



SAHF DATAEX PLATFORM AND ECMWF DATA EXTRACTION ORIENTATION

VIRTUAL | 24 JUNE 2024

TRAINING OUTCOME REPORT

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BACKGROUND

The Department of Hydrology and Meteorology (DHM), Nepal identified a need to enhance its capabilities in extracting and utilizing data from the South Asia Hydromet Forum (SAHF) Data Exchange (DataEx) platform, particularly focusing on (European Centre for Medium-Range Weather Forecasts (ECMWF) data. The SAHF DataEx platform and ECMWF Data Extraction Orientation aimed to provide a comprehensive introduction to the tools and methods required to effectively download and use this data for DHM's operational needs.

RATIONALE FOR THE TRAINING

The training was necessary to enable DHM staff to effectively use the DataEx platform and ECMWF data for improved meteorological and hydrological applications.

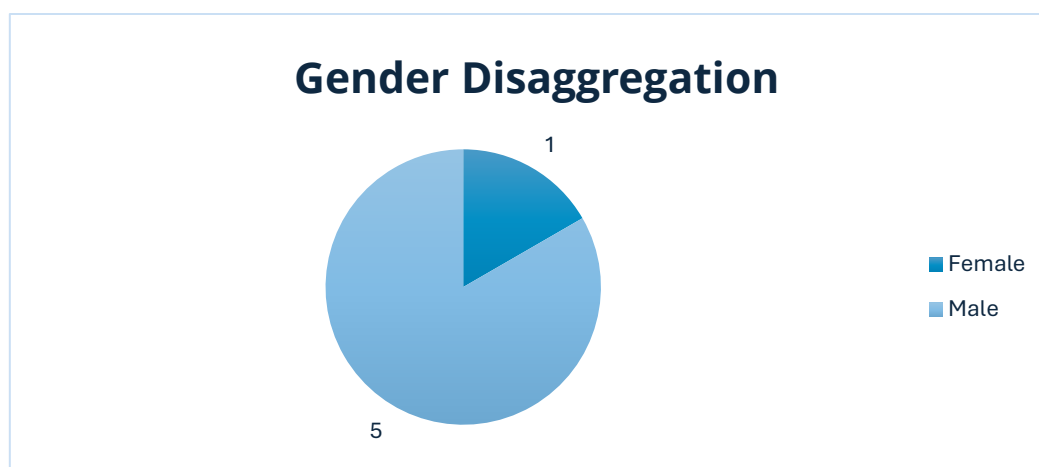
TRAINING OBJECTIVES

The orientation objectives were as follows:

- Provide an overview of the DataEx platform and its functionalities.
- Demonstrate the process of downloading NetCDF files using the Python API.
- Explore the ECMWF high-resolution forecast (HRES) data products available through DataEx and their applications.
- Outline the necessary software and prerequisites for working with NetCDF files.

PARTICIPANTS

The orientation was attended by six officials from the Department of Hydrology and Meteorology, representing different meteorological divisions. The participants ranged in age from 25 to 60 years and held varied roles, including those focused on knowledge enhancement, research, data management, operational decision-making, and skills development.



I. Gender distribution among the orientation participants

HIGHLIGHTS

Session 1: Overview of DataEx Platform

Resource Person: Mr. Nazmul Ahasan, RIMES

Type of Methodology Used: Lecture and demonstration

Participants were introduced to the DataEx platform, a robust system designed to facilitate seamless data sharing and collaboration among member countries. The session emphasized the platform's key features, including real-time data visualization, historical data access, and advanced security protocols. Attendees gained insights into how DataEx supports meteorological and hydrological services by ensuring reliable data exchange and enhancing forecasting capabilities. The discussion also covered ongoing developments in automatic quality control systems, which play a crucial role in maintaining data accuracy and consistency across diverse datasets. Overall, the session provided a foundational understanding of how DataEx enables efficient data management and enhances decision-making processes in meteorology and hydrology.

Session 2: Downloading NetCDF Files through the Python API

Resource Person: Mr. Nazmul Ahasan, RIMES

Type of Methodology Used: Lecture and demonstration

This session offered a comprehensive guide on leveraging the Python API to download NetCDF files from the DataEx platform. Participants received step-by-step instructions and practical demonstrations on using the API to retrieve specific subsets of meteorological and hydrological data. The tutorial covered essential topics such as parameter selection, customization options, and best practices for efficient data retrieval. Through hands-on examples, participants learned how to integrate downloaded data into their analytical workflows, thereby enhancing their ability to perform detailed analyses and generate actionable insights. By mastering these techniques, participants gained practical skills in leveraging Python for accessing and utilizing NetCDF files effectively within their professional contexts.

Session 3: Utilizing DataEx for ECMWF Data

Resource Person: Mr. Nazmul Ahasan, RIMES

Type of Methodology Used: Lecture and demonstration

Focused on accessing ECMWF data through DataEx, the session highlighted the platform's role in providing access to high-resolution ECMWF data products. Participants gained insights into the various ECMWF HRES data products available via DataEx, which are crucial for weather forecasting and climate analysis. Practical examples demonstrated how to integrate ECMWF data into predictive models and decision-making processes. By showcasing real-world applications, the session illustrated the platform's

capability to enhance accuracy in weather predictions and support informed decision-making across various sectors. Participants acquired valuable knowledge on leveraging DataEx to access and utilize ECMWF data effectively, thereby enhancing their ability to derive actionable insights and optimize operational outcomes.

Outputs

- Participants gained practical knowledge of the DataEx platform for data observation, downloading, and analysis.
- Successful demonstration of methods for accessing and using ECMWF data through DataEx.
- Increased participant confidence in managing and analysing meteorological data using the covered tools and techniques.

Issues/Concerns Raised and Resolutions

Issue: Data Privacy Concerns-Data security and privacy when using the DataEx platform.

Resolution: The sandbox feature was demonstrated that allow users to test and work with data in a secure, isolated environment. The data encryption methods used by DataEx was discussed, highlighting the platform's compliance with international data security standards.

Issue: Automated Quality Control-Effectiveness and reliability of the automated quality control system in DataEx.

Resolution: The automated quality control processes was detailed, covering how the system flags data anomalies and the verification steps by country members. The ongoing improvements to enhance system accuracy was also discussed.

Issue: Forecast Data Accuracy- Accuracy and reliability of forecast data provided through DataEx.

Resolution: The integration of multiple forecast models within DataEx was discussed, how they are continuously calibrated and validated, and shared insights into collaborations with leading meteorological institutions to improve forecast verification and accuracy.

Discussion Highlights

- Need for individual user accounts for forecasters accessing the platform, beyond the current single account setup.
- Discussion on parameters available for download from ECMWF and their applicability beyond surface levels.
- The importance of verification metrics and bias correction in forecast models was highlighted.

- Issues related to the absence of observation data for Nepal were discussed, impacting verification processes.
- Requests were made for additional features such as hourly precipitation and wind data, which are currently not available but are critical for operational forecasting in Nepal.
- Queries were raised about integrating historical thunderstorm data for research and insurance purposes.
- The SAHF Knowledge Hub, a repository for training materials and knowledge resources, was introduced as a crucial support tool for operational forecasters.
- Plans were discussed for hands-on training sessions to familiarize users with the platform's functionalities and improve operational efficiency.
- Plans to integrate data from NCMRWF into the platform were discussed, pending further meetings and collaborations.

OUTCOMES

Knowledge, Skills, and Abilities (KSA)

Participants reported significant enhancements in their understanding of the DataEx platform and its functionalities. This improved knowledge has equipped them with the capability to utilize ECMWF data for various meteorological and hydrological applications, thereby enhancing their operational decision-making processes. Furthermore, the training sessions have developed participants' skills in downloading and managing NetCDF files through the Python API, which is crucial for handling large datasets and performing advanced data analyses. These newly acquired skills have increased their ability to integrate the DataEx platform into daily operations, enabling more efficient, data-driven decisions. Participants also expressed increased confidence in troubleshooting common issues related to NetCDF files, although some participants still feel less confident in this area and would benefit from additional support.

Learning

The orientation sessions effectively provided an overview of the DataEx platform and its various applications. Participants found the sessions on downloading and managing NetCDF files through the Python API particularly beneficial, although they noted that hands-on exercises are necessary to reinforce this learning. The training has empowered participants to apply the data and skills acquired to their specific operational contexts, such as forecasting and climatic analysis. Additionally, the orientation has bolstered participants' research capabilities by improving their data management and utilization skills, making them more adept at handling and analysing complex datasets.

Further Training Gaps and Feedback

Despite the overall effectiveness of the training, several gaps have been identified. Participants highlighted the need for more hands-on training sessions to solidify the theoretical knowledge provided during the orientation. Practical, onsite training sessions were recommended to give participants direct experience with the tools and data, which would further enhance their learning. Some participants also noted the need for specialized training to address the challenges of forecasting over complex terrains. While the overall orientation was well-received, with appreciation for the clarity and confidence of the trainers, the length of the sessions was deemed insufficient by some, suggesting a need for extended or additional sessions. Participants expressed a desire for more interactive and practical components to complement the theoretical lessons.

Insights and Opportunities

The training has provided participants with valuable insights into effectively using the DataEx platform and ECMWF data, which can significantly enhance their operational efficiency and accuracy. This new knowledge provides opportunities for better integration of data extraction and application processes within their institutions. By addressing the identified training gaps and incorporating participant feedback, future training sessions can be more effective and impactful. Continuous training and development will be crucial in maintaining and further enhancing the knowledge, skills, and abilities of the participants, ensuring they remain proficient in using advanced data management tools and techniques.

FEEDBACK

The orientation sessions received varied feedback from participants, highlighting several strengths and areas for improvement. Participants found the orientation relevant to their work, particularly in enhancing their knowledge and skills in data management and operational decision-making. Specifically, the orientation improved their understanding of the DataEx platform, skills in downloading and managing NetCDF files, and the utilization of ECMWF data.

Participants appreciated the detailed demonstrations provided during the sessions. The "Overview of DataEx Platform" session was particularly well-received. However, there was a consensus on the need for more hands-on training to complement theoretical knowledge. Some sessions, like "Utilizing DataEx for ECMWF Data" and "Downloading NetCDF Files through the Python API," were rated as relevant and satisfactory, but participants emphasized the need for practical application through hands-on exercises.

Feedback also included requests for additional features, such as hourly data for nowcasting, integration of historical thunderstorm data, and access to specific forecast products. Participants expressed the need for a dedicated support channel for ongoing troubleshooting and assistance.

Moreover, the delivery of the sessions was generally well-received, with high marks for clarity, conciseness, and the effectiveness of the trainers. Participants felt the trainers were supportive and approachable, contributing positively to the learning experience. Confidence levels post-orientation varied, with many expressing confidence in using the DataEx platform but showing uncertainty in troubleshooting common issues related to NetCDF files.

RECOMMENDATIONS

- Conduct more practical, hands-on training sessions to enhance participants' ability to apply the theoretical knowledge gained. Interactive sessions where participants can engage directly with the DataEx platform and work on real-world problems are recommended.
- Provide onsite training opportunities focusing on real-world applications, operational forecasting, and utilizing ECMWF data effectively. These sessions should address specific challenges, such as improving forecasting over complex terrains.
- Extend the duration of orientation sessions and provide a more flexible schedule to ensure comprehensive coverage of all topics and allow adequate time for practice and Q&A.
- Address the need to improve forecasting accuracy over complex terrains. Future training should offer advanced techniques and strategies to enhance reliability.
- Explore the possibility of integrating additional features requested by participants, such as hourly data for nowcasting, historical thunderstorm data, and specific forecast products.
- Set up a dedicated support channel to provide ongoing assistance and troubleshooting for participants. This will help maintain and enhance their skills post-orientation.
- Request DHM to provide detailed lists of required data and forecast products to better integrate and support these needs.
- Utilize the SAHF NWP Working Group support to streamline expedite the implementation of new features requested by participants.

ANNEX I: TRAINING NOTE AND AGENDA

CONCEPT NOTE AND MEETING AGENDA: SAHF DATAEX PLATFORM AND ECMWF DATA EXTRACTION ORIENTATION

Date: 24th June 2024

Time: 14:00 (Nepal Time) | 15:15 (BKK)

Meeting Link: <https://meet.google.com/ocq-dhzw-aog>

Introduction

The Department of Hydrology and Meteorology (DHM), Nepal has identified a need to enhance its capabilities in extracting and utilizing data from the DataEx platform, particularly focusing on ECMWF data. This orientation meeting aims to provide a comprehensive introduction to the tools and methods required to effectively download and use this data for DHM's operational needs.

Objectives

- Provide an overview of the DataEx platform and its functionalities.
- Demonstrate the process of downloading NetCDF files using the Python API.
- Explore the ECMWF HRES data products available through DataEx and their applications.
- Outline the necessary software and prerequisites for working with NetCDF files.

Expected Outcomes

- Participants will gain a clear understanding of the DataEx platform and its functionalities.
- Participants will be equipped with the skills to download and manage NetCDF files using the Python API.
- Improved ability to utilize ECMWF data for DHM's hydrological and meteorological applications.
- Participants will be aware of the software requirements and be able to troubleshoot common issues.

AGENDA

Time	Agenda Item	Resource Person	Description
2:00 - 2:10 PM	Introduction and Welcome	Ms. Puja Shakya, RIMES	Welcome participants and provide an overview of the meeting objectives.
2:10 - 2:25 PM	Overview of DataEx Platform	Mr. Nazmul Ahasan, RIMES	Introduction to DataEx platform, its key features, and capabilities.
2:25 - 3:00 PM	Downloading NetCDF Files through the Python API	Mr. Nazmul Ahasan, RIMES	Step-by-step guide on using the Python API to download a subset of NetCDF files, including a demonstration.
03:00- 3:25 PM	Utilizing DataEx for ECMWF Data	Mr. Nazmul Ahasan, RIMES	Accessing ECMWF data through DataEx, overview of available ECMWF HRES data products, and practical examples.
3:25 - 3:40 PM	Prerequisites and Software Requirements	Mr. Nazmul Ahasan, RIMES	Required software for working with NetCDF files, installation, configuration, and troubleshooting tips.
3:40- 3:50 PM	Discussion and Q&A	Dr. K.J. Ramesh, RIMES/All Participants	Open floor for questions, discussions, and clarifications.
3:50 - 4:00 PM	Wrap-Up and Next Steps	Ms. Puja Shakya, RIMES	Summary of key points, follow-up actions, and concluding remarks.

ANNEX II: PARTICIPANTS LIST

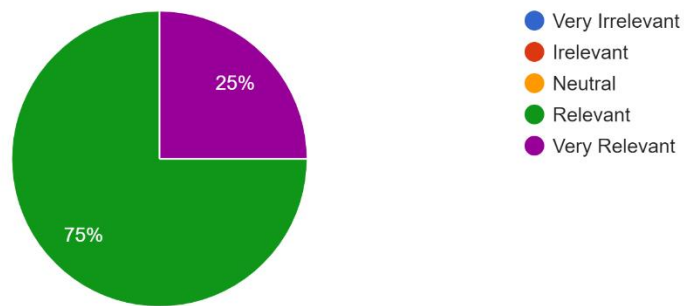
S No.	Name	Designation	Institution	Gender
1	Raju Dhar Pradhananga	Senior Divisional Meteorologist	Department of Hydrology & Meteorology	Male
2	Sudarshan Humagain	Meteorologist	Department of Hydrology & Meteorology	Male
3	Govind Kumar Jha	Meteorologist	Department of Hydrology & Meteorology	Male
4	Saroj Pudasainee	Meteorologist	Department of Hydrology & Meteorology	Male
5	Sanjib Adhikari	Meteorologist, MFD	Department of Hydrology & Meteorology	Male
6	Bibhuti Pokharel	Senior Divisional Meteorologist, Agromet Section	Department of Hydrology & Meteorology	Female

ANNEX III: POST TRAINING ASSESSMENT

RELEVANCE

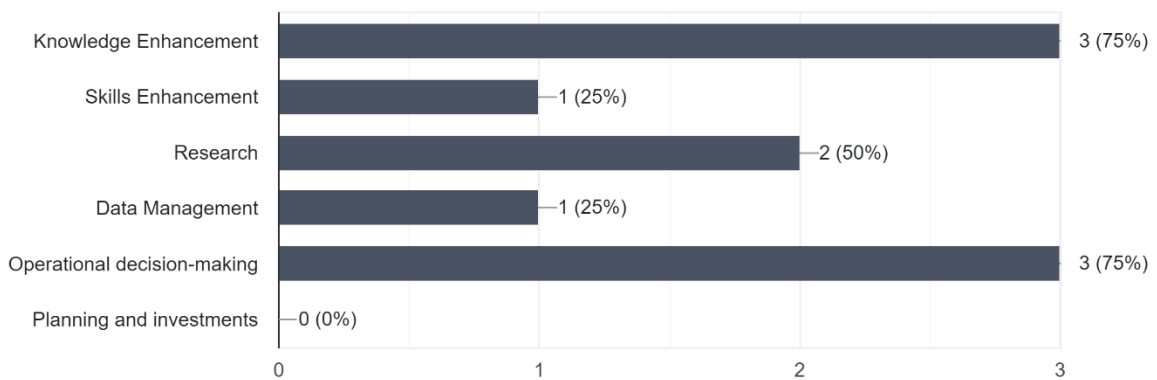
How relevant is this orientation in your work/institution?

4 responses



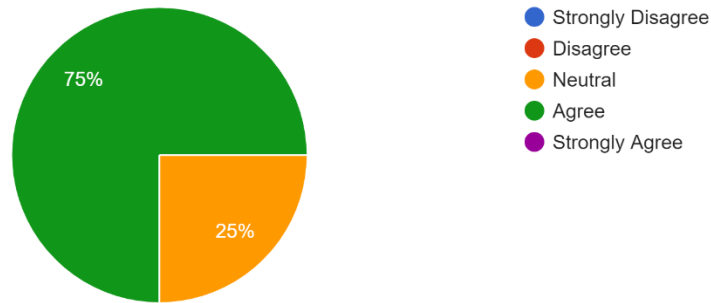
Please identify specific areas where the orientation might be relevant

4 responses



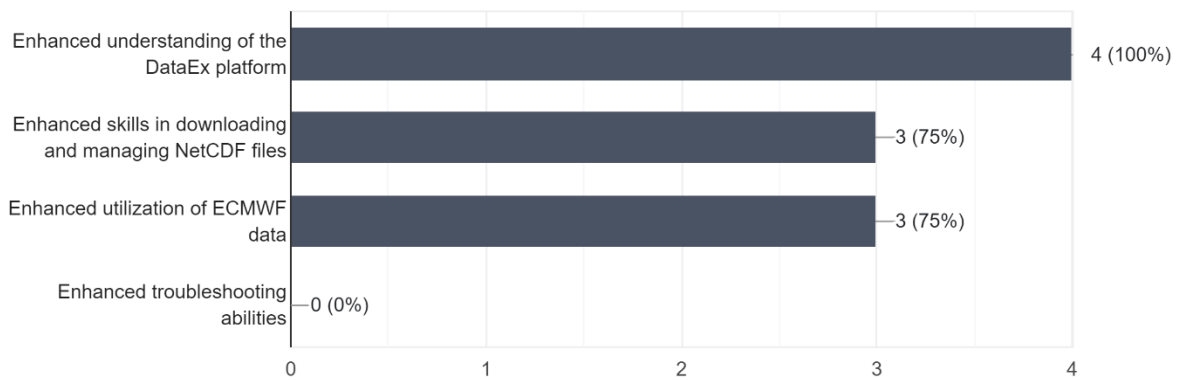
This orientation has addressed gaps in data extraction and application in your operational and tactical plans.

4 responses

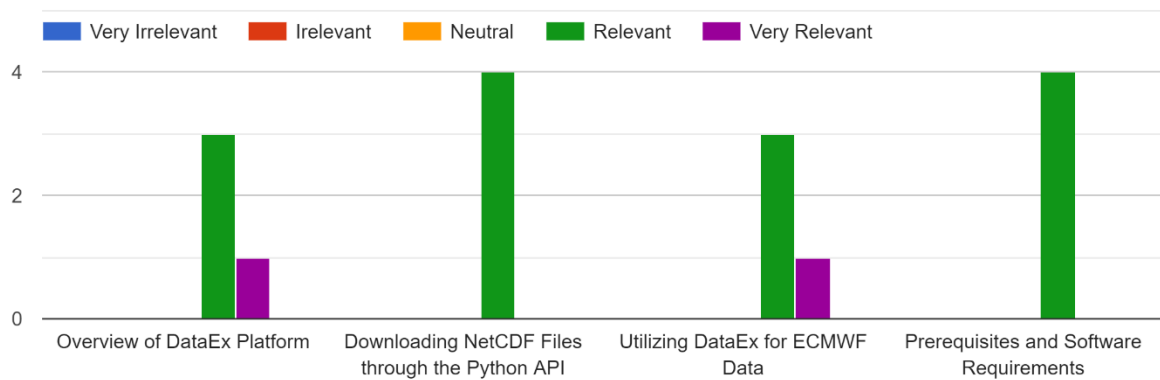


Please identify areas where the training has made/might have an impact

4 responses

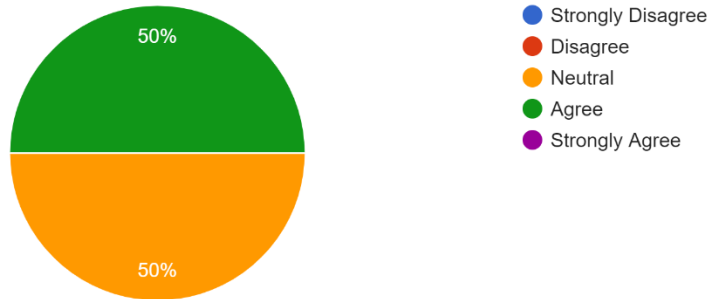


How relevant are the following orientation sessions?



This orientation complements/contributes to other programs, projects, and activities related to data extraction and application.

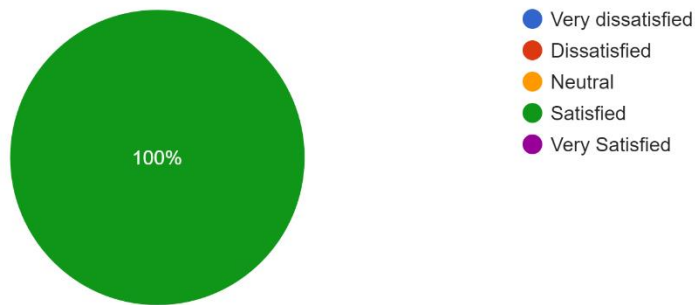
4 responses



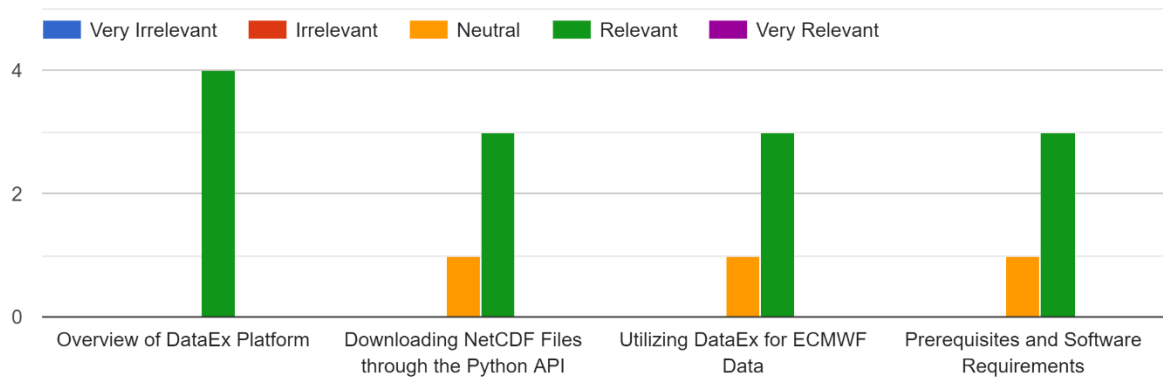
EFFECTIVENESS

Overall, how satisfied are you with this orientation?

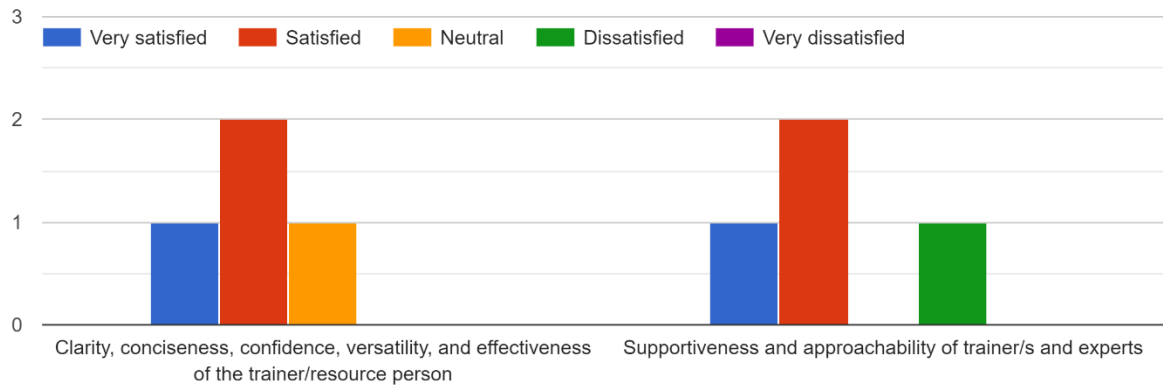
4 responses



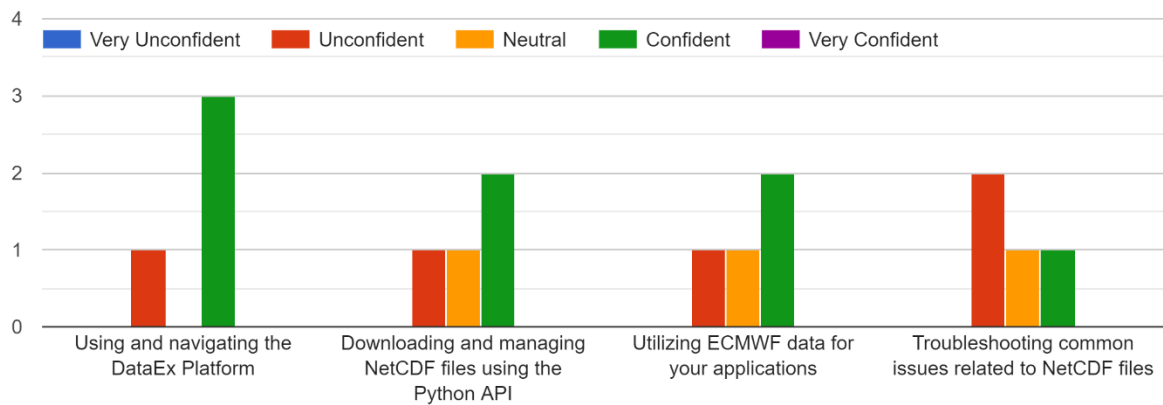
How satisfied are you with the orientation sessions/hands-on exercises (e.g., clarity, conciseness, timeliness, and effectiveness of the content and materials)?



How satisfied are you with the delivery of the orientation sessions?



Post orientation, how confident are you in:



How likely are you to apply knowledge/skills gained to your work after this training?

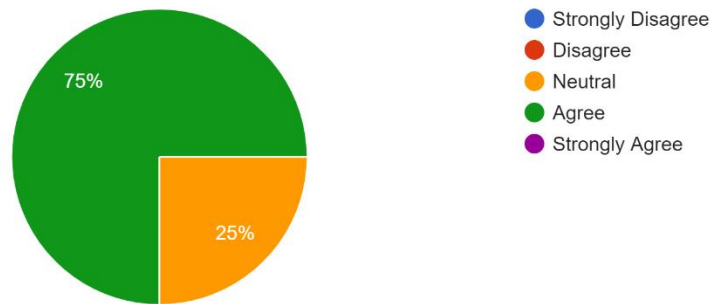
4 responses



EFFICIENCY

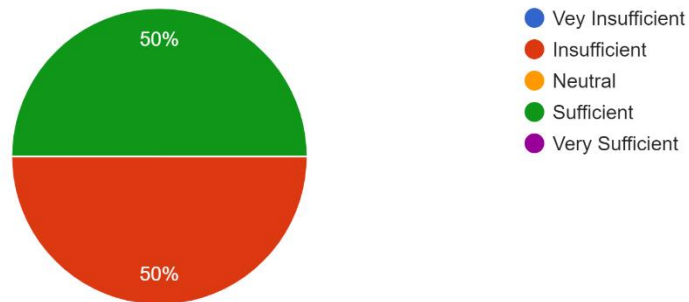
This orientation is well-planned (e.g. schedule, agenda, topics, presenter).

4 responses



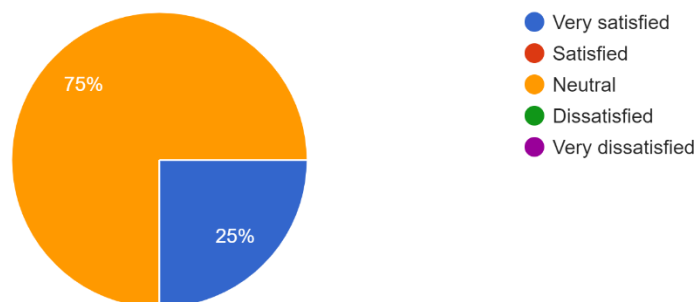
Was the length of orientation sessions sufficient?

4 responses



How satisfied are you with the coordination of this orientation (e.g., communications, logistics, support)?

4 responses



LESSONS LEARNT AND RECOMMENDATIONS

What went well? What areas need improvement?

4 responses

More friendly.
orientation was good. hands-on training is needed.
Need to improve on forecasting, overestimated over the Complex terrain need to improve.
Overview of DataEx platform went well. The training should be complimented with hands on.

What insights/opportunities have you gained from this training that you can apply in your work?

4 responses

Operational forecasting.
can use ECMWF data for various climatic analysis.
I have learned how to use the DataEx platform downloading NetCDF data.
Use of ECMWF data

What recommendations can be made for enhancing subsequent orientation/trainings?

4 responses

Onsite training is recommended. should be more practical
hands-on training is needed so that we can use the DataEx platform.
Conduct surveys or hold focus groups with participants to gather feedback on the training content, delivery style, and overall effectiveness. Use a variety of instructional methods, such as lectures, hands-on exercises, and case studies.
Hands on trainings