

Environmental Data and Surveillance

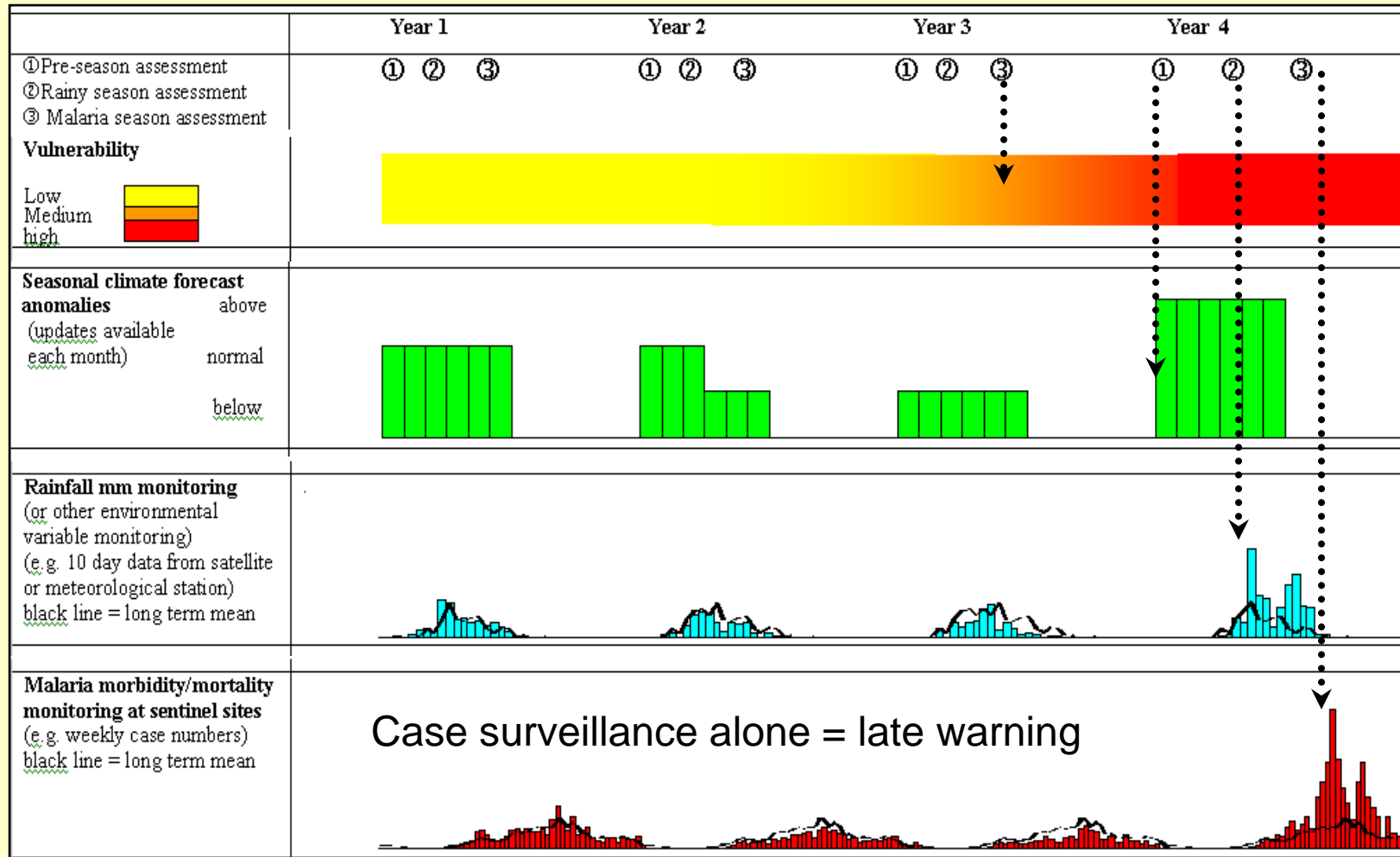
Pietro Ceccato,

Michael Bell, Benno Blumenthal, Stephen Connor,
Judy Omumbo, Madeleine Thomson, Sylwia Trzaska

GEO Meningitis Meeting Sept 26-27 2007



Framework (Malaria Early Warning System)



Analysis of Relationship between Climatic-Environmental Factors and Diseases

- ❑ Show evidences that climate and environmental factors influence diseases

Evidence of impact of climate variability on Malaria epidemics in Botswana (Thomson et al. *Nature* 2006),

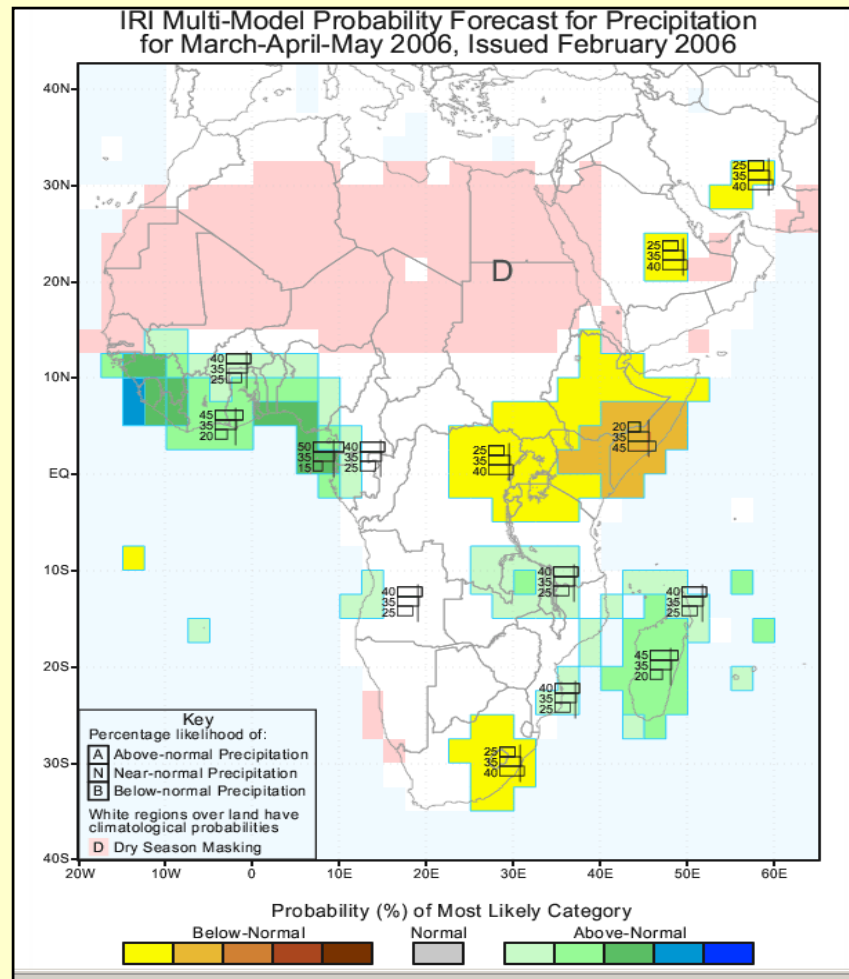
Evidence of impact of environmental variability on Malaria epidemics in Eritrea (Ceccato et al. *AJTMH* 2007)



Long-Term Forecasting...



IRI Forecasting Rainfall Products



Short-Term Forecasting...



Monitoring Environmental Factors (Rainfall, Vegetation, Temperature)

Using measurements:

From meteorological
stations

or

From remotely-sensed
images available free of
charge via

IRI Data Library

A screenshot of a web browser displaying the IRI Climate and Health Resource Room website. The browser's address bar shows the URL: http://iridl.ideo.columbia.edu/maproom/Health/. The page features a navigation menu on the left with links for Data Library, Maproom, ENSO, Global Health, Local, Regional, Health, Local, Regional, help@iri, and Printable Page. The main content area is titled "Climate and Health Resource Room" and contains a paragraph of text explaining the room's purpose. Below the text is a world map with Africa highlighted in red. The browser's toolbar includes various icons for search, mail, and other applications.

<http://iridl.ideo.columbia.edu/maproom/.Health/>

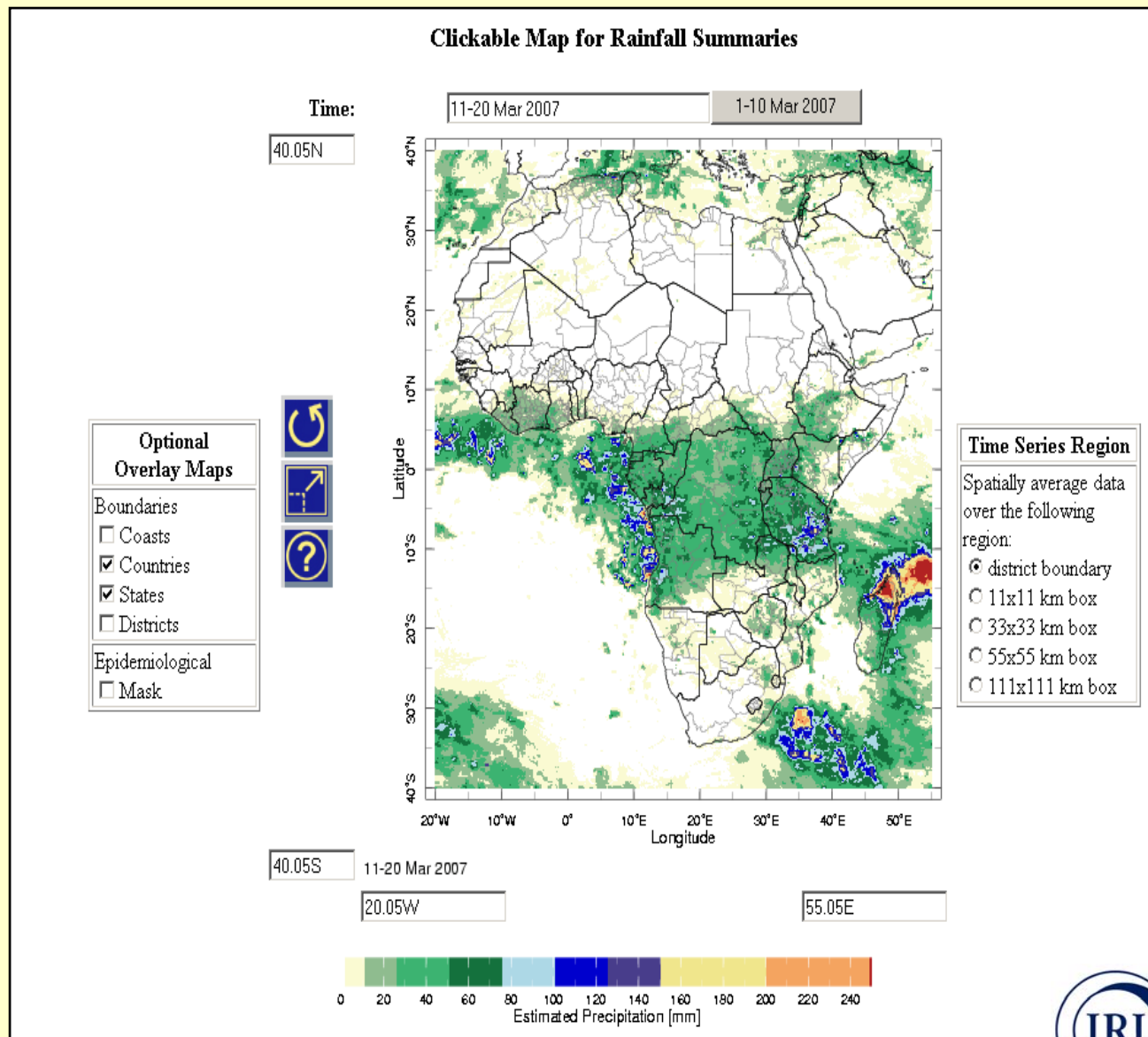


Rainfall Estimates

Interface to provide information on the current rainfall season compared with recent seasons

Spatial resolution: 10km

Available every 10-days



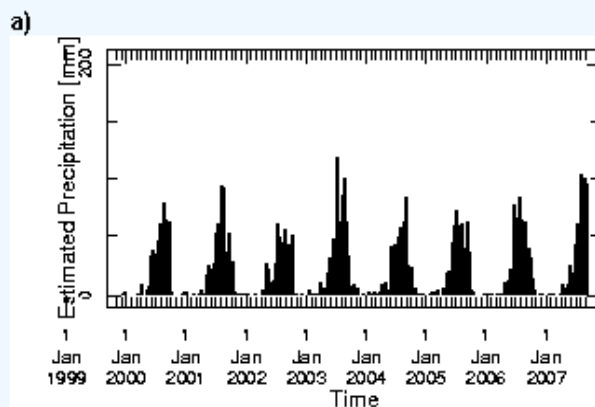
Continued

Various summary information is available for the specific point queried

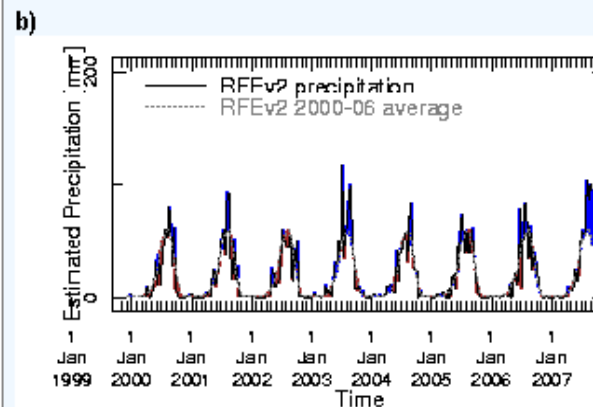


Observations for:
**Kain, Yatenga,
Burkina Faso**

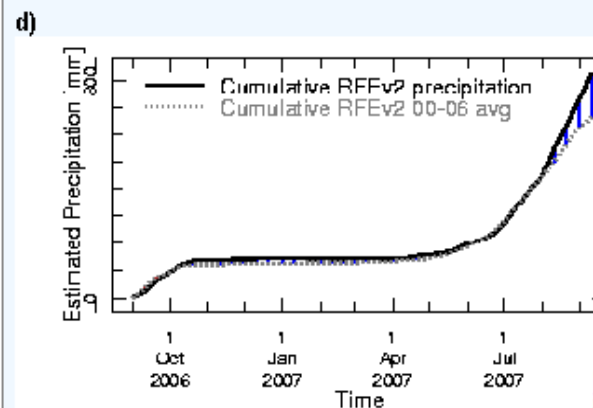
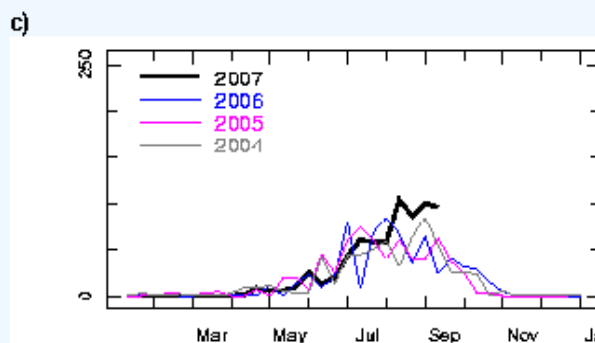
district



[Data in this graph](#)

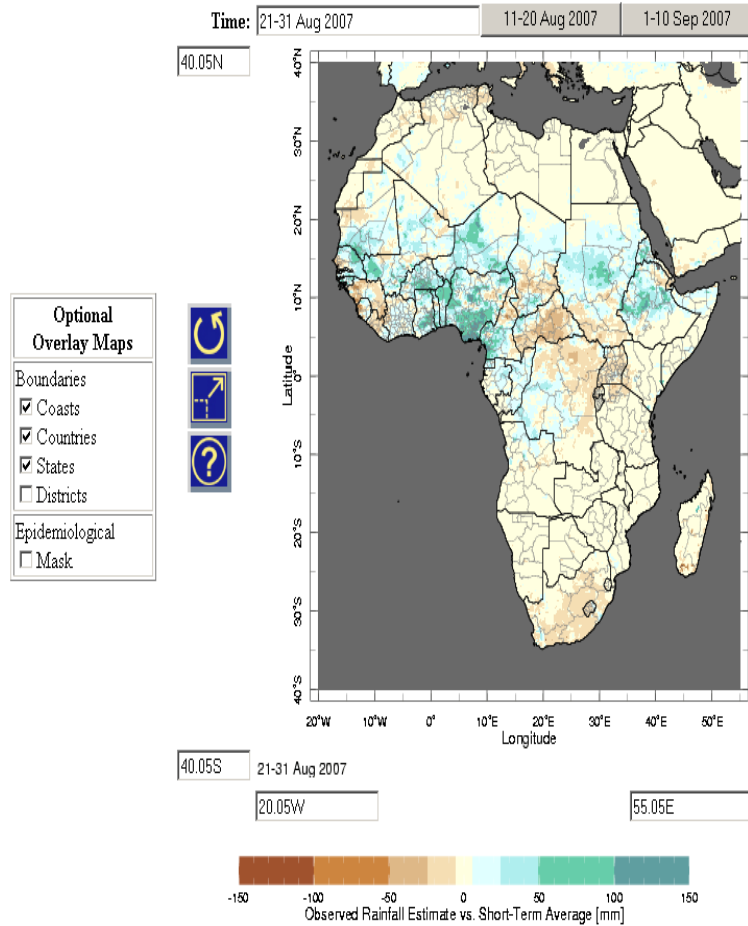


[Data in this graph](#)

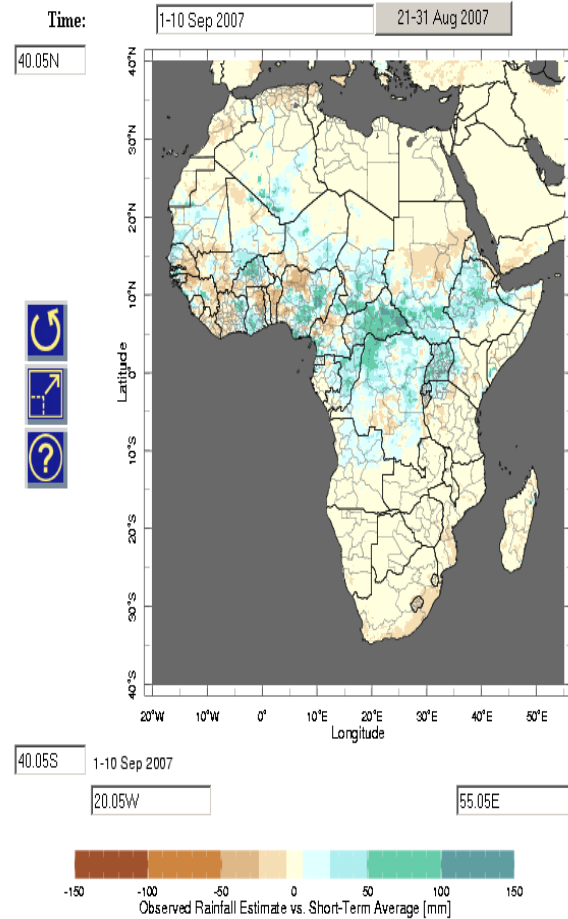


Rainfall Anomalies

Rainfall Estimate Differences




Rainfall Estimate Differences



Vegetation and Water Bodies Monitoring

Provide MODIS images
250m spatial resolution
every 16-days to monitor
vegetation and water
bodies



Data Library

Regional

Dekadal Rainfall
EVI
MODIS
Rainfall
Analysis Tool

MODIS

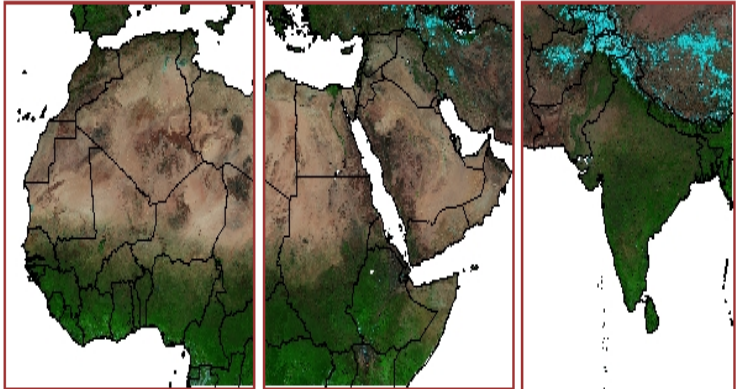
East Africa
Southwest Asia
West Africa

help@iri

Printable Page

MODIS Image Download Tools

MODIS Image Download Tools are available for the regions shown below. Please click on your region of interest.



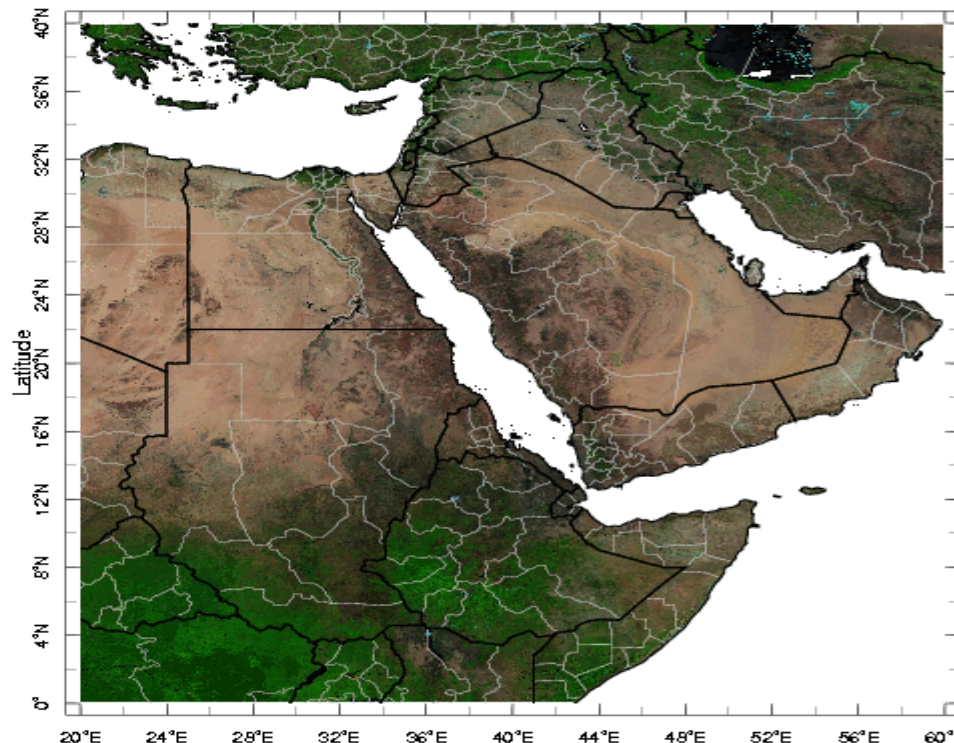
MODIS Image Download Tool: East Africa

Time:

9-24 May 2007

23 Apr 2007 - 8 May 2007

39.99889N



Optional Overlay Maps

- Coasts
- Countries
- States
- Districts



9.5446024E 9-24 May 2007

20E

60.00206E

Dataset Documentation

Data: MODIS image constructed from the middle infrared, near infrared and red channels at 250m spatial resolution

Data Source: United States Geological Survey, Land Processes Distributed Active Archive Center, Moderate Resolution Imaging Spectroradiometer ([USGS LandDAAC MODIS](#))

Note: There is typically a 12- to 16-day delay between the end of the observation period for the latest data and the date when those data are received and displayed on this page.

Download Map

Download Layer

Download Data

[Figure as PDF](#)

[Figure as JPEG](#)

[GeoTiff for GIS](#)

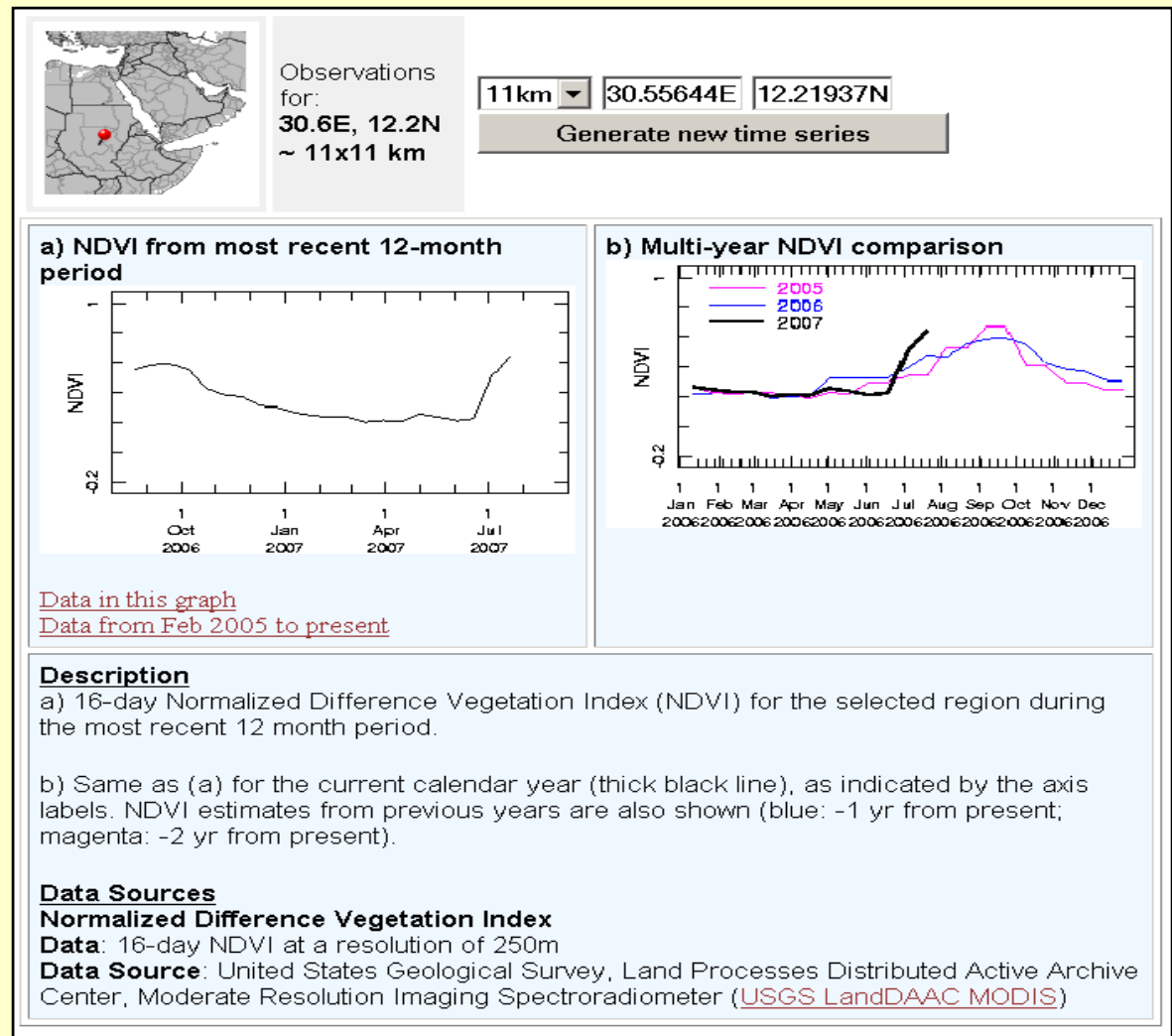
[Data for GIS](#)





Extract Vegetation Indices

Automatic procedure to extract different vegetation indices (*NDVI*, *EVI*, *NDWI*) and create temporal series through the Internet



Training



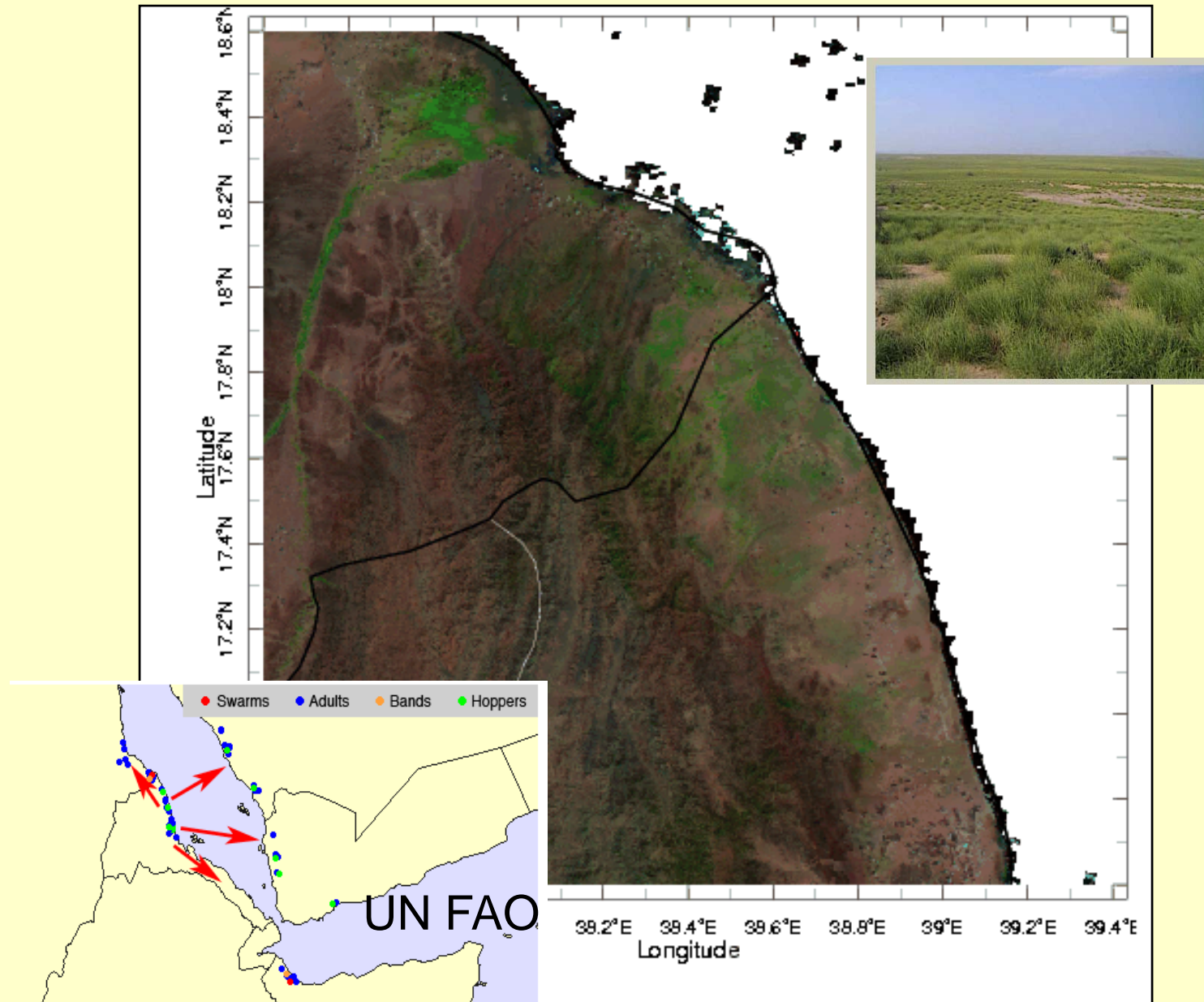
Desert Locust

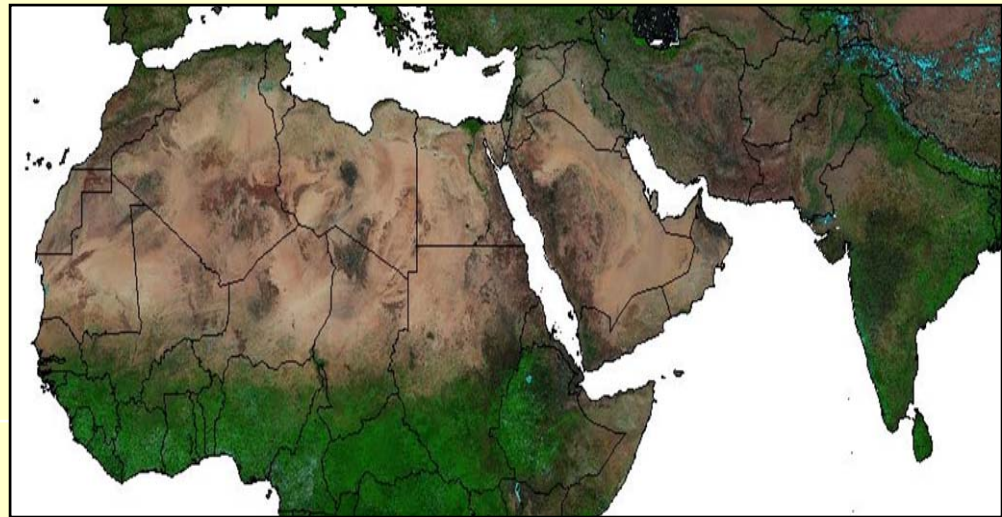


Cairo, Egypt, 2004



Eritrea: Red Sea Coast





Courtesy of DLIS, UN FAO

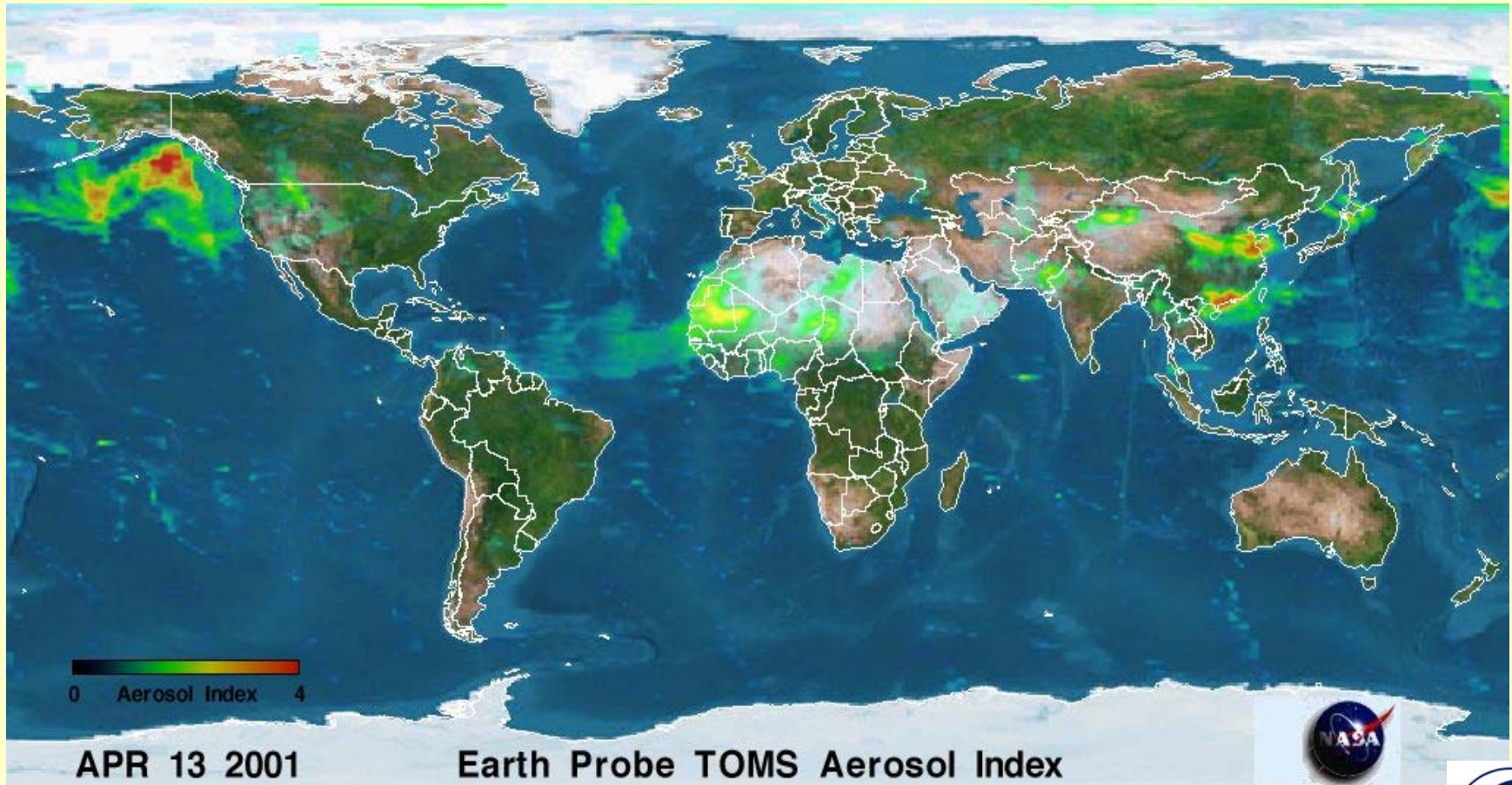


Work in Progress



Monitoring Dust from Remotely-Sensed Data

NASA (TOMS) Herman et al. (1997),



Integrate IRI Data into WorldWind (NASA)



How Can the Health Community Use the Data Library for Analyzing the Surveillance Data ?

- ❑ Provide a training on how to analyze data in relation to climate and environmental factors
- ❑ Provide the possibility to perform the analysis through the IRI Data Library (free software, accessible via Internet)

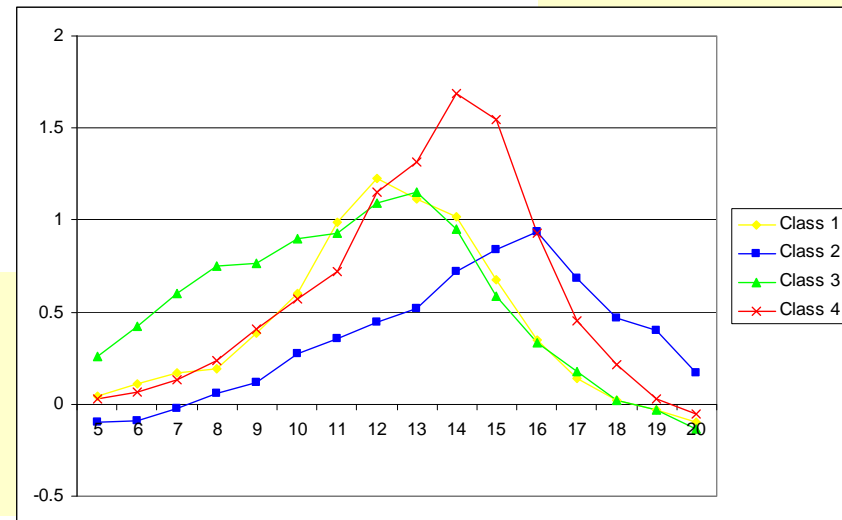
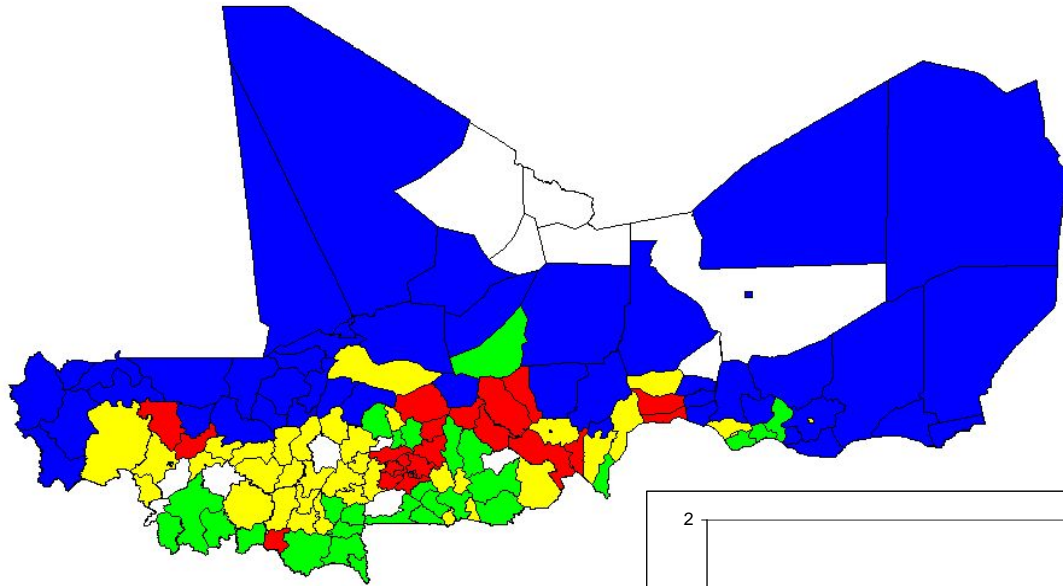


□ 1. Clean the Data:

- Convert surveillance weekly data to 10-days or monthly data
- Resolve the problem of missing data
- De-trend the data
- Create anomalies ...

	A	B	C	D	E	F	G	H	I	J	K
1	Year	Month	Zone	Sub-Zone	G.OPD <5	G.OPD >5	G. op total	Mal.OPD <5	Mal.OPD >5	OP Ma total	G. IP <5
2	2004	1	Gash-Barka	Agordat	381	1101	1482	0	28	28	98
3	2004	1	Gash-Barka	Barentu	501	1063	1564	25	33	58	77
4	2004	1	Gash-Barka	Dighe	1478	2891	4369	9	39	48	2
5	2004	1	Gash-Barka	Forto	559	1097	1656	7	17	24	7
6	2004	1	Gash-Barka	Gogne	496	705	1201	38	70	108	0
7	2004	1	Gash-Barka	Haikota	505	604	1109	13	82	95	22
8	2004	1	Gash-Barka	Lalay Gash	880	1493	2373	123	256	379	8
9	2004	1	Gash-Barka	Logo Anseba	506	1246	1752	0	20	20	18
10	2004	1	Gash-Barka	Mensura	1106	2249	3355	24	112	136	4
11	2004	1	Gash-Barka	Mogolo	684	1337	2021	40	99	139	11
12	2004	1	Gash-Barka	Mulki	454	1222	1676	6	58	64	3
13	2004	1	Gash-Barka	Goluj	1236	3512	4748	71	207	278	49
14	2004	1	Gash-Barka	Shambuko	721	1029	1750	32	109	141	9
15	2004	1	Gash-Barka	Tesseney	946	2025	2971	44	167	211	146
16	2004	1	Dehub	Mendefera	691	2130	2821	3	35	38	148
17	2004	1	Dehub	Adi Keih	712	2165	2877	1	16	17	16
18	2004	1	Dehub	Adi Quala	470	1514	1984	9	54	63	43
19	2004	1	Dehub	Dekemhare	1200	3576	4776	1	14	15	47
20	2004	1	Dehub	Senafe	1054	2942	3996	1	108	109	18
21	2004	1	Dehub	Segeneiti	1160	3135	4295	0	42	42	106
22	2004	1	Dehub	Dubaruwa	1130	3557	4687	58	127	185	40
23	2004	1	Dehub	Areza	981	2542	3523	55	183	238	57
24	2004	1	Dehub	Maimine	376	1935	2311	16	64	80	15
25	2004	1	Dehub	Tsorona	931	2018	2949	3	56	59	9
26	2004	1	Dehub	EMNI Haili	453	1190	1643	2	4	6	12
27	2004	1	Dehub	Maiaini	470	1569	2039	17	133	150	38
28	2004	1	SRS	Araeta	201	840	1041	0	0	0	

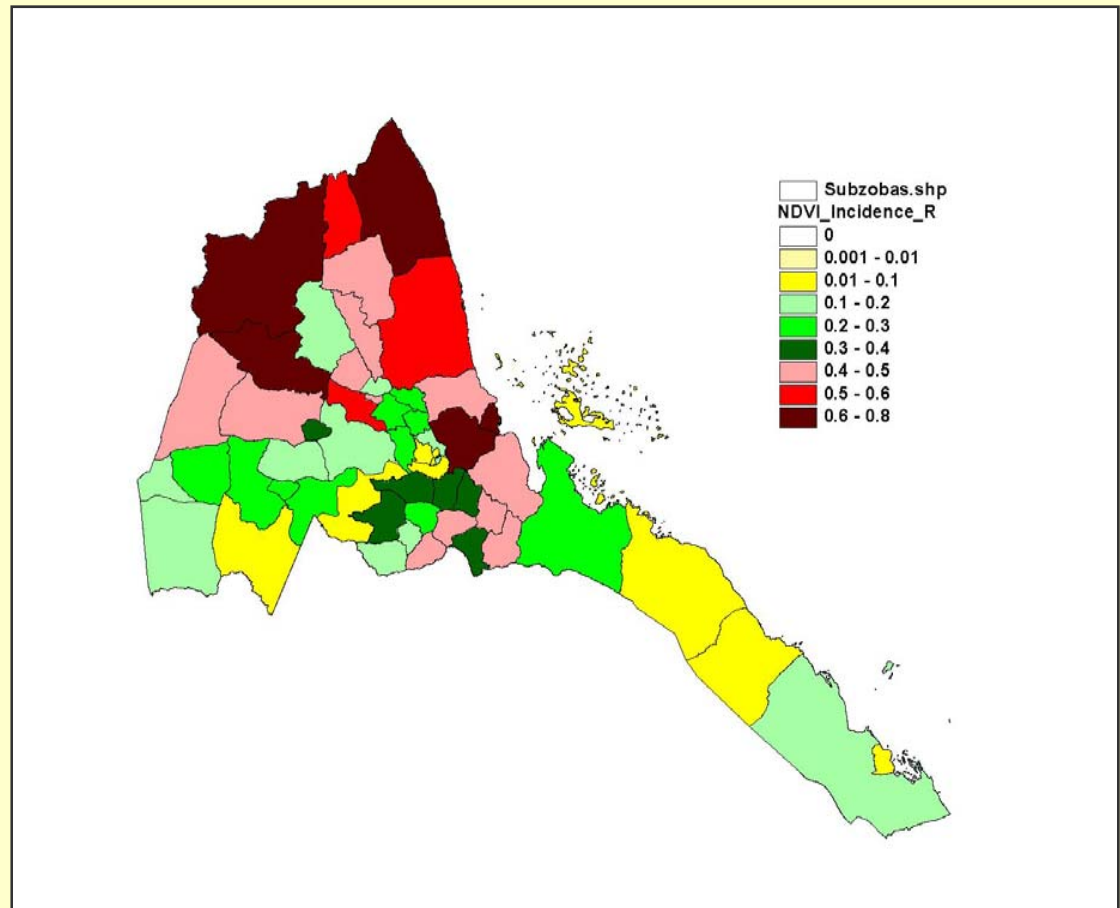
□ 2. Analyze Spatial and Temporal Distribution



3. Analyze Relationship with Environmental factors

Example:

Malaria incidence
in relation to
Vegetation



R^2 for significant regression of NDVI anomalies
and concurrent malaria incidence anomalies

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