Basic Climate Statistics Workshop in BMD(Bangladesh Meteorological Department)

Overview

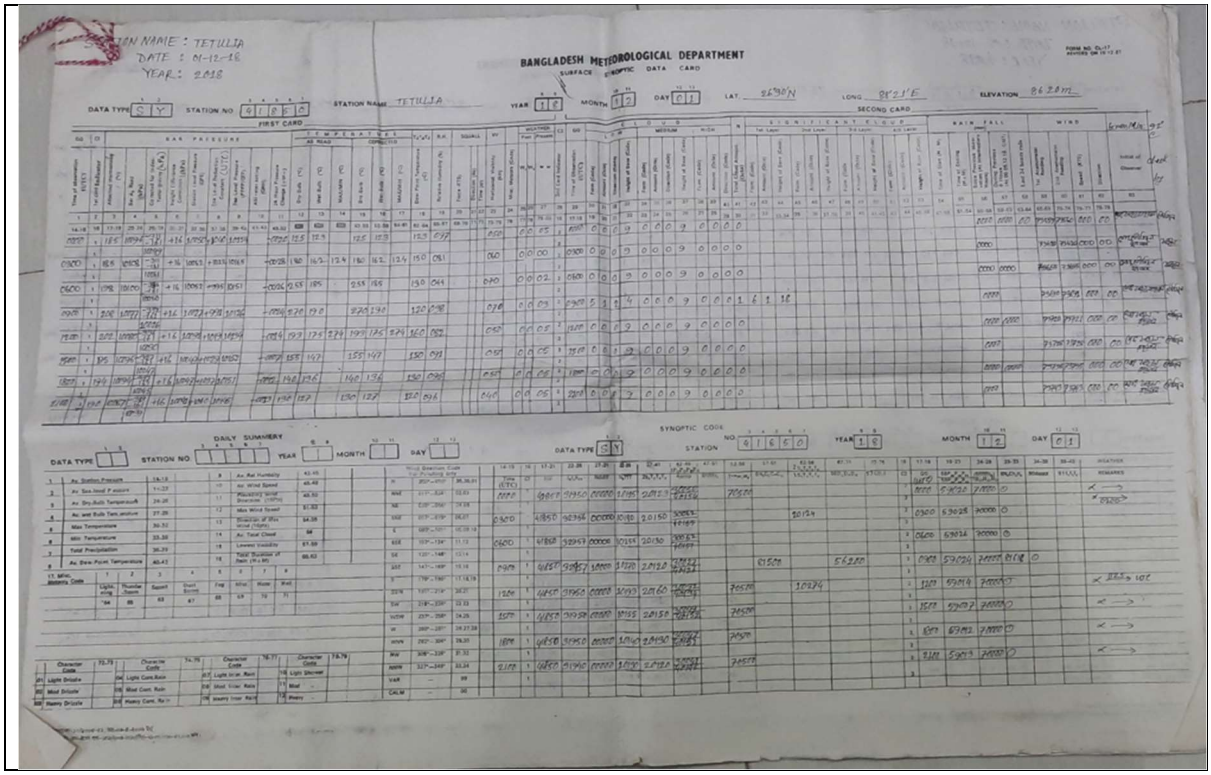
This report is on the conclusions for the WMO-LOA 2024 project. It follows the second of two one-week visits to the BMD Climatology Division. This was a training workshop for 10 staff, mainly from climatology.

The WMO project and the previous World Bank support

This small initiative through WMO follows a large 5-year project by the World Bank. The contrast was well emphasized on the first day of the R-Instat workshop, when an evaluation team, of 7 staff, from the World Bank, arrived to learn about the current state of the Clidata software, they had supplied earlier in 2024 for BMD. One parallel was that BMD had received a one-week training workshop on Clidata, in June 2024. This was an overlapping group to the one on the current R-Instat workshop. That workshop had fewer participants and two trainers. The staff of BMD are a talented, but also challenging group. If we have further R-Instat workshops, it will be important to emulate the Clidata formula and have 2 resource persons.

Within this project we were urged to learn more about the past work and future plans concerning data rescue by BMD. I report in this section, because of the recent data rescue activity undertaken as part of the World Bank support.

The main paper form to be rescued is shown here.



The data are 3-hourly and this is a form for a single day. The top half of the form contains the ordinary variables and these have all (or almost all) been digitized. The bottom section of the form had not been digitized. Hence, the rescue undertaken by the World Bank was to digitize the bottom of these forms. Their contract was to digitize 5 million records. (As I write this, I realise it must be 5 million values, not daily records.) They employed 6 or 7 staff, supervised by a retired BMD employee, and the work took about 6 months. This completed the digitization of the data from 1971, to 1981. They started with the early forms, because the paper copies were in poor shape. However, while undertaking this task, they did not photograph of any of the forms. Having reached 5 million, they stopped. The resulting files were given to the Climatology Division. They remain there, unused

We are now 3 years from this data rescue activity. These same forms continue to be collected at the 61 stations and the same data, in the bottom section of these forms, continues to **not** be digitized.

I queried what the plans were to rescue the remaining forms, or to photograph the paper forms, or to stop collecting the data in the forms, if they were never digitized, or seemingly used. I was informed that for this sort of important topic, they would set up a committee.

The R-Instat training workshop

The previous visit had indicated that the data in the Fortran Managed Database seemed good. There were minor problems identified in the data supplied that were either problems in the database, or in the Fortran scripts used to extract the data, for customers. We identified some tasks (Appendix 2 in the first report) and I was delighted that they were undertaken prior to this visit.

The staff provided 2 datasets for the workshop, one daily, and one a 3 hour set. They were each for 33 stations, from 1948. These were much better. However, there were still issues with the data. They were minor in the daily data, which was used for the training. Progress was such that, we did not need the 3-hour data.

My intention was for all 10 participants to become reasonably adept users of R-Instat. The first day was introductory, on the software. From day 2 we used only the Bangladesh data. I suggest this objective has been realized.

Progress was slower than expected for a variety of reasons. Hence the bulk of the workshop was on organizing and then checking the data. This confirmed that the quality of the data is excellent.

Furthermore, the data showed a welcome contrast to some other countries. There were, of course, occasional missing values, but they are very few in the recent years. Both the completeness and quality of the data in the recent years is very high. This is a testament to the quality of the staff at the individual stations, as well as the current system for data entry and quality control, into their Fortran database.

On the minus side I had expected to illustrate a variety of products, including the climate normals, and we did not get that far. Progress was slow, partly because I was the only resource person, and partly because the participants needed individual support. This was further compounded by problematic attendance. It was easy to start a break, but difficult to gather staff to then restart the training. I gather this is normal. I was given high praise as a trainer, primarily because I was claimed to have been the first to not lose my temper with them – and this was much appreciated!

There were further interruptions because this was a particularly important week for BMD. On day 1 we met the Director (Dr Md. Shadekul Alam). He announced that he was due to retire on the

coming Thursday – the last day of the workshop. But that his successor had yet to be nominated, so he might yet be asked to continue.

On Wednesday we learned that the head of climatology (Md. Momenul Islam) is the new director. Hence, on Thursday, the closing ceremony for the workshop was a surprisingly large affair, as it was also for two directors. One was on his last day of formal work, and the new director was just starting This was a first for me!

Workshop Evaluation

At the end of the workshop, an evaluation questionnaire was administered to determine whether the training was effective and achieved its objectives. The questionnaire comprised specific questions measuring the R-Instat skill level of the participants after the training in addition to some general questions about their opinions and views about the workshop.

The table below shows the results of the evaluation. The training seems to have been effective as most participants reported that they can use R-Instat to examine and check climate data as well as produce summary graphs.

After the training, I am able to R-Instat to:-	**Yes**	**Partially**	**No**	**Not Sure**
Examine climate data	8			
Check climate data for quality and correct errors	7	1		
Produce graphs, summaries and other visualizations of climate data	6	2		
Answer questions about climate data in my role	2	6		

Furthermore, most participants reported that they found the sessions on checking and examining the data for quality the most useful. The participants also reported that they liked how R-Instat makes it easy to perform the checks.

Suggestions for further training included a follow-up R-Instat training to teach them how to generate climate products.

The participants and detailed answers to two of the evaluation questions are on the last page of this report.

What's next?

The now-retired director, summed up the priority well in his presentation at the close of the workshop. BMD had earlier started using Clysis for their data management. This had not worked out. Now the World Bank project had supplied Clidata. He had helped specify the required data management system and had proposed an open source solution be obtained. Clidata is more comprehensive than Climsoft, but also clearly has a steeper learning curve. The director stated, in his view, Climsoft will be appropriate and sufficient for their needs.

I concur with this view. BLD plan to request Climsoft and I hope that UK Met may be prepared to support the installation. However, I propose it be a different installation, initially, to any other, of which I am aware. It should be installed "in series" with the existing Fortran-based system. The

current system of data-entry and quality control is working well. Hence the initial installation of Climsoft should build on that system, rather than replace it.

Hence, the data and meta-data from the Fortran-based system should be transferred, additionally, into Climsoft. In addition, a transfer scheme should be added so updated data is transferred automatically, perhaps on a weekly basis. The training should then be on how to manage these data, once in Climsoft, and how to provide them to users. Hence the existing data-entry, quality control and Fortran-based storage system should remain intact, probably at least for a year. What changes is the output of data and summaries, not the input. Output should only be from Climsoft. This will transform their data supply, for internal customers, for external users, and for future training courses.

The usual installation and training on Climsoft is over 2 weeks. I suggest this should again be the case here, even though there is less of Climsoft needed to train in the first instance. The priority is for Climsoft to become a key component of the management system for the manually collected data from their 61 stations.

Climsoft can also ingest and manage data from the automatic stations, and that is an important component of the normal installation process. I hope it can be included here too, but it should not be at the expense of ensuring that the main system, for the manual stations, works well. Following the installation staff should not be using the Fortran-based system for output, or summaries.

Staff were also keen for further training in R-Instat, particularly for products. This may be included in an initial request to UK Met, by BMD. It is clear that Climsoft, together with R-Instat can provide much that is in Clidata, but in a way that is easier to adopt, by the BMD staff. In addition R-Instat provides a range of products, that are also useful.

In the longer term the progress on data and products by staff at the headquarters, could usefully be implemented by the staff working at the individual stations. The current Excel, based data entry could be replaced by a web-based system of data entry, directly into Climsoft. This assumes Climsoft is working smoothly at the headquarters. There are substantial numbers of staff at each station, and hence they could also prepare products locally, i.e. through training in R-Instat.

I was impressed that the transformation of the staff, at the individual stations, from a manual, to an Excel-based data entry system was handled largely using local funds, with trainers who were staff members from the headquarters team. This proposal requires much more substantial training, but a parallel initiative, via an initial training of trainers, should therefore not be unduly costly, for a donor.

One surprise for me, in Bangladesh, was the lack of additional rainfall stations. One reason is that hydrology is handled by a separate organisation. Their website (http://www.hydrology.bwdb.gov.bd/index.php?pagetitle=ground_water-_hydrology&sub2=170&_subid=79&id=165), indicates over 300 stations for rainfall. I requested discussions, to assess whether future developments could usefully involve both organisations, and perhaps include data sharing. However, time was short. I hope any future proposals could consider both organisations.

In Conclusion

The current system for data entry and quality control works impressively. R-Instat was useful and was appreciated by the staff. It was also clear, that R itself, taught in the conventional way, would not have been suitable. One participant, Dr. Md. Bazlur Rachid was already an adept R-user, and a

user also of the current climatic data. He worked, with BMD colleagues, in a long-term project, in partnership with the Norwegian Meteorological Institute. He showed me an impressive recent publication Changing Climate of Bangladesh for which he is the first author. I gather this collaboration has recently been extended for a further five years. If the developments above are implemented then I hope maybe more BMD staff may become sufficiently skilled to be able to join the current teams.

The data processing staff and management are conscious they are using dated software tools and are very keen to use a modern data management system. However it must be appropriate for them, and be provided in an appropriate way that also facilitates the transfer from their current system.

Participants on the R-Instat training workshop

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Answers to two of the evaluation questions

With the skills I have learned in this training, I would like to use them in my work in new ways:	Do you have any other comments or feedback?
Loads	Test
Now i play with data that not like earlier	Really the training was good and for more benefit continuation is necessary.
Quality control of data with R-instat	The training was very important and helpful for us . Thanks.
After this training I learned to identify the data anomalies which is very useful to make the database perfect. Hopefully I will be able to utilize the knowledge that I achieved during Training in the sector of data quality control.	I like to convey my thanks to Mr.Roger for giving us a wonderful and helpful training session.
1. How to short out duplicate and missing values. 2. How to correct any anomalies or unexpected values. and 3. How to generate output from climate data using R-Instant.	We have learned many crucial parts of data management by using R-Instat. So I can honestly and firmly say that R-Instat has helped us a lot in data management and is an increasingly helpful software.
How to find missing value & How to Correct any anomalies.	I honestly happy to learn a new system like R-Instat that helps us improve our work
Yes	We need further advanced training for R-instat and also climsoft.
yes	