SOUTH ASIA
HYDROMET FORUM

SAHF Strategic direction for Numerical Weather Prediction (NWP): A Roadmap to 2030

The Implementation

SAHF has been providing a cooperative knowledge transfer and capacity enhancement framework through fully leveraging accelerated advances in weather and climate forecasting with key actions needed across the public, private and academic sectors.

In the next five years, the Strategy for Regional NWP will address the opportunities offered by continued regional collaboration, the support of international partners (both technical partners and donors), and the scientific and technological advances. Therefore, three main principles will be at the heart of this work: collaboration, partnerships, and flexibility.

The delivery of the Strategy i.e. its implementation is reliant on strong collaboration of SAHF members, the engagement of partners, the computing facilities in the region, and the several activities that address at the same time the challenges and the developments. It requires the involvement of the dedicated and talented staff that exists in the South Asia region, together with leading world-wide experts, to address the challenges to create an impact in numerical weather predictions for the safety and security of the people in South Asia, as well as for realizing contributions to economic sectors and society well-being.

The roadmap 2025-2030

Activities	Timeline						Partners	Funding Source
	2025	2026	2027	2028	2029	2030		
PILLAR 1: IMPACT								
Goal 1.1: Reliable and quality-controlled observations shared across the region *[Jointly addressed with the WG/OBS]*.								
A1.1.1: Establishing data-sharing agreements and protocols for a South Asia RBON *[Note: follow WMO guidance for the definition of South Asia RBON]*.								CREWS-SA
A1.1.2: Sharing data via DataEx and perform quality control of observations *[Note: (a) Data to be shared: upper-air, AWS, lightning, radar, wave and ocean currents; (b) engagement of INCOIS required]*.								CREWS-SA
A1.1.3: Having DataEx compliant with WIS2.0 and ensuring automation of data sharing.								CREWS-SA
A1.1.4: Establishing a pool of experts in the region to deal with instrumentation and IT related aspects; recommend the establishment a regional sensor calibration facility/lab (following WMO standards) keeping the usability of the NWP system.								CREWS-SA
A1.1.5: Generating a land use/land coverage dataset. Initially make use of what exists from UNESCAP, but then								Possibly UNESCAP

update it with what exists from countries and generate new data set as appropriate.								
Goal 1.2: Quality of forecasts understood by establishing a baseline that can be compared as improvements are done in NWP and forecasting process.								
A1.2.1: Implementing forecast verification at NMHSs using the RIMES tool *[Note: currently set up for verification of temperature and rainfall]* – explore synergies with the Met Norway tool implemented at BMD.								CREWS-SA
A1.2.2: WG/NWP will guide NMHSs what verification analysis to be utilised.								CREWS-SA
A1.2.3: RIMES to expand the verification tool to other parameters (e.g. EFI, lightning flash, and ocean parameters).								CREWS-SA
A1.2.4: RIMES to scale-up the methods from point verification to extreme weather verification.								CREWS-SA
A1.2.5: Making the improved tool available to all.								CREWS-SA
A1.2.6: Providing training on the use of the verification tool.								CREWS-SA
A1.2.7: NMHSs to conduct verification on a monthly basis with the support of RIMES.								In-kind contributions of the SAHF members
Goal 1.3: Improved forecast capabilities.								

A1.3.1: Sharing all global models and LAM data through DataEx.							IMD	CREWS-SA
A1.3.2: Implementing country specific High-resolution Rapid Refresh (HRRR) models with the support of IMD *[Note: For those countries with computing facilities, this activity can initiate immediately; for those without computing facilities can pair e.g. India with Sri Lanka; Thailand with Myanmar]*.							IMD	Resource mobilization required
A1.3.3: Enabling NWP support to WGs on IBF, climate services and hydrology.								CREWS-SA WISER Adaptation Fund
A1.3.4: (Phase 1) Optimising provision and sharing of computing resources for basic activities (e.g. for verification) for Regional compute and storage infrastructure (e.g. RIMES, NCMRWF and/or BIMSTEC) to be explored by SAHF members (with specific credentials and space for each NMHS to run their own applications); for more complex activities (phase 2), additional cloud-computing resources are required e.g. Microsoft Azure or Amazon Web Services (AWS) and allocation of financial resources is required.								(Phase 1) In-kind contributions by RIMES, NCMRWF and/or BIMSTEC (Phase 2) Resource Mobilization Required
A1.3.5: Implementing basic training on the use of cloud computing; advance training to be provided on demand.								CREWS-SA

Goal 1.4: Improved operational forecasting through robust, cost-effective, flexible and agile infrastructure and processes for efficient and easy access products.								
A1.4.1: Leveraging existing platforms in the region (e.g. DIANA, SMARTMET, METCAP+ and RIMES forecaster workstation) for visualization of NWP products by forecasters. This will be facilitate by RIMES with the support of Met Norway, FMI and Turkish Met Service – a webinar will be organize to demonstrate all existing platforms and explain their main features, for NMHS to decide what to use. RIMES will support installation with Training of Trainers (ToT) support from developing groups of DIANA, SMARTMET, and METCAP+. Engage WGs on IBF, climate services and hydrology.							RIMES, Met Norway, FMI and Turkish Met Service	CREWS-SA, Met Norway, FMI and Turkish Met Service
A1.4.2: Further integrating the Severe Weather Forecasting Programme (SWFP) resources into the national forecasting processes through the ingestion of data and products into the forecasters workstations, using IMD developed APIs. An email to PR of India is required to have access to these API.							IMD, UKMO, ECMWF, JMA	CREWS-SA
A1.4.3: Enhancing partnerships and collaborations for improved data access and capacity building / training on interpretation of forecasts, with a especial emphasis on the use of ensemble prediction systems which are required for forecasting extreme events – bringing together FMI, Met Norway, Met Office UK, NCMRWF, RIMES, and WMO World Met Centres and RSMCs (as appropriate) in a comprehensive training program.							FMI, Met Norway, Met Office UK, NCMRWF, RIMES, and WMO World Met	CREWS-SA

							Centres and RSMCs	
PILLAR 2: SCIENCE AND TECHNOLOGY								
Goal 2.1: High-quality NWP/EPS products fit for purpose.								
A2.1.1: Driving down systematic model errors through bias correction and calibration of models using statistic methods and innovative ML/AI approaches.							RIMES, FMI, Met Norway	CREWS-SA
A2.1.2: Enhancing partnerships and collaborations with academia and research centres; attachment trainings.								CREWS-SA
Goal 2.2: Reliable, accurate and more useful marine forecasts								
A2.2.1: Improving marine meteorology, with engagement of INCOIS and WMO RSMCs covering the Indian Ocean.							INCOIS and WMO RSMCs covering the Indian Ocean	CREWS-SA
A2.2.2: Explore the engagement of other institutions (e.g. JMA, MRI, BoM, and others).							JMA, MRI, BoM, and others	CREWS-SA
A2.2.3: Enhancing partnerships and collaborations with academia and research centres; attachment trainings.								CREWS-SA
Goal 2.3: Reliable, accurate and more useful forecasts over the mountain regions.								

A2.3.1: Improving mountain meteorology through the application of data-driven methods (as described in the concept note, with the support of DWD, MeteoSwiss and University of Oxford).							DWD, MeteoSwiss and University of Oxford	CREWS-SA
A2.3.2: Enhancing partnerships and collaborations with academia and research centres; attachment trainings.								CREWS-SA
PILLAR: RESEARCH AND DEVELOPMENT								
Goal 3.1: Climate drivers understood.								
A3.1.1: Studying the impact of MJO, ENSO and IOD in the weather in South Asia. NCMRWF has initiated this activity and will continue. Possible engagement of BoM; Monsoon WG and others. Engage WGs on climate services.							NCMRWF, BoM	Possibly NCMRWF
A3.1.2: Capacity building/training on the above subjects.								CREWS-SA
A3.1.3: Develop case studies to understand the relationship between the climate drivers and the extreme weather events in the South Asia region.								In-kind contributions of the SAHF members
Goal 3.2: Indices developed from a Grand Ensemble for South Asia.								
A3.2.1: Using the 3 existing EPS available in the region (2 from India and 1 from ECMWF) and develop a Grand Ensemble for South Asia and derive indices (e.g. EFI).							NCMRWF	Possibly NCMRWF
A3.2.2: Capacity building/training on the above subject.								NCMRWF

A3.2.3: Develop case studies based on extreme weather events in the South Asia region, highlighting how effectively NWP models predict these extreme events. Such case studies can enhance regional forecasting capabilities, improve preparedness, and support targeted training for meteorologists and disaster management agencies.								In-kind contributions of the SAHF members
Goal 3.3: Sectoral applications developed *[Jointly addressed with the WG/IBF, WG/CS and WG/Hydro]*.								
A3.3.1: Developing sectoral applications through post-processing, big data and analytics from nowcasting to S2S in a seamless approach.								Resource mobilization required
A3.3.2: Establish a research group in SKHub with TAG members as mentors to expedite weather and climate related research in South Asia.							TAG members	

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