DISCUSSION OUTLINE

1. Progress Overview
2. Progress Highlights
3. Partnerships and Collaborations
4. Key Challenges
5. Lessons Learned
6. Way Forward

PROGRESS OVERVIEW

- **Expanded Technical Scope**
Two new Working Groups (WGs) formed: Hydrology and Climate Services, complementing existing thematic areas.

- **Capacity Building and Knowledge-Sharing**
Specialized training programs (e.g., on ocean forecast customization, NWP verification) has significantly enhanced NMHSs' operational capabilities.

- **Digital Platforms Enhanced**
Upgraded SAHF Knowledge Hub (SKHub) and Data Exchange (DataEx) platforms for better access, usability, and interoperability.

- **Centralized Data Infrastructure Established**
Dedicated Data Centre at RIMES operationalized to host SAHF tools including IBF, SKHub, and DSS platforms.

PROGRESS OVERVIEW

- **Operational Advisory Support**
  Technical Advisory Group (TAG) formed in January 2024 to guide SAHF's technical direction.

- **Thematic Roadmaps Developed**
  Strategic plans and roadmaps for OBN, NWP and IBF were drafted and refined, forming the basis of the next implementation phase (2025–2027).

- **Forecasters' Forum (FForum) Expansion**
  The FForum continues to serve as a cornerstone of regional forecasting collaboration, having conducted over 160 weekly sessions and 7 special sessions.

Progress Highlights

ANNUAL CONFERENCE

SAHF IV

- SAHF IV was held in Colombo in February 2024 to strengthen regional collaboration on weather, water, and climate services.

- The forum emphasized creating actionable value through hydromet services, regional observation networks, early warning systems, and user-driven decision support tools.

- Key discussions included integrating AI in forecasts, enhancing impact-based forecasting, fostering multi-sectoral Communities of Practice, and leveraging private sector innovation.

- Participants called for open data sharing, long-term programmatic investments, and stronger ties between NMHSs and user communities.

- The SAHF IV Declaration reaffirmed commitments to improve forecasting services, deepen collaboration, and build resilient infrastructure and systems across South Asia.

HYDROLOGY WORKING GROUP

- The inception meeting was held in April 2024, focusing on strengthening flood forecasting and drought monitoring systems across the region.

- Participants from SAHF member countries and partners (World Bank and RIMES) discussed key hydrological challenges, emphasizing the need for cross-border collaboration and capacity building.

- Members reviewed and provided feedback on the draft Terms of Reference (ToR), with suggestions aimed at clarifying objectives, responsibilities, and coordination mechanisms.

- **Next steps**: finalize the ToR, host technical knowledge-sharing sessions, and draft a Working Paper to guide regional actions on hydrological risks.

IBF WORKING GROUP

- IBF WG meet in Bangkok in July 2024 along with regional stakeholders to advance Impact-Based Forecasting (IBF) capabilities in the region.

- The meeting translated strategic goals from the SAHF Executive Council into action plans focused on collaboration, capacity-building, and user-centered forecast products.

- Countries shared IBF progress and challenges, highlighting needs for localization, data integration, and engagement with sectoral agencies, particularly in agriculture, health, and disaster risk reduction.

- A key focus was on developing a customized IBF toolkit targeting high-priority hazards like heatwaves, lightning, and forest fires, with strategies for verification and public education.

- **Next steps**: toolkit development, training initiatives, and deeper integration with early warning systems and regional platforms like SWFP and SASCOF.

NWP WORKING GROUP

- The NWP Working Group (WG) meet in Bangkok in February 2025 to develop a Regional NWP Strategy and Roadmap (2025–2030) for South Asia.

- Participants identified critical challenges including limited access to global data, low nowcasting capacity, and lack of standardized verification tools.

- The strategy is built on three pillars: Impact (operational efficiency), Science & Technology (forecast accuracy), and R&D (climate diagnostics).

- Countries emphasized leveraging AI/ML, building national strengths (e.g., marine, mountain, lightning forecasting), and adopting unified forecasting tools.

- The strategy was formally adopted by the WG and awaits endorsement from the SAHF EC for implementation.

CLIMATE SERVICES WORKING GROUP

- The Climate Services (CS) WG will support regional collaboration on climate-informed decision-making, sectoral engagement, and long-term strategy development.

- The ToR for the CS WG have been developed, providing a clear mandate, objectives, and coordination mechanisms.

- Formation of the WG has been initiated, with nominations underway from SAHF member countries.

TRAINING ON CUSTOMIZATION OF OCEAN FORECAST PRODUCTS

20–24 May 2024

Indian National Centre for Ocean Information Services (INCOIS)

Strengthen the capacity of coastal NMHSs in customizing ocean forecast products for enhanced maritime safety and climate resilience

- 11 NMHS professionals from Bangladesh, Maldives, Myanmar, and Sri Lanka participated, engaging in both theoretical sessions and hands-on exercises on tools such as SWAN, WWIII, ADCIRC, Ferret/PyFerret, and SARAT.

- Participants gained operational knowledge of INCOIS services and tools, with significant improvements in skills related to forecast customization, data visualization, and ocean data analysis.

- Key recommendations: more hands-on sessions, extended duration, modular training tracks, and follow-up engagements, including country-specific applications and technical attachments with INCOIS.

DATAEX PLATFORM ORIENTATION

📅 24 June 2024

🎯 Build the capacity of Department of Hydrology and Meteorology (DHM) - Nepal to access and utilize ECMWF data via the SAHF DataEx platform

- 6 DHM officials participated, gaining foundational skills in downloading and analyzing NetCDF files using Python and understanding applications of ECMWF high-resolution forecasts (HRES).

- Sessions covered platform features, secure data access, and data extraction methodologies, with emphasis on forecast accuracy, quality control, and real-time data visualization.

- Participants expressed increased confidence in operational data use, but highlighted the need for more hands-on training, terrain-specific forecasting support, and additional platform features (e.g., hourly precipitation, wind data).

- Key Recommendations: onsite practical sessions, extended training durations, user account enhancements, and a dedicated support channel for troubleshooting and continued learning.

REGIONAL WORKSHOP ON SAHF FFORUM EXPANDED SERVICE SUPPORT

📅 29-30 July 2024

🎯 Convene forecasters from across South Asia to strengthen collaboration and forecasting capabilities

- The event brought together 18 professionals from 9 NMHSs in the South Asia

- Core sessions focused on integrating advanced tools such as AI/ML, ensemble forecasting, medium-to-extended range products, and Ocean State Forecasts.

- Participants identified key gaps in data access, model usability, and forecast verification, and emphasized the need to align FForum outputs with the IBF process.

- Key Recommendations: monthly extended sessions, standardized reporting templates, and targeted training to sustain FForum's relevance and operational impact.

TRAINING ON FORECAST INTERPRETATION & VERIFICATION

📅 23-27 September 2024

🤝 National Centre for Medium Range Weather Forecasting (NCMRWF)

🎯 Enhance SAHF NMHSs' capacity in interpreting and verifying NWP products, with a focus on operational forecasting and impact-based services

- 17 participants from 6 South Asian countries engaged in interactive sessions on probabilistic forecasting, ensemble techniques, extreme weather prediction, and model verification using tools like MET, MODE, and CRA.

- The training combined lectures, real-world case studies, and hands-on exercises (Linux scripting, NetCDF handling, forecast verification in R), significantly improving participants' analytical and technical capabilities.

- Key recommendations: longer duration, more practical exercises, access to training materials via SAHF Knowledge Hub, and regular follow-up sessions to support skill retention and regional collaboration.

PLANNING WORKSHOP ON IBF AND CLIMATE SERVICES

📅 21-24 January 2025

🎯 Strengthen regional collaboration on IBF and climate services

- A regional IBF framework and toolkit will be developed, with initial piloting on temperature extremes (heat and cold) from 2025–2027 (upon endorsement of workplan by EC).

- Stronger cross-WG coordination (IBF, NWP, CE, CS) was proposed to align technical inputs, training, and data sharing.

- The CS WG was proposed to coordinate sectoral priorities and develop long-term strategies.

- Key priorities included capacity building (Train-the-Trainer model), DSS development, local engagement, GESI integration, and institutionalizing IBF in national systems.

SAHF KNOWLEDGE HUB (SKHUB) AND DATAEX PLATFORM TRAINING WORKSHOP

27 February 2025

Enhance the capacity of South Asian NMHSs in using SKHub and DataEx for forecasting and data sharing

- SKHub was introduced as a regional learning platform offering LMS features, expert-led modules, and resources to support continuous capacity building.

- DataEx was demonstrated as a real-time, secure platform for sharing, visualizing, verifying, and automating forecast data across countries.

- Hands-on training sessions helped participants practice data extraction, geospatial analysis, and forecast verification techniques.

- Key recommendations: adding country-specific sessions, enhancing platform usability, and integrating Python training and API documentation.

Progress Highlights

FORECASTERS' FORUM

OVERVIEW

168

Sessions
since Feb 2022

7

Special Sessions

2

FForum Reviews

SPECIAL SESSIONS

- **Review of the Southwest Monsoon 2023**
  25 January 2024, Virtual

- **Lecture Series on ENSO, Ocean Warming and Monsoon**
  22 February 2024, Virtual

- **Special Session to address Cyclonic Storm "REMAL" and its impact on the monsoon season**
  27 May 2024, Virtual

- **Special Lecture on the Mid-season Review of the Southwest Monsoon 2024**
  22 August 2024, Virtual

- **Review of South West Monsoon 2024**
  03 April 2025, Virtual

ANNUAL REVIEW OF THE SAHF FFORUM 2023

- In the 2023 review, 26 participants from eight countries acknowledged the forum's strong regional relevance and engagement.

- All respondents agreed that the forum's content supports forecasting operations, particularly for extreme weather events.

- 96% of participants found the tools and methods shared—adaptable to their national forecasting needs.

- The forum significantly improved forecast accuracy, early warning dissemination, and institutional collaboration.

- Participants suggested improvements including more region-specific case studies, hands-on training on emerging technologies like AI, and better scheduling.

- There is strong support to institutionalize the forum as part of NMHSs' regular capacity-building efforts and to promote joint forecasting initiatives.

ANNUAL REVIEW OF NMHSs - PAKISTAN

Conducted on 29 November 2024 in Islamabad, the assessment focused on evaluating PMD's operational services, institutional capacities, and user engagement strategies.

Key Takeaways:

- Enhancements required in feedback mechanisms to improve responsiveness and service quality.

- Greater integration of PMD's products and services with user sectors emphasized for improved application and impact.

- Strengthened coordination between PMD and stakeholders recommended to support climate-informed planning and risk management.
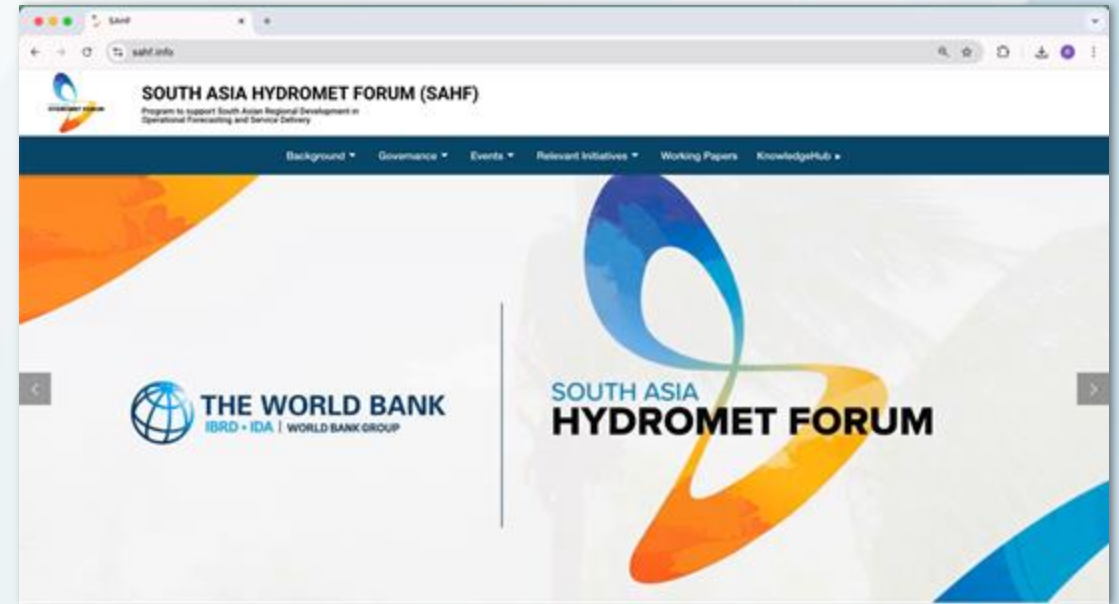
Progress Highlights

SAHF KNOWLEDGE HUB & DATA EXCHANGE PLATFORM

knowledgehub.sahf.info | dataex.rimes.int

SAHF WEBSITE

- The website (sahf.info) serves as a centralized platform to consolidate all SAHF activities, including information on Working Groups (IBF, NWP, CE, etc.), training and events, EC Meetings, Annual Conferences, and other relevant initiatives

- Data related to SAHF's events, both past and ongoing, including agenda, documents, presentations, photos, and media, are made available on the platform

- Includes a dedicated link to the SAHF Knowledge Hub, offering users access to an extensive repository of resources, references, and knowledge products relevant to hydrometeorological practices in South Asia

- Integrates a collection of working papers that address key topics within the SAHF Thematic Areas, supporting knowledge dissemination and thematic research engagement
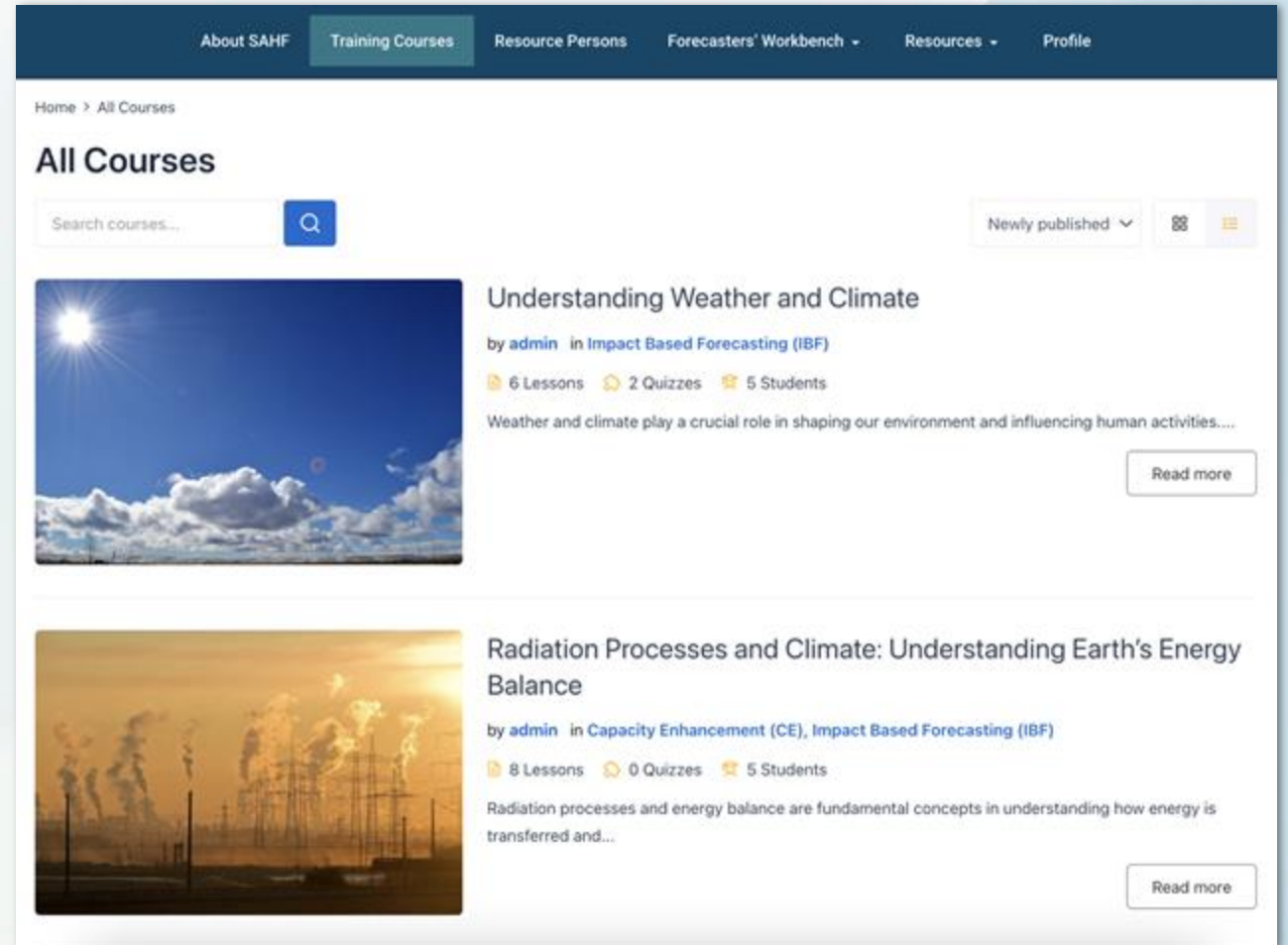
SAHF KNOWLEDGE HUB

- Introduced Forecasters' Forum and facilitation of Archived Reports from all recorded forecasters' forum

- Collected and integrated a curated collection of Learning Resources such as: Open Access Courses, Libraries, Educational Videos and Articles on Hydrology and Meteorology

- Established a resource library of Ebooks with a collection of books on hydrology, meteorology, climate services and many more

- Provided access to SAHF Video Podcast and The WeatherPod Podcast series

- Linked the Data Exchange Platform (DataEx) into SKHub along with an informative video explaining DataEx and it's features

- Provided access to atlas' and manuals from different hydromet organizations

- Integrated and introduced the Learning Management System (LMS) for SAHF Knowledge Hub

SAHF KNOWLEDGE HUB

Key Features of the LMS:

✓ Courses developed by SAHF Resource Persons (Experts) and categorized according to SAHF Thematic Areas.

✓ Automatic course progress tracking was implemented to help users monitor their learning journey.

✓ Functionality implemented to allow users to search, filter, and enroll in courses upon registration.

✓ Comment and discussion section integrated to support learner engagement and interaction.

SAHF KNOWLEDGE HUB

Key Features of the LMS:

✓ Profile section added, allowing users to view course statuses, resume courses, manage personal details such as name, avatar, and password, and access earned certificates

✓ Certificates integrated to be made available upon course completion and can be downloaded by users

✓ User Reviews implemented which enabled enrolled users to leave reviews and star ratings, with the system calculating an average course rating based on all submitted feedback

✓ Searchable and filterable list of Resource Persons implemented, enabling users to browse by criteria such as Name, Email, SAHF Thematic Area, Organization, and Country, view detailed profiles, and contact them directly via email
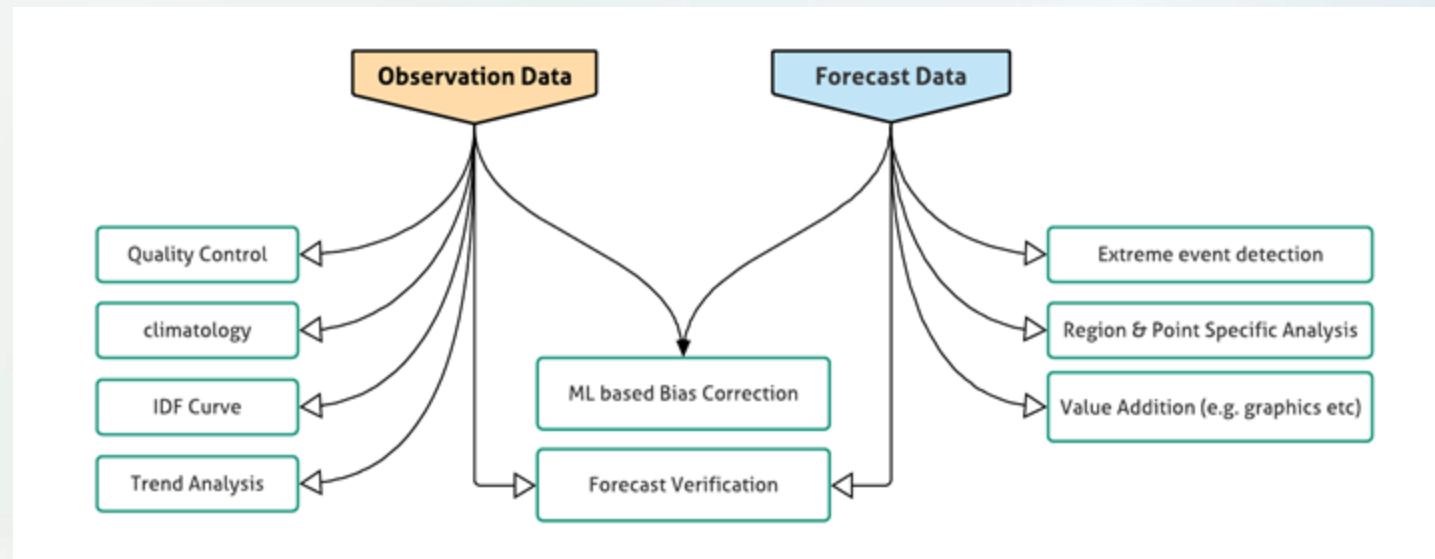
SAHF KNOWLEDGE HUB

Key Features of the LMS:

✓ Quiz integrated into the platform, allowing users to test their knowledge, track their past results, and receive scores upon completion

✓ Glossary feature integrated within courses and lessons, offering tooltips for complex terms, redirecting users to detailed explanation pages upon clicking, and providing a glossary listing page with alphabetical filtering for easy navigation

Ongoing: Development of the **Communities of Practice (CoP) feature** that would enable peer-to-peer knowledge exchange through discussion forums where members can ask and answer questions, with automated email notifications sent to encourage participation whenever a new question is posted

DATAEX PLATFORM

Dataex platform works as a central hub of sharing observation and forecast data between RIMES member countries. DataEx has a robust set of modules which allows user to

- Share and analyze observation data
- Visualize and Access raw forecast data form global producing centers.
- Perform various spatial analysis on top of forecast data; with user defined assets e.g. shapefile, points.
- Generate forecast graphics from different forecast sources.
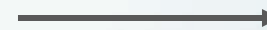
DATAEX PLATFORM: Analysis

Users can request reduced forecast data (e.g. average, weighted average, maximum, minimum etc.) under a polygon region, with assets[1] from assets manager. This will be useful for extracting basin average rainfall most commonly used in hydrological modelling. Also an option to extract forecast data for a specific grid with interpolation.

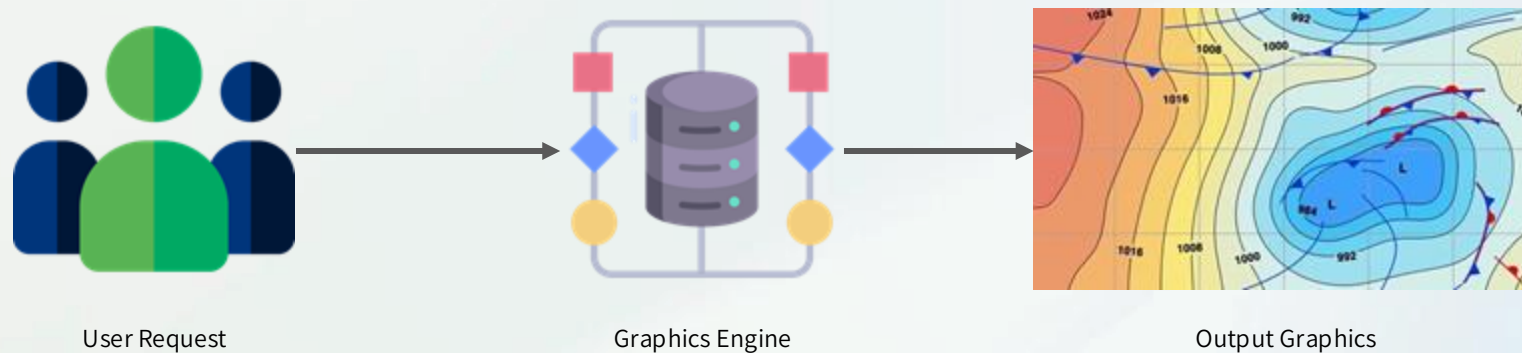| Asset - shapefile of basin | Weighted average processing | Forecast Time-Series |

1. Assets: ESRI Shapefile/ GeoJSON files
2. Asset manager for managing user specific shapefile/geojson file.

DATAEX PLATFORM: Analysis

Request graph for a specific/multiple variables within a certain domain to generate static image for a single time-step or animated graph for that region.
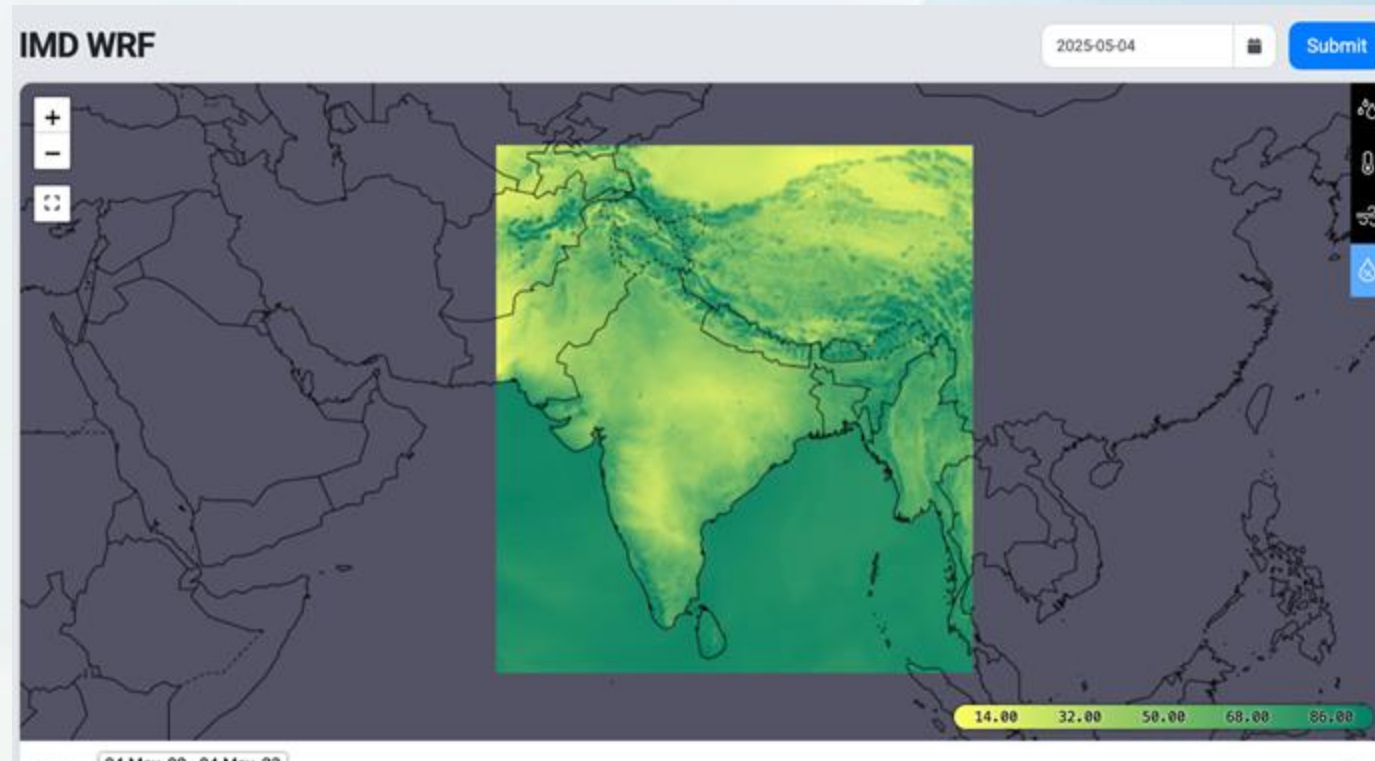

| User Request | Graphics Engine | Output Graphics |

DATAEX PLATFORM: New Addition

Integration of IMD-WRF forecast

IMD-WRF data is fully integrated with datex platform; this includes data subsetting; graph and analytics

Details of IMD-WRF forecast product
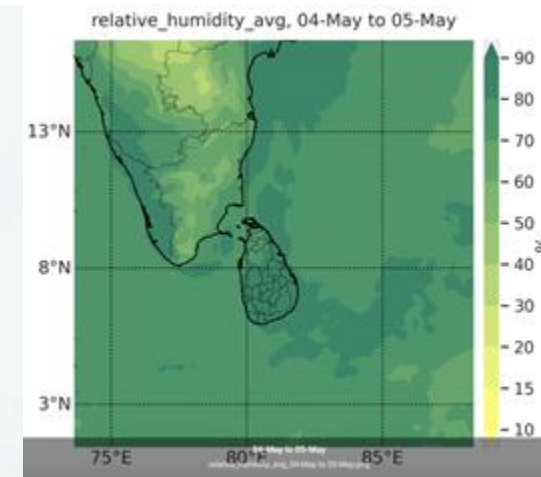
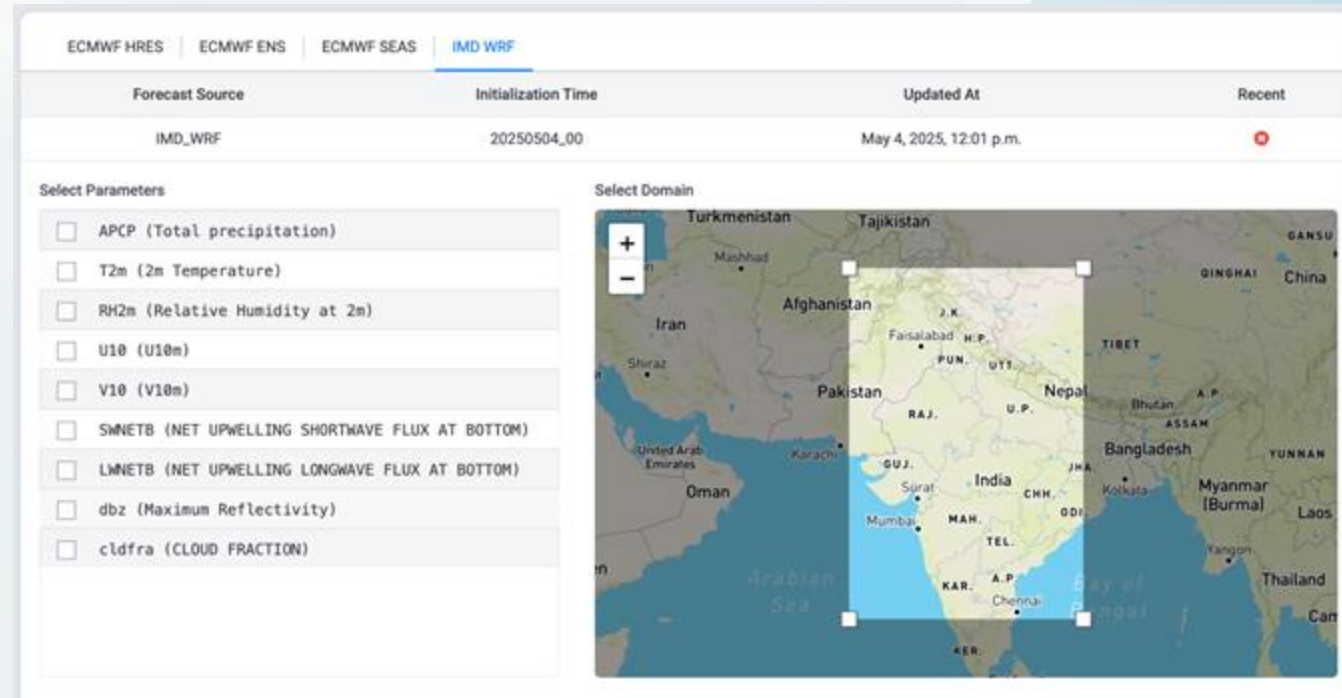- Lead time 72hr (3 day)
- Resolution 3KM

DATAEX PLATFORM: New Addition

NETCDF Subset & Graphics generation of IMD-WRF data

Development for netcdf subset completed; which allows user to download raw data in netcdf format.

Primary features

- ability to select a set of variables
- ability to subset area based on selected region
- Generate predefined set of graphics form IMD-WRF dataset

relative_humidity_avg, 04-May to 05-May

WRITTEN ARTICLES

Development of news articles, feature stories

From Science to Impact: Women Shaping Climate Resilience in South Asia

Hydrometeorology, the science of weather and water, is critical in a region where climate change amplifies the risks of extreme weather events like floods, droughts, and cyclones. Traditionally male-dominated, the field is witnessing a transformative wave of female professionals breaking the barriers into hydromet.

Across South Asia, women professionals are not only breaking barriers but also driving meaningful change in climate services and early warning systems. This feature highlights the journeys of four remarkable women—Dr. Shiromani Jayawardena, Dr. Mandira Singh Shrestha, Puja Shakya, and Kousalya Kumar—who are leading efforts to strengthen climate resilience in the region. Their stories exemplify the vital role of women in translating science into action, ensuring that hydrometeorological advancements benefit communities at risk.

South Asia Boosts Climate Resilience wi... on Impact-Based Forecasting

February 03, 2025

Second session of the South Asia Hydromet Forum (SAHF)'s Executive Council kicks off in Bangkok.
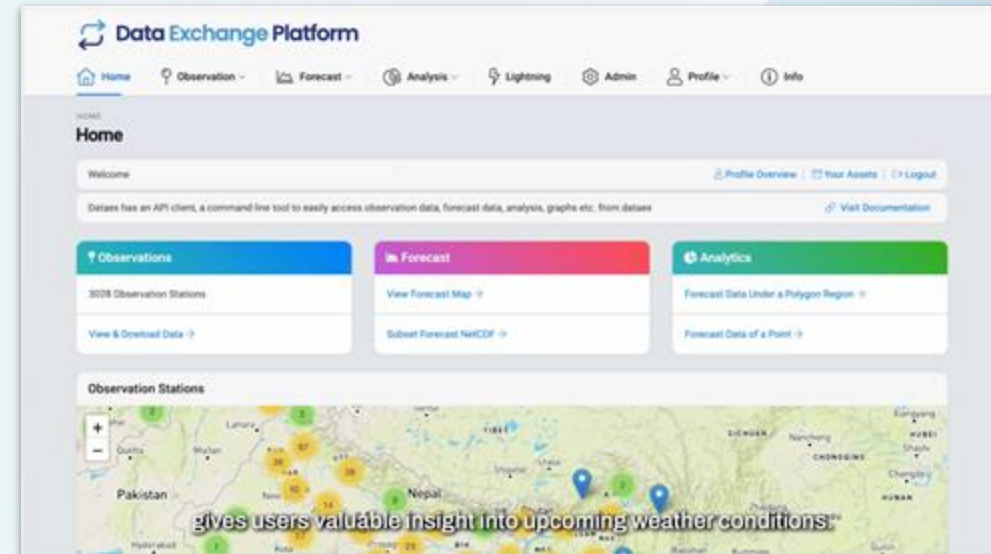

Regional Training Workshop boosts collaborative effort, expertise, and use of tools to augment South Asia weather forecasting

August 14, 2024

IN-HOUSE INFORMATIONAL VIDEO

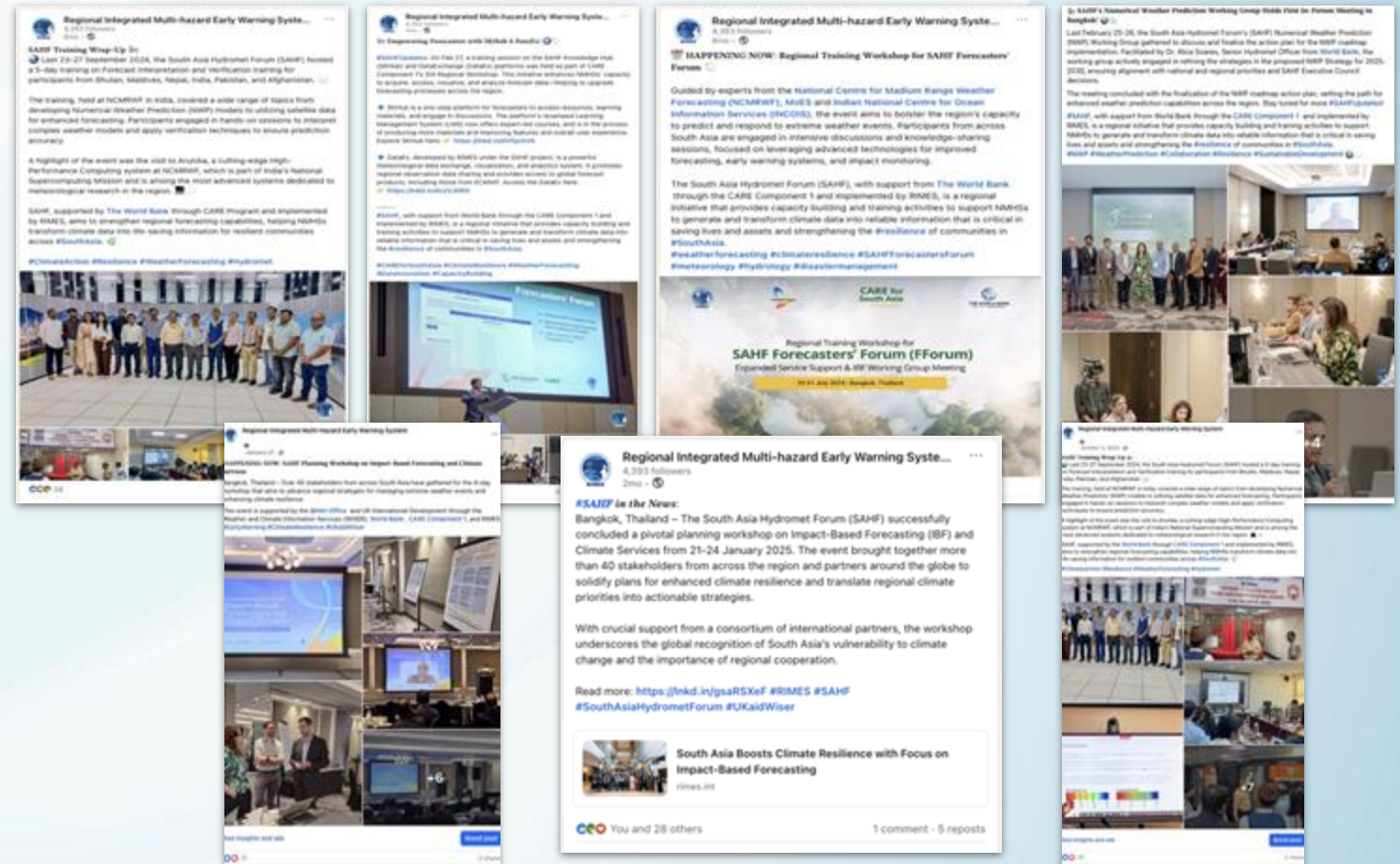Overview of the Forecasters' Forum

Introduction to the DataEx Platform

ONLINE PRESENCE

More active online presence; dissemination of project updates as it happens

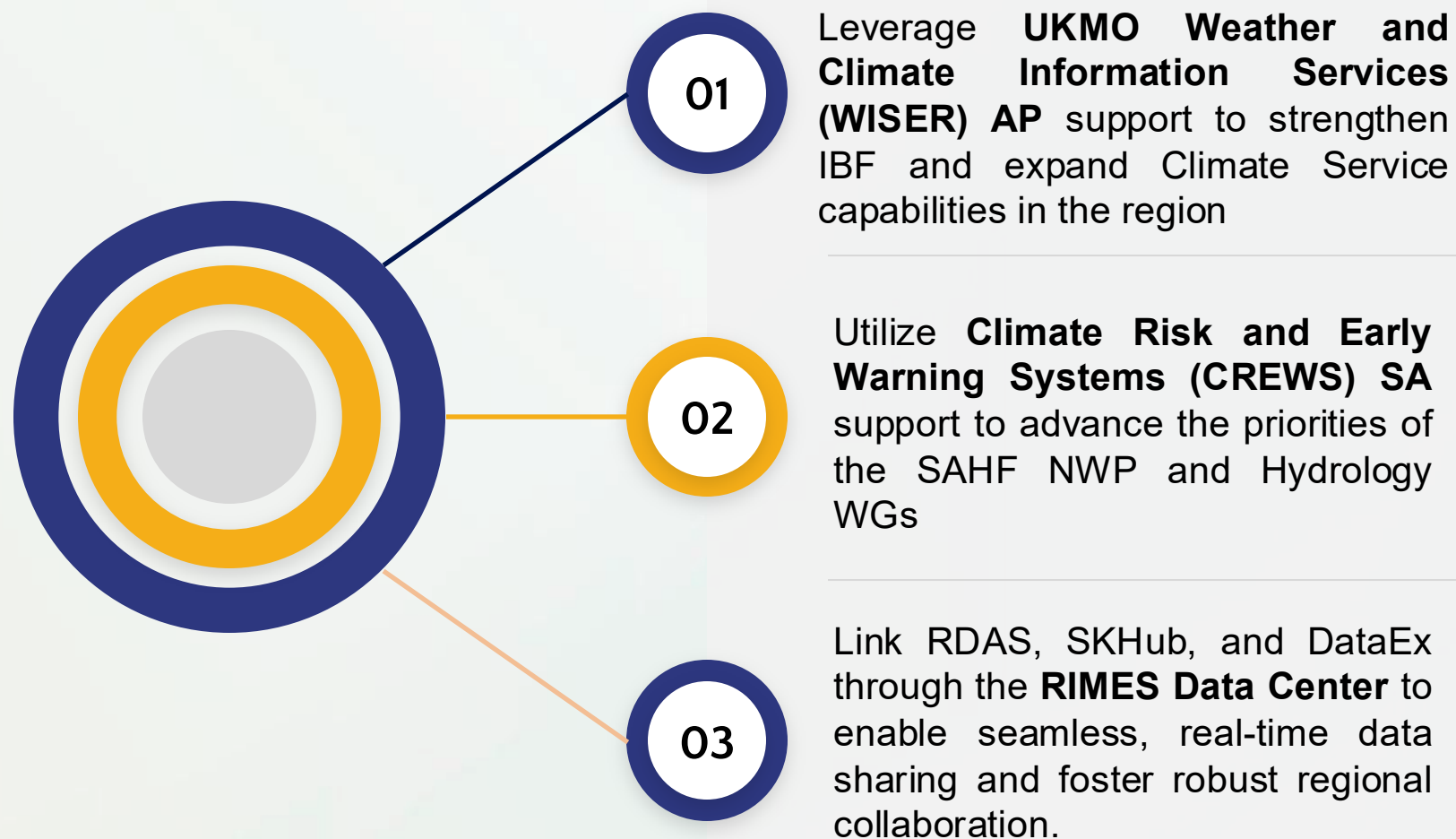10 updates from June 2024 - posted on RIMES Facebook and LinkedIn, with the following insights:

✓ Facebook
  ○ Reach: 8,705
  ○ Engagement: 1,862
✓ LinkedIn
  ○ Reach: 11,913
  ○ Engagement: 388

01 Leverage **UKMO Weather and Climate Information Services (WISER) AP** support to strengthen IBF and expand Climate Service capabilities in the region

Impact-Based Forecasting And Climate Services

02 Utilize **Climate Risk and Early Warning Systems (CREWS) SA** support to advance the priorities of the SAHF NWP and Hydrology WGs

Numerical Weather Prediction and Hydrology

03 Link RDAS, SKHub, and DataEx through the **RIMES Data Center** to enable seamless, real-time data sharing and foster robust regional collaboration.

Integrated Data Ecosystem

4th session of the
SAHF EXECUTIVE COUNCIL MEETING

KEY CHALLENGES IN SUSTAINING SAHF

Limited technical and financial resources to scale WG activities across member NMHSs.

Inconsistent data-sharing mechanisms and standards across the region.

Weak institutional anchoring reduces uptake of SAHF tools at the regional and national levels.

Need for sustained institutional and partner support for implementation and capacity development.

Baseline observational infrastructure remains insufficient in many countries, impacting forecasting quality.

Need for deeper engagement with global and regional partners to diversify funding sources.

Limited mechanisms to coordinate strategic resource mobilization for long-term sustainability.

1 Strategic integration with regional initiatives has reinforced the value of coordinated planning and technical synergy.

2 Working Groups require continuous support, clear mandates, and institutional commitment to sustain momentum and deliver results.

3 While SKHub and DataEx have improved access and functionality, national-level adoption hinges on hands-on training and technical follow-up.

4 Inconsistent data protocols across countries limit forecasting accuracy; formal agreements and common standards are crucial for interoperability.

5 Tailored applications, sector-specific DSSs, and engagement with end-users are vital for IBF and actionable services.

6 FForum has significantly improved forecasting accuracy, peer learning, and real-time collaboration-but requires ongoing institutional support and alignment with NMHS operational cycles.

7 Collaboration with expert institutions like INCOIS, NCMRWF, and UKMO has significantly strengthened regional expertise in areas such as ocean forecasting, NWP verification, data analysis and IBF.

Implement Working Group Roadmaps	Continuity of FForum	SKHub and DataEx Platform
Operationalize priority actions outlined in the thematic roadmaps for SAHF WGs developed during 2024–2025.	Continue convening weekly FForum sessions with a focus on thematic depth, peer exchange, and alignment with user needs to strengthen regional forecasting collaboration.	Ensure the continued functionality, enhancement, and user-centric evolution of the SKHub and DataEx to support operational effectiveness.

Develop a Financial Sustainability Strategy

Leverage Strategic Partnerships

Institutionalize Executive Council Resolutions

Formulate and validate a comprehensive financial strategy for SAHF by September 2025, in consultation with member NMHSs and strategic partners.

Utilize ongoing support from CREWS, WISER AP, and other development partners to reinforce technical capacities and accelerate regional service delivery.

Facilitate the formal endorsement and integration of EC resolutions to strengthen governance and long-term strategic alignment.