Agricultural Research and the use of Seasonal Climate Information in Ethiopia

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Outline

- Background: Ethiopian Agriculture
- Challenges and constraints in Ethiopian Agriculture
- Agricultural Research to address some of the challenges
- Agro-Weather Advisory System (AWAS)
- Other Research initiatives Capitalize on AWAS
- Major Challenges
- The Way Foreword

Background: Ethiopian Agriculture

- Agriculture remains one of the most important sectors in the Ethiopian economy for the following reasons:

  - directly supports about 83% of the population in terms of employment and livelihood;
  - contributes over 40% of the country's gross domestic product (GDP);
  - generates about 85% of export earnings; and
  - supplies around 73% of the raw material requirements of agro-based domestic industries, such as biofuels

Cont..

- It is also the major source of food for the population and hence the most important sector for food security

- In addition, agriculture is expected to play a key role in generating surplus capital to speed up the country's overall socio-economic development

- The country has a total land area of about 112.3 million hectares. Of this, about 16.4 million hectares are suitable for producing annual and perennial crops.

- Of the estimated arable land, about eight million hectares is used annually for rain-fed crops.

Challenges and constraints in Ethiopian Agriculture

- Land degradation
  - decline in soil fertility
- Climate risk
  - Climate variability and extreme weather events (e.g. drought and extended dry spell)
- Low inputs and low output
- Low productivity (yield, labor)
- Lack of (timely) information about weather, seasonal risks, market prices,
- Lack of coordinated effort from climate information generation to dissemination and implementation
- Limited technologies and information about available varieties, agronomic production techniques, methods of pest and diseases control, credit and insurance services
- …etc

Agricultural Research to address some of the Challenges

Research Areas

Crop Research

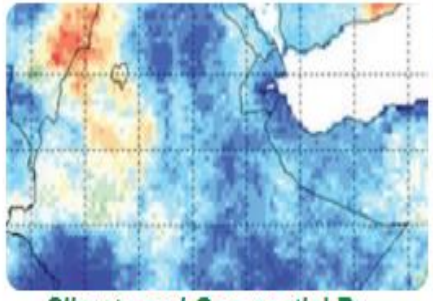
Livestock Research

Natural Resource Managemen...

Agricultural Engineering R...

Agricultural Biotechnology...

Agricultural and Nutrition...


Climate and Geo-spatial Re...

Agricultural Economics Res...

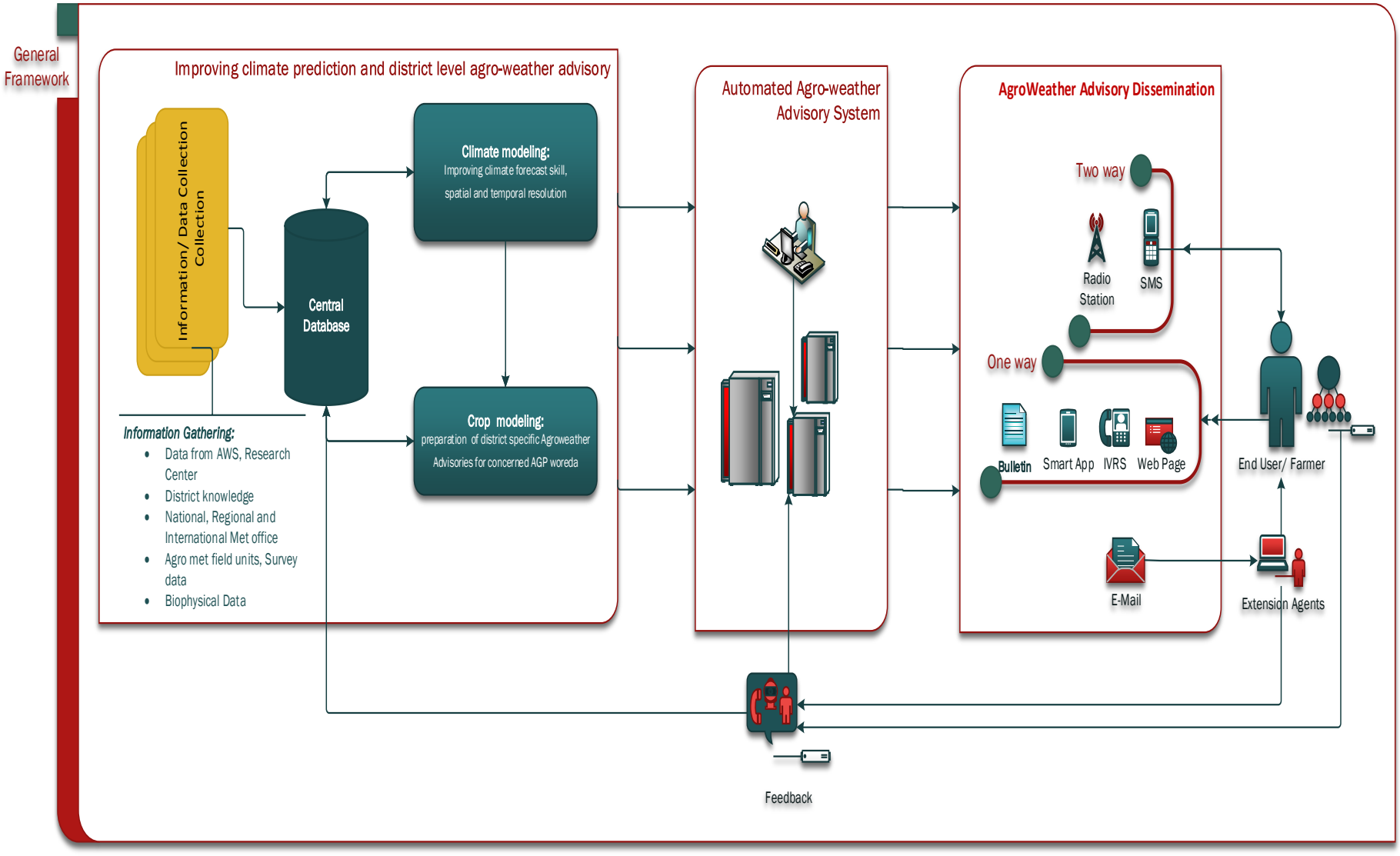
Technology Multiplication...

Technology Transfer &...

Pastorial and Agro-Pastora...

Gender and Youth

Agro-Weather Advisory System (AWAS)



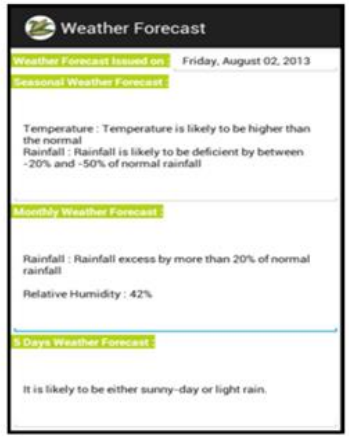
Cont…

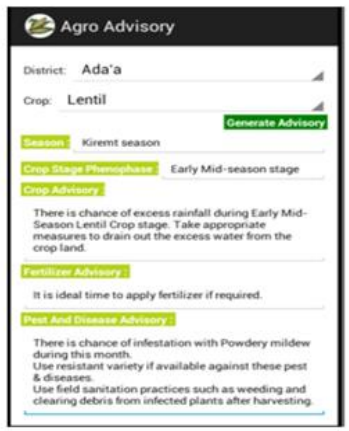
Advisories based on Weather forecast	Time scale
Crop variety selection	Weakly
Crop field selection	
Sowing time	
Crop health	Monthly
Harvest time	
Post harvest conditions	
Preventive measures on pests & diseases	Seasonal
Fertilizer application	
Irrigation applications	

AgroAdvisor – Ethiopia (for android)

Informing Farmers to Increase Productivity, Manage Weather Induced Risks and Improve Food Security

Download





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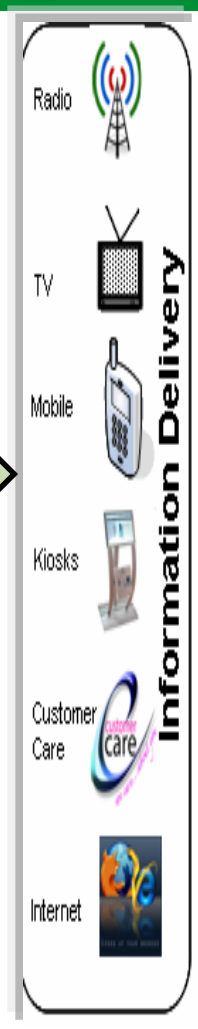
Information on forecasted weather & climate-smart crop advisories

Delivery channel



- Interactive Voice Response System (IVRS)
- Farmers Call Centres
- District Call Centres
- Online (web based service)
- Mass media(TV, Radio, Newspapers)
- Print Media (Pamphlet, Gazette, Notifications etc.)
- Advertisement
- Dashboard / Digital Notice Board
- Farmers Training Centres,

Languages:

- Amharic
- Afan Oromo
- English

Improved the effectiveness of the extension service

2600 Farmers (Ada'a)

- Dissemination Platform:
  - SMS - 8125
  - IVRS – 8325 (Dial)
  - www.eiar.gov.et/AgroWeatherAdvisory/ or
  - www.agrometeeiar.gov.et/AgroWeatherAdvisory/

Cont…..

Examples of advisories

FileName	Text
21	በመጪው ክረምት የሚኖረው ዝናብ መደበኛ ስለሚሆን በተለምዶ ተዘውትረው የሚዘሩ እንደ ስንዴና ጤፍ ያሉ ሰብሎችን እንዲዘሩ ይመከራል።
22	በተለምዶ ተዘውትረው የሚዘሩ እንደ ስንዴና ጤፍ ያሉ ሰብሎችን ነገር ግን ቶሎ የሚደርሱ ዝርያዎች እንዲዘሩ ይመከራል።
23	በተለምዶ ተዘውትረው የሚዘሩ እንደ ስንዴና ጤፍ ያሉ ሰብሎችን ቶሎ የሚደርሱ ዝርያዎች ወይም ድርቅን የሚቋቋሙ እንደ ጤፍ ያሉ ሰብሎችን ብቻ እንዲዘሩ ይመከራል።
24	ድርቅን የሚቋቋሙ እንደ ጤፍ ያሉ ሰብሎችን ብቻ እንዲዘሩ ይመከራል።
25	የውሃ መጥለቅለቅን የሚቋቋሙ ሰብሎች እንዲዘሩ ይመከራል።
32	ከነሀሴ እስከ ታህሣሥ ያለው ዝናብ መደበኛ ስለሚሆን ሽምብራን ለማምረት ተስማሚና ተመራጭ ይሆናል።
33	ሽምብራ የውሃ መጥለቅለቅን መቋቋም ስለማይችል በዚህ ወቅት ሽምብራ አይዝሩ ወይም የውሃ መጥለቅለቅን በተሻለ መቋቋም የሚችል የሽምብራ ዝርያ ወይም ደግሞ ሌላ የውሃ መጥለቅለቅን የሚቋቋም ሰብል ይምረጡ።
34	ድርቅን የሚቋቋም የሽምብራ ዝርያን ይጠቀሙ አለበለዚያም የተለመዱ የሽምብራ ዝርያዎችን የሚዘሩ ከሆነ ግን ተጨማሪ የመስኖ ውሃ ለሰብሉ ለመስጠት ይዘጋጁ።
36	ሽምብራ ባይዘሩ ካልሆነም ሌላ ድርቅን የሚቋቋም ሰብል እንዲመርጡ ይመከራል።

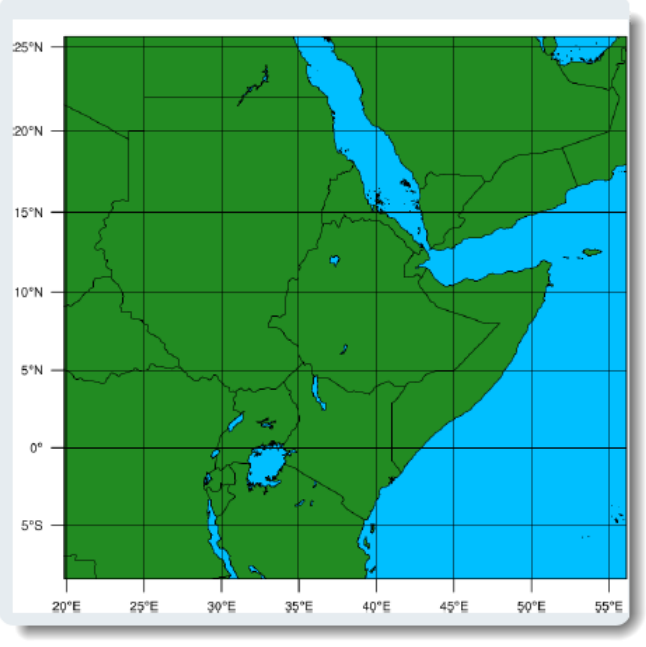
File Name	Text
1	ማዳበሪያ መጠቀም ካስፈለገ ይህ ወቅት በጣም ተስማሚ ጊዜ ነው።
2	በዚህ ሣምንት የትኛውንም ዓይነት ማዳበሪያ መጠቀም አይመከርም።

Other Research Initiatives Capitalizing on AWAS

1. Employing NWP Modeling System for the Ethiopian Region with Focus on Agricultural Application *(EIAR-IGSSA-NMA, other international partners)*

Objective: to employ short range weather forecasting NWP modeling system which will enhance significantly Ethiopian capabilities in mesoscale meteorological modeling for *short range weather forecast application*.

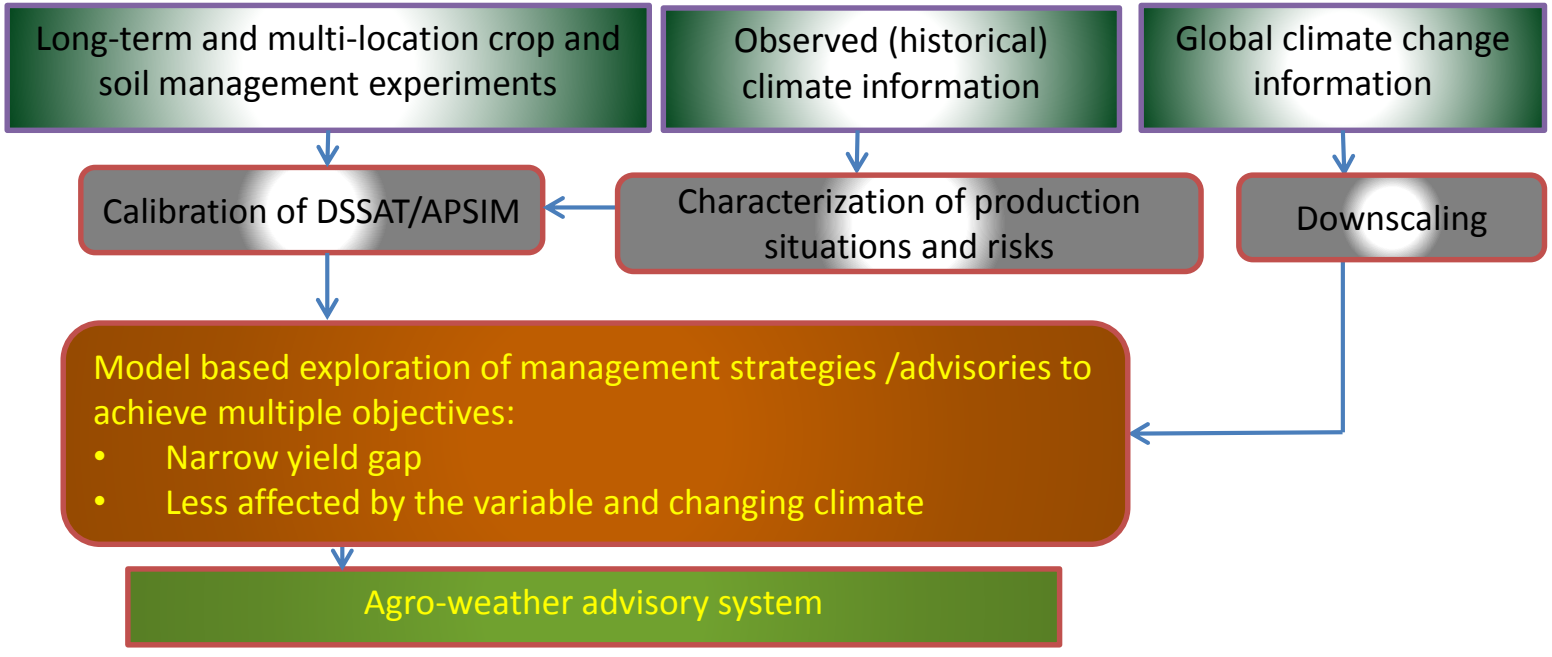
- Domain center= 09.00°N, 38.0°E
- Horizontal grid points= 333 x 321
- Horizontal resolution= 12km
- Maximum lead-time=5 days
- Vertical levels=35
- Model top=5000
- Map projection=Mercator



Other Research Initiatives Capitalizing on AWAS

2. Exploration of agro-advisory options/ adaption options to close yield gaps of major crops in Ethiopia under changing and variable climate

Objective: to explore and test site specific climate adaptation options and agro weather advisories



Other Research Initiatives Capitalizing on AWAS

3. Real-time and seasonal forecasting of wheat rust epidemics to inform surveillance and control ***(EIAR, UK Met Office, Uni of Cambridge, CIMMYT, ATA)***

Four major features of project are:

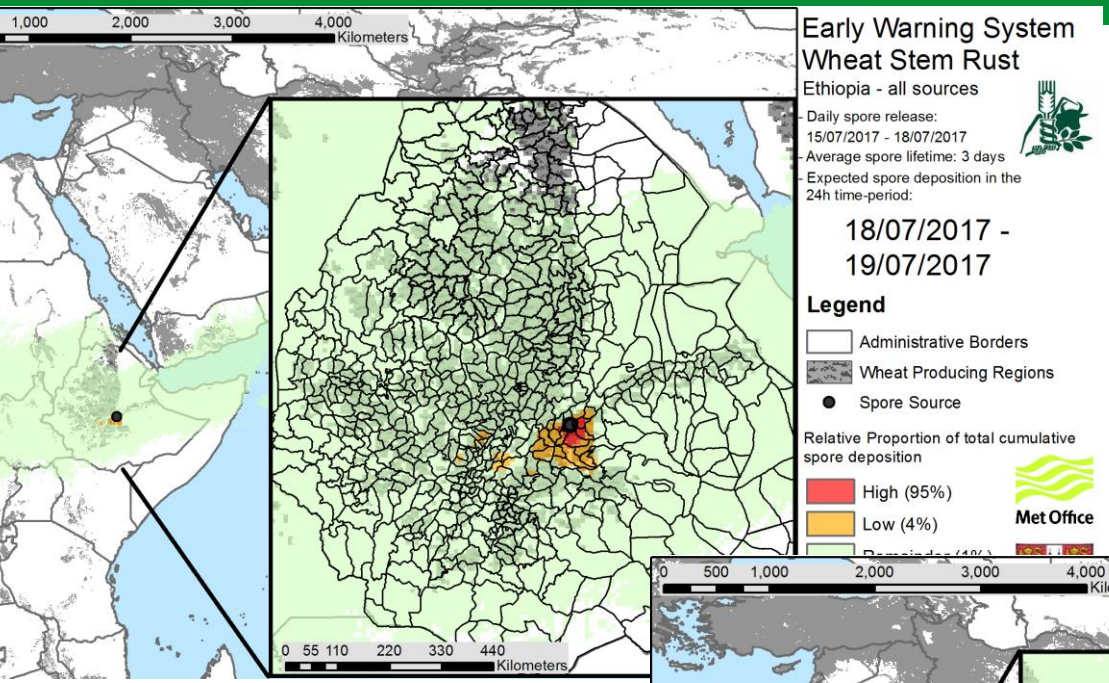
(i) the estimation of meteorologically-driven, spore dispersion dynamics based on real-time weather data coupled with epidemiological models for disease spread;

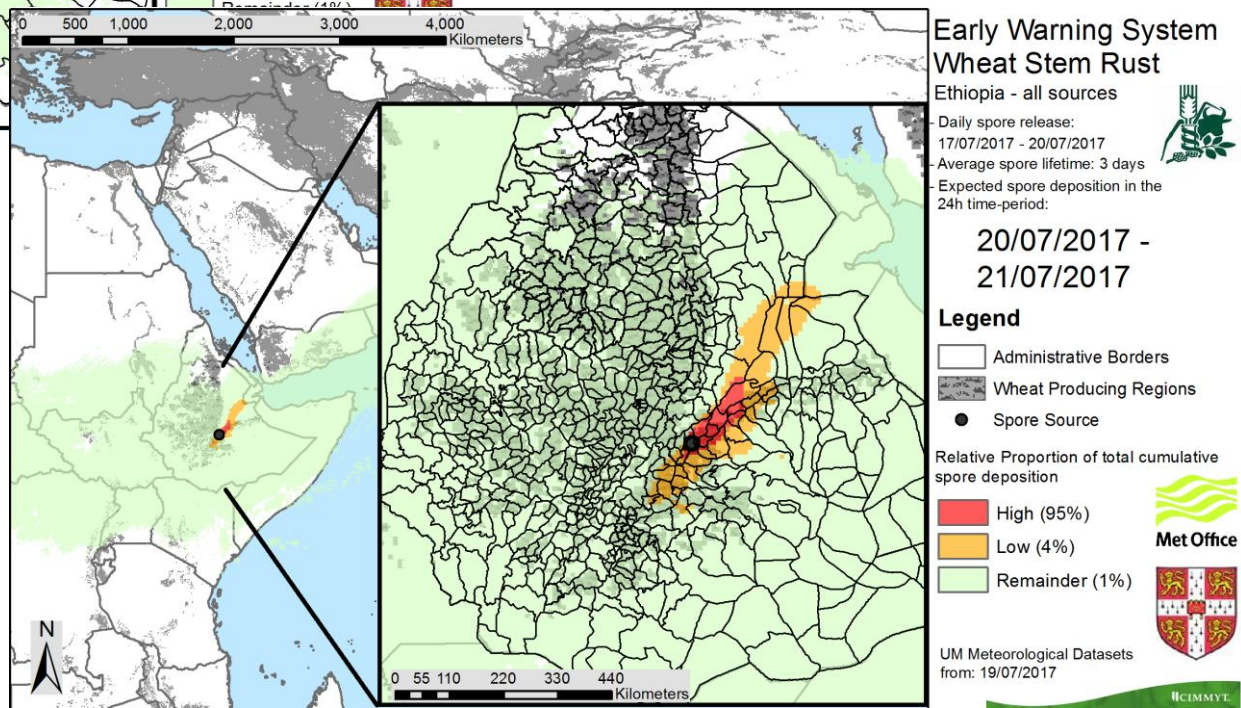
(ii) computationally-intensive, stochastic models to predict spore dispersal and disease spread

(i) highly resolved dynamic risk maps and consequences of disease are likely to be most severe; e,g. for crop loss;

(i) provide real-time predictions and comparison of the likely effectiveness of different disease management strategies, allowing for a range of uncertainties.

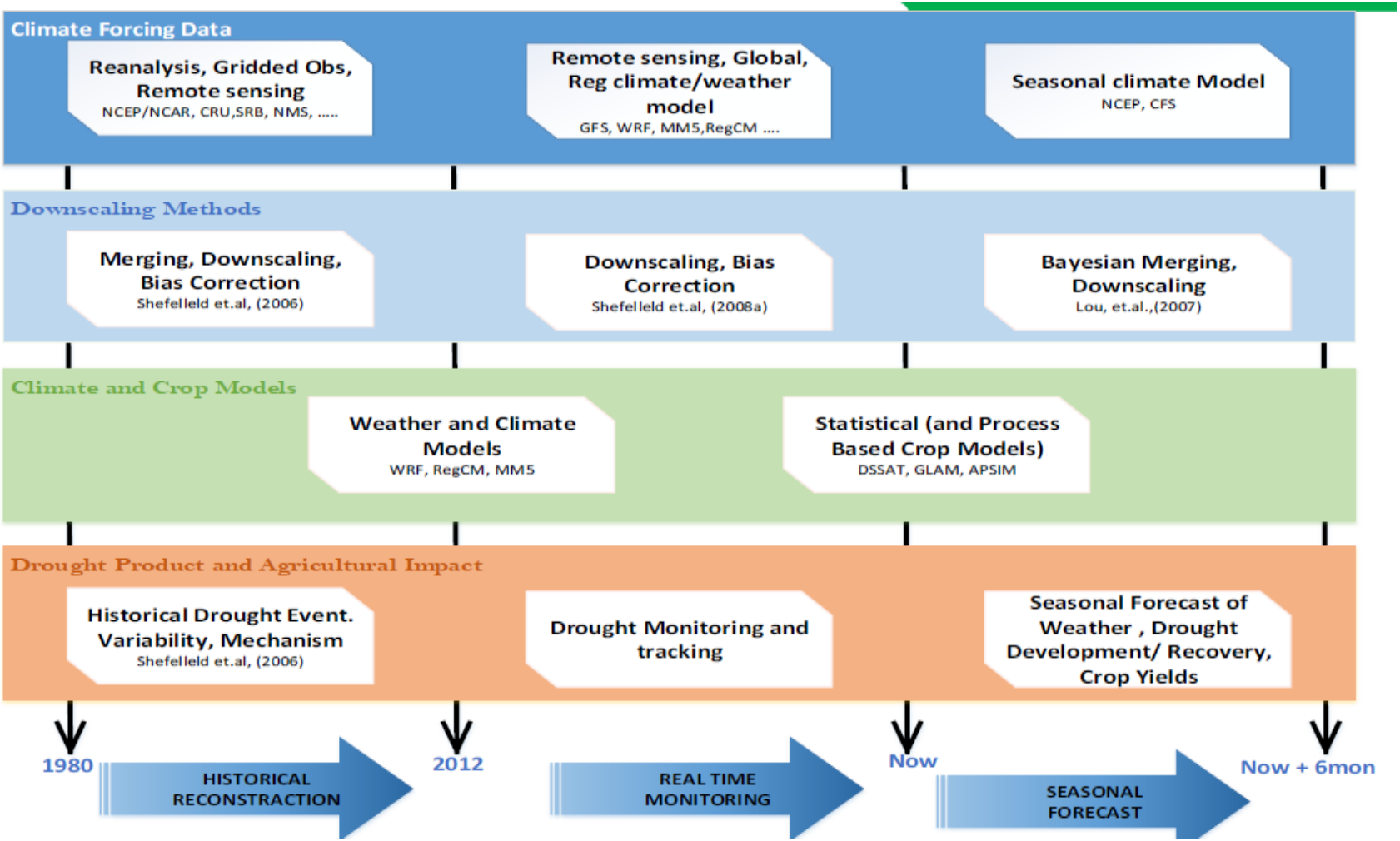
Other Research Initiatives Capitalizing on AWAS





Other Research Initiatives Capitalizing on AWAS

4. Developing Agricultural drought monitoring and prediction



Major Challenges

- ✓Data quality (spatio-temoral resolution)
  - Experimental data
  - Biophysical data
  - Weather data (station distribution)
- ✓Forecast quality (skill) tailored for agriculture
- ✓ In adequate dissemination mechanism.
- ✓Limited Human and Infrastructure capacity

The Way Forward

- Institutional integration and collaboration
- Expanding AWAS into other agricultural sectors, i.e. Livestock
- Human and infrastructure capacity
- Awareness creation and developing trust by small holder farmer and policy makers
- Working with implementing institutions to sustainably operationalized research products

Acknowledgment

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- CIMMYT, Ministry of Agriculture, ICRISAT, AAU (Physics dept.)
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- Government of Ethiopia
- International Data Providers (IPCC, ENMWF, NASA, ICTP)

Thank You