Tailored Climate Information Resources for Malaria Control in Africa

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Tucson, Arizona
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Malaria in Africa

IMPACT

- 110 million people living in epidemic-prone areas
- More than 1 million deaths per year
- Decreases annual economic growth by 1.3%

TIME AND LOCATION OF OCCURRENCE

- Economic development has largely shaped distribution of malaria

BUT….

- Climate has a significant relationship with the distribution and seasonality of the disease where it has not been adequately controlled
- Rainfall recognized as major factor influencing malaria transmission in epidemic-prone regions

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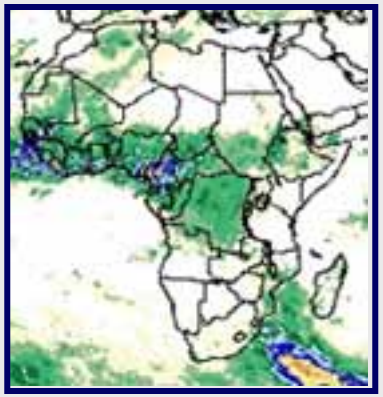
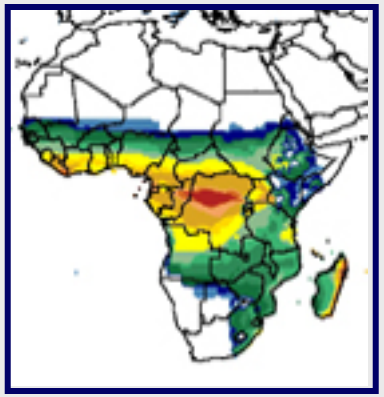
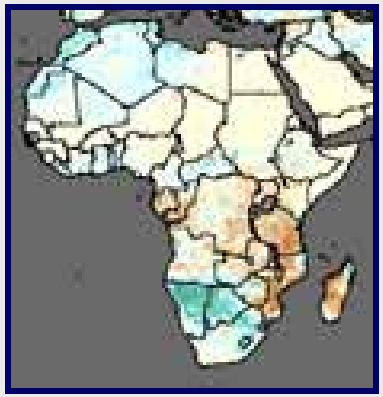
Climate and Malaria Resource Room



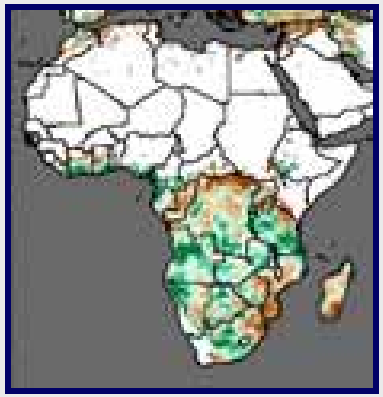
Malaria Early Warning System



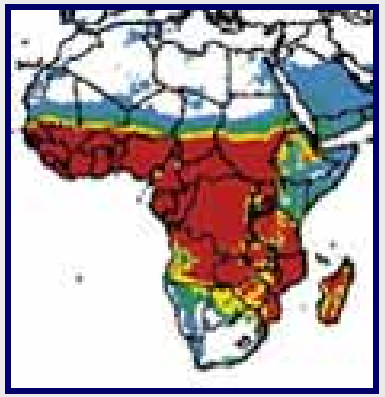
Seasonal Climatic Suitability for Malaria Transmission



Rainfall Estimate Differences



Rainfall Estimate Percentages



MARA Distribution Model of Climatic Suitability

http://iridl.ldeo.columbia.edu/maproom/.Health/.Regional/.Africa/.Malaria/

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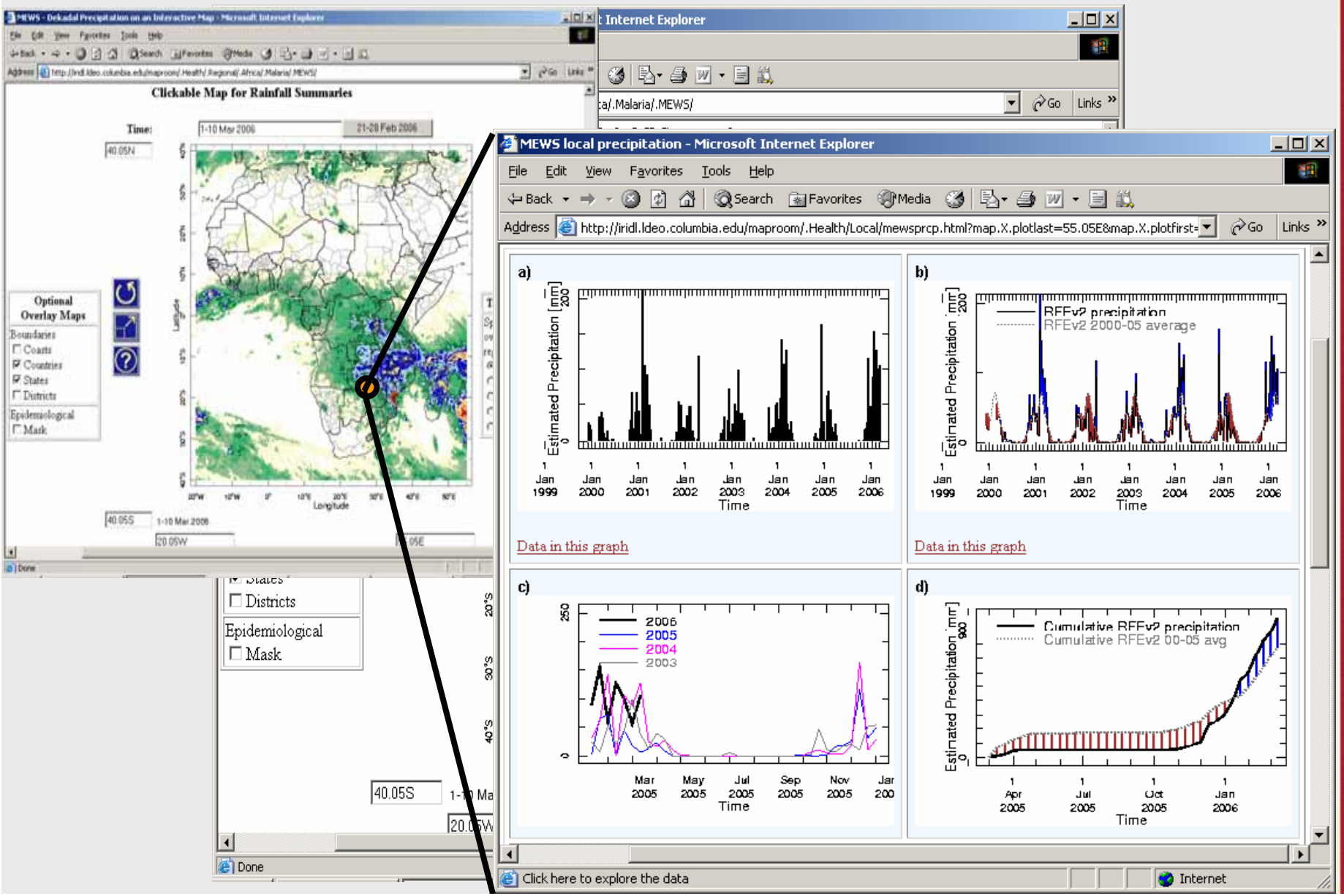
Rainfall Monitoring



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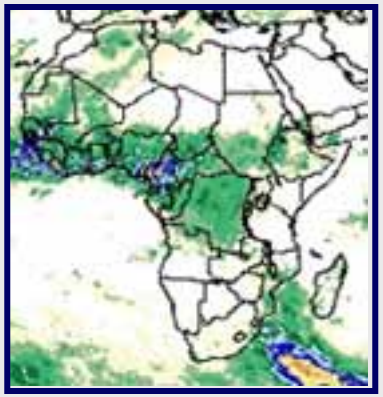
Climate and Malaria Resource Room



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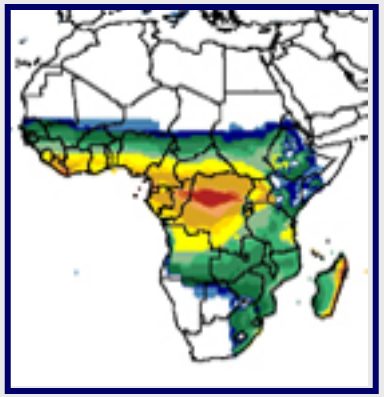

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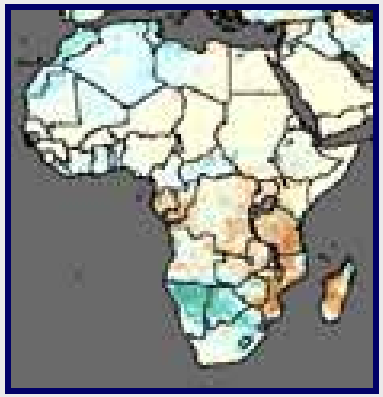

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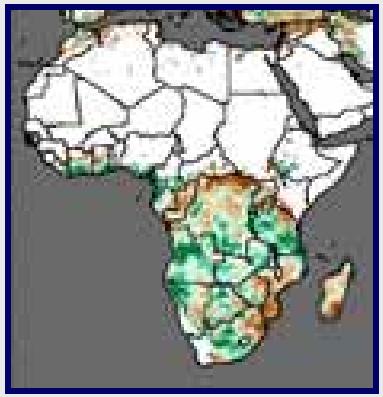

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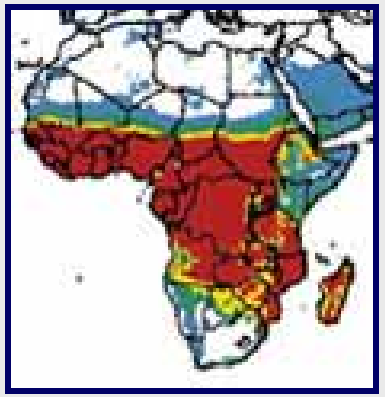

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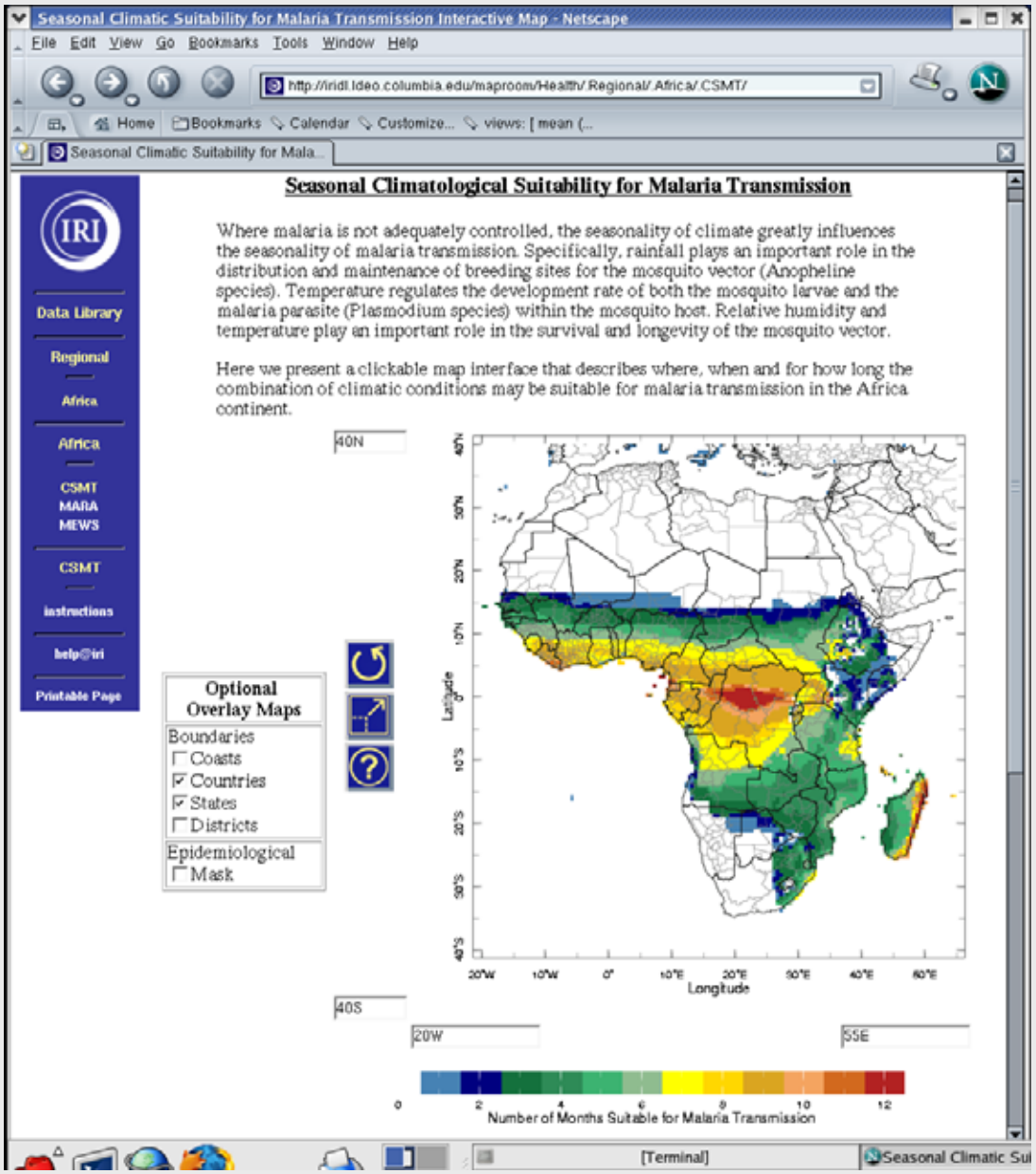
Climatic Suitability Interface



Interactive product focused on climatic suitability for malaria transmission

What do we mean by “climatic suitability”?

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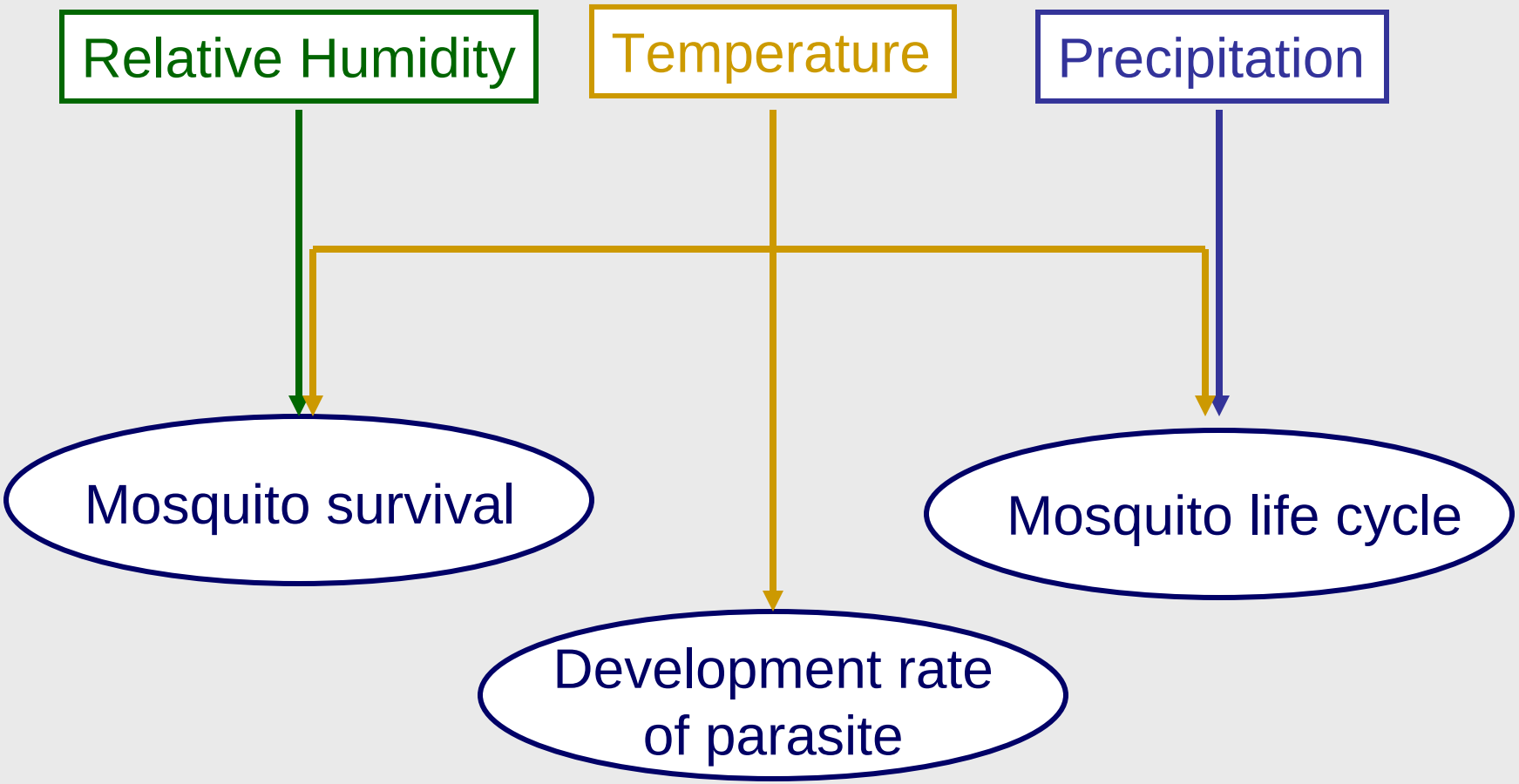
The Role of Climate



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Suitable Conditions for Transmission

$T \lesssim 18^{o}C$	Development rate of parasite decreases significantly
$T \gtrsim 32^{o}C$	Mosquito survival compromised
$RH \lesssim 60\%$	Mosquito won't live long enough for parasite to develop sufficiently
$P \lesssim 80mm$	Lacking sufficient surface water for egg laying, larval stage

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Suitable Conditions for Transmission

Temperature Condition

18ºC < T < 32ºC

Relative Humidity Condition

RH > 60%

Precipitation Condition

P > 80 mm/month

Climate conditions suitable for transmission

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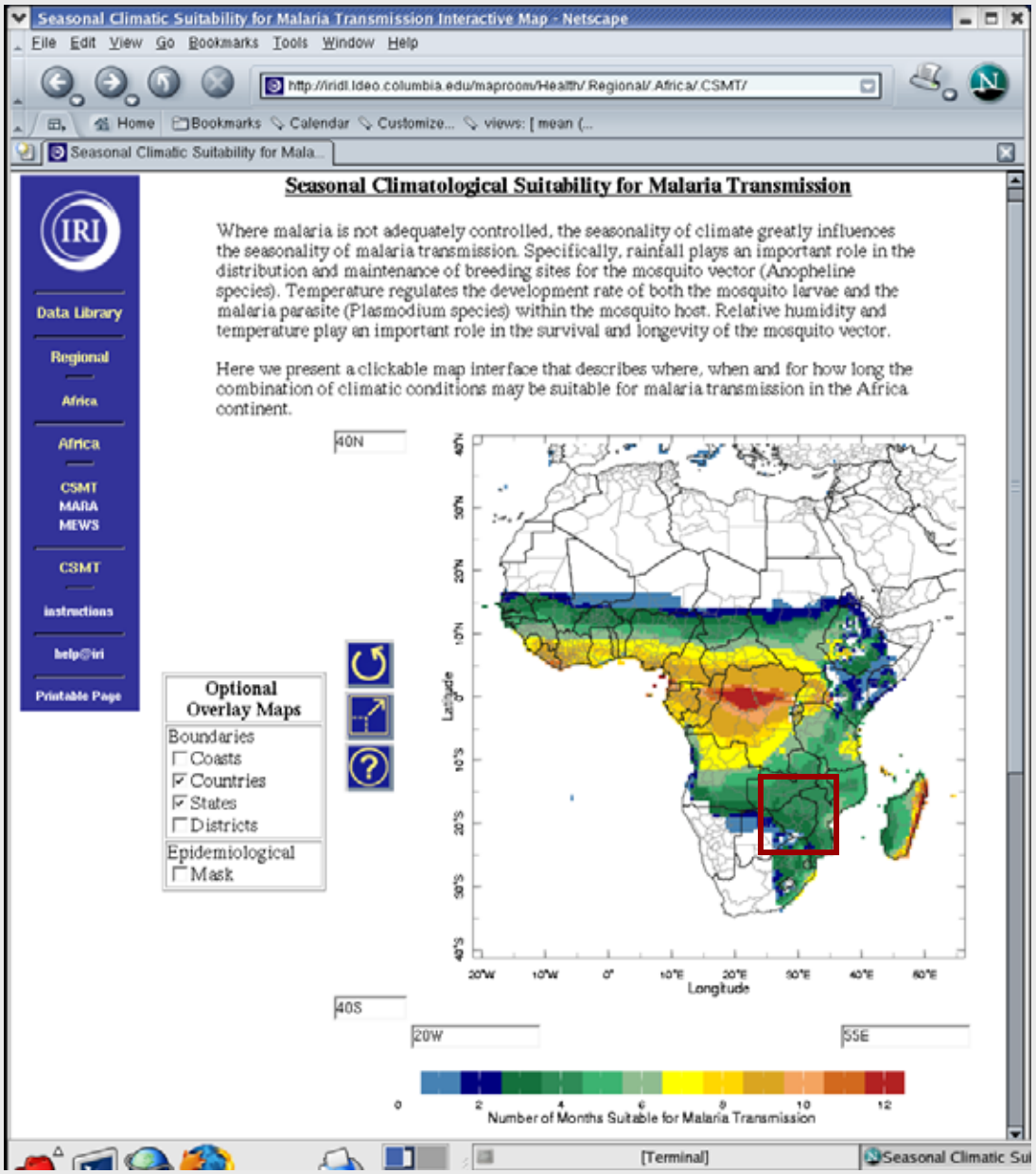
Climatic Suitability Interface



- Front page illustrates number of months during the year that are suitable based on “normal” conditions

- Visual options available to users:
  - Map Overlays
  - Zoom

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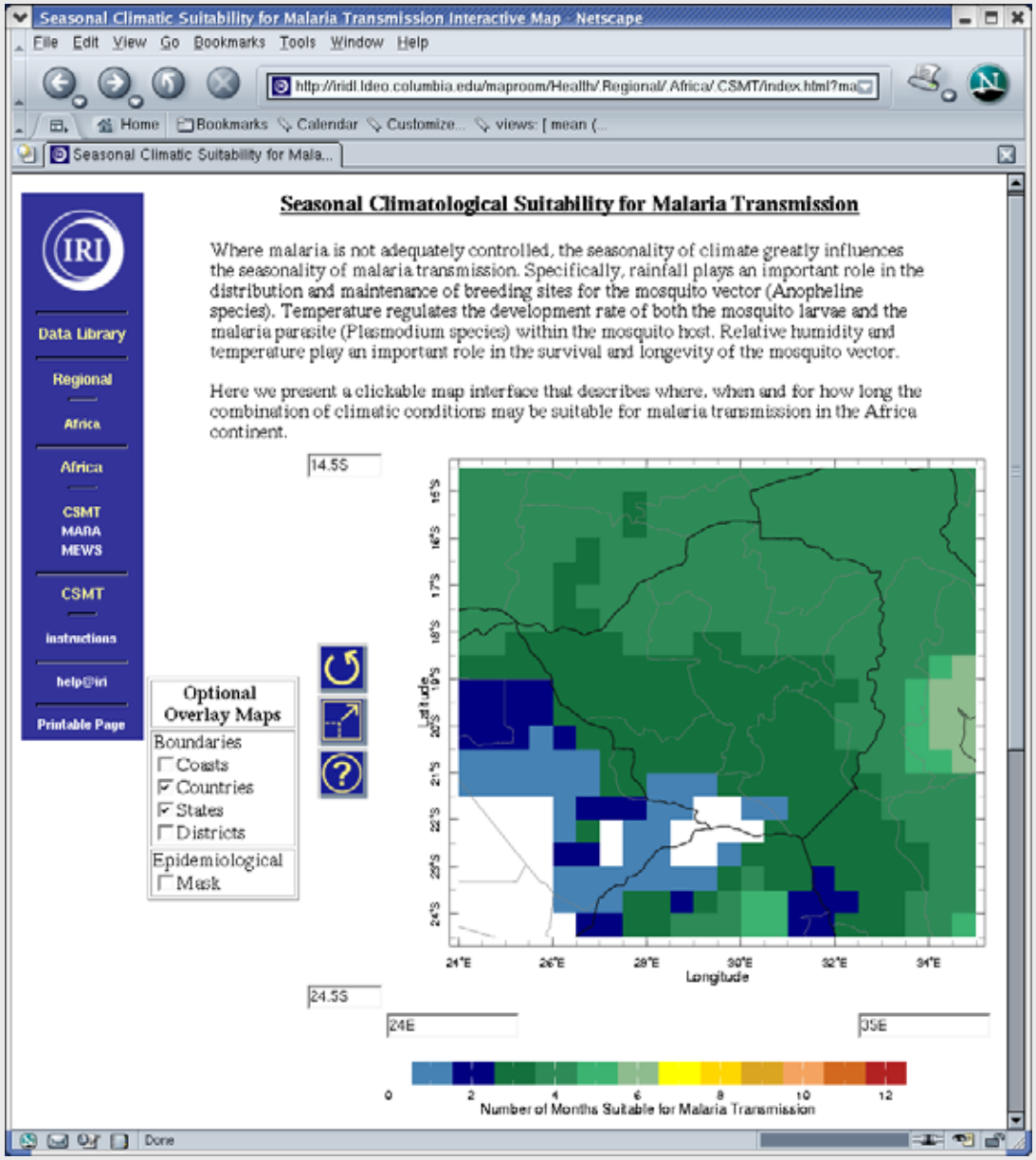

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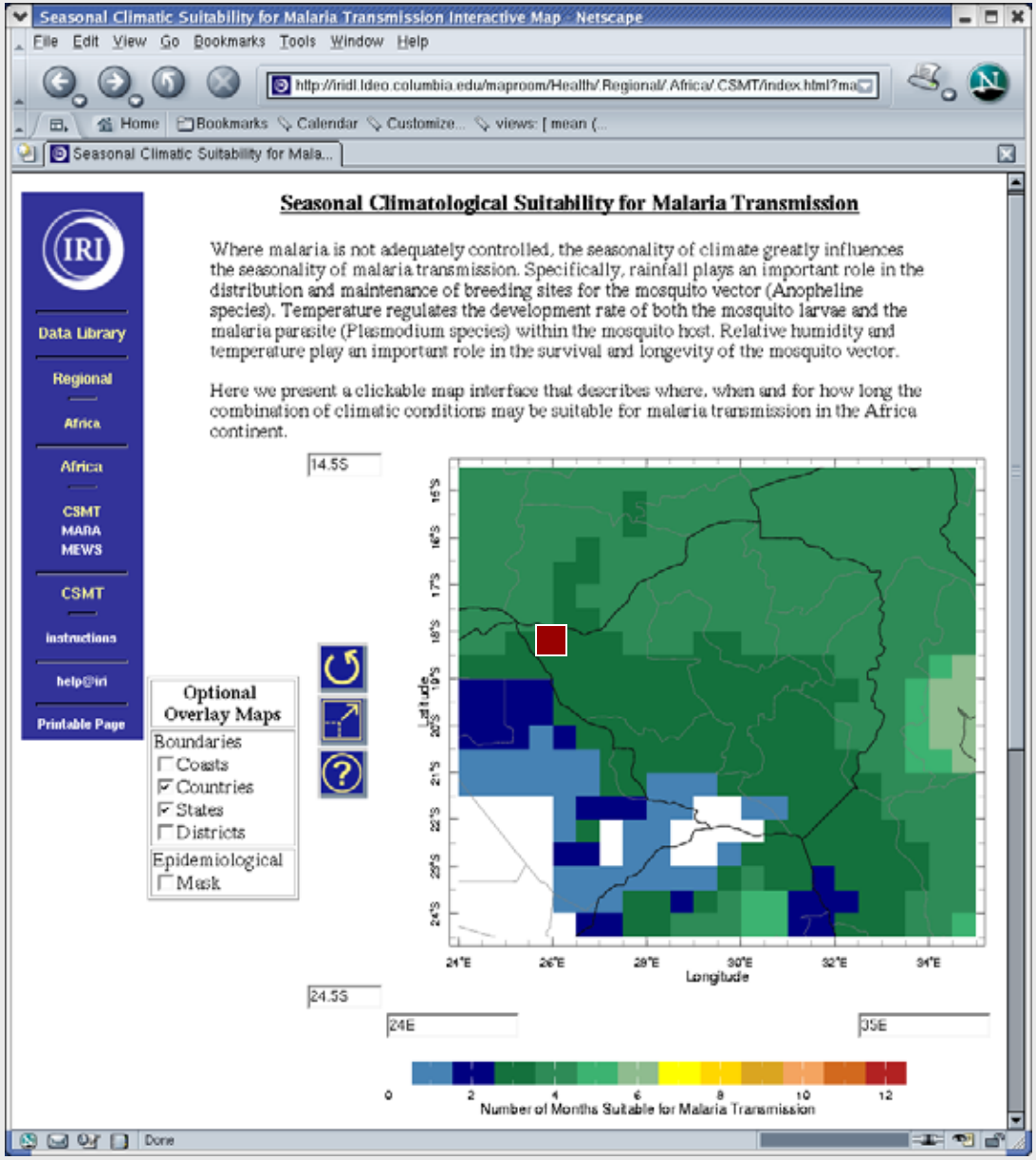

Historical information about how often these conditions have actually occurred in the past can be obtained by clicking on the map at the point of interest

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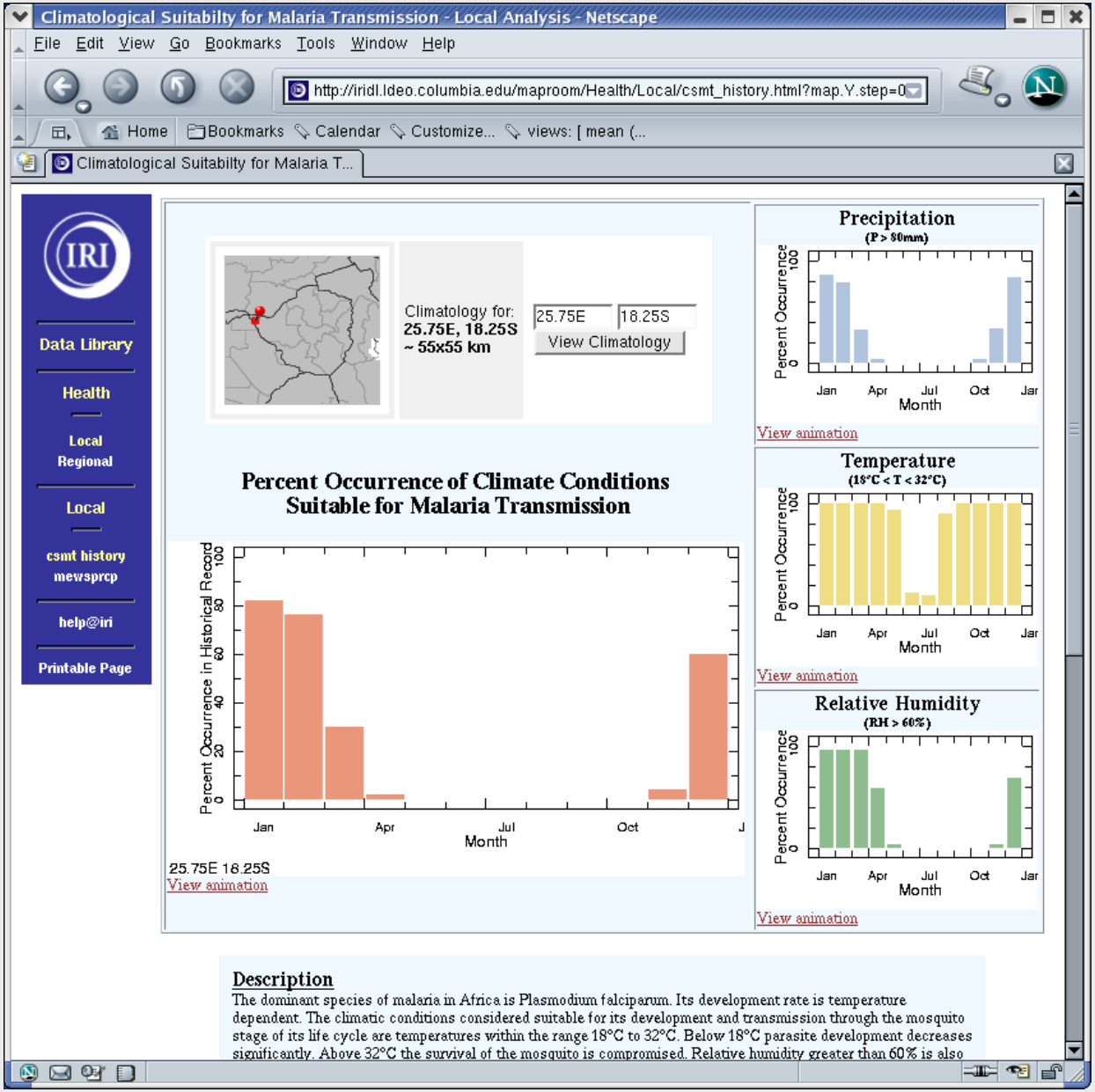
Climatic Suitability: A Historical View



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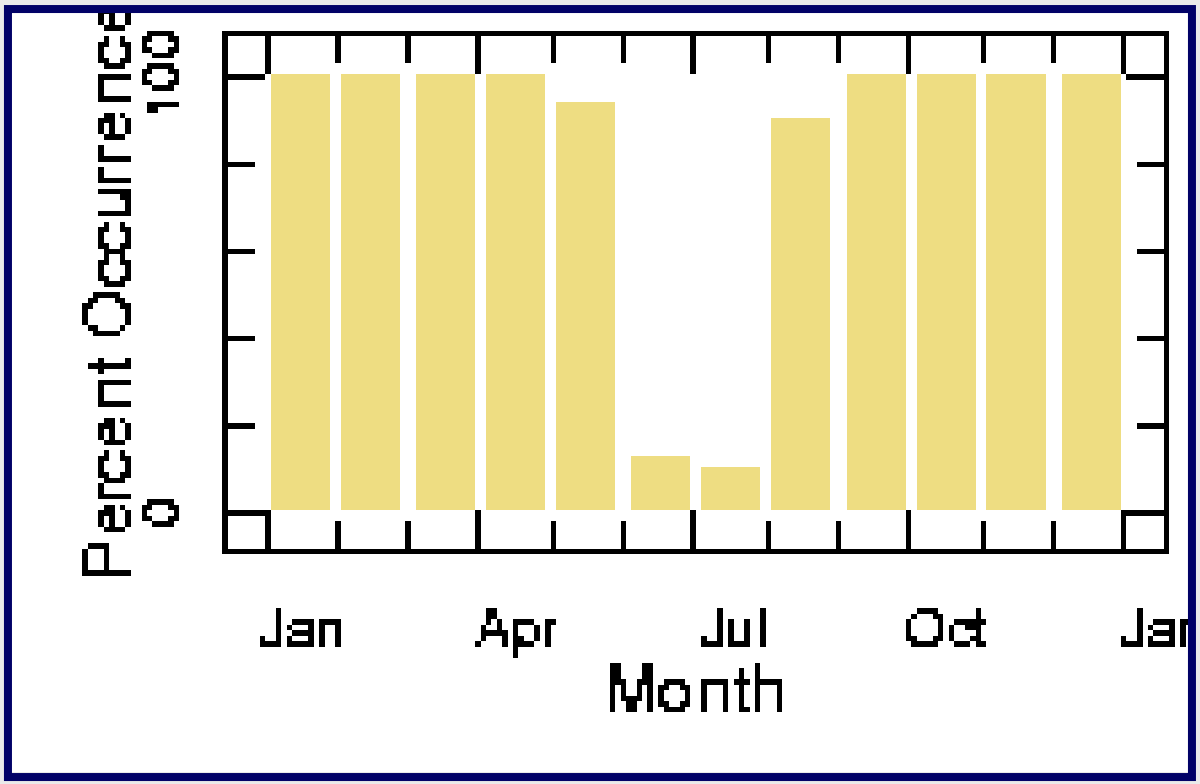

Percent occurrence of temperature condition (18ºC<T<32ºC) in 50-year historical record (1951-2000)

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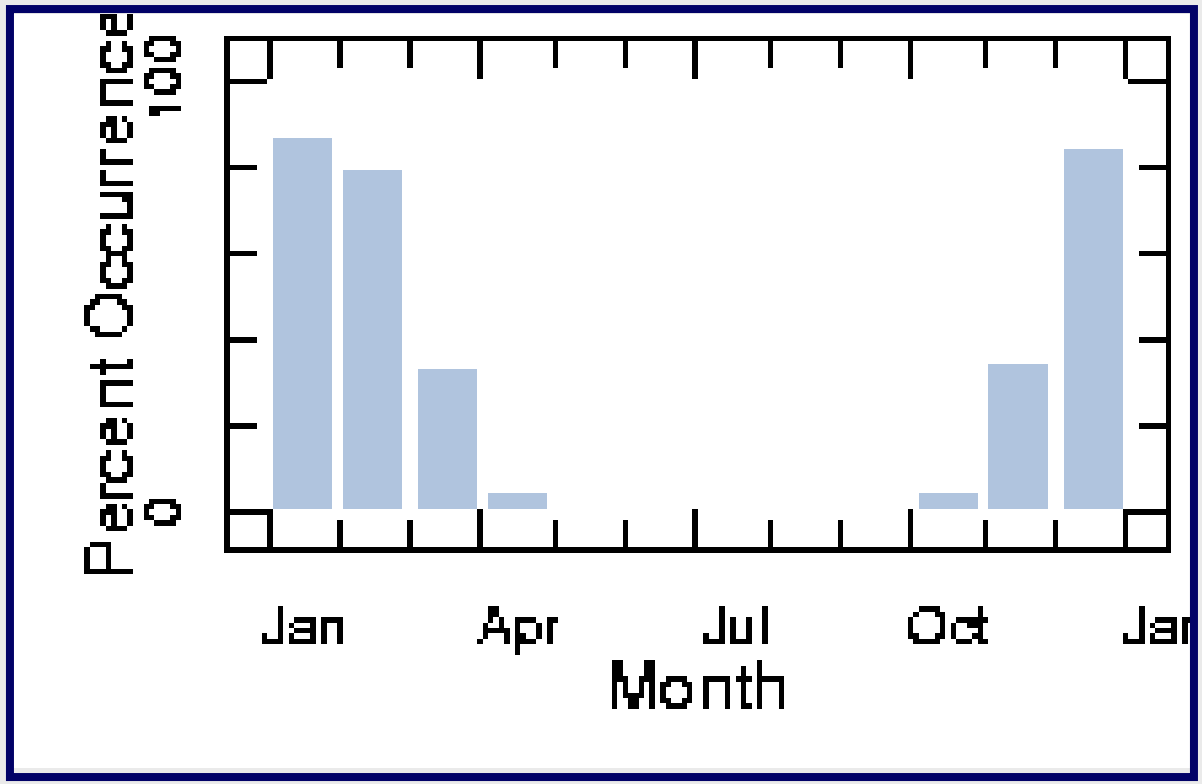

Percent occurrence of precipitation condition
(P > 80mm) in 50-year historical record (1951-2000)

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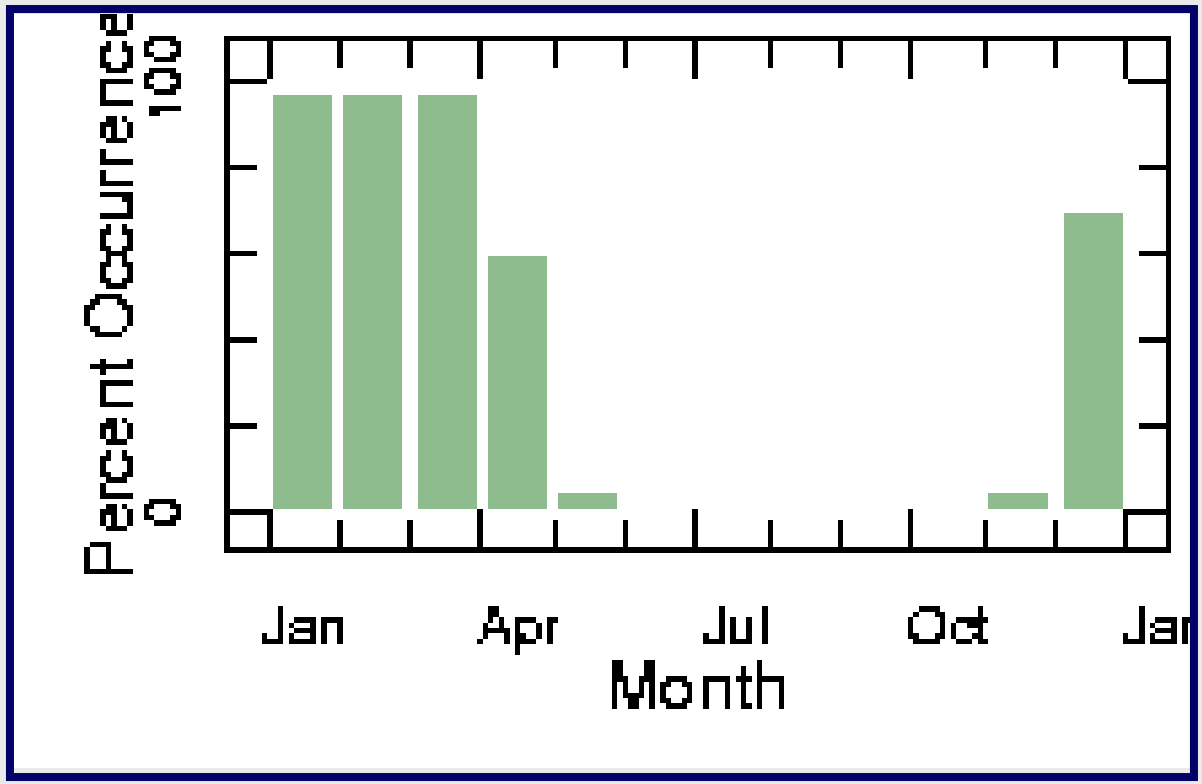

Percent occurrence of relative humidity condition (RH>60%) in 50-year historical record (1951-2000)

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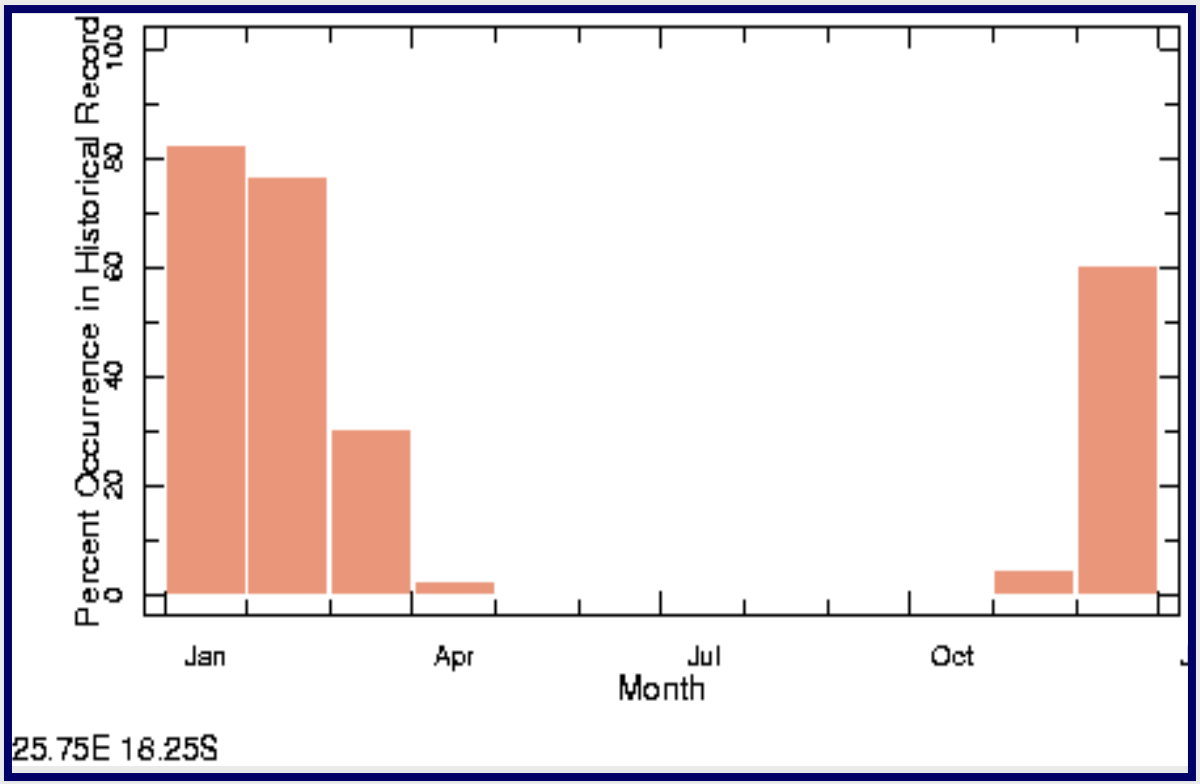

Percent occurrence of all three conditions in 50-year historical record (1951-2000)

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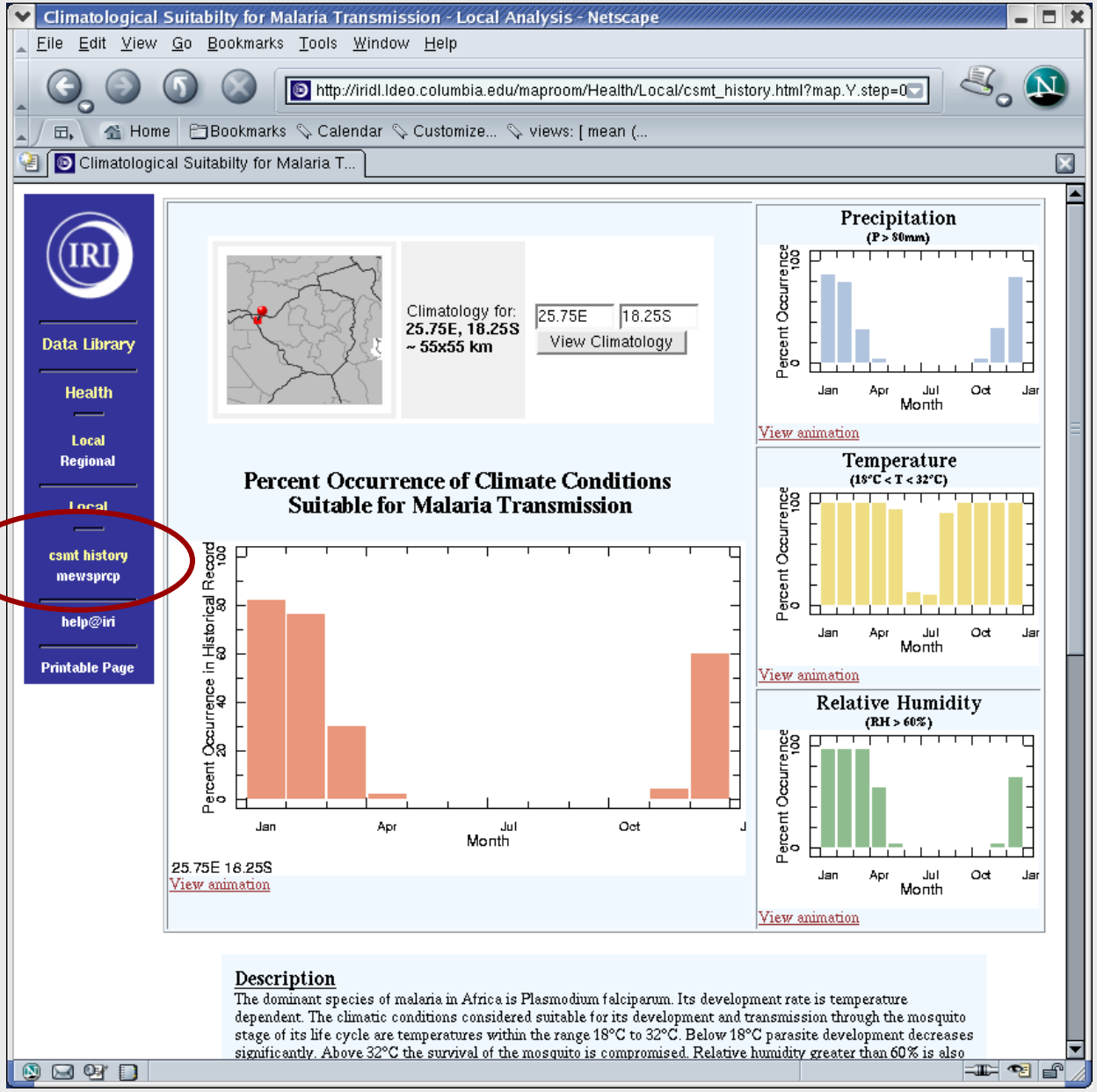
Connection Between Resources

Links on the side menu allow users to interact between products



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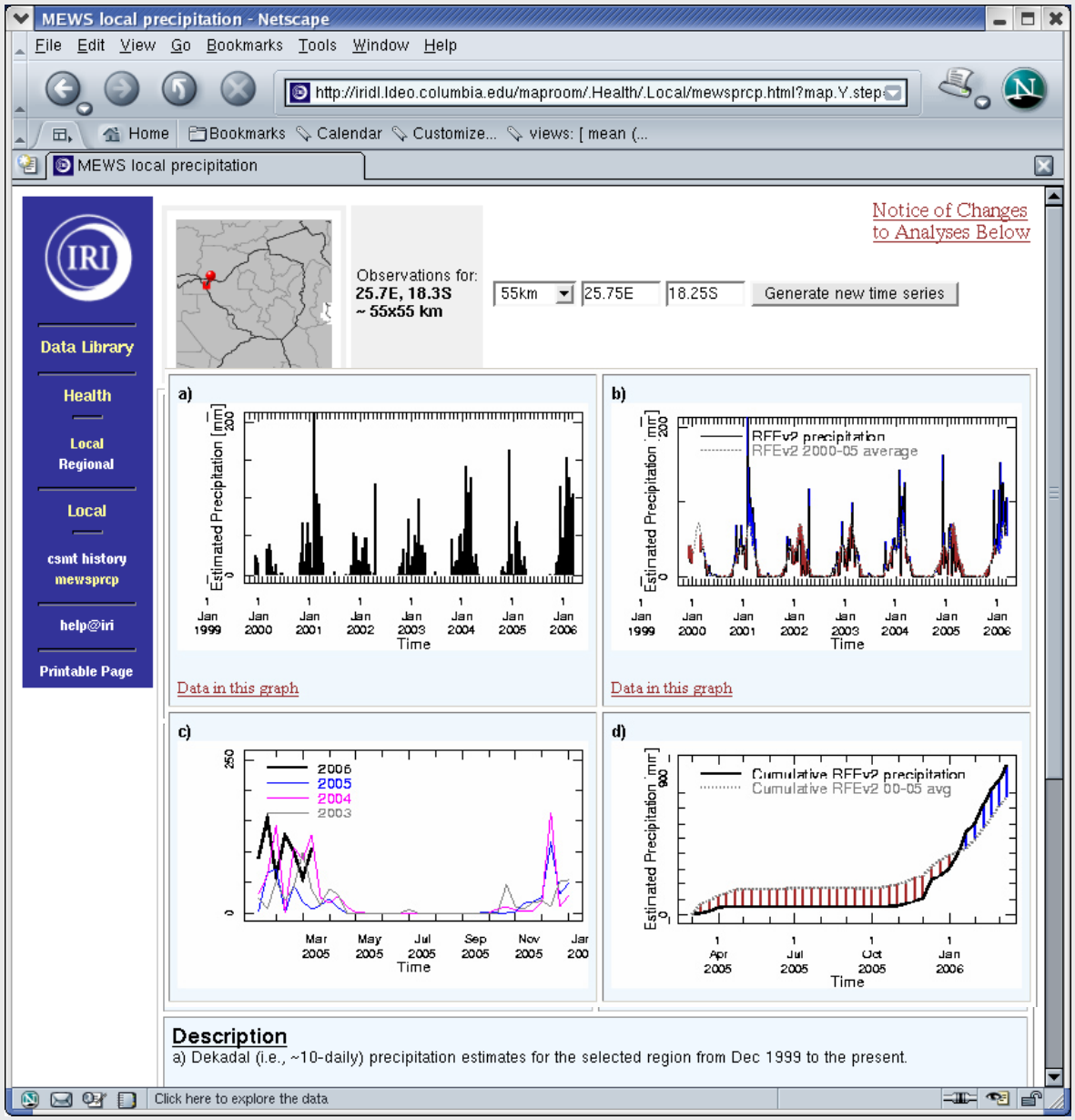

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The Value of Seasonal Information

- Development of seasonal calendars to help malaria control programs focus activities
  - Drug procurement
  - Timing of spray activities
- Assist health services with day-to-day operations
  - Help avoid misdiagnosis and inappropriate drug treatment → Extremely important in reducing rate of parasite drug resistance

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Climate and Malaria Resource Room

- Set of web-based climate information resources designed for/with malaria control community
- Freely available to public
  - Data and image downloads available
  - Disseminate information about resource via partners in field, sector-specific journals
- Future Work
  - Vegetation-based analyses
  - Instructional material about climatological jargon and concepts, probabilistic forecasts, etc.

http://iridl.ldeo.columbia.edu/maproom/.Health/.Regional/.Africa/.Malaria/

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Climate and Malaria Resource Room

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Collaborators

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WHO-Geneva: Mika Kawano

USGS: Robert Klaver

MARA: Marlies Craig

IRI: Steve Connor, Benno Blumenthal, Pietro Ceccato, Tufa Dinku, Judy Omumbo

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