Basic Climate Statistics Workshop at UNMA (Uganda National Meteorological Authority)

Introduction

During the week beginning 18th November 2024, IDEMS delivered a 5-day onsite training to the Uganda National Meteorological Authority (UNMA) as part of its WMO LoA 2024 contract. The training aimed to enhance the capacity of UNMA staff in leveraging historical climate data through statistical time-series analysis, thereby supporting informed decision-making on climate variability and risk assessment. This report describes how the training was designed and delivered to meet its objectives. The report also presents the results of the training evaluation by its participants.

Terms of Reference

The purpose of the WMO LoA 2024 was to support Uganda, Bangladesh and Liberia with data rescue for early warning. In Uganda, the support was through two face-to-face trainings with the first training focusing on support UNMA to conduct a gap analysis of their data to kick-start data rescue. The training described in this report is the second and aimed *To facilitate time-series generation of key climate parameters and analyses to better understand climate variability and change ….and to identify related climate risks and vulnerabilities*. As a consequence of the training, *statistical time-series analyses of principle meteorological parameters to underpin climate variability and change as well as climate risk and vulnerability assessments* was expected as a complimentary deliverable.

The Training

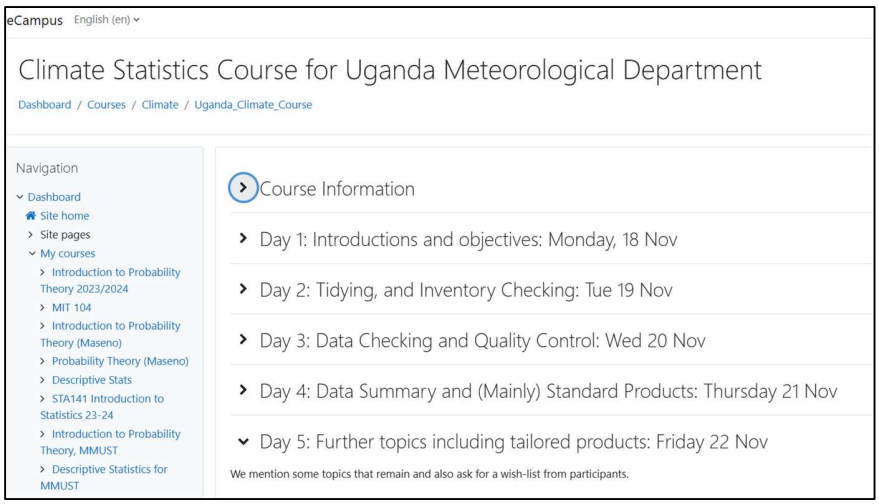
During inception meetings, it was agreed that this training would involve building the capacity of UNMA to employ R-Instat for the analyses largely because its free, powerful and easy-to-use through its specialized climatic menu. To meet the objectives of the training, sessions were designed to be hands-on to build the practical skills required for UNMA to perform the statistical time series analyses of their data. During the sessions, the facilitators demonstrated the R-Instat procedures while the participants watched and practiced using their own data. Each participant had access to a computer.

It was agreed that the training would use a subset of the Uganda climate data. The participants would then employ the skills learnt to extend the analysis to include all the station data in Uganda.

Face-to-face sessions were complemented by a Moodle-based course offering participants unrestricted access to diverse training resources, including presentations, tutorial videos,

and practical guides. The Moodle site was also used to administer short quizzes designed to allow participants check their understanding of concepts and skills covered by the training. At the end of the course, an evaluation questionnaire was also administered using the Moodle site. The link to the Moodle site is https://ecampus.idems.international/course/view.php?id=427

Figure 1: Moodle Site for Training



Topics and Content

As shown by figure 1, the training content was organised in 5 topics, one for each day. Below is detailed information about what was covered on each of the 5 days of the training:-

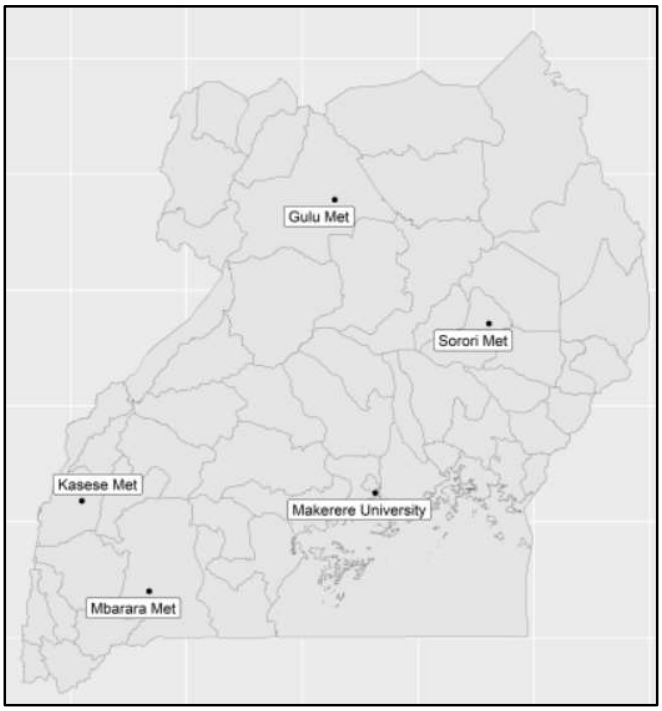
- Day 1: Monday 18 Nov - Introductions and Objectives
  - Official opening of the workshop including introductions by participants and facilitators
  - The project, training objectives and schedule/plan
  - R-Instat installation
  - Introduction to R-Instat using Tutorial
- Day 2: Tuesday 19 Nov – Tidying and Inventory Analysis
  - Importing data from 5 stations in Uganda
  - Tidying the data in preparation for quality checking and analyses
  - Inventory analysis to understand what's available and missing for each station and more gap filling where possible
- Day 3: Wednesday 20 Nov – Data Checking and Quality Control
  - Introduction to quality checks for rainfall and temperature data
  - Performing quality control checks and preparing data quality reports for each station

- Correcting simple anomalies in the data
- Day 4: Thursday 21 Nov – Climatic Summaries and Standard Products
  - Producing annual, monthly and decadal rainfall and temperature summaries from the daily records
  - Calculating and presentation of rainfall and temperature Normals 1991 -2020
- Day 5: Friday 22 Nov – Tailored Products
  - Introduction to PICSA to illustrate climate products for agriculture
  - Defining PICSA climate products for Uganda
  - Producing PICSA summaries and graphs including those for seasonal rainfall, start and end of rains, length of season, length of dry spells and extreme rainfall.

Training Data

For the participants to gain hands-on practical skills, UNMA agreed to supply real data from Uganda for the training as opposed to R-Instat's example datasets which belong to other countries. Daily rainfall and temperature datasets from 5 stations for the period 1991 to 2020 were supplied for the training. The stations were selected to represent the different climatic zones of the country as shown by the map below.

Figure 2: Station Data for Training



Participants

16 UNMA staff drawn from data, ICT, forecasting and climate services attended the training. There was a good representation of female participants (32.5%) in the training. The ages of the participants ranged from 25 to 60 years with most participants (11 out 16) aged between 25 and 44 years. Table 1 below provides list of participants.

Table 1: Names and Email Addresses of Participants

Name	email
Moses Tumusiime	tmoses2000@gmail.com
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Gertrude Oguaru	ogugertrude@gmail.com

Evaluation

At the end of the training, participants were asked to complete an evaluation to determine whether the training achieved its objectives and expectations.

The first part of the evaluation comprised 5 multiple choice questions measuring the R-Instat skill level of the participants to perform specific components of the statistical analyses of climate data. The results are shown in table 2 below.

As a result of the training, it seems that the participants were confident using R-Instat to import, tidy, examine, analyse climate data to generate climate summaries and products

Table 2: R-Instat Skills Evaluation

Question	Yes	Partially	No	Not Sure
I have a good overview of R-Instat	13	1		
I am able to use R-Instat to import and tidy climate data	14	2		
I am able to use R-Instat to check climate data for quality and correct errors	11	4		
I am able to use R-Instat to produce graphs, summaries and other visualizations of climate data	14	2		
I understand what tailored products are and I am able to use R-Instat to produce PICSA products	13	3		
I am able to use R-Instat to answer questions about climate data in my role	10	6		

The second part of the evaluation comprised open ended questions seeking to identify the sessions, and suggestions for improving the training in future.

According to most of the participants, the sessions on tidying, visualizing and summarising the data were most important. This implies that the whole training in general was useful. Some participants also appreciated the hands-on training style was important in making the training effective.

As for improvements to the training, most participants suggested the organisers should consider a two-week period for training so there is more time to correct all the data anomalies before the analysis, practice more and also extend the analysis to include more stations. Others suggested a follow-up training to teach advanced skills and topics building on this basic training. The advanced topic suggested by some participants is about methods for comparing and using satellite estimated climate data to complement sites with no station records.

Conclusion

The 5-day R-Instat training conducted for the Uganda National Meteorological Authority (UNMA) successfully met its objective of enhancing the participants' capacity to utilize historical climate data for time-series analysis. The practical approach and use of Uganda-specific datasets enabled participants to develop essential skills for data importation, quality control, visualization, and the generation of standard and tailored climate products. The evaluation results confirmed that participants gained confidence in employing R-Instat for these tasks.

Feedback highlighted the need for a follow-up training(s) to support further work on improving the data and/or cover advanced topics such as incorporating satellite climate data. These recommendations underscore the potential for future capacity-building initiatives to further support UNMA's critical role in climate analysis and early warning systems.

Overall, the training was a significant step toward strengthening UNMA’s ability to analyze and interpret climate data, paving the way for more robust climate risk and vulnerability assessments in Uganda.