Training on Use of ANACIM Senegal ENACTS Platform and Maprooms

Sylwia Trzaska | James Hansen | Lamine Diop | Ndeye Amy Sal | Asse Mbengue | Amanda Grossi

Workshop Report

CGIAR | AICCRA
Accelerating the Impact of CGIAR Climate Research for Africa

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Accelerating Impact of CGIAR Climate Research for Africa (AICCRA)

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About AICCRA reports
Titles in this series aim to disseminate interim climate change, agriculture, and food security research and practices and stimulate feedback from the scientific community.

About AICCRA
Accelerating Impacts of CGIAR Climate Research in Africa (AICCRA) is a project that helps deliver a climate-smart African future driven by science and innovation in agriculture. It is led by the Alliance of Bioversity International and CIAT and supported by a grant from the International Development Association (IDA) of the World Bank. Explore AICCRA's work at aiccra.cgiar.org

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Acronyms

ACToday	Adapting Agriculture to Climate Today, for Tomorrow project
AICCRA	Accelerating the Impact of CGIAR Climate Research for Africa project
ANACIM	*Agence Nationale de l'Aviation Civile et de la Météorologie*
ANCAR	*Agence Nationale de Conseil en Agriculture Rurale*
CCAFS	*CGIAR research program on Climate Change, Agriculture and Food Security*
CIAT	International Center for Tropical Agriculture
CINSERE	Climate Information Services in Senegal
ENACTS	Enhancing National Climate Services initiative
GTP	*Groupes de Travail Pluridisciplinaire*
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IRI	International Research Institute for Climate and Society
NGO	Non-Governmental Organization
USSEIN	*Université du Sine Saloum El-hâdj ibrahima Niass*

Introduction

Weather and climate play a vital role in most human activities especially in the agriculture and livestock sectors. According to the United Nations, on the planet, one in nine people in developing countries go hungry each year for long periods of time as a result of bad weather conditions; and this problem is only getting worse with climate change disrupting agricultural calendars. Climate variability is also one of the greatest threats to the food systems of these countries, whose economies still largely depend on rainfed agriculture. For years, considerable investments have been made to improve the agricultural yields of smallholders and support resilient and sustainable development. These programs are often implemented without knowing whether the proposed strategy can actually make farmers more vulnerable to their local climate.

In the face of climate change and variability, the use of historical climate data helps us better understand climate cycles and their effects on food systems, human health and water resources. High-quality climate data allows us to see how the climate varies from place to place, season to season, and over years and decades, as well as the frequency of droughts and other events serious. If observational data are sparse, climate forecasts and projections are likely to be less accurate. It is within this framework that ANACIM, in collaboration with the International Institute for Research on Climate and Society (IRI, Columbia University), implemented in 2017 the ENACTS (Enhancing National Climate Services) initiative to improve the availability, access and use of climate information provided by ANACIM. Since its inception ANACIM and IRI have co-developped with various stakeholders a series of analytical and visualizations improving the access to climate information. Among new products is a high resolution (4km) gridded daily temperature and rainfall dataset, updated every 10 days that allows improved and easy real-time monitoring of climatic conditions in any point of Senegal.

In order to support a wider use of the platform, ANACIM in collaboration with the IRI conducted a workshop to introduce agricultural professionals to the data and tools that are available through ANACIM's ENACTS platform and Maprooms, and train them to access, interpret and apply these tools. The training covered basic climate concepts, the ENACTS approach, demonstration and hands-on experience using ANACIM's data analysis Maproom tools, and discussion of how these analyses can address a range of climate-related problems and climate-sensitive management decisions. Participants were introduced to a new seasonal rainfall forecast Maproom that was designed to increase the usefulness of probabilistic seasonal climate forecasts for local decision making for agriculture and other climate-sensitive sectors. Workshop agenda is available in Appendix A.

This workshop targetted an audience that did not benefit from prior ENACTS capacity building activities (e.g. Multidisciplinary Workiong Group, actors of food security and nutrition) but need basic understanding of climate information in ther professional activities. The 14 participants to the workshop (6 females) stemmed from otrganisations in charge of climate information and agricultural advisories dissemination in Senegal such as ANCAR, MLouma or Jokalante and professionalisation-oriented University of Sine Saloum El-Hâdj Ibrahima Niass (USSEIN).

Workshop Activities

The workshop was structured around the following sessions:

1. Basic concepts and analyses in climate
2. Overview of ENACTS
3. ANACIM historical climate maprooms
4. Flexible climate forecast

Basic concepts and analyses in climate

The target audience of this workshop being less familiar with basic concepts and analyses in climate than actors stemming directly from climate-sensitive sectors, the first session introduced concepts such a climate seasonality, climate variability vs change, correspondence between time and spatial scales, various types of forecasts and rationale behind it, different types of weather and climate data and most common analyses in climate.

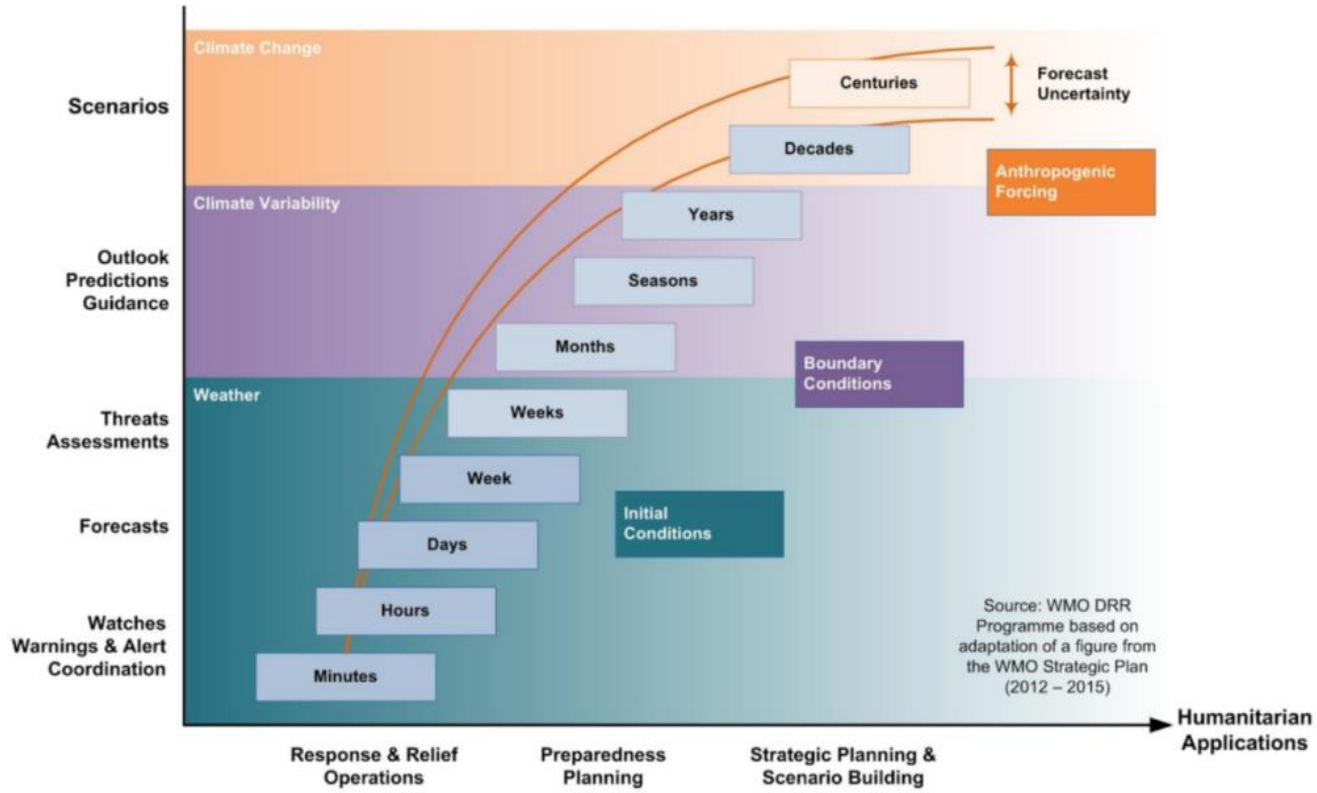


Figure 1: Schematic diagram showing the relationship between climate timescales, from weather to climate change, and emergency adaptation mechanisms, from relief operations to climate change planning. Source: S. Mason et al. (2015) Accessing and using climate data and information in fragile, data-poor states. IISD, Pp.22

Overview of ENACTS

ANACIM presented the rationale and the main achievments of the ENACTS initiative, in Senegal including the web-based data visualisation interface and the draft users' guide. Figure 2 presents the overarching structure of typical ENACTS climate information interface.

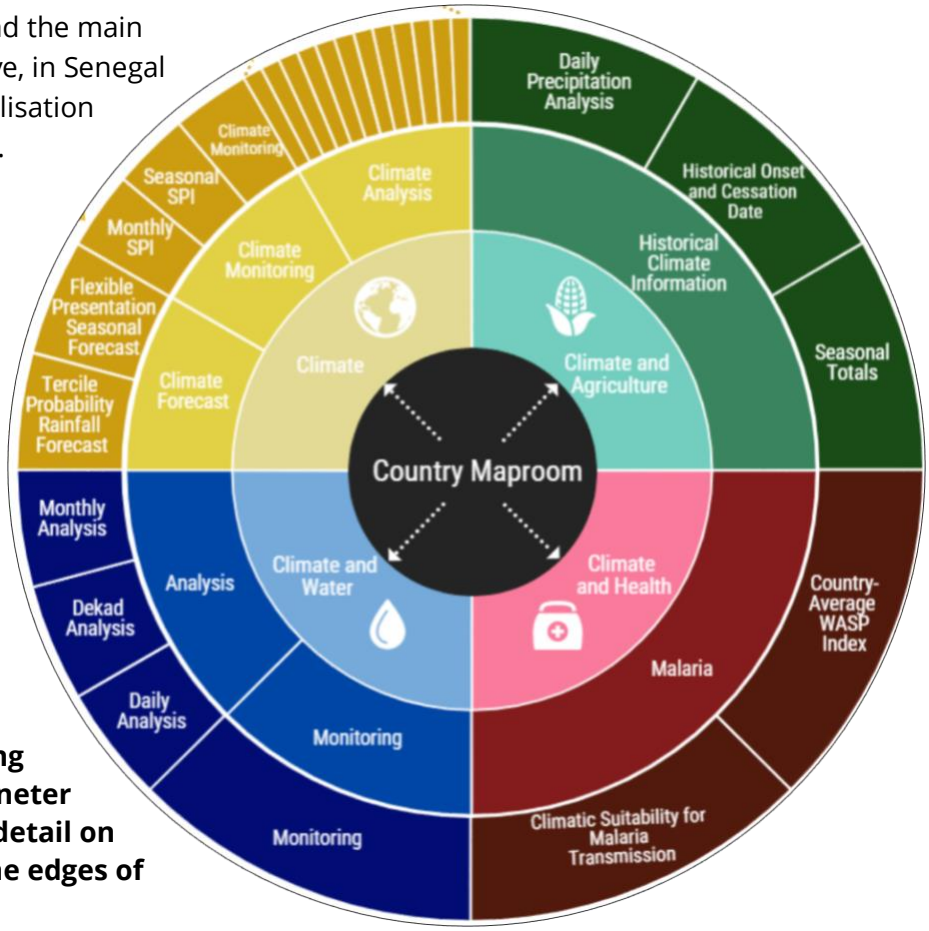
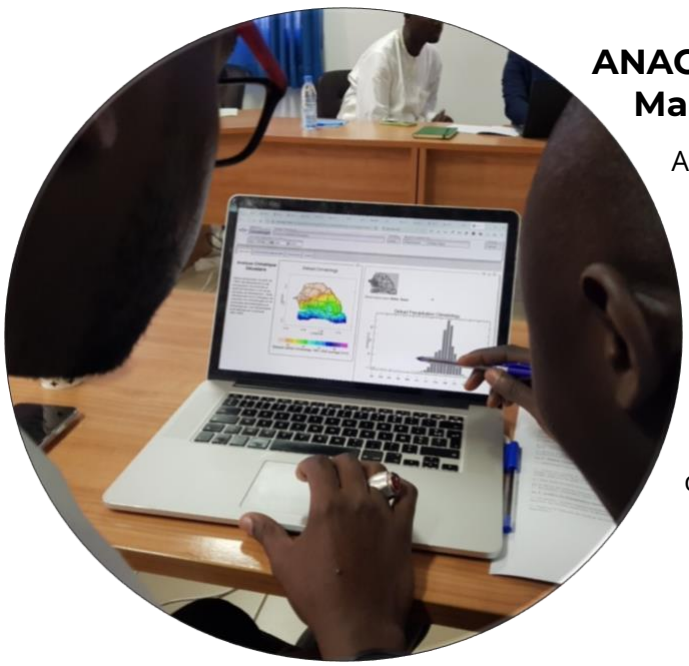


Figure 2: The architecture of the ENACTS on-line interface depicting the navigation scheme. In the ceneter are the main themes with more detail on information available towards the edges of the circle.



ANACIM Historical Climate Analysis Maprooms

After the presentation of the rationale and the structure of the maprooms participants were invited to a guided exploration and discussion of the available information with ANACIM and IRI's facilitators. The exploration included spatial scales and main statistical analyses of historivcal daily and 10-daily rainfall and tempreturev, climate monitoring and rainfall onset maprooms. More detail on the the exercices can be found in Appendx 2B.

Flexible Climate Forecast Maproom

This session introduced a new Seasonal Rainfall Forecast Maproom, developed and piloted through a collaboration between IRI and ANACIM, that aims to address many of the known needs of decision makers. It presents the seasonal forecast in a "flexible forecast" format that was first developed at the IRI as an alternative way to present the IRI's operational global seasonal forecasts, and later adapted and

extended to the East Africa regional climate center, ICPAC, and several NMS through the IRI's ENACTS initiative. This format improves on the tercile convention as it presents information derived from the full probability distribution of the forecast along with historical climatological conditions for a specified location and can more readily inform on-farm decisions. It addresses some of the known barriers to the use of seasonal forecast (see table 1)

Table 1. Solutions to constraints to usability of tercile seasonal forecast presentation.

Problem	Solution
Lack information about local climate	Downscale forecasts
	Present with local climatology
Categories difficult to communicate and understand	Provide full forecast probability distribution
Categories do not match decision-relevant thresholds	
Limited relevance of seasonal averages alone	Forecast additional variables
	Translate into agricultural impacts, management options

IRI has developed a six-step process that allows to understand and interpret the flexible forecast and successfully piloted it with smallholder farmers in Senegal, Kenya, Tanzania and Rwanda with the support from the CGIAR research program on Climate Change, Agriculture and Food Security (CCAFS). The steps involve:

- *Step 1: Purpose, concepts* involves explaining the purpose and roadmap of the workshop, and agreeing on the meaning of key concepts including: weather, climate, variability, frequency, uncertainty, probability, and forecast.

- *Step 2: From memory to variability* is designed to help farmers relate time series graphs to their collective experience. It elicits participants memory of recent growing season conditions, introduces a time series graph, and validates it against their collective memory.

- *Step 3: From variability to probability* introduces the probability of exceedance (POE) graph and participants them to interpret it. Activities include: sorting the recent time series onto a frequency of exceedance graph, discussing the relationship between past frequency and future probability, and reading the probability of experiencing above or below a threshold rainfall amount from the POE graph.

- *Step 4: Forecasts shift probabilities*, introduces the concept that a forecast is new information that shifts the historical probability distribution, and equips participants to interpret a forecast in POE graph format.

- *Step 5: Current forecast* presents the current seasonal forecast, current climate conditions, and potentially other information that might impact farmers' plans for the upcoming season.

- *Step 6: Farm planning* supports participant discuss and decide what seasonal management decisions, if any, they will change in response to the forecast.

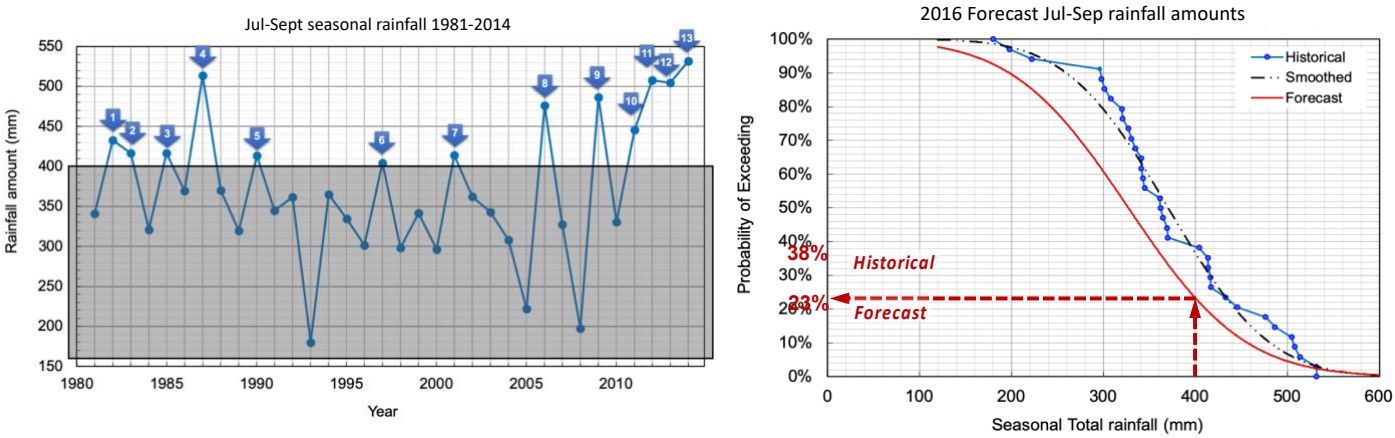
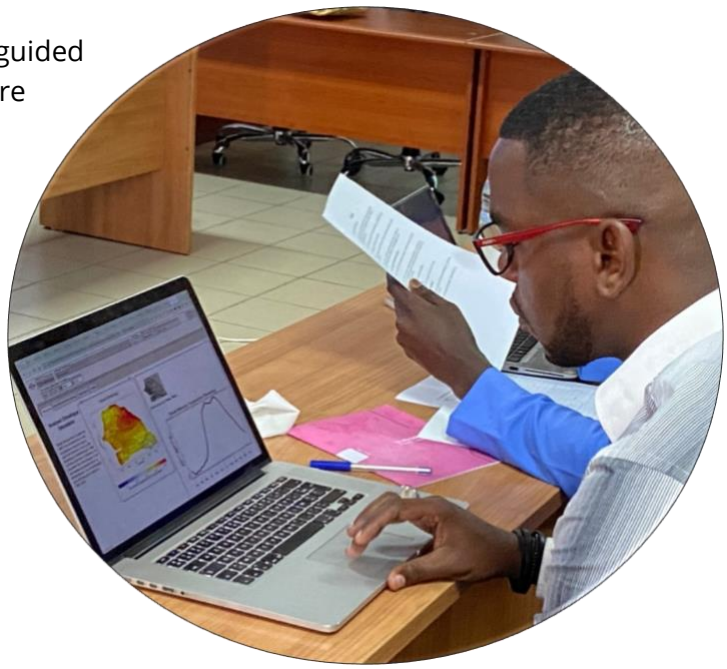


Figure 3: Interpreting flexible seasonal forecast: left- calculating frequencies from a time series; right – using the cumulative curve and shifts in probabilities. two ways of estimating the probability of exceedance of a 400mm rainfall thershold based on historical rainfall observations.

Participants had the opportunity to explore steps 3-6 guided by a presentation and specific exercices (step 1&2 were addressed in previous sessions). In particular they calculated the probability of exceeding/not exceeding a given user-relevant threshold using different methods and discussed the predicted shifts in probabilities and their impacts on on-farm decisions. The guiding exercise can be found in Appendix C.



Conclusions and Recommendations

Since the start of the ENACTS initiative in Senegal, ANACIM and IRI engaged with various actors of climate sensitive sectors of paramount importance to the economy of Senegal to assess the gaps and co-codevelop climate information products responding to the needs of climate -resilient development. This engagement and co-production benefited from the support of earlier projects such as CCAFS and CINSERE, and more recently ACToday and from existing well structured users group uch as the Multidisciplinary Working Group (GTP). The capacity to access and use climate information supported by these initiatives focused on various Senegalese motsly governmental and para-statal institutions, in Dakar and progressively in regions but the benefits to the end-users (e.g. farmers, herders) is hampered by the centralized nature of the institutions with relatively small footprint on the ground. Private sector and non-governmental organisations are progressively filling many gaps, including in agricultural advisories, but have historically not been included in the capacity building initiaives. AICCRA is recognaising the plural nature of the actors enaged in agricultural inputs and advisories and this workshop was the starting point for more systematic capacity building of the variety of stakeholders in climate-sensitive sectors in Senegal, identified during the AICCRA workshop on curriculum development, held earlier in the week.

Appendices

APPENDIX A: Workshop Agenda

Time		Topic	Presenter
9:00	**9:30**	Welcome Workshop objectives and overview	Oumar Konte Jim Hansen, Sylwia Trzaska
9:30	**10:30**	Capacity building opportunities whitepaper presentation and discussion	Sylwia Trzaska
10:30	**11:00**	Workshop photo Coffee	
11:00	**12:00**	Participant perspectives on capacity development priorities and contributions:	Participating Institutions
12:20	**1:00**	SWOT Analysis of the Capacity Building in Climate Risk Management in Agriculture in Senegal	Sylwia Trzaska
1:00	**2:00**	Lunch	
2:00	**2:45**	ACToday curriculum resources for farmer advisory services and universities	Jim Hansen, Sylwia Trzaska, Amanda Grossi
2:45	**3:30**	AICCRA capacity development strategy discussion	
3:30	**4:00**	Closing	

APPENDIX B: Workshop Participants

No	M/F	Organization	Location
1	F	Jokalante	Dakar
2	M	MLouma	Dakar
3	M	Université du Sine Saloum El-Hâdj Ibrahima Niass (USSEIN)	Kaolack
4	M	Civil Aviation and Meteorology Service in Senegal (ANACIM)	Dakar
5	F	Civil Aviation and Meteorology Service in Senegal (ANACIM) & GTP	Dakar
6	M	Civil Aviation and Meteorology Service in Senegal (ANACIM) & GTP)	Dakar
7	F	World Food Program	Dakar
8	M	Civil Aviation and Meteorology Service in Senegal (ANACIM)	Dakar
9	F	Civil Aviation and Meteorology Service in Senegal (ANACIM)	Dakar
10	M	ICRISAT	Dakar
11	M	Agence National de Conseil Agricole et Rural (ANCAR)	Dakar
12	F	IRI, AICCRA	New York
13	M	IRI, AICCRA	New York
14	F	IRI, AICCRA	New York

APPENDIX C: Exercices on historical climate maprooms

Exercice 1 : Analyse Climatique des pluies décadaires

1. Quel est l'unité spatiale de vos décisions affectées par le climat ? Choisir une niveau d'analyse spatiale le plus approprié pour les décisions que vous prenez (parmi point de grille, Commune, Arrondissement, Département et Région)

2. Choisir une entité géographique (dans la liste automatiquement générée ou en cliquant sur la carte)

3. Relever les décades de début, de la fin, et du pic des pluies

4. En fonction de #3, choisir le mois de début et fin de l'analyse des anomalies saisonnières (par défaut : Juillet – Septembre)

5. Relever les années qui connurent les plus grands excès et déficit de pluies. Ces années vous évoquent-elles des évènements/impacts particuliers pour l'entité géographiques choisie ?

Exercice 2 : Analyse Climatique des températures décadaires

1. Sélectionner l'une des trois variables de température (moyenne, minimum, maximum) de votre choix.

2. A partir des resultats de l'exercice 1.3 determiner les mois correspondant à la saison sèche et les utiliser comme début / fin possibles de l'analyse des anomalies saisonnières (si besoin retourner sur la variable pluie pour identifier la saison sèche)

3. Dans quelle décennie se trouvent les années les plus chaudes ?

Exercice 3 : Revue des analyses mensuelles

En pleniere : presentation rapide du cycle saisonnier avec courbes a 50 et 150%

Exercice 4 : Analyse des Précipitations Quotidiennes

1. En plénière : Quelles analyses pourraient-on faire avec des données quotidiennes, qu'on ne peut pas faire avec des données mensuelles ou décadaires ?

2. Explorer la Maproom des Analyse des Précipitations Quotidiennes. Quelles analyses sont disponibles ?

Exercice 5 : Suivi Climatique

1. Choisir pour cet exrcice la 2nde décade de Juillet 2017

2. Pour chacune des 5 analyses proposées, noter les régions qui connaissent des évènements particulièrement pluvieux et celles qui connaissent des évènements particulièrement secs.

3. Ces résultats correspondent-ils entre eux ?

4. Pouvez-vous expliquer les différences repérées ?

5. Parmi les analyses proposées, lesquelles utiliseriez-vous pour votre travail et dans quel but ?

Exercice 6 : Début Historique de la Saison des Pluies

1. Utilisez-vous une définition spécifique de démarrage de la saison des pluies ? si oui, laquelle ?

2. La Maproom utilise une certaine définition qui est paramétrable. Votre définition est-elle compatible avec celle de la Maproom ? si oui, entrer vos paramètres ; sinon, utiliser les paramètres par défaut.

3. Cliquer un point de grille de la carte vers Thiès. Pour combien d'années l'algorithme a-t-il trouvé une date de démarrage ? Si besoin, élargir la recherche pour comptabiliser plus d'années où une date a été trouvée (date de recherche ou fenêtre de recherche, ou les deux)

4. Que représente la carte ? Quelle est la date moyenne approximative de démarrage vers Thiès?

5. Pour la meme localite, quelle est la probabilité que le de démarrage ait lieu après le 15 Juillet ?

6. Compter les dates qui ont lieu après le 15 Juillet, à l'aide de la Table des Dates.

Exercice 7 : Previsions climatiques : Probabilites historiques de terciles conditionnes par l'ENSO

1. Noter que ces maprooms sont en construction et les maprooms actuelles ne sont que des maprooms de substituion temporaires.
2. Discussion pleniere : Le phenomene ENSO a-t-il un impact fort sur la variabilité climatique du Senegal ?
3. Selectionner la phase El Nino Tecile sec. Que represente la carte ? Est-elle en accord avec votre connaissance des impacts de l'ENSO sur le cliamat du Senegal ?
4. Cliquez sur une region de fortes probabilites. Que voye-vous ? Cliquez sur une zone de faible probabilites, que voyez-vous ?

APPENDIX D: Exercices on flexible forecast

Exercice 1 : Graphique de probabilités extraites d'une série chronologique

1. Supposons que le risque de maladie d'une culture particulière augmente considérablement si les précipitations saisonnières sont supérieures à 650 mm. Quelle est la probabilité que cela se produise ?

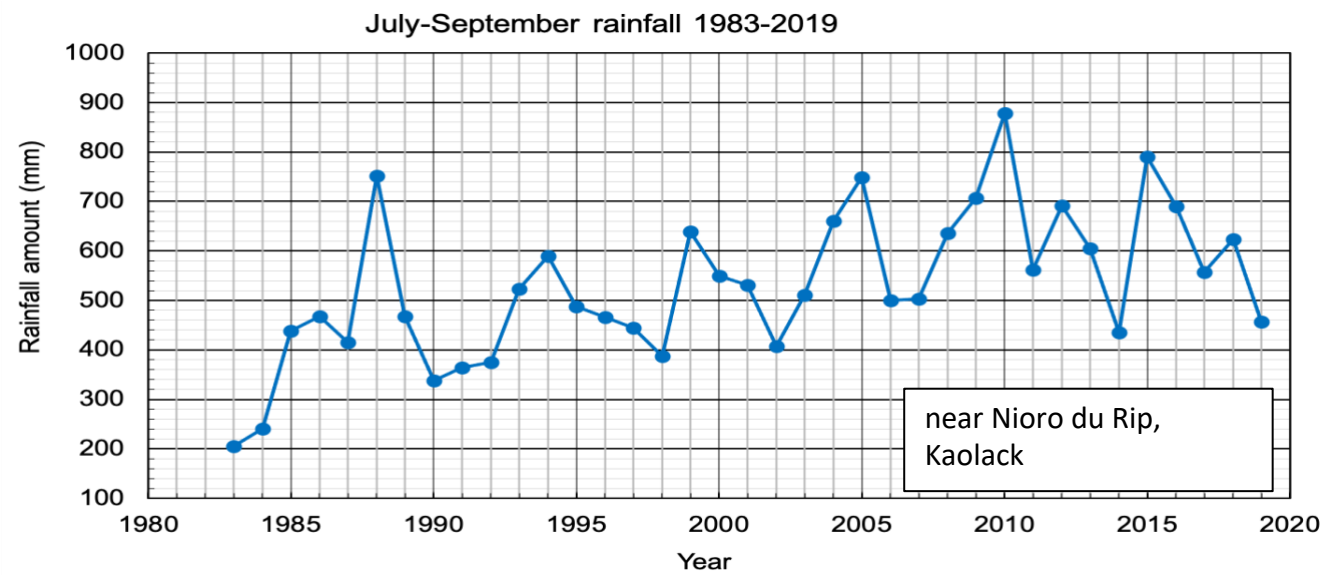
    a. Combien d'années de données existe-t-il?

    b. Combien d'années ont eu au minimum 650 mm de précipitations ?

    c. Calculez le pourcentage d'années avec au minimum 650 mm de précipitations.

La probabilité d'au minimum 650 mm de pluie la saison prochaine est estimée par la fréquence relative d'obtention de cette quantité dans les années disponibles des données historiques.

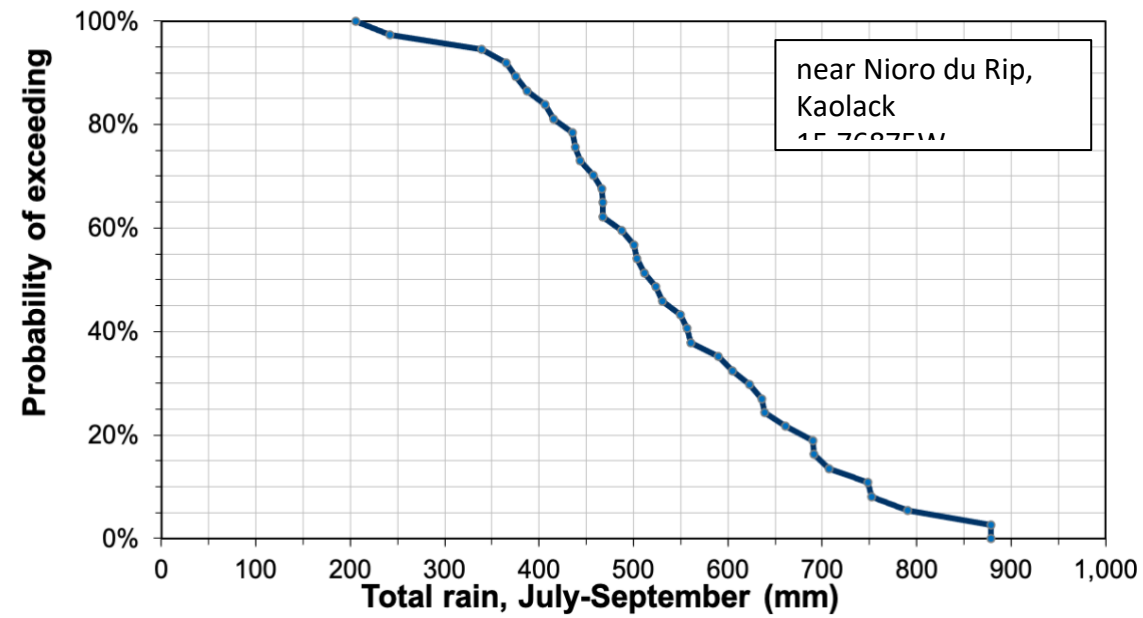
2. Supposons que la production d'une variété de maïs à haut rendement peut échouer si les précipitations saisonnières sont inférieures à 400 mm. Quelle est la probabilité que cela se produise ?



Exercice 2: Probabilités a partir d'un graphique de probabilité de dépassement

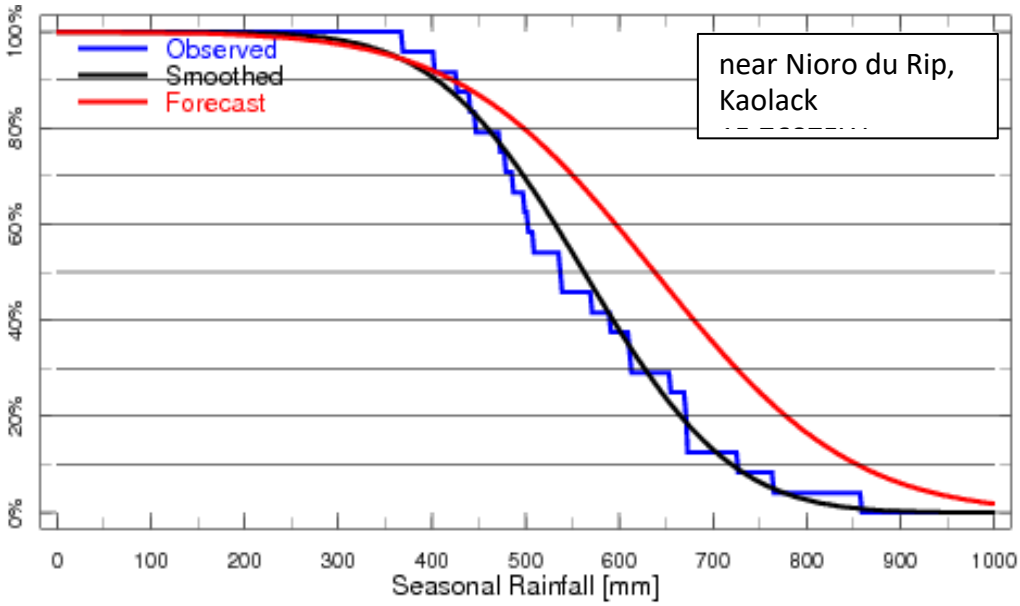
1. Supposons que le risque de maladie d'une culture particulière augmente considérablement si les précipitations saisonnières sont supérieures à 650 mm. Quelle est la probabilité que cela se produise ?

2. Supposons que la production d'une variété de maïs à haut rendement échoue probablement si les précipitations saisonnières sont inférieures à 400 mm. Quelle est la probabilité que cela se produise ?



Exercice 3: Probabilités issues d'une prévision saisonnière

1. Supposons que le risque d'une maladie d'une culture particulaire augmente si les précipitations dans un saison sont supérieures 650 mm. Quelle est la probabilité prévue que cela va arriver ? Comment le risque est-il modifié par la prévision?



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