Seasonal Forecast training

Guidance on Operational Practices for Objective Seasonal Forecasting

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The Guidance document

- ***Guidance on Operational Practices for Objective Seasonal Forecasting*** prepared under the auspices of the World Meteorological Organization Commission for Climatology (CCl) and Commission for Basic Systems (CBS), through concerted efforts by a group of around 10 authors.
- Writeshop in December 2018,
- External review from around 20 experts,
- Incorporation of comments, suggestions, corrections by April 2019 and final draft ready for publication end of spring 2019
- Final draft @

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The content

- **9 chapters dedicated to seasonal forecast + an executive summary,**
  - Introduction to seasonal forecast
  - Components of a seasonal forecasting system,
  - Seasonal forecast products
  - Guidance on good practices for developing objective seasonal forecasts,
  - WMO Infrastructure and resources for seasonal forecasts
  - Other sources of seasonal prediction products
  - Other aspects of seasonal prediciton and variability
  - Examples of good practices followed at NMHS, RCCs and RCOFs
  - Futur prospects for seasonal and other long range forecasts
  - References, Resources, Glossary, Acronyms,

The content

10 main recommandations,

- Follow a traceable, reproducible, and well-documented procedure (including model selection, bias correction, calibration and statistical downscaling) that is amenable to assessments of forecast quality (verification).
- Use dynamical climate models, including multi-model ensembles as the primary basis for seasonal forecasts.
- Establish and maintain observational databases (including databases associated with reanalysis and other blended analysis products) of adequate quality, length of record and spatial resolution for verification, bias correction, calibration and monitoring drivers of seasonal predictability.
- Identify and monitor drivers of predictable climate variability and assess their representation and prediction skill in models.

The content

10 main recommandations,

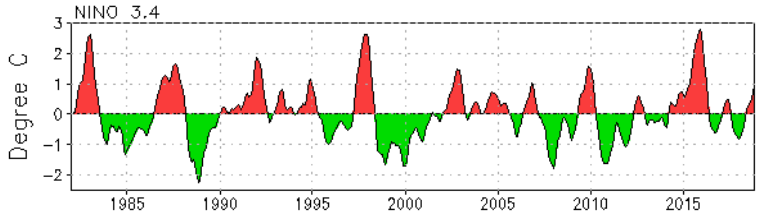
- Ensure forecasts are verified according to established standards, keep archives of past forecasts, and conduct post-season assessments.
- Provide forecast information together with historical performance (for example, skill and reliability).
- Use clear and non-technical language for the communication of seasonal forecasts, including emphasizing the probabilistic nature of seasonal forecasts and inherent uncertainty.
- Collaborate across regions influenced by the same climate drivers in forecast production though mechanisms such as RCOFs.

The content

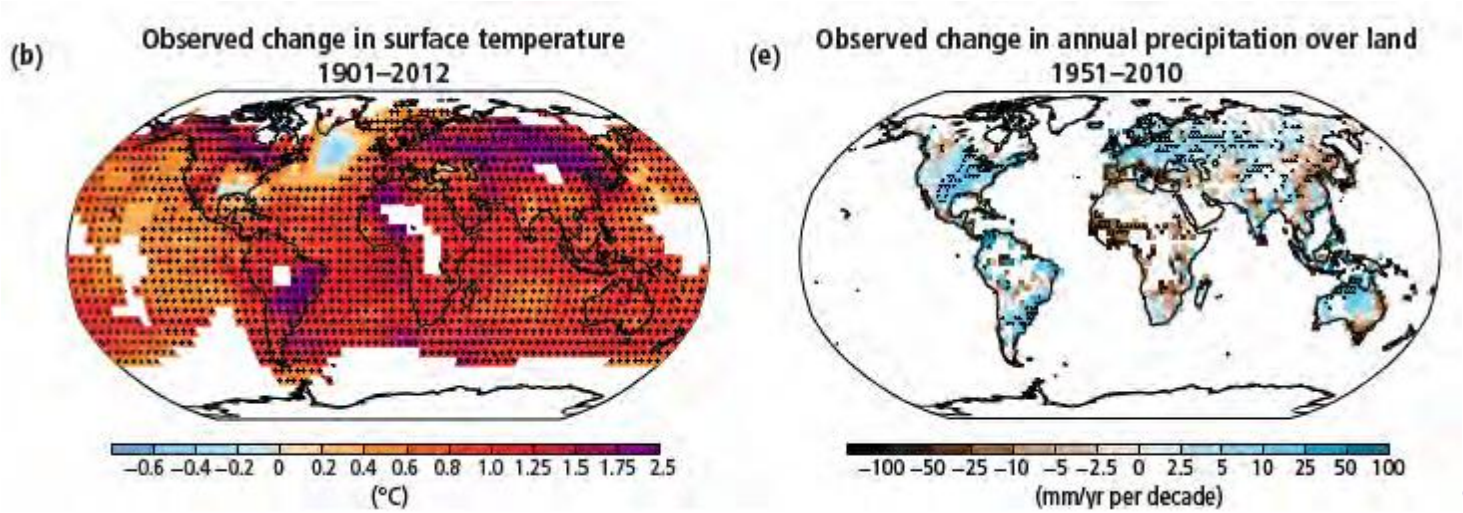
- **10 main recommandations,**
  - Provide seasonal forecasts as well as regular updates on a fixed operational schedule tailored to the applicable decision-making context.
  - Establish user feedback and product upgrade mechanisms and support co-production of tailored products.

Chapter 4 : Guidance on good practices for developing objective seasonal forecasts

- **Catalog and document regional climate variability and its drivers**



  - Climatology,
  - Climate drivers,
  - Climate recent trends,

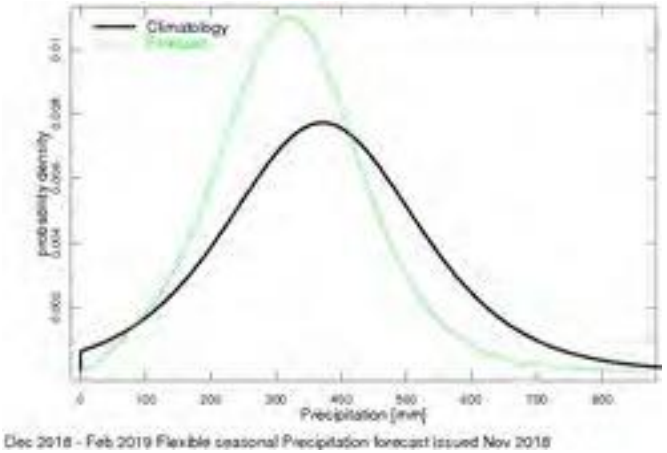


Chapter 4 : Guidance on good practices for developing objective seasonal forecasts

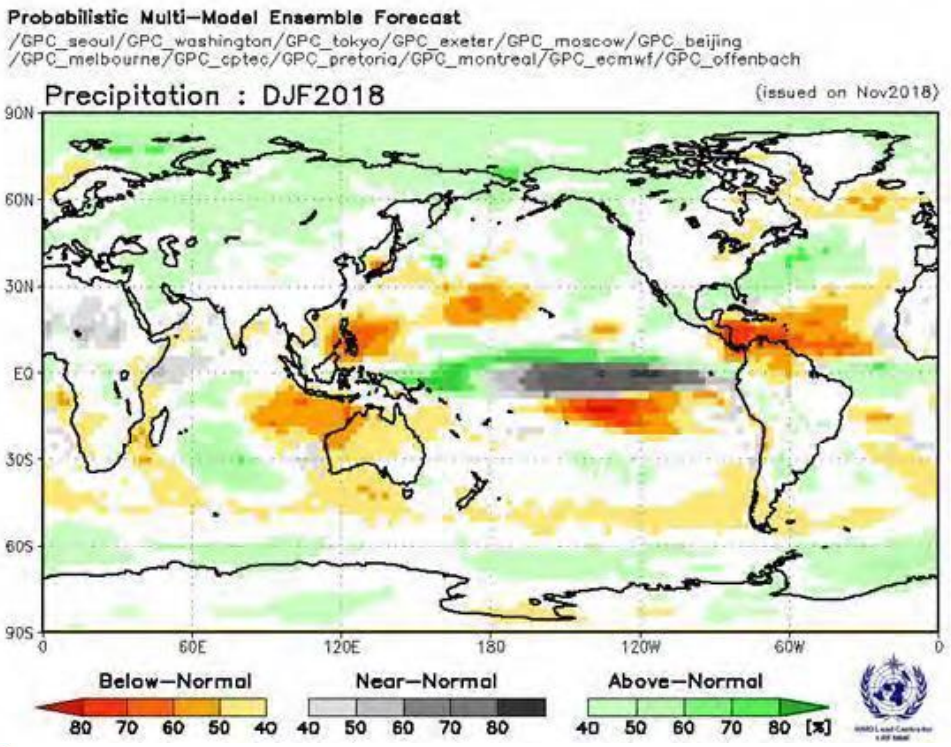
- **Establish a schedule for seasonal forecasts**
  - GDPFS (e.g. GPC-LRFs),
  - Co-production involving users,
  - Facilitation of downstream applications,
- **Review and document the performance of issued forecasts**
  - Skill of issued forecasts (taking care of the current predictability)
  - Highlight of factors which may influence the result,
  - Discussion with users (e.g. via RCOFs and NCOFs),

Chapter 4 : Guidance on good practices for developing objective seasonal forecasts

- **Provide the forecast in probabilistic format**
  - Terciles and other categories,
  - Estimate of the full Pdf,
  - Tailored thresholds,

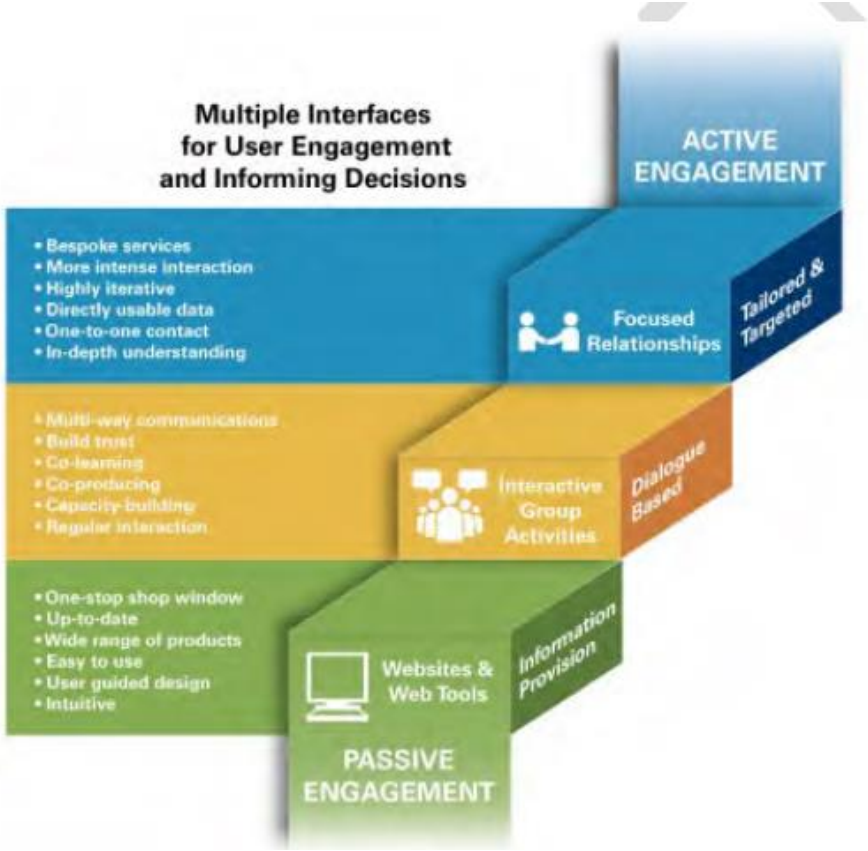


Dec 2018 - Feb 2019 Flexible seasonal Precipitation forecast issued Nov 2018



Chapter 4 : Guidance on good practices for developing objective seasonal forecasts

- **Establish engagement with users and feedback mechanisms**
  - Co-production and co-design processes
  - Matching user needs with scientific and technical capabilities
  - Using all relevant tools (web sites, interactive activities, focused relationship)



Chapter 4 : Guidance on good practices for developing objective seasonal forecasts

- **Recommended approach for developing operationnal objective seasonal forecast**
  - Starting with Large Scale forecasts (GPCs, LC-LRFMME, Copernicus, ...)
  - Discussing the models selection and relevant MME,
  - Using this first step as a first guess to be discuted if necessary (taking care with the necessary expertise to do so),
  - Performing the usual post-processing such as bias correction and calibration
  - Moving from « regional » to « local » forecasts thanks to appropriate downscaling methods

Chapter 4 : Guidance on good practices for developing objective seasonal forecasts

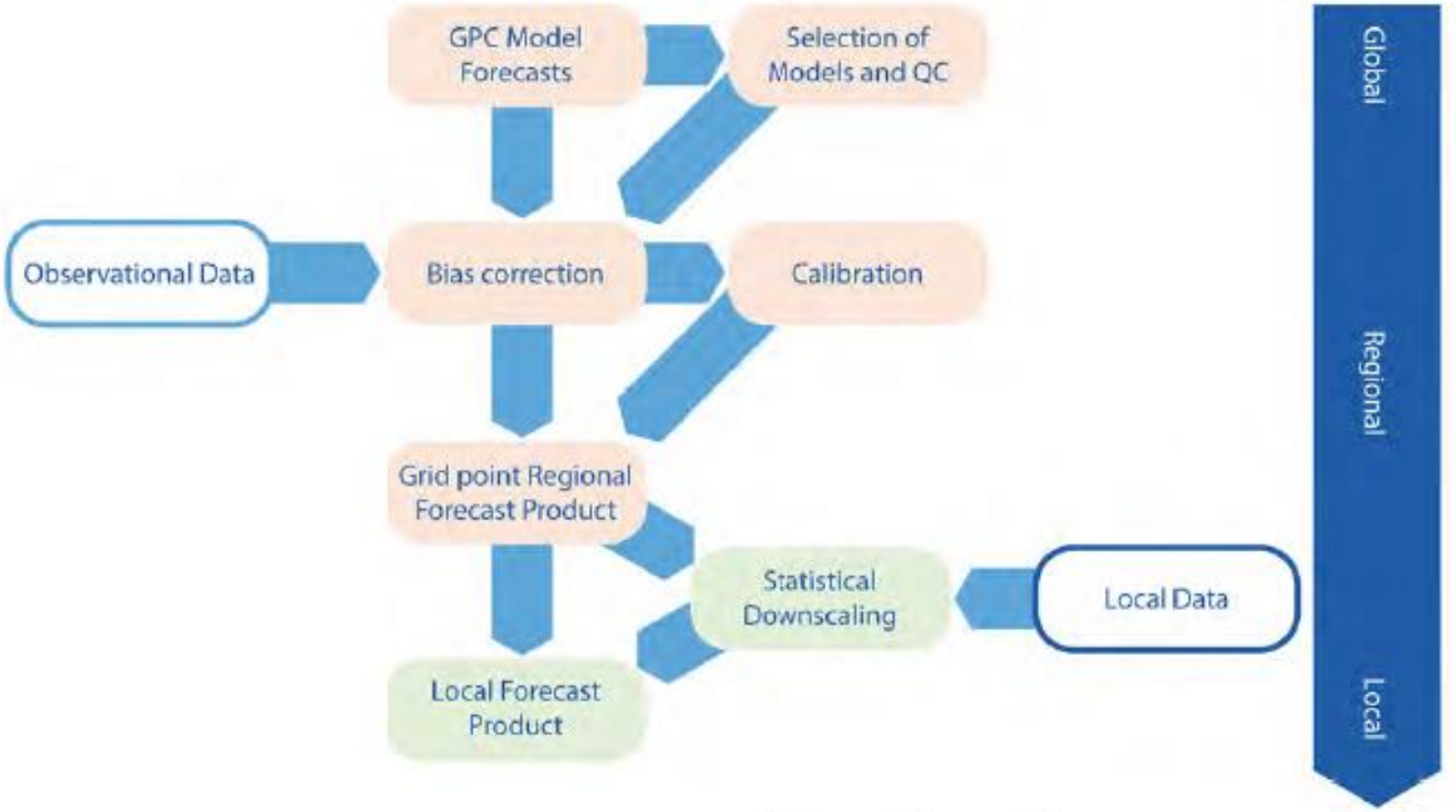


Figure 4.7: An outline of the recommended procedure for developing seasonal forecasts at regional and national level starting from the forecasts from GPCs-LRFs. The first step in the forecast development process is the choice of GPCs-LRF models that will be available in a consistent manner, and if desired,

Some examples of good practices

- **The SWIOCOF example**
  - Methodology guide
  - Regional plateform for data sharing and COF
  - Dedicated software (CPT-like coded under « R »)

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The SWIOCOF Methodology

- **Understanding the behaviour of the Climate System**
  - Starting from the Large Scale up to the Local Scale
  - Principal Component Analysis of the parameters describing the different scales. Interpretation of the different modes of variability
  - Composite Analysis starting with the Large Scale stratified with Local parameters. Use of yearly analysis of anomalies for help.
  - Consolidation with the Composite Analysis of the Local Parameters stratified using Large Scale or Regional Scale parameters
  - Study and Interpretation : Logic of consistency between the different results, Mobilisation of the knowledge on the climate at all scales. Linking PCA and CA results
  - Note the needs to define consistently (at the different scales) the used stratifications

The SWIOCOF Methodology

- **Understanding the potentiality for LRF**
  - Use of Large Scale and Regional fields highlighted at the previous step
  - Linking the behaviour of relevant observed Large Scale and Regional fields with the target for the forecast : use of CCA and the modes of correlation
  - Study of the relationships between the large to regional scale information to the regional to local scale information
  - Exploration of the different possible parameters
  - Interpretation in terms of mechanisms and consistency between the different results (interparameters) and the previous step
  - Domain choice

The SWIOCOF Methodology

- **From the Potentialities to the Forecast : the Perfect Prog method**
  - Applying the results from the previous step for forecasting : using the PP method based on the forecast of Climate models as input of the models built at the previous step
- **Improving the use of Climate Models for LRF**
  - Using the ability of the Climate models to forecast the evolution of the climate system and correcting some possible spatial bias coming from the models of Climate : the MOS method
  - Replacing the Observed Large Scale or Regional fields at step 2 by Forecasted Large Scale or regional fields (model hindcasts)

Use of CCA and the modes of correlation

Study of the relationships between the large to regional scale information to the regional to local scale information

Exploration of the different possible parameters

Interpretation in terms of mechanisms and model behaviour

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