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Technical guidance on RCC operations: Current status and way forward

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Technical Guidance

- *To complement the descriptions of the mandatory and highly recommended functions.*
- *To provide examples of best practice, derived from the existing RCC websites, scientific/technical recommendations / guidance (e.g. RCOF, ET-OPSLS).*
- *To provide a central reference of resources available to RCCs e.g. WMO LC-LRFMME (and other global model resources), NMME, COPERNICUS etc. Various global climate monitoring resources and analysis tools.*
- *Recognised that RCCs will have have varying levels of resources available and have different regional requirements. Does not aim to be prescriptive but rather to provide illustrative examples and options.*

First stage: Review of content on existing RCC sites, input from this meeting and relevant guidance/recommendations

Function: Operational activities for long-range forecasting

Activities	Criteria
Interpret and assess relevant LRF products from Global Producing Centres (GPCs), distribute relevant information to RCC users, and provide feedback to GPCs	**Product:** assessment of the reliability and outcomes of GPC or LC-LRFMME products including the reasoning (make use of LC-SVSLRF), for the region of interest **Output type:** texts, tables, figures etc. **Element:** 2-m mean temperature, total precipitation **Update frequency:** monthly or at least quarterly
Generate regional and sub-regional tailored products, relevant to RCC user needs, incl. seasonal outlooks etc.	**Product:** probabilities for tercile (or appropriate quantile) categories for the region or sub-region **Element:** 2-m mean temperature, total precipitation **Output type:** rendered images (maps, charts), text, tables, digital data **Forecast period:** one month up to six months **Update frequency:** 10 days to one month
Generate consensus statement on regional or sub-regional forecasts	**Product:** consensus statement on regional or sub-regional forecast **Element:** 2-m mean temperature, total precipitation **Output type:** report **Forecast period:** a climatologically significant period (from one month to one year) **Update frequency:** at least once per year (to be defined by the region)
Perform verification of RCC quantitative LRF products, including the exchange of basic forecast and hindcast data	**Product:** verification datasets (e.g. SVS LRF scores, Brier Skill Score; ROC; Hit Rate Skill Score) **Element:** 2-m mean temperature, total precipitation
Provide on-line access to RCC products/ services to RCC users	**Product:** an on-line data/information portal
Assess use of RCC products and services through feedback from RCC users	**Product:** analysis of feedback (which is made available using a template) **Update frequency:** annually, as part of a regular reporting of RCCs to WMO RAs

Guidance issues:
Operational Activities for LRF

What is done now:

- *Use of single GPC/statistical model forecast*
- *Limited set (e.g. 3 or 4) multi-model forecast outputs*
- *Multi-model forecasts (e.g. LC-LRFMME, NMME) with multiple display options (e.g. ensemble mean, probability forecasts etc) and with skill metrics based on hindcast*
- *In some cases, consolidated forecast based on multiple model inputs, climate diagnosis of variability and expert interpretation – RCOF 'like' outlooks*
- *Outlook can be starting point for RCOF consensus discussion and interpretation*
- *Inter-RCOF outlook updates*
- *Subsequent individual outlook evaluation against observations.*

Provide guidance on:

- *Some delineation of GPC ► value add in RCC ► value add to RCOF*
- *Need to link closely to the RCOF Review recommendations on outlook production*
- *Use of skill information. Important but not to over-interpret – Verification guidance document.*
- *Use of existing resources WMO LC-LRFMME (also NMME, COPERNICUS, IRI, APCC etc.)*
- *Locally optimised forecasts (e.g. statistical models, CPT, dynamical downscaling)*
- *Issues around graphical displays, plot labelling, product descriptions*

Function: Operational activities for climate monitoring

Activities	Criteria
Perform climate diagnostics incl. analysis of climate variability and extremes, at regional and sub-regional scales	**Product:** climate diagnostics bulletin incl. tables, maps and related products **Element:** Mean, Max and Min temperatures, total precipitation; other elements (esp. GCOS essential climate variables) to be determined by the region **Update frequency:** monthly
Establish an historical reference climatology for the region and/or sub-regions	**Product:** database of climatological means for various reference periods **Spatial resolution:** by station **Temporal resolution:** monthly at a minimum **Elements:** Mean, Max and Min temperatures, total precipitation; other elements (esp. GCOS essential climate variables) to be determined by the region **Update frequency:** at least 30 years, preferably 10 years
Implement a regional climate watch	**Product:** climate advisories and information for RCC users **Update frequency:** whenever required, based on the forecast of significant regional climate anomalies

Guidance issues:
Operational Activities for Climate Monitoring

What is done now?

- *Regional description of climatology and climate drivers to provide context for NMHSs/users*
- *Customised information derived from existing monitoring sites (e.g. SYNOP&CLIMAT, NCEP, IRI Map Room, etc.)*
- *Indices on modes of variability*
- *Products on extremes (requires access to daily data)*
- *Use of additional information from the region and composite products (e.g. combined in-situ satellite)*
- *Use of re-analysis information*
- *Climate diagnostic bulletins – seasonal, monthly*
- *Climate Watches*

Provide guidance on:

- *Climatological means e.g. 1961-1990, 1981-2010 etc.*
- *Provision of product descriptions*
- *Actual, anomaly, percentage of normal , etc in common display. Clear labelling and map descriptions*
- *Online analysis tools*
- *Sector oriented indices e.g. drought, SPI, vegetation, hot and cold days, dry/wet days etc.*
- *Feed into State of Climate reports*
- *Clear organisation of information (avoid long lists with no obvious organising principle)*

Function: Operational data services, to support operational LRF and climate monitoring

Activities	Criteria
Develop quality controlled regional climate datasets, gridded where applicable	**Product:** regional, quality controlled climate datasets, gridded where applicable, following CCl guidance on QA/QC procedures **Temporal resolution:** daily **Elements:** Mean, Max and Min temperatures and total precipitation, at a minimum **Update frequency:** monthly
Provide climate database and archiving services, at the request of NMSs	**Product:** national databases with metadata, accessible to the NMS in question (backup service, development site etc.) **Elements:** as determined by the NMS **Update frequency:** at the request of the NMS

Guidance issues:
Operational Data Services to Support LRF and Climate Monitoring

What is done now?

- *Regional climate atlas/databases and analysis tools EACA&D etc.*
- *Links to available international forecast and observational datasets*
- *Tabulated station data*
- *Specific GPC data sources and tools*
- *Regional data rescue*

Provide guidance on:

- *Consistency in provision of LRF, monitoring and climate data (e.g. some domains used in tools, plotting colour schemes etc.)*
- *Becoming regional centre of excellence in data management*
- *Capacity building in aspects of data provision (QC, homogenisation etc)*
- *Developing regional data sharing frameworks*
- *Making regionalised LRF/observational data available for use in sector impact models + guidance*
- *Sharing of analysis tools among RCCs, GPCs – not re-inventing capabilities*

Other functions…

Guidance on user engagement and feed-back procedures ….

- *Some RCCs have good end-user engagement – what can we learn from these?*

*Information on **regional climate projections***

- *Ease access to existing climate resources for the region e.g. CORDEX, CMIP, various analysis and plotting tools.*
- *However, a robust interpretation of the projections - particularly for rainfall – is a substantial undertaking ► issues around modelling uncertainty, decadal variability*

- *Engagement with end users on the longer climate timescales **and** LRF*

Current status and way forwards

- *RCC sites have been reviewed. Further input from this meeting*
- *First draft following the Pune workshop*
- *Ensure consistency between guidance docs (e.g. verification, regionalisation etc).*
- *Review process*

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Thank you
Merci

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