

RCC Operations review

Toward objective seasonal forecasts

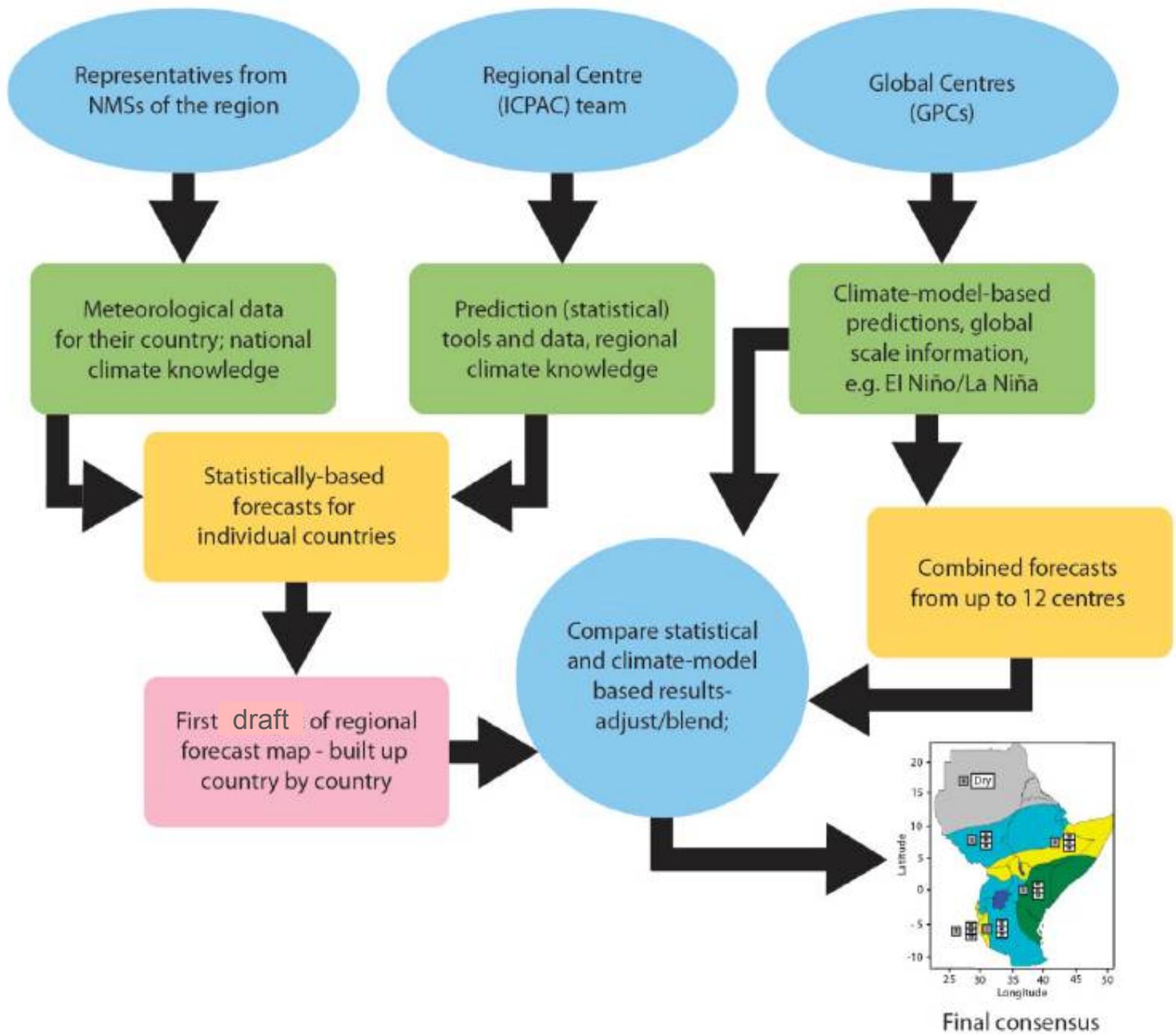
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Typical Outlook Process in RCOFs



Draft Discussion Paper

■ Main considerations

- Seasonal forecast (outlook) flagship activity of RCOFs;
- Seasonal forecast key mandatory function of RCCs
- Increasing focus on development of objective regional seasonal forecasts

■ Draft Paper

- Increasing focus on development of objective regional seasonal forecast. Living document, to be generalized to cover all regions (Reviewed by CCI, CBS, WWRP and WCRP experts) – suggestions for improvement welcome
- Considered by WMO Executive Council at its 69th session in May 2017
- RCOF Review 2017 agreed to take it forward: RCOF new generation.
- Available @ : WCASP pages on WMO web site

Sub-Seasonal and Seasonal Forecasting Systems

EC-69 Decision 4.5/2 (May 2017) : main considerations leading to the EC decision

1. **Use of dynamical forecasts** in the process of developing seasonal climate outlooks at RCOFs is **mainly subjective**.
2. **Subjective consensus-based approaches** are a limitation for the **usability of forecasts**. Especially at national level and for the verification
3. **Expert assessment** (current climate conditions, past statistical relationships, characteristics and limitations of the models used) are also **still required** to formulate sub-seasonal to seasonal forecasts with **better forecast skill**,
4. **RCOF process** through consensus building of expert assessment, is **not only a mechanical blending** of the various forecast inputs,
5. **Rapid advances in dynamical modelling** for sub-seasonal and seasonal forecasting, **operational availability** and the need to **optimize their use** in the operationalization of regional forecasting systems,
6. Further **progress on seasonal forecasting**, and the development of **tailored products for decision support**, will entail adoption of objective seasonal forecasting schemes

Sub-Seasonal and Seasonal Forecasting Systems

EC-69 Decision 4.5/2 (May 2017) :

EC-69 decides to consider the adoption of **objective sub-seasonal and seasonal forecasts** as an overarching technical strategy, particularly at **regional and national levels**, promoted through RCOFs, by adopting suitable operational practices and capacity development efforts, **to be facilitated by a global RCOF review;**

Input

● **Dynamical forecasts from GCM systems**

- Tier 1, Coupled Atmosphere-Ocean GCM
- Tier 2, Atmosphere GCM driven by SST (predicted/persisted)
- Ensemble, MME, probabilistic .

● **Statistical forecasts**

- Various methods (consistency?)
- Quite often SST based
- Probabilistic (but consistency with Ensemble forecasts and MME?)

● **Conditional Climatology**

- Knowledge of Climate Drivers (Global, Regional and Local)
- State of Climate Drivers especially ENSO state
- Knowledge of impacts of the Climate Drivers

● **Observed state of the Climate system and its evolution**

● **Climatology (including Climate trends) .**

Methods

● Wholly Objective

- (Skill-weighted) average or ensemble of model output
- Possibly bias-corrected, calibrated
- Without “interpretation”

● Mostly Objective

- Use the above as a first guess, adjust by expert judgement
- Hedging, allowing for “modest skill”

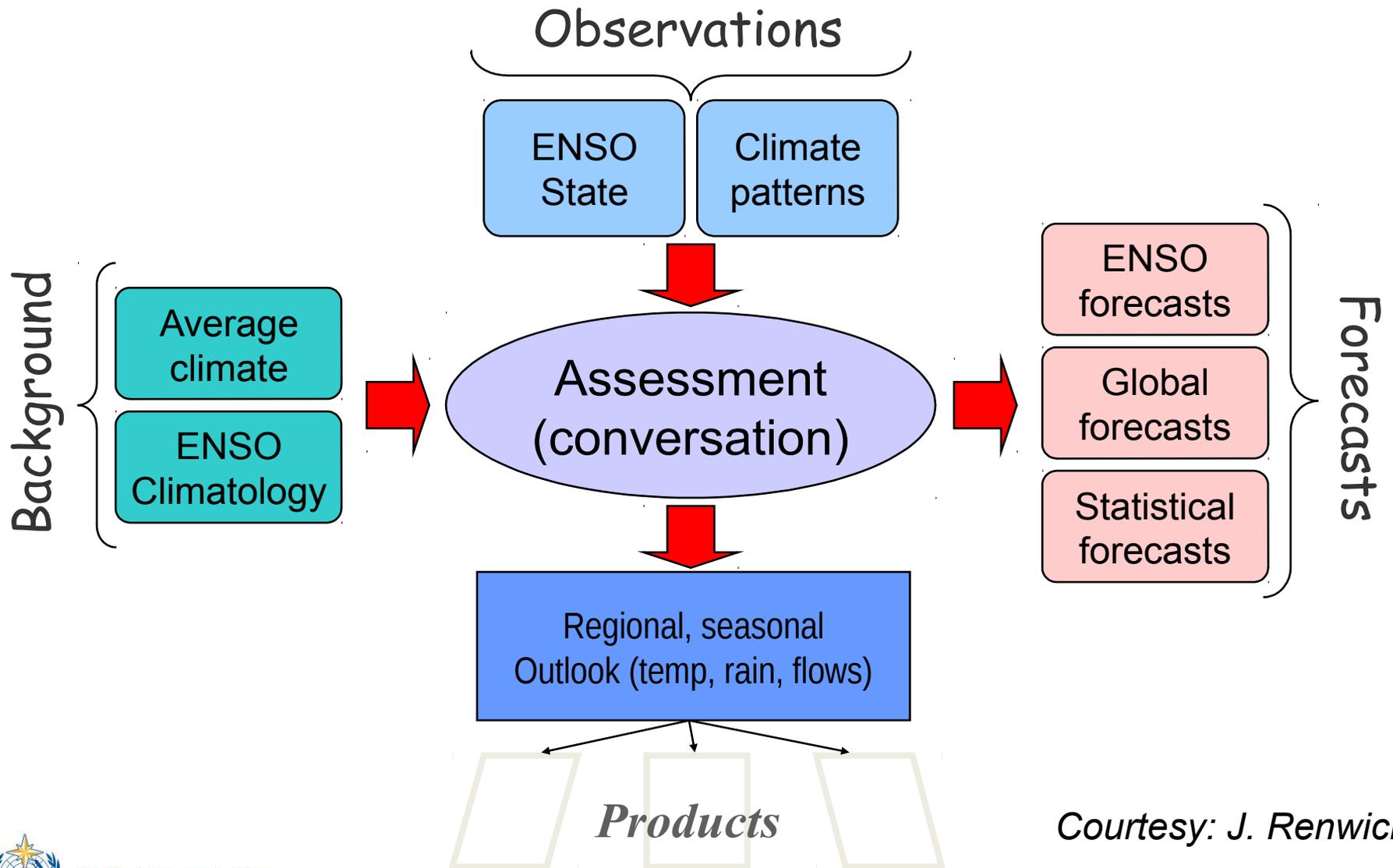
● Mostly Subjective

- Model output weighted or averaged through consensus discussion

● Wholly Subjective

- Knowledge of ENSO and other drivers, expert assessment of local effects

Consensus Process in RCOFs: Mostly Subjective



Pre COF Consensus

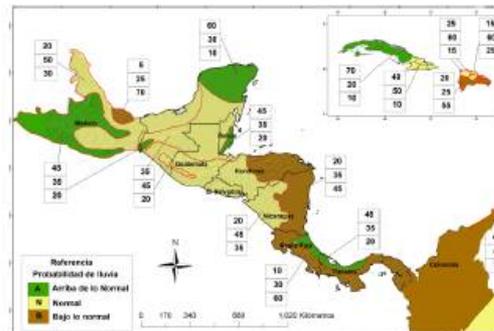
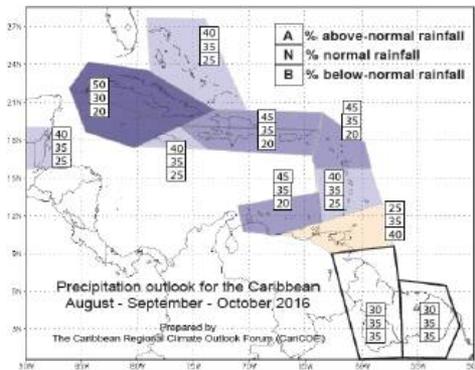
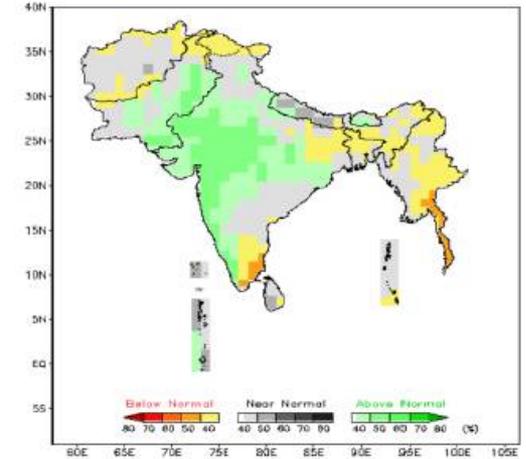
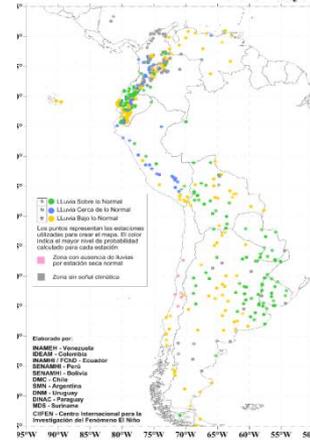
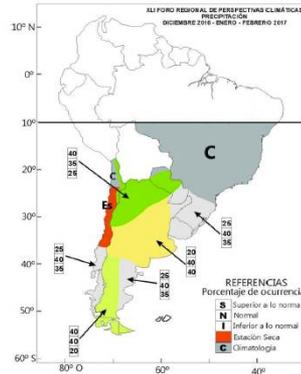
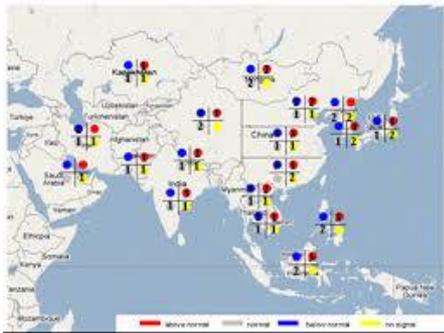
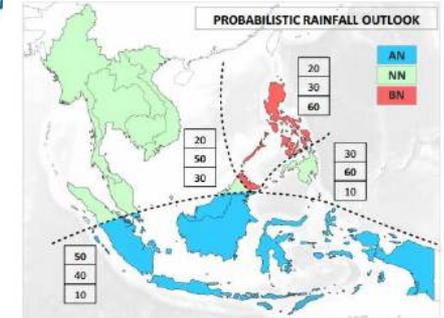
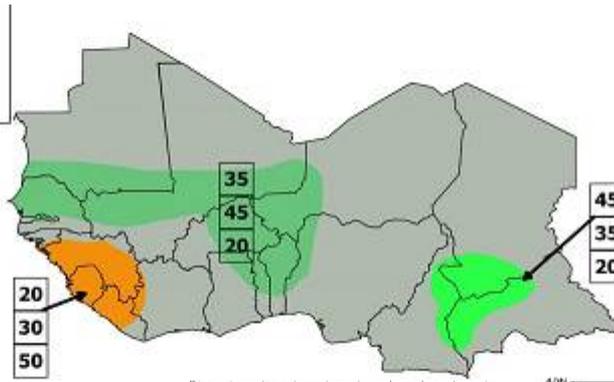
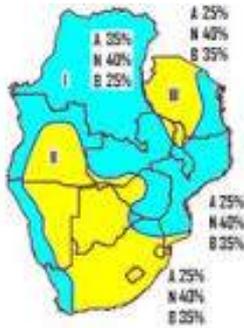
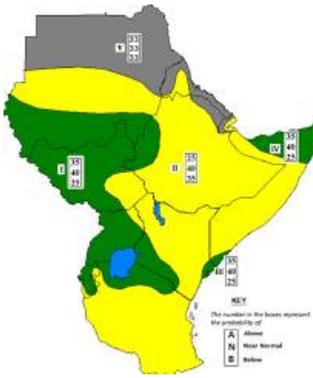
• Consolidate forecast information

- Multiple sources available
- Multiple methods used
- Different level of expertise

• Major inconsistencies to be resolved by

- Democratic forecast combination rather than simple averaging.
- Consideration of model viability as opposed to skill (sometimes some of the predictors have weak theoretical basis).
- The large-scale structure of the forecast.
- Redefinition of regions, perhaps with examination of predictions for individual stations.
- Further analyses.adjust by expert judgement

Some RCOF products worldwide



RCOFs Outlooks

■ Some Key limitations

- Format unsuitable for applications in specific decision making
 - Forecast skills not routinely evaluated/communicated
 - Lack of opportunities to implement new measures reflecting progress in science
 - No systematic approach to provide regular updates as the target season evolves
 - Very limited use of RCOF products or value addition at the national level
 - Lack of user-tailored or targeted product packages/practical constraints to engage users at the regional level
- Space-time resolution inadequate for most user level decision support
- Co-Design and Co-Production are essential to develop tailored Climate Services for Decision Making

Operational Regional Seasonal Forecasting

■ Promoting Objective approaches

- CBS/CCI Technical Guidance on Operational Predictions from Sub-seasonal to Longer-time Scales (OPSLS), in collaboration with WWRP and WCRP – A high-priority need (first draft planned by the end of this year)
- OCP Workshop series to be key drivers of good practices
- Global RCOF Review 2017 showed the intent to change
- GPC-LRF/RCC engagement – Digital data access
- Move from consensus regional outlook preparation to consensus objective approach for regional prediction
 - Reference periods,
 - Variables, model identification/MME,
 - Calibration tools,
 - Presentation formats,
 - Verification, etc.);
 - rule-based consensus – replicable, traceable, verifiable
- Piloting of development and institutionalization of objective seasonal forecasting schemes in selected regions

3 dimensions for Pilots

■ Identification of skillful seasonal forecast methodologies for specific regions

- Identification of the global model(s) which demonstrates the highest skill for a given regional domain
- Identification of a Multi-Model Ensemble (MME) of global models that gives the best skill for a given regional domain
- Maximize the exploitation of the available predictability in the system
- Design innovative products to extract/characterize decision-relevant features

3 dimensions for Pilots

- **Identifying and accessing the necessary resources for developing and operationalizing such methodologies**
 - WMO is making concerted efforts to attract extra-budgetary resources
 - Opportunities already opening up with an explicit focus on sub-seasonal and seasonal forecasting (e.g., CREWS regional/national projects, ACP, ACREI, Adaptation Fund, etc.)

3 dimensions for Pilots

- **Assembling and coordinating the cooperation among the institutions that would be involved in further developing and operationalizing skillful seasonal forecast systems**
 - WGPC-LRF and RCC inputs; engagement of other institutions (e.g., IRI, APCC, C3S,...)
 - Targeting NMHS implementation (two-way interaction)
 - Addressing research needs, particularly at regional/national levels
 - Co-design and Co-production with climate-sensitive user sectors

RCC Operations review

