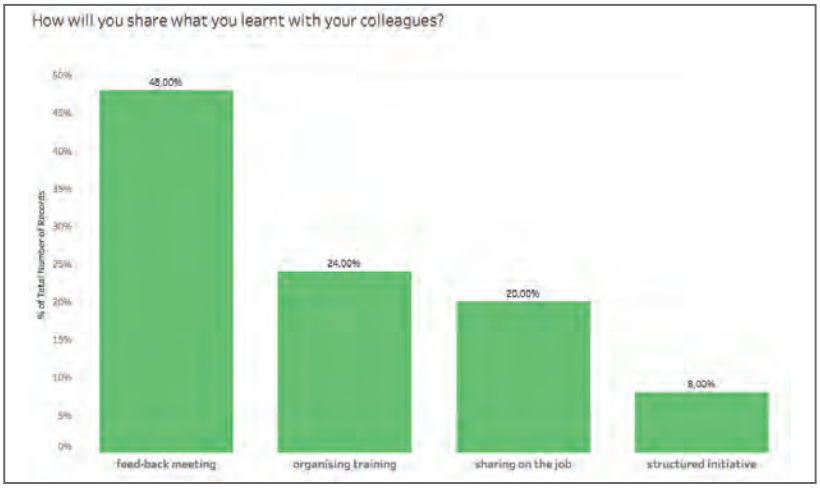

Fig. 21 Q.6

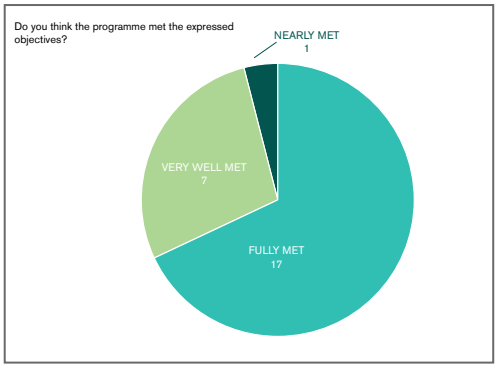

Fig. 22 Q.1

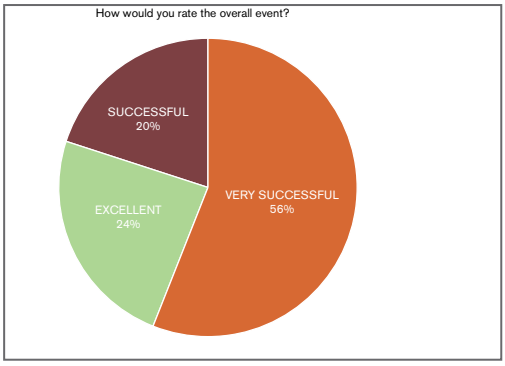

Fig. 23 Q.29

documenting (photo, videos, presentations) the sharing initiatives in participants' home country will give some insights on what participants will achieve.

KNOWLEDGE BACKGROUND LEVEL

The knowledge background level of the participants is a crucial point for a well balanced training initiative. The survey investigates two dimensions of the background level: the language and the specific competence.

About the language, some participants declare to have some difficulties with the English language.

> *Some enseignants had very pronounced accents for English* so it was difficult to understand the course.

> The presentation is *too speed*

> *The participants from the french speaking countries had not the same level of comprehension, for some of them particularly the morning lessons were a bit difficult.*

However the graph Fig. 25 "Suggestions and Language Gap" (Q.9 and Q.30 open-ended question coded) reveals that only some of the respondents re-confirmed the language as a gap.

While, the majority of the participants affirm that the educational background level well suits the level of the training course.

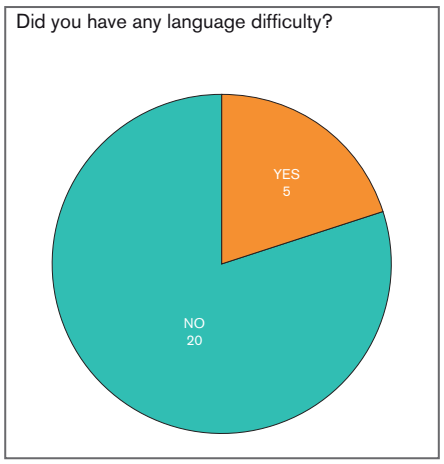

Fig. 24 Q.9

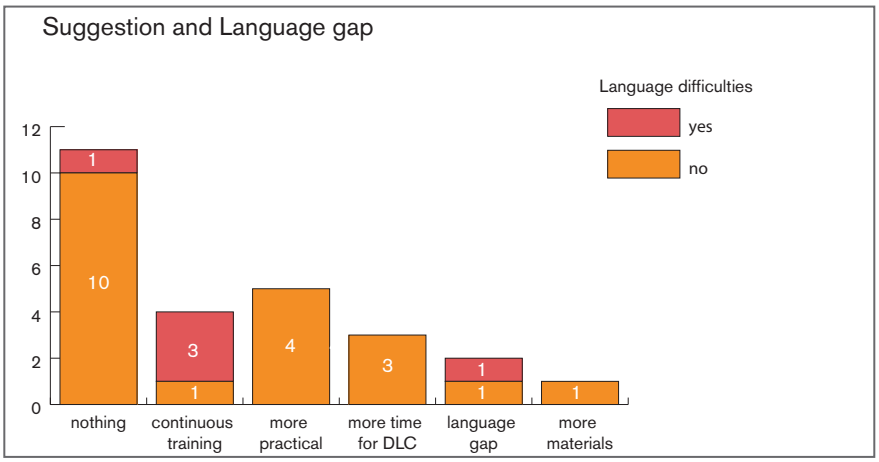

Fig. 25 Q.9/Q.30

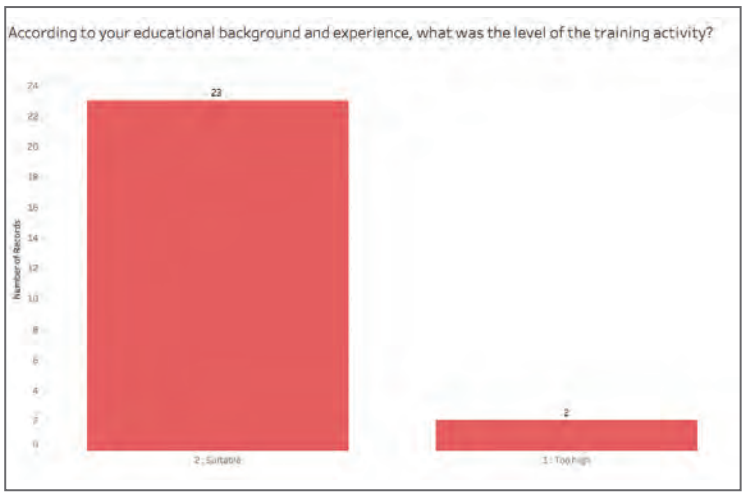

Fig. 26 Q.11

THEORY/PRACTICE

The surveys results of the previous editions of RTC Italy training courses highlighted a need of practical training. On the basis of these findings, the RTC 2017 course has been structured as follows: in the morning theoretical lectures and hands-on afternoons focused on R software and QGis.

As highlighted in the DLC analysis, the issue “theory vs. practice” shows some contradictions. Generally the majority of the respondents considered “balanced” the ratio theory/practice of the course.

However, the question focused on relevant comments (open-ended question Q. 16 coded) highlights that few participants still request more practice, and they gave similar answers when asked to suggest how to improve the programme (open-ended question Q26 coded).

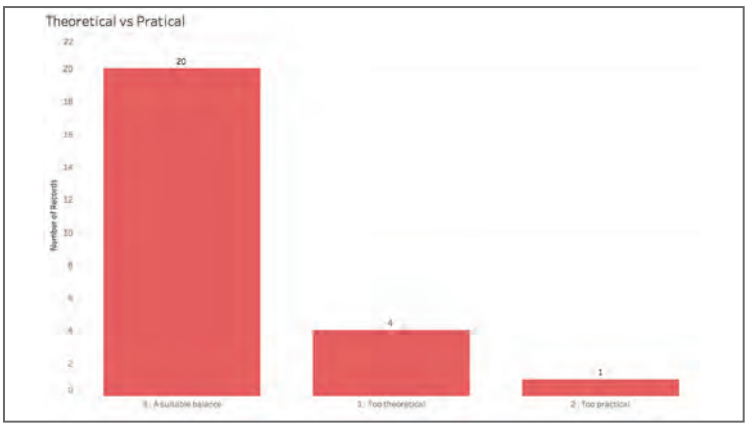

Fig. 27 Q.14

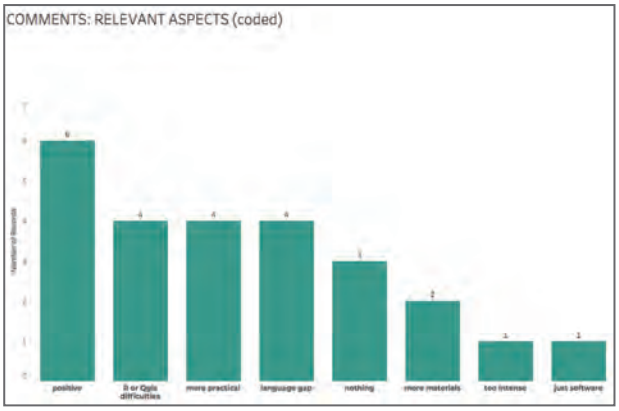

Fig. 28 Q.16 coded

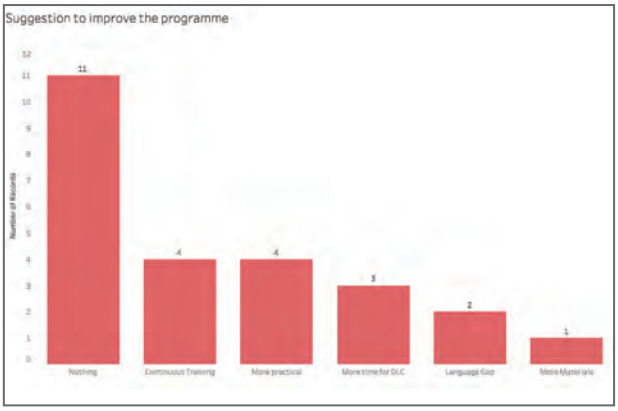

Fig. 29 Q.26

Some insights could be deducted from the comments to question (Q.7) on the advice received to apply the knowledge gained during the course.

The majority of the participants declared that they received advice, and the 8% (3 people) that answered “no” explained as follows:

> *I was expecting to have more information on applicables tools in my home country and tips to develop climate services for DRR and health sectors.*

> *We received advices but we need further assistance in effectively implementing a conducive framework for the implementation of a well organised data collection and analysis and production architecture.*

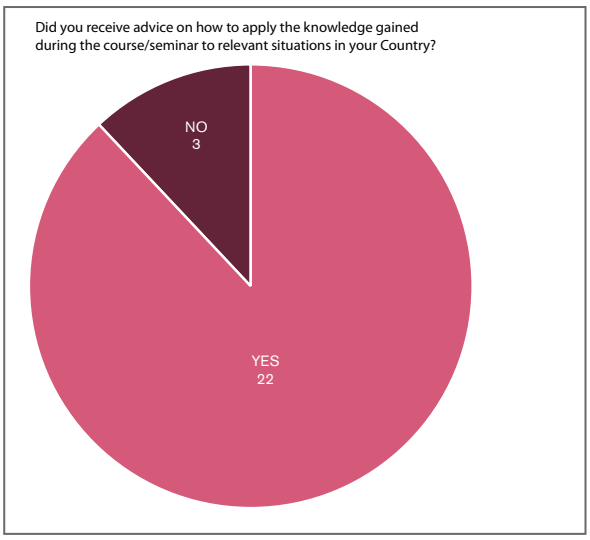

Fig. 30 Q.7

The “more practice” issue is recurring across participants comments; although it is an issue for a minority, it could be useful to understand if the motivation could be rooted in the need to have more time and more support to practice and experience what they learnt, particularly the R software tool. As a matter of fact this need could be in some ways related to the request of a longer duration of the course to met the course objective expressed by the 36% (9 people) of the participants. Amongst the ones that would suggest a longer duration the 56% opted for one month and the 44% for three weeks. (Fig. 31- Q. 18)

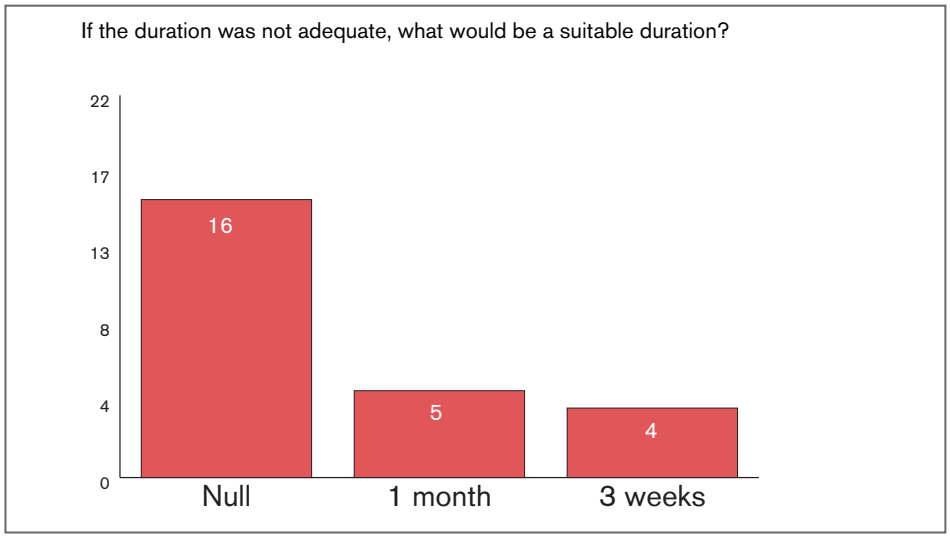

Fig. 31 Q.18

TRAINING MATERIALS AND TRAINERS

The majority of the respondents evaluate the training materials for theoretical

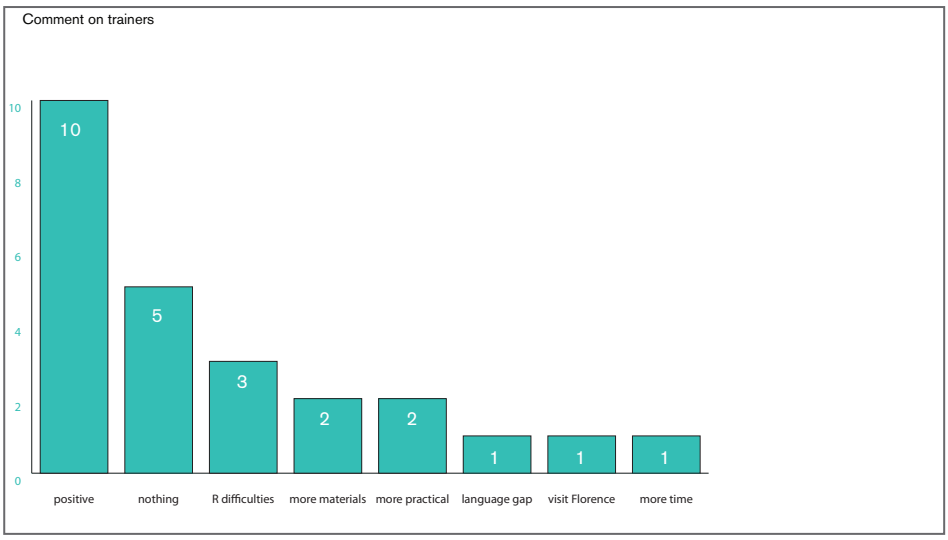

Fig. 32 Q.21 coded

and practical lectures exhaustive. Only one participant requests "more than PPT presentations."

The comments on the trainers (open question Q.21 coded) show a positive evaluation for the majority of the participants, and also the 20% (5 people) that had "Rien à déclarer" and that can be considered as a no-negative evaluation.

The other comments and suggestions underline what showed by the other questions: difficulties in learning R, more practical, more materials, language gap, more time and also some more time off visiting Florence.

The more practice need is well described by one of the respondent:

> *For R practical exercise, it would be better to let all trainees to work on a concrete* example focusing on a given area in west Africa, on 1 or 2 given extreme event(s) *(probably the most common in West Africa) and the type of indexes to be analysed and also give to trainees the appropriate thresholds to look for the risk according to their area.*

LEARNING AND KNOWLEDGE TRANSFER

As shown in the previous paragraph, the large majority of the participants evaluate the knowledge acquired valuable.

The coding of the comments to the question (Q.23) highlights a really positive outcome of the course: the networking.

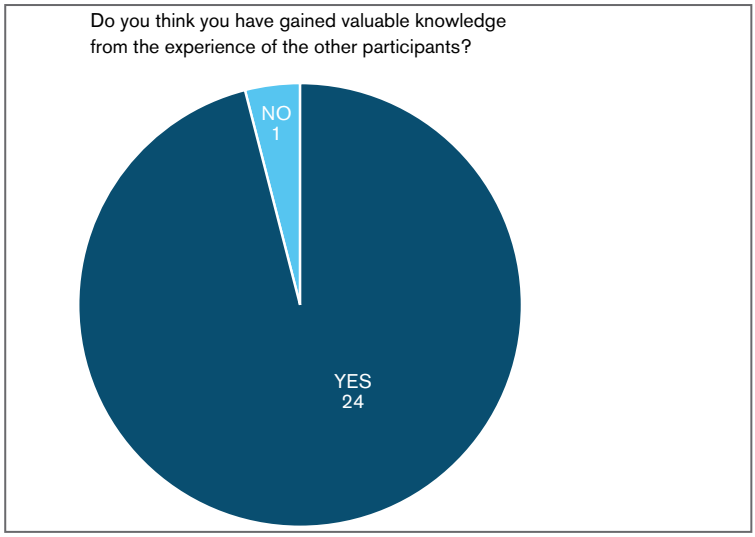

Fig. 33 Q.22

During the course, around the 40% (10 people) experienced the networking and sharing with other colleagues, both formally and informally, and also to receive support from the colleagues during the learning process.

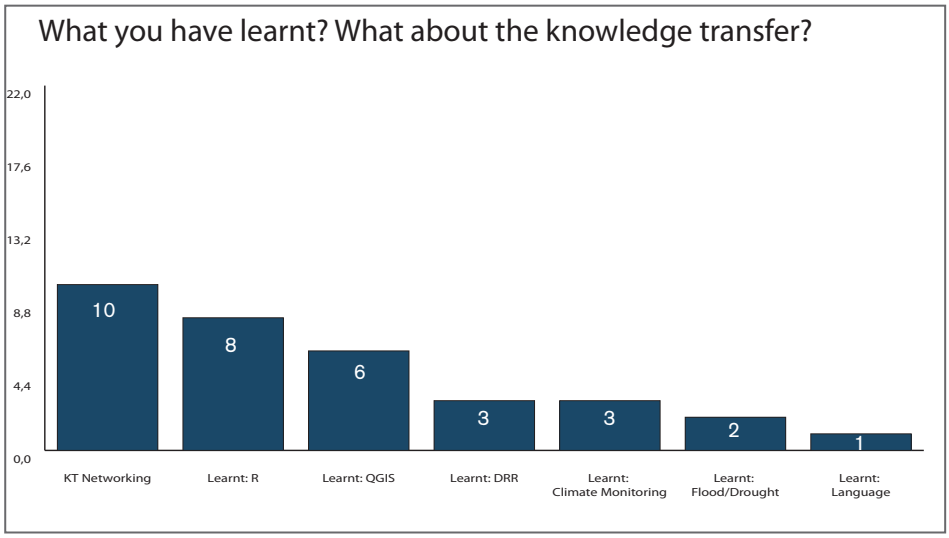

Fig. 34 Q.23

Their question to me was like a challenge.

We can refer to each other for assistance!

There was good interaction amongst the participants especially when we were given an assignment work to do.

In cafe break and other sharetime.

Share the knowledge in another country of part of west Africa on QGIS, how to get the country's shapefile.

Most of my colleague were very helpful in helping me understand some of the things I did not fully understood in the class lessons.

Assisting each other to solve problems.

Working together and information sharing.

The hands-on afternoon were perceived as helpful and truly valuable, the 56% of the respondents spontaneously refer to R and qGis, underlining the importance and the benefit for their work of these two tools.

The two most important tools I've learned is R and the Q-GIS which I can easily integrate into our operational activities. My knowledge of disaster management has significantly improved and can go along way in help me in terms weather and climate monitoring particularly on how it relate to Agriculture.

Only one of the respondent expresses a critical opinion on the value of the knowledge gained; however this opinion is interesting as it is not on the content but on the language difficulties and proposes to involve more the participants in the knowledge sharing and transfer process.

I think the language barrier prevent some participants to communicate with each other. The participants cases studies reporting and presentation were done in English. I would suggest to do that in their home countries working language with translation by trainers to make all people understand each other. After theorical lectures, we should give floor to participants

to give their experiences in the topics covered in the lecture.

SUGGESTIONS ON FUTURE TOPICS

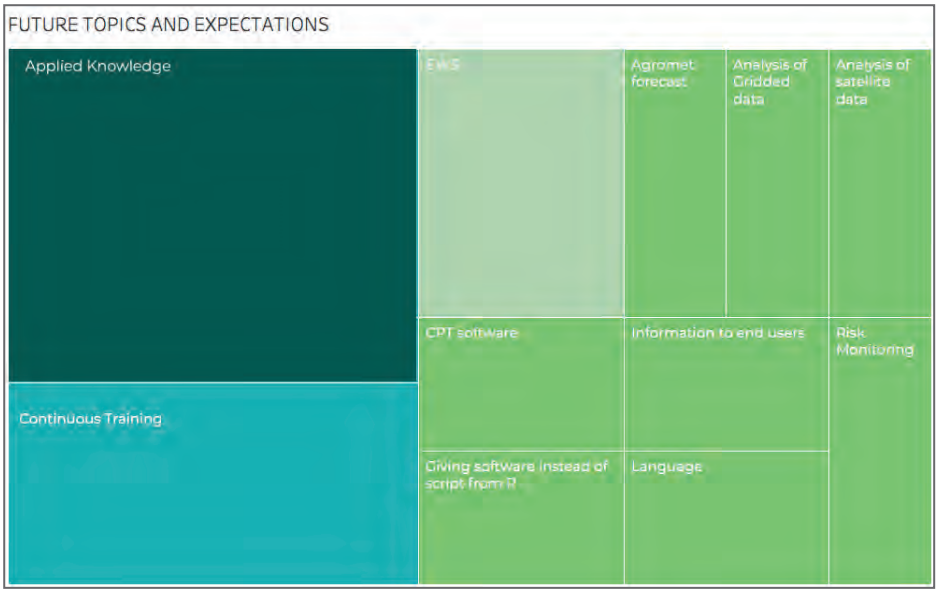

Fig. 35 Q.30 coded

The open-ended question Q.30 asked the participants to suggest topics for future courses. The graph below considers only 18 answers as some participants did not give any suggestion. The open-ended question is coded in a figure that illustrate the responses in a visual overview.

What the participants suggest allow to better understand why "more practice" is still an issue to be taken into account, even though the Florence hands-on afternoon were focused on practical lessons.

> *Case study in countries in a given field of applications of climate analysis to sectors of developement (agriculture, health, water resources, drought, heat wave, disaster prevention, etc); with insitu data and global dataset to show practical uses and know how development*

> *Increase the training period. Reduce the theoretical lesson time and increase the practical period*

> *I suggest that future courses take much into account the time*

given to practical sessions. It would be good if he had plenty of time for the practices.

we want more times 3 weeks for this training and more practical.

I hope all topics are very important, but it is better to give more time in practical session than theorical session.

Considering the answers given throughout the questionnaire, we could say that the "more practical" request could be interpreted as a request of more "applied knowledge". In this perspective the meaning of "more practical issue" refers to more applied exercises, best practices, concrete examples and tips that suit the different needs of the participants.

The "continuous training" categorises the answers that underlining the need to have more training time and events, showing the willingness of the participants to improve their knowledge and competences in their job.

More training

My suggestion is to have a repeat of these courses because of their importance

I recommend that fellowship be granted to NMHSs for training of staff for mid term and full levels on various training courses such as weather forecasting, Agro meteorology, climatology, Hydrology and General Meteorology etc.

GRADES RESULTS

The analysis of the results of final test shows that the participants acquired knowledge and skills during the two weeks course.

The 20 questions test was focused on the topics illustrated during the course; the questions were mainly single choice questions (a multiple choice question that has only one correct answer). The minimum grade to pass was 15 and the highest grades that could be obtained is 60.

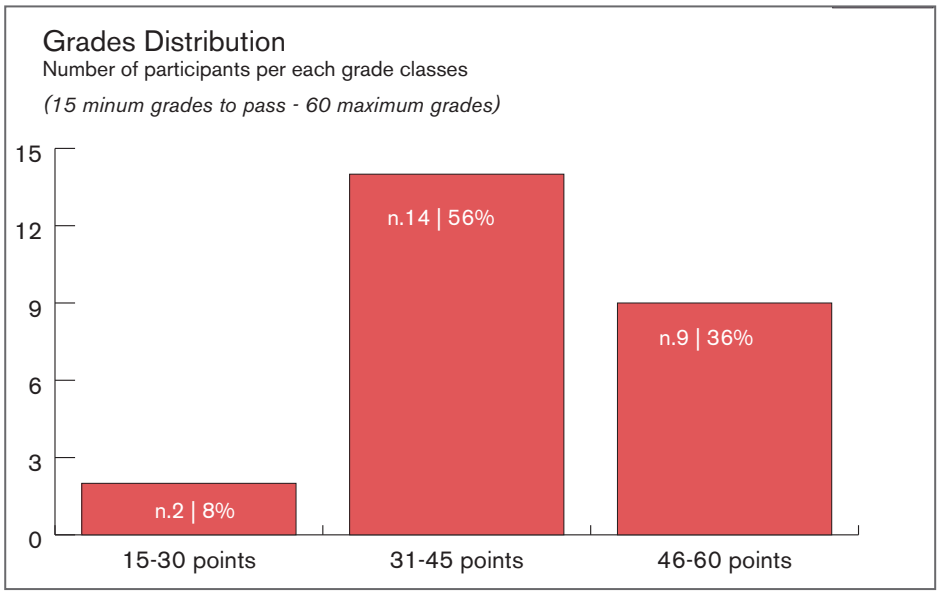

Fig. 36 - Grades distribution

The majority of the participants (56%) obtained between 31-45 points, the 36% between 46-60 points, and only two participants between 15-30 points.

The minimum, maximum, mean, median and mode describe the central tendency of the results.

Mean	42.82
Minimum	27.00
Maximum	55.50
Mode	43.50
Median	43.50

The overall results highlight the positive outcome of the course.