



IRI Data Library: enhancing accessibility of climate knowledge

CDS Workshop 2015- 03

Data Library Team

International Research Institute
for Climate and Society
EARTH INSTITUTE | COLUMBIA UNIVERSITY

Data Library Team

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The challenges of providing portals for diverse user communities

Our institutional challenge is to deliver information to people outside of our (climate) community so they can make informed analyses and decisions that lead to solutions

- non-climate scientists
- decision makers
- organizations and businesses

tools need to be part of that work flow



Issues?

Database, tables, spreadsheets, GRIB, netCDF, images, binary, servers, OpenDAP, THREDDS, shapefile

Barriers: Technology constraints

Generate knowledge

Barriers: Access in relevant and timely manner

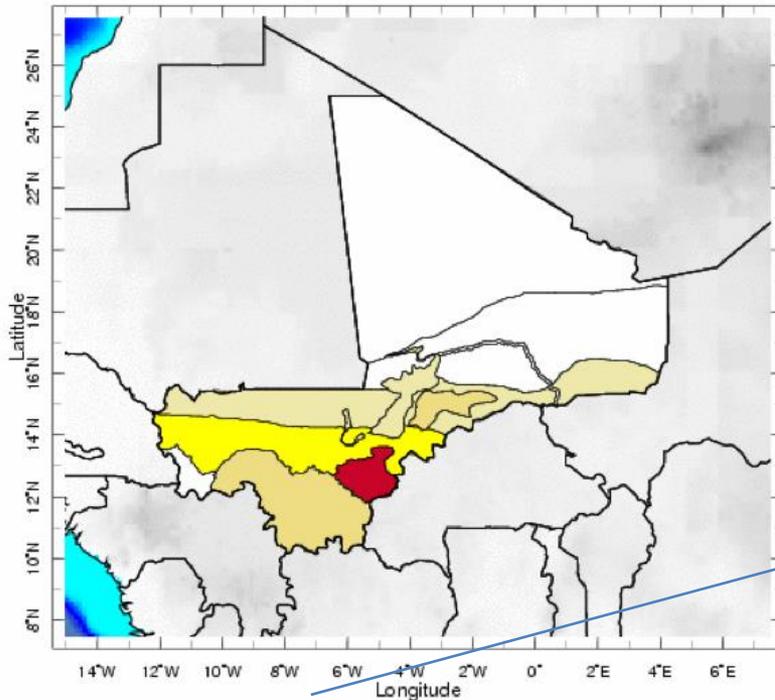
Access to knowledge

Barriers: Uptake of Climate Information

Informed action by decision-maker

Datasets Inter-operability

Average production per capita



15.04167W

7.541667E



Mali Zoning System: Livelihood FEWS05

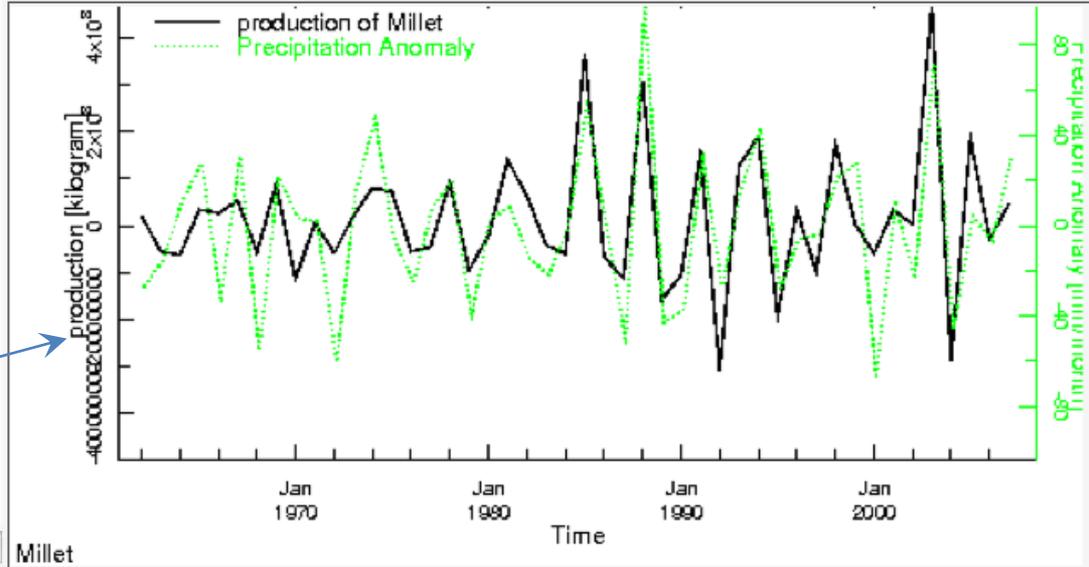
Crop: Millet

Define Rainfall Season from July to September

Compute Food Vulnerability Indicator...

Mean Standard Deviation Households whose income relies on more than 50 %

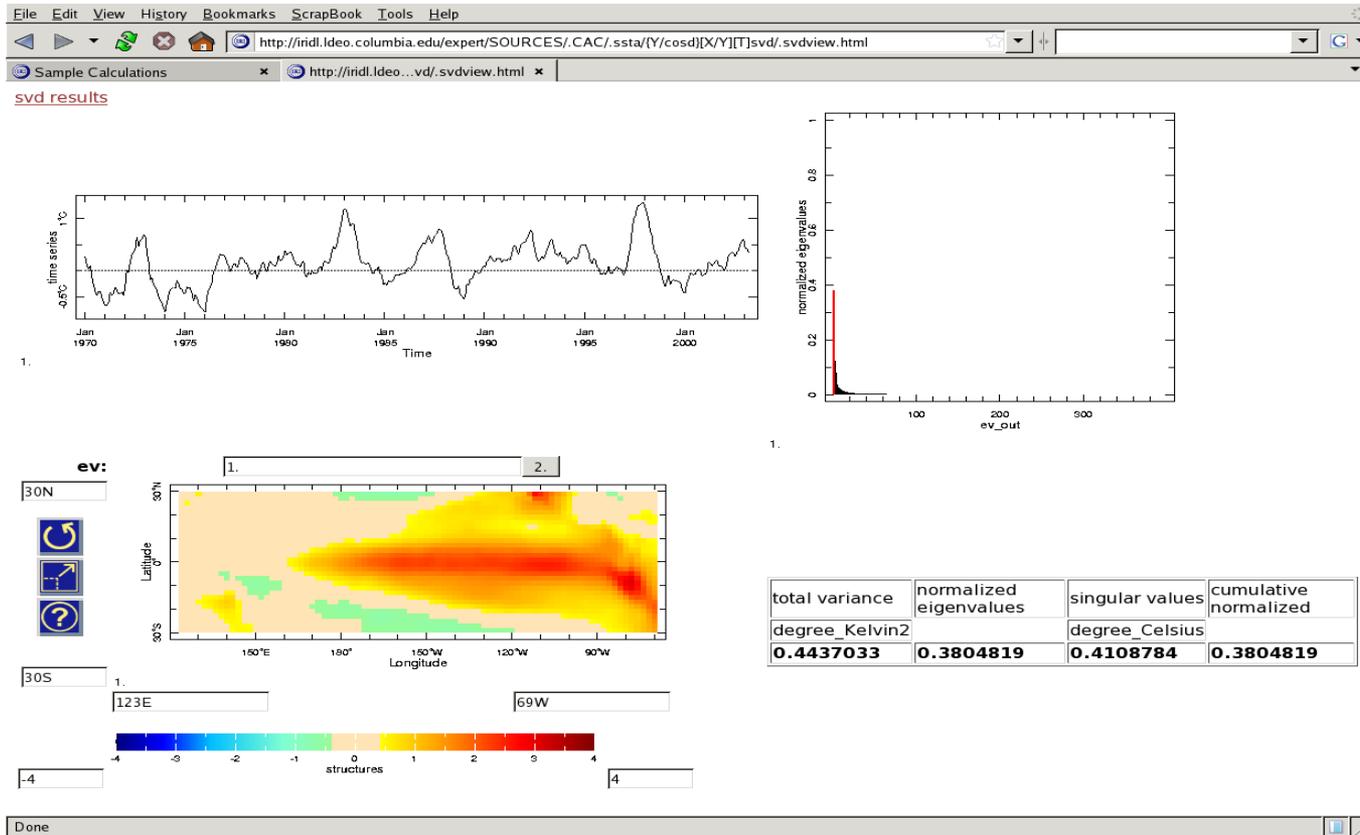
Millet - Rainfall Correlation: 0.759039
Mali Livelihood FEWS05: Rainfed millet/sorghum



Millet

Time

Generating Knowledge



Issues?

Solutions

Database, tables, spreadsheets, GRIDB, netCDF, images, binary, servers, OpenDAP, THREDDS, shapefile

Data Library Technology
Semantics Framework

Barriers: Technology constraints

Generate knowledge

Ingrid Data Language
IRI science
Climate Predictability Tool (CPT)

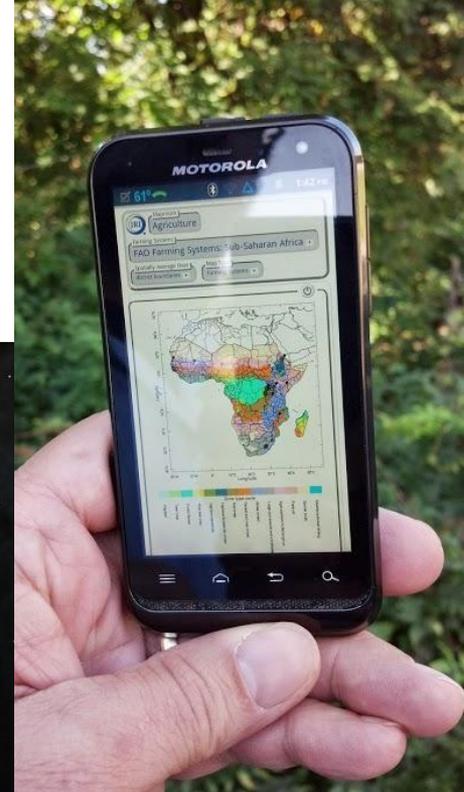
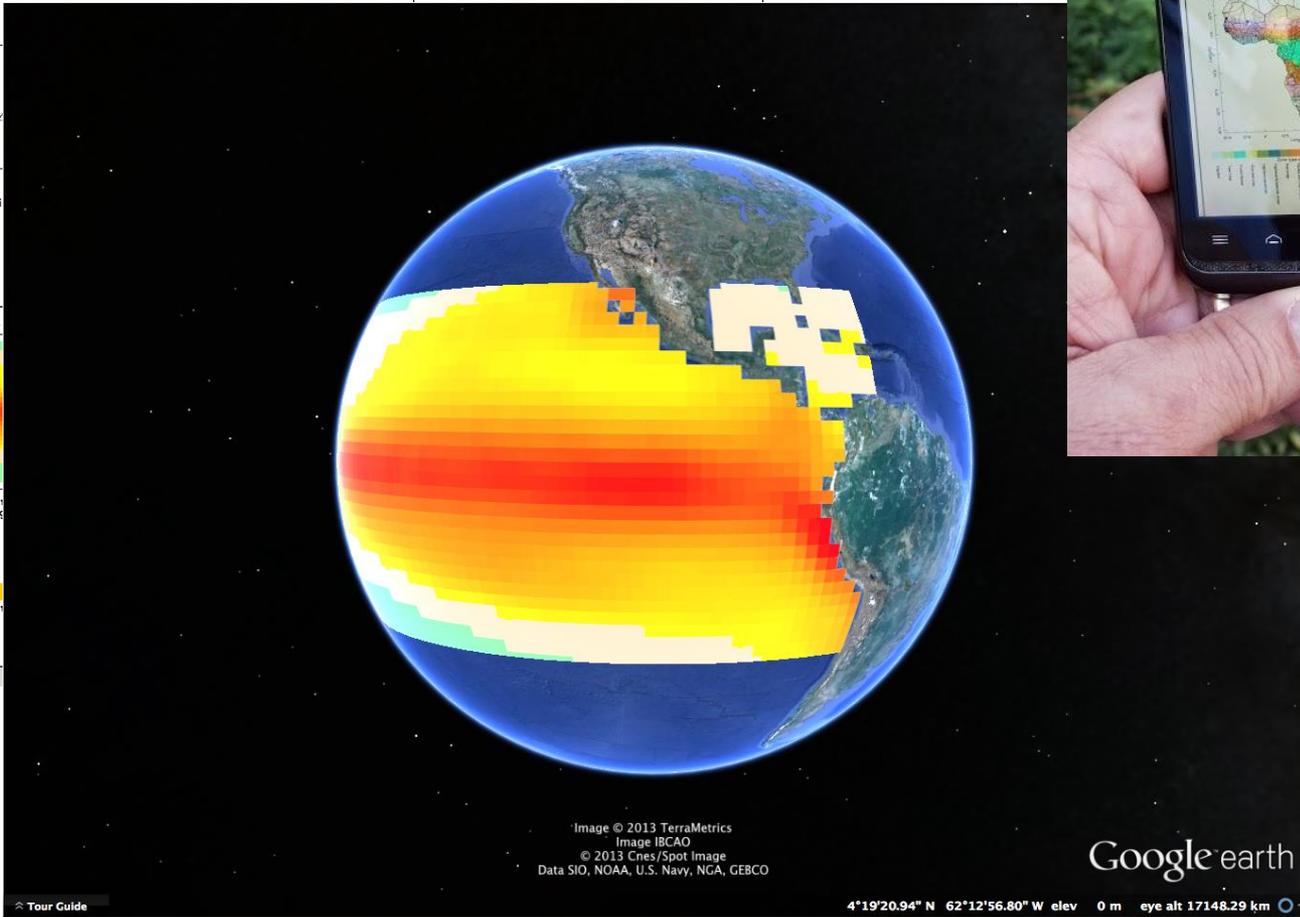
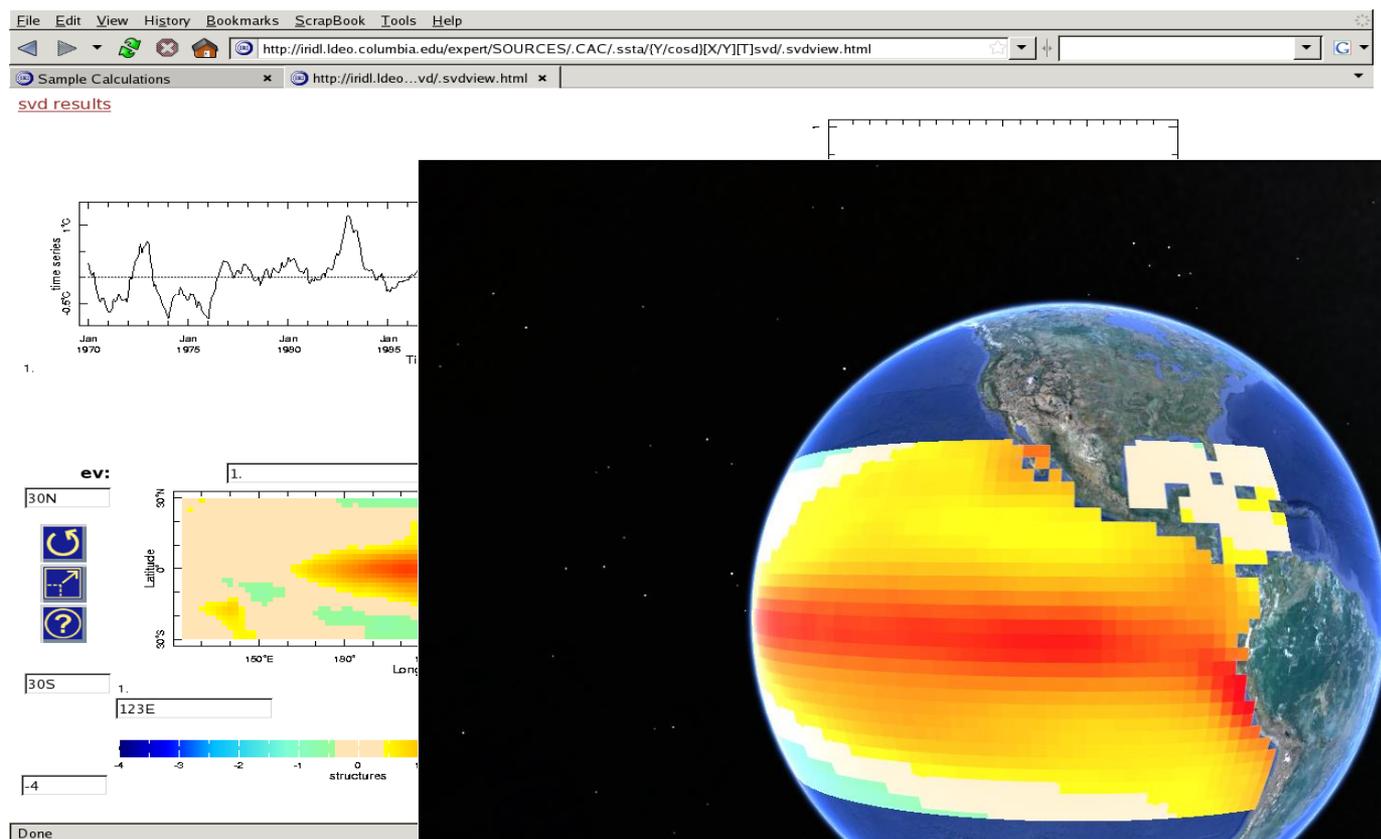
Barriers: Access in relevant and timely manner

Access to knowledge

Barriers: Uptake of Climate Information

Informed action by decision-maker

Serving data



Issues?

Solutions

Database, tables, spreadsheets, GRIDB, netCDF, images, binary, servers, OpenDAP, THREDDS, shapefile

Data Library Technology
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Access to knowledge

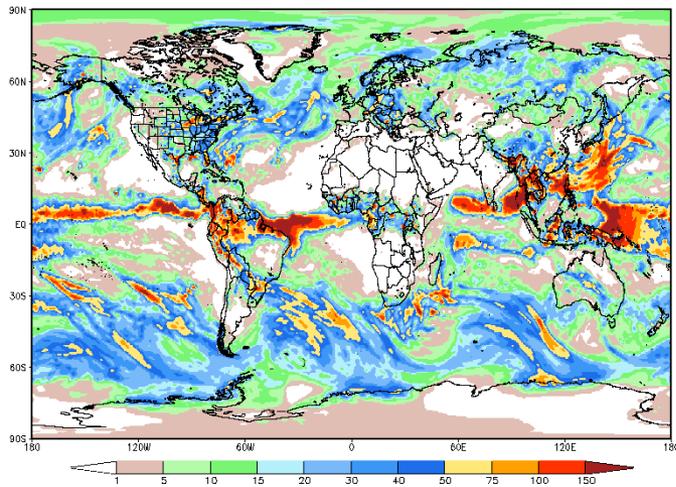
Internet-based technology
Serving data
Maprooms

Barriers: Uptake of Climate Information

Informed action by decision-maker

The birth and life of the IFRC Maprooms

NOAA GFS 37.5 km Week 1 Total Precipitation (mm)
Issued at May 26 2009 00Z for the period ending at Jun 2 2009 00Z



If floods relate to unusual rainfall, does this map tell where rainfall is unusual?

No! Need for historical context: Compare current 6-day forecast with historical 30-year average same 6-day period

Need for a new dataset



The birth and life of the IFRC Maprooms

International Federation
Forecasts in Context

Where is exceptionally heavy rainfall expected?

Region: Global Language: english

Where is exceptionally heavy rainfall expected?

This map shows places in the world forecasted to receive exceptional rainfall in the next six days relative to normal for their location.

What early action can I take to reduce possible disaster effects?

- Contact your local/regional meteorological department and monitor their forecasts for the next six days.
- Consider who may be most affected by heavy rainfall.
- Review your contingency plans and update as necessary.
- See pages 4 and 5 in this [Early Warning Early Action booklet](#) for examples of early action based on rainfall forecasts.

See the "More Information" tab for forecast details.

Share: +1 Like 24

International Federation of Red Cross and Red Crescent Societies

01 Jan 2008 ← 0000 30 May 2013 → 0000 16 Jun 2013

3 - 4 Jun 2013 Issued 0000 30 May 2013

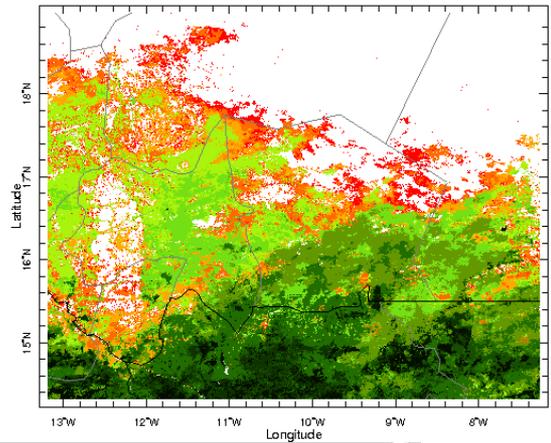
Latitude: 30°N, 0°, 30°S, 60°S
Longitude: 180°W, 150°W, 120°W, 90°W, 60°W, 30°W, 0°, 30°E, 60°E, 90°E, 120°E, 150°E

Heavy Rainfall Very Heavy Rainfall Extremely Heavy Rainfall

Desert Locust Control Support


Food Security | Locusts
LOCUSTS | Greenness Estimates

Description | Dataset Documentation | Dataset | Contact Us

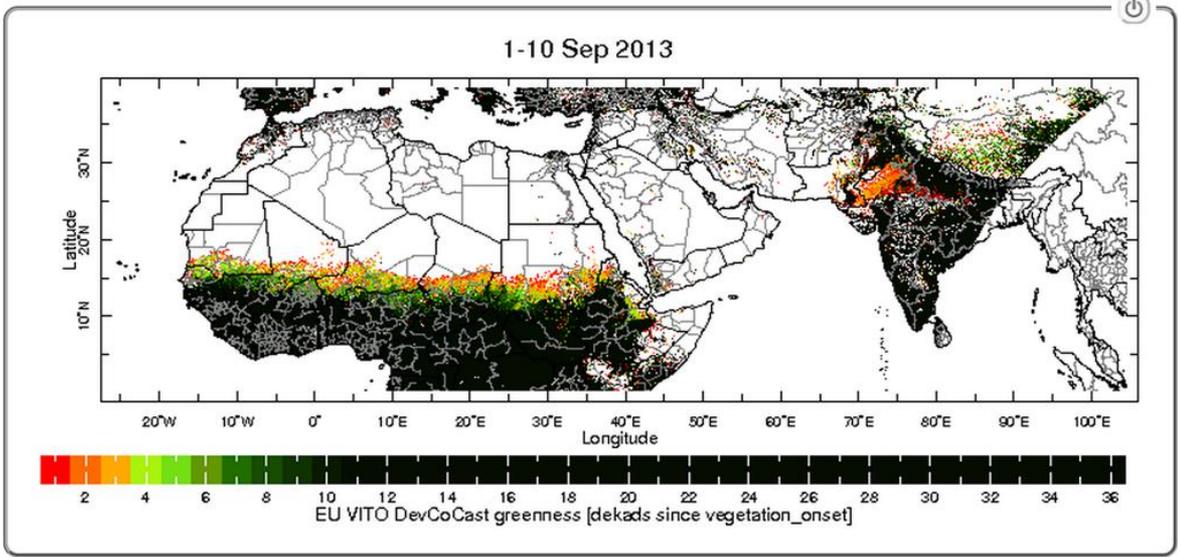


Greenness Estimates

A critical factor in Locust control is areas which have recently transitioned from desert to vegetation. Greenness is the number of dekads (approximately ten days) passed since vegetation onset.

The warmer colours (dekads 1-3) indicate annual vegetation that has just recently become green, and this is preferred by Desert Locust. Darker colours (dekads 7 and beyond) are most likely areas of perennial vegetation (oasis, forests, etc.) that are not particularly favourable for Desert Locust.

The methodology allows a robust and reliable discrimination between vegetation and no vegetation. It identifies efficiently the vegetation close to the onset and avoids the classic commission errors (i.e., detecting vegetation when there is no vegetation on the ground), encountered with the NDVI-based approach in these arid and semi-arid areas.



References



Malaria Early Warning



Climate and Health

Malaria Early Warning System

Monitoring The Environment

Dekadal (10-day) Precipitation

Spatially Average Over

district boundaries

Language

english

Description

Dataset Documentation

Dataset

Contact Us

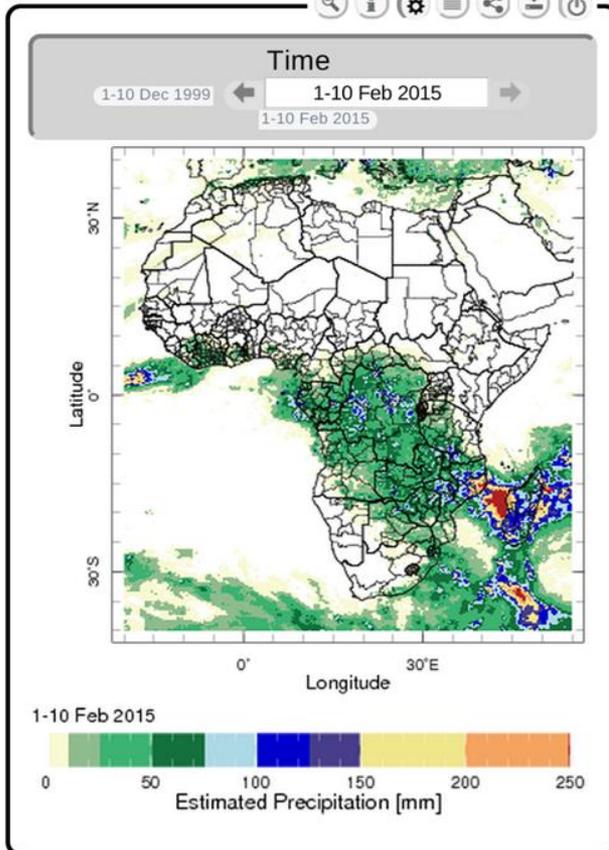
Instructions

Dekadal (10-day) Precipitation

This map shows dekadal (10-day) precipitation estimates from the Climate Prediction Center.

Precipitation, especially in warm semi-arid and desert fringe areas, is one of the factors responsible for creating the conditions which lead to the formation of sufficient surface water and moisture for mosquito breeding sites. Monitoring precipitation on short term time scales (1-2 weeks) may aid in determining the location and timing of a potential outbreak.

By placing recent precipitation in historical context, comparisons can be made to past outbreaks and useful early warning information can be developed for epidemic prone regions.

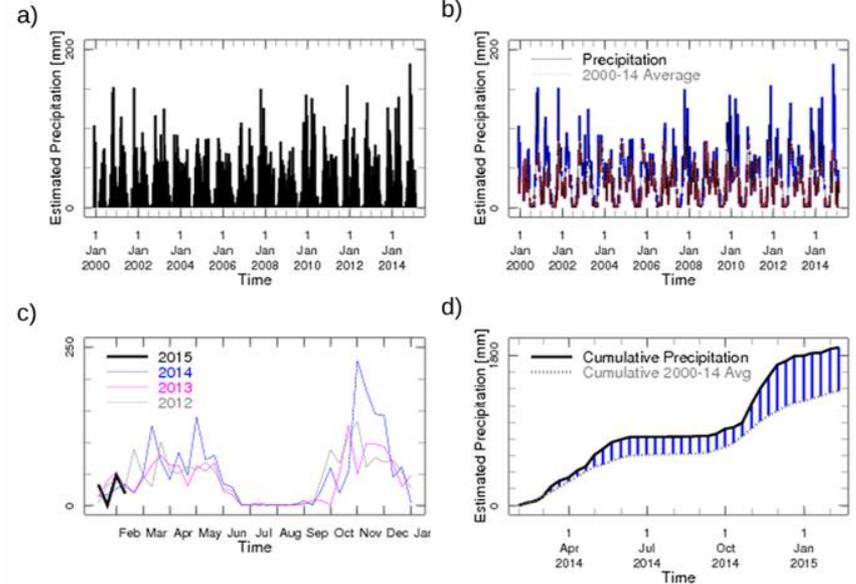


References

Grover-Kopec E., Kawano M., Klaver R. W., Blumenthal B., Ceccato P., Connor S. J. [An online operational rainfall monitoring resource for epidemic malaria early warning](#)



Observations for Lope (Booue), Ogooue-Ivindo, Gabon



a) Dekadal (i.e., ~10-daily) precipitation estimates for the selected region from Dec 1999 to the present.

b) Same as (a) (solid black line) with the addition of the recent short-term average precipitation for the same region (grey dotted line). The blue (red) bars



Probabilistic Precipitation Forecast



Climate

Forecasts

Flexible Forecasts

Precipitation Flexible Seasonal Forecast

Region

South America

Model

Forecast

Target Time

Feb-Apr 2015

Climatology (1979 to 2011)

1981 to 2010

Probability

exceeding Percentile 50.0 %-ile

- Description
- Dataset Documentation
- More Information
- Instructions
- Contact Us

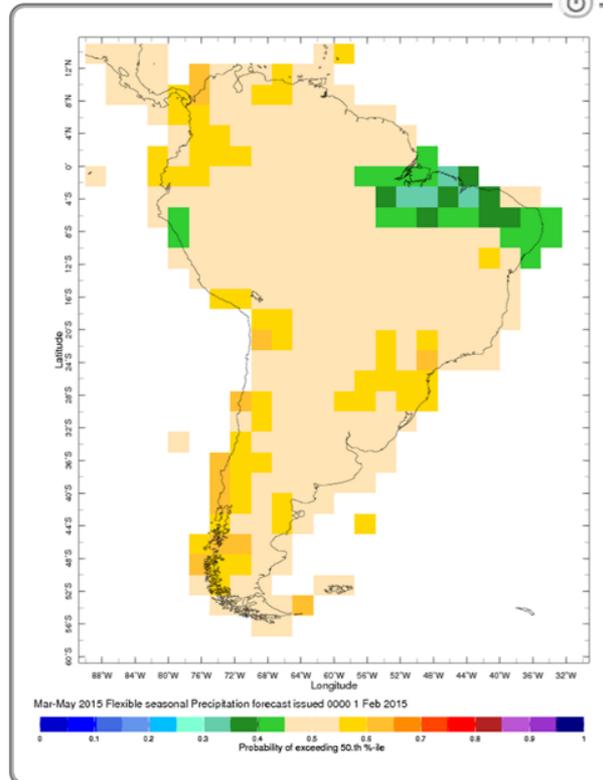
Precipitation Flexible Seasonal Forecast

This seasonal forecasting system consists of probabilistic precipitation seasonal forecasts based on the full estimate of the probability distribution.

Probabilistic seasonal forecasts from multi-model ensembles through the use of statistical recalibration, based on the historical performance of those models, provide reliable information to a wide range of climate risk and decision making communities, as well as the forecast community. The flexibility of the full probability distributions allows to deliver interactive maps and point-wise distributions that become relevant to user-determined needs.

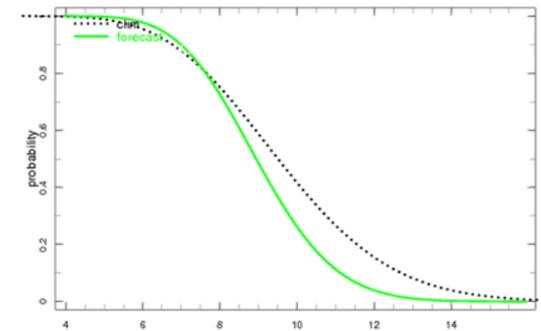
The default map shows globally the seasonal precipitation forecast probability (colors between 0 and 1) of exceeding the 50th percentile of the distribution from historical 1981-2010 climatology. The quantitative value (in mm/day) of that percentile is indicated by the contours. The forecast shown is the latest forecast made (e.g. Sep 2012) for the next season to come (e.g. Oct-Dec 2012). Five different seasons are forecasted and it is also possible to consult forecasts made previously. What makes the forecast flexible is that underlying the default map is the full probability distribution for the forecast and climatology.

Therefore, the user can specify the historical percentile or a quantitative value (here precipitation in mm/day) for probability of exceedance or non-exceedance. The climatological reference on which the forecast probability of (non-)exceeding is computed can be tailored by defining its starting and ending years.



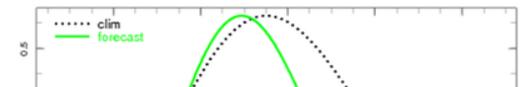
Target Date	Issue Date	Lead Time
Feb-Apr 2015	0000 1 Jan 2015	2.5

Probability of Exceedance



Mar-May 2015 issued 0000 1 Feb 2015 at (46.25W,3.75S)

Probability Distribution



Issues?

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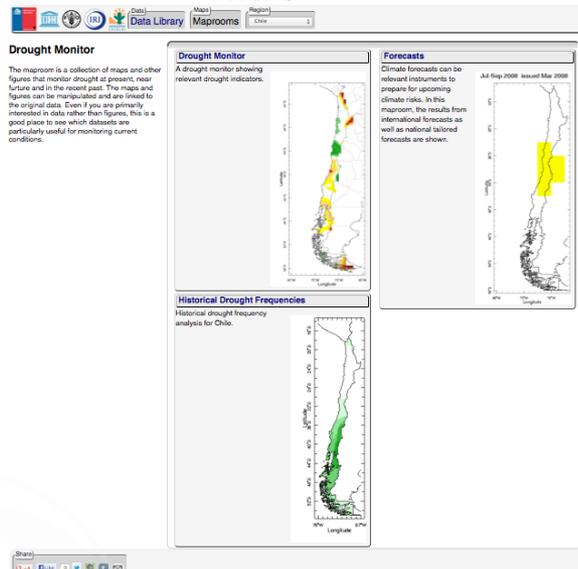
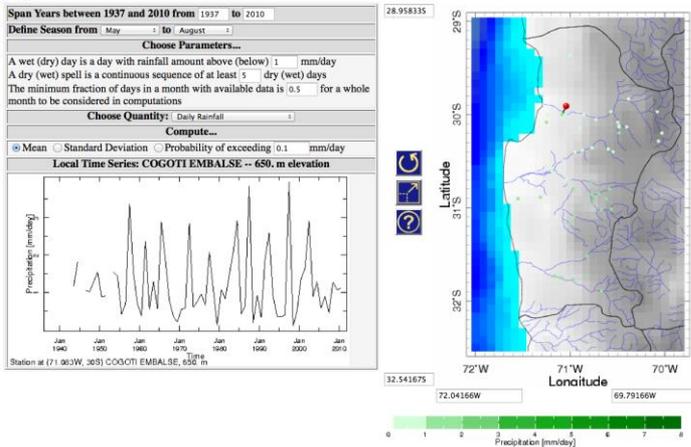
Informed action by decision-maker

Maprooms
Training tool
Technology Transfer

Technology Transfer



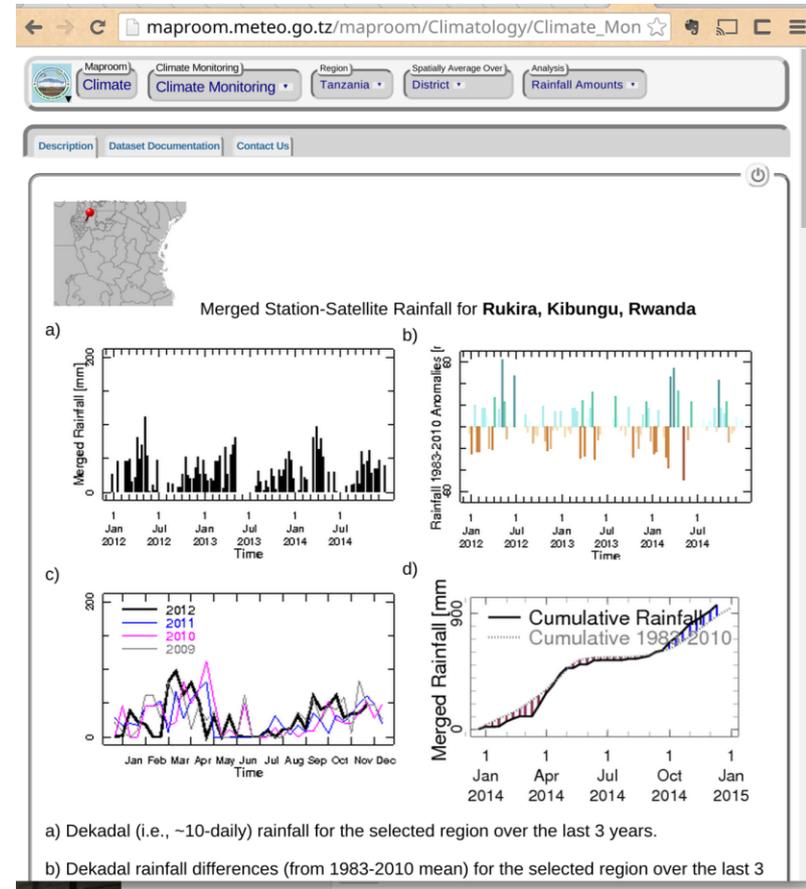
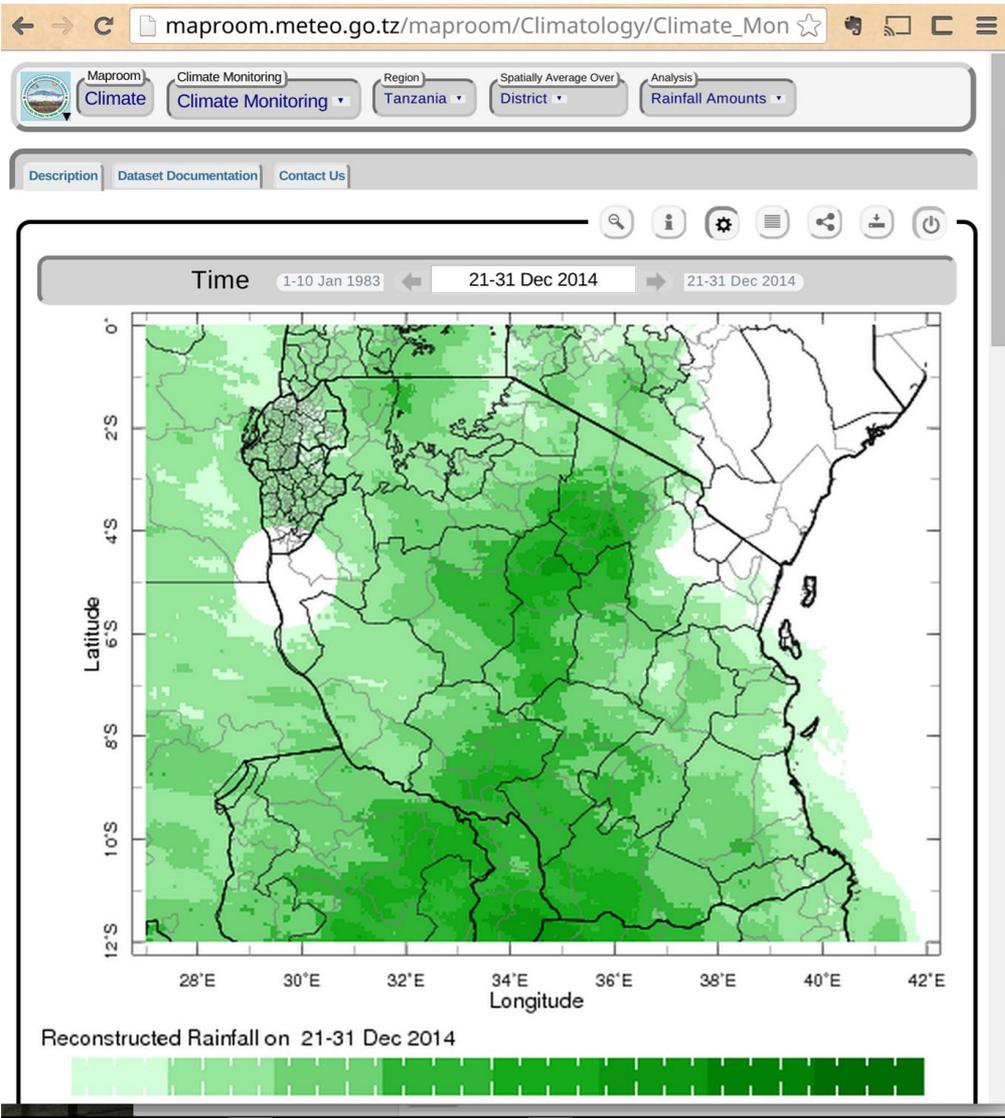
Chile Coquimbo Region Climate Monitoring - Historical



- NMA (Ethiopia)
- TMA (Tanzania)
- AGRHYMET (West Africa)
- CEAZA (Chile)
- SNIA (Uruguay)
- ACMAD (Africa)
- IIT-Delhi, IMD (India)
- CAZALAC (LAC)
- CCROM (Indonesia)
- Syngenta Nairobi (East Africa)



Tanzania (ENACTS)



Madagascar

map.meteomadagascar.mg/maproom/Health/CSMT/index.html?region=bb%3A48.900000000000006%3A-16.1%3A49.000000000000000

Maproom: **Climate and Health**

Malaria: Seasonal Climatic Suitability for Malaria Transmission

Region: Madagascar

Language: english

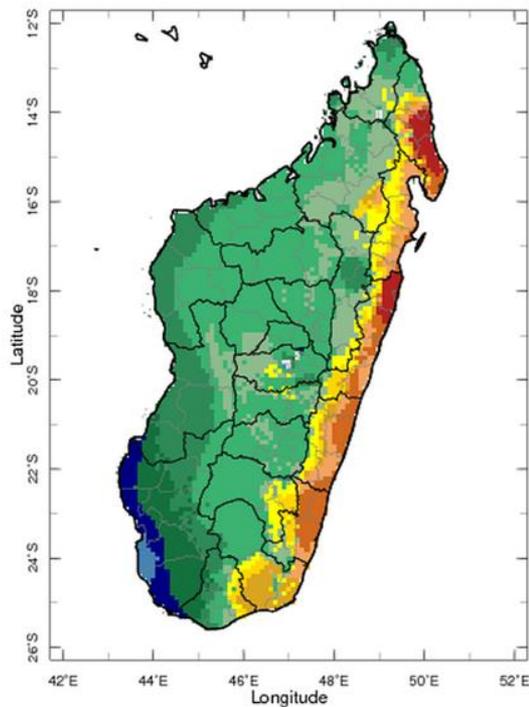
Map Shows: Number of Months suitable for Malaria Transmission

Description Dataset Documentation Contact Us Instructions

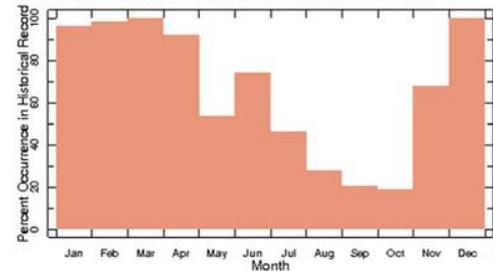
Seasonal Climatic Suitability for Malaria Transmission

This map shows the number of months suitable for malaria transmission, based on climatological averages. Suitability is defined as the coincidence of precipitation accumulation greater than 80 mm, mean temperature between 18°C and 32°C, and relative humidity greater than 60%.

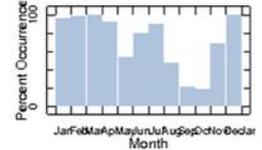
Temperature, precipitation and relative



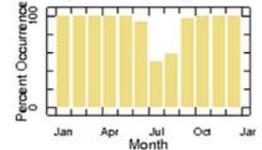
Situations for [48.9E-49E, 16.1S-16S] Percent Occurrence of Climate Conditions Suitable for Malaria Transmission



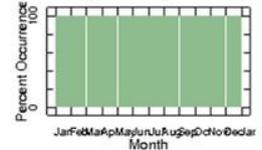
Precipitation (P > 80mm)



Temperature (18°C < T < 32°C)



Relative Humidity (RH > 60%)



Technologies to support dissemination

Ingrid -- data and analysis server, hides technical detail from user, flexible

maproom -- lightweight client-side user interface with semantic gathering of metadata, connects analysis to use with distilled set of choices



Specialized Data Tools

Maproom

Generalized Data Tools

Data Viewer

Data Language

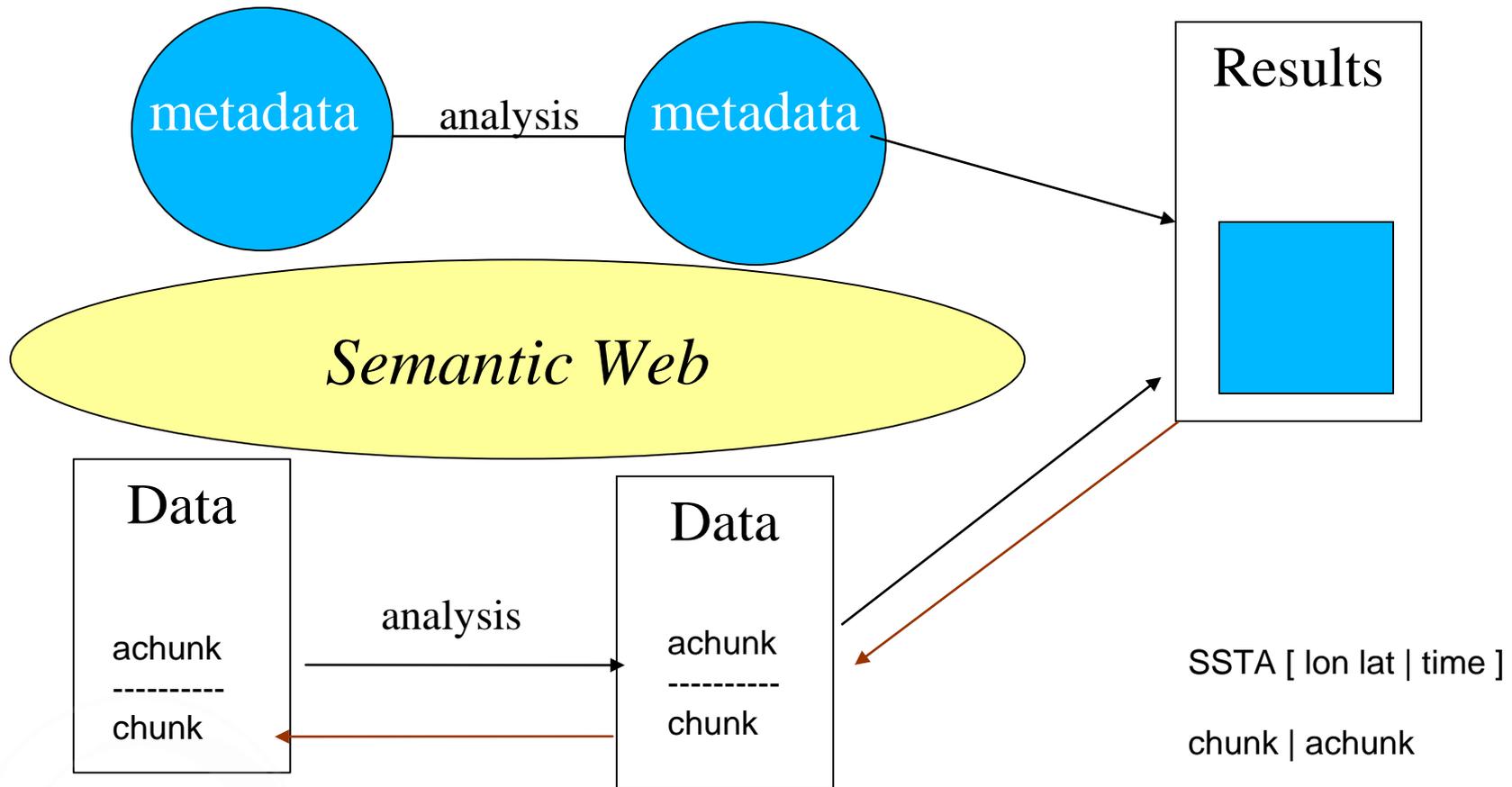
IRI Data Collection

- Dataset
- Dataset
 - Dataset
 - Variable
 - ivar
 - ivar

multidimensional

*URL/URI for data,
calculations, figs, etc*

Data Flow based Analysis with explicit semantics



Example: SSTA Maproom

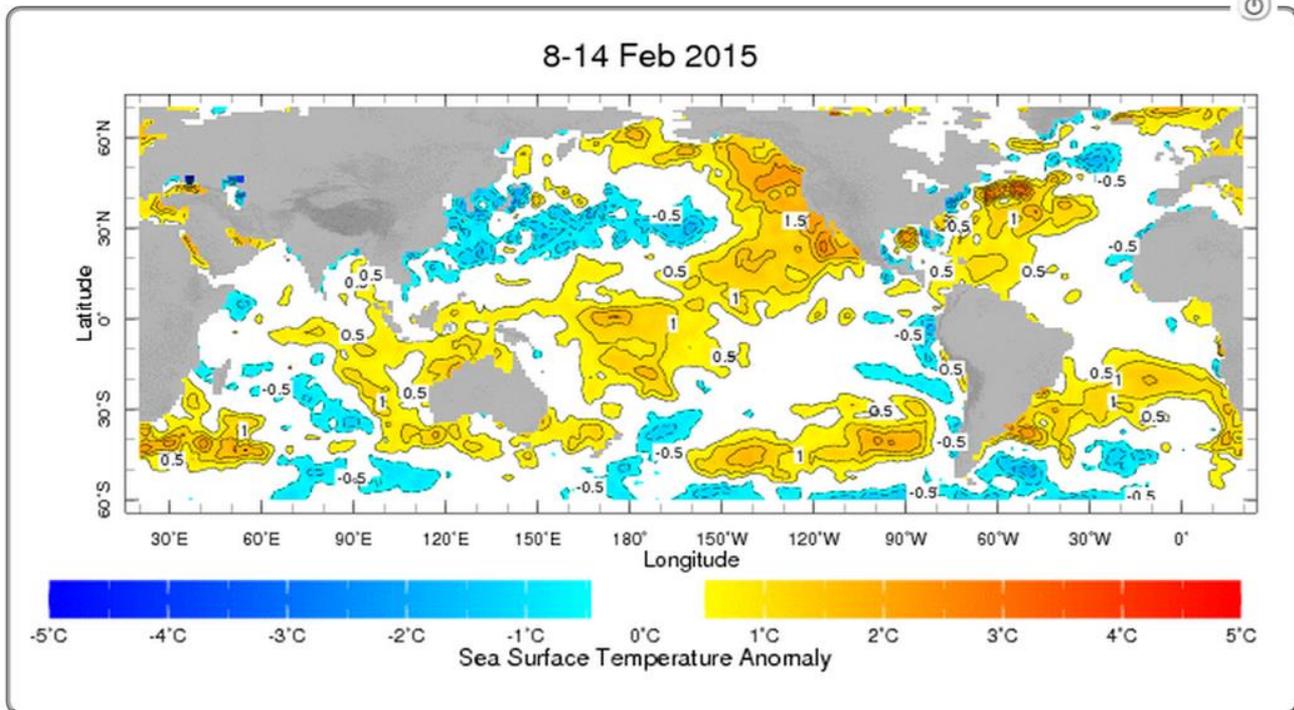
Climate Monitoring **Ocean Temperature** Weekly Weekly Sea Surface Temperature Anomaly Region Global

Description Dataset Documentation Dataset Contact Us

Weekly Sea Surface Temperature Anomaly

This map displays weekly sea surface temperature anomalies for the globe.

Weekly sea surface temperature anomalies are calculated with respect to the 1971-2000 climatology. Yellow to red colors on the map indicate areas where sea surface temperature for the week shown is above the climatological value for that week of the year, and blue shades indicate where sea surface temperature is below normal. Shading starts at $\pm 0.5^\circ\text{C}$. Anomalies are also contoured at an interval of 0.5°C .

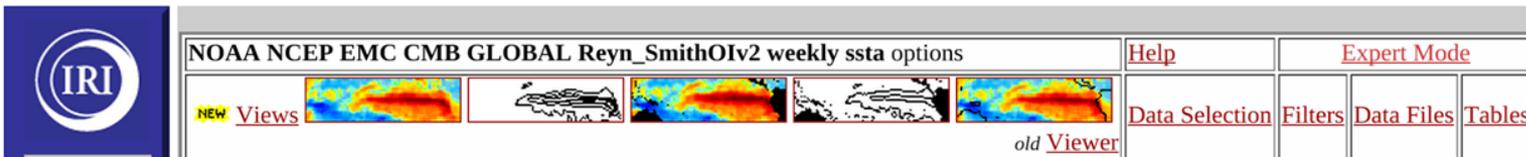


Share

Like 1 Recommend this on Google



Example: SSTA dataset



served from [IRI/LDEO Climate Data Library](http://iri.ldeo.columbia.edu/ClimateDataLibrary/)

... [NCEP](#) [EMC](#) [CMB](#) [GLOBAL](#) [Reyn_SmithOiv2](#) [weekly*](#) [Sea Surface Temperature Anomaly *](#) [DATA 0.5 STEP](#)

NOAA NCEP EMC CMB GLOBAL Reyn_SmithOiv2 weekly ssta: Sea Surface Temperature Anomaly data

weekly ssta Sea Surface Temperature Anomaly from NOAA NCEP EMC CMB GLOBAL Reyn_SmithOiv2: SST fields updated from version 1 with more COADS data, new sea-ice to SST conversion algorithm, and 1971-2000 climatology.

Independent Variables (Grids)

Time (time)

grid: /T (julian_day) ordered [(5-11 Nov 1981) (12-18 Nov 1981) (19-25 Nov 1981) ... (8-14 Feb 2015)] N= 1737 pts :grid

Longitude (longitude)

grid: /X (degree_east) periodic (0.5E) to (0.5W) by 1.0 N= 360 pts :grid

Latitude (latitude)

grid: /Y (degree_north) ordered (89.5S) to (89.5N) by 1.0 N= 180 pts :grid

Other Info



- IRI
- Data Library
- Finding Data
- Tutorial
- Questions and Answers
- Function Documentation
- NOAA NCEP EMC CMB GLOBAL Reyn_SmithOiv2 weekly documentation
- help



Example: SSTA calculation



Data Library

Finding Data
Tutorial
Questions and Answers
Function Documentation



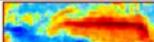
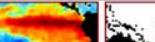
help

T X Y
M M M

NOAA NCEP EMC CMB GLOBAL Reyn_SmithOIv2 [weekly - pentad-climatology] sst [X Y | T] M M M

```
expert
SOURCES .NOAA .NCEP .EMC .CMB .GLOBAL
.Reyn_SmithOIv2
a: .weekly .sst
:a: .pentad-climatology .sst :a
[T]1.0 0.0 regridLinear
sub
```

ok
reset

NEW Views      old Viewer

Data Selection Filters Data Files Tables

... NOAA NCEP EMC CMB GLOBAL Reyn_SmithOIv2

weekly* Sea Surface Temperature

weekly* Sea Surface Temperature

pentad-climatology Sea Surface Temperature *

[T] 1.0 0.0 regridLinear

sub

served from [IRI/LDEO Climate Data Library](http://iri.ldeo.columbia.edu)

NOAA NCEP EMC CMB GLOBAL Reyn_SmithOIv2 [weekly - pentad-climatology] sst: Sea Surface Temperature data

NOAA NCEP EMC CMB GLOBAL Reyn_SmithOIv2 [weekly - pentad-climatology] sst.

Independent Variables (Grids)

Time (time)
grid: /T (julian_day) ordered [(5-11 Nov 1981) (12-18 Nov 1981) (19-25 Nov 1981) ... (8-14 Feb 2015)] N= 1737 pts :grid

Longitude (longitude)
grid: /X (degree_east) periodic (0.5E) to (0.5W) by 1.0 N= 360 pts :grid

Latitude (latitude)
grid: /Y (degree_north) ordered (89.5S) to (89.5N) by 1.0 N= 180 pts :grid



function: classify



Help Resources

Function Documentation

Documentation

Function Documentation

Function

classify

Language

english

classify

Classifies data into categories, i.e. labels ranges of values.

```
var {classes 1 ... 2n+1} (facet) classify
```

Description

classify is used to assign ranges of values from a variable into user-defined classes. Given a variable with a given range of values, the **classify** statement accepts a list of alternating class names and constants which define the boundaries between the classes within that range. As a result, a new grid composed of the defined classes is created, and the values from the input variable are transformed into flags of 0 (not a member of the class), 1 (is a member of the class), or NaN (not a number -- missing). This is best illustrated with an example.

Examples

```
SOURCES .KAPLAN .Indices .NINO3 .avOST  
T (Jan 1901) (Dec 1990) RANGE  
T 3 boxAverage  
[T]percentileover  
{LaNina 0.2 Neutral 0.8 EINino}(ENSO)classify
```

This example first takes non-overlapping 3-month seasonal averages of sea surface temperature anomalies (SSTA) from the NINO3 region of the equatorial Pacific Ocean over the period January 1901 to December 1990. This gives a single time series of seasonal sea surface temperature anomalies. The first time step is Jan-Mar 1901, the second is Apr-Jun 1901, and so on until Oct-Dec 1990.

Then, the SSTA values are converted into percentiles, from 0. to 1., using **[T]percentileover**. The most negative SSTA values in the distribution are assigned a value near zero, and the most positive values are assigned a value near one, with intermediate values ranging between these extremes.

The next line comprises the **classify** statement and its parameters. The class names and the boundaries between them are placed within the curly braces. Since the input

Arguments

label	type	Description
var	variable	input data to be classified
classes	name and number set	alternating names and numbers, starting and ending with a name, so that there are N+1 names and N numbers (optional)
facet	string	name of new independent variable (name of var if omitted) (optional)
weights	output variable	output. There is an additional grid consisting of the N+1 names, and the values are 0, 1, or missing depending on whether the data was between the values given in the <i>classify</i> number set. This variable is sometimes referred to as being in <i>complete disjunctive form</i> .



ENSO Classify by 1D

ENSO , [Indices india rainfall] Table

```
expert
SOURCES .Indices .india .rainfall
SOURCES .KAPLAN .Indices .NIN03 .av0S
T (Oct 1901) (Dec 1990) RANGE
T 4 boxAverage
T 12 STEP
[T]percentileover
{LaNina 0.2 Neutral 0.8 ElNino} (ENSO) classify
T 4 shiftdatashort
[T]weighted-average
table:
1 :table
```

OK reset

The full table is available [here](#). Alternatively, the table is also available as [tab-separated-value](#), [R tab-separated-value](#), [comma-separated-value](#), or [LaTeX](#) files.

ENSO	summer monsoon rainfall
ids	mm
LaNina	921.6111
Neutral	849.5849
ElNino	765.8333

Entries 1 to 3 of 3



Data Library

Finding Data

Tutorial

Questions and Answers

Function Documentation



help

IRI

ENSO Classify by 3D

Description Details Options Instructions

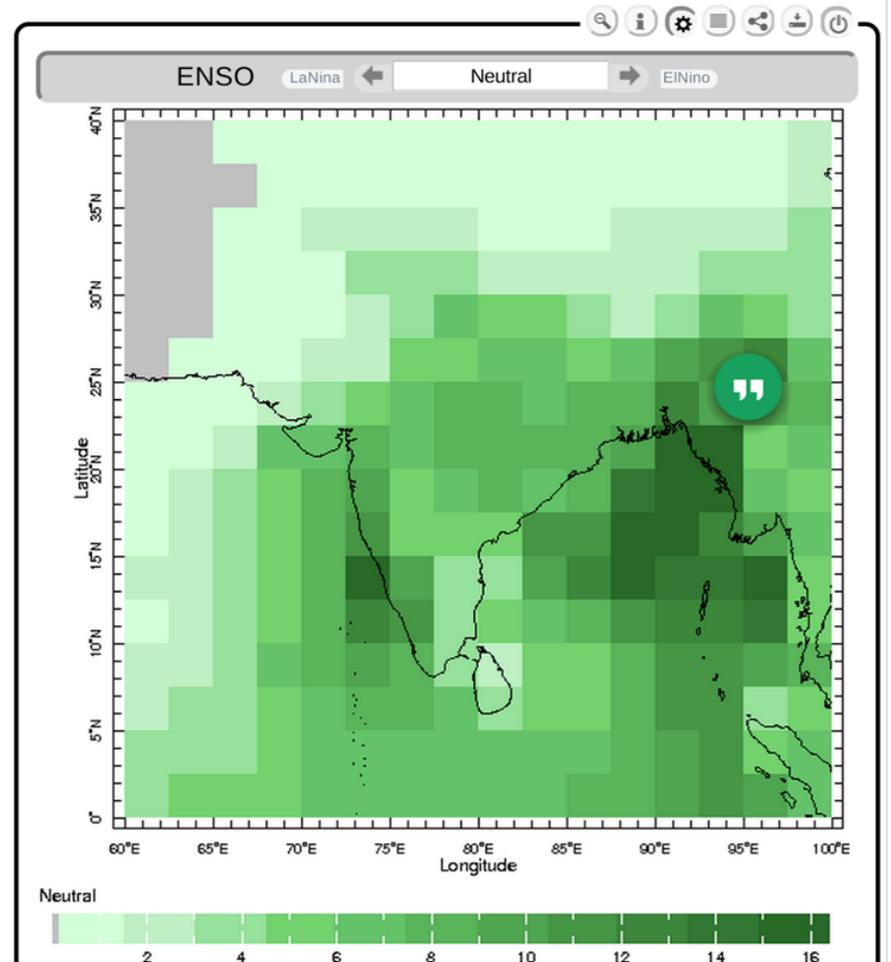
```
expert
SOURCES .NOAA .NCEP .CPC .Merged_Analysis .monthly
.v0703 .ver2 .prcp_est
X 60. 100. RANGEEDGES
Y 0 40 RANGEEDGES
T (Jun 1979) (Sep 2006) RANGE
T 4 runningAverage
T 12 STEP
SOURCES .KAPLAN .Indices .NINO3 .av0S
T (Oct 1979) (Dec 2006) RANGE
T 4 boxAverage
T 12 STEP
[T]percentileover
{LaNina 0.2 Neutral 0.8 ElNino} (ENSO) classify
T 4 shiftdatashort
[T]weighted-average
a- -a X Y fig- colors coasts lakes -fig
/ENSO /LaNina plotvalue
/plotaxislength 432 psdef
/plotborder 72 psdef
```

OK reset

- NOAA NCEP CPC Merged_Analysis monthly v0703 ver2 prcp_est[X Y ENSO]]
- NOAA NCEP CPC Merged_Analysis monthly v0703 ver2 prcp_est[X Y ENSO]]
- grid: /X (degree_east) ordered (61.25E) to (98.75E) by 2.5 N= 16 pts :grid
- grid: /Y (degree_north) ordered (1.25N) to (38.75N) by 2.5 N= 16 pts :grid
- fig: colors coasts_gaz lakes :fig

EPSG:4326

EPSG:4326 60.0 0.0 100.0 40.0 2.5 2.5



Function Library

Help Resources | Documentation | Function Menu | Language: english

2 [2xtoNaN8](#) Changes missing_values into NaNs. Uses either missing_value or valid_range flags. Outputs are both real*4 or both real*8.

: [:butt_filter](#) designs a Butterworth filter and applies it to **stream**

[:c](#) Defines a numeric constant with units and (optionally) other attributes

[:cressman](#) Performs a cressman objective analysis to create gridded data from station data

[:Water_Balance](#) applies a water balance algorithm to daily climate data (precipitation, average temperature and temperature amplitude), crop cultivars (Kc) and soil total available water.

[:WCT](#) computes Worrall Connor Thomson climate-driven malaria dynamical model

[:weaver](#) Performs a simplified weaver objective analysis

A [abrat](#) Ratio of alpha to beta

[abs](#) Returns the absolute value of a variable or a constant

[add](#) Adds the last two items on the stack

[add_variable](#) adds a variable to a dataset

[addGRID](#) Adds a single-valued independent variable

[addGRIDlast](#) Adds a single-valued independent variable as the slowest-varying independent variable

[average](#) Calculates the average

B [beginLoop](#) marks the beginning of a loop

[bias_mean](#) calculates the **mean bias** for deterministic forecasts **fcst** from observations **obs**.

[BofA=C](#) Converts a variable A to a variable B using a table B(C=A) and linear interpolation. Out of range values beyond half a grid step are NaN

[BofA=C-bounded](#) Converts a variable A to a variable B using a table B(C=A) and linear interpolation. Out of range values are pegged to the extreme values

[boxAverage](#) Calculates the box average. Commonly used for creating seasonal averages. Note: function should only be used with continuous data domain (see example below).

[monthlySD](#) Standard deviation (by month of year) of multiple years of monthly values

[mul](#) Multiplies the last two items on the stack.

[mulavg](#) Multiplies and averages over a set of independent variables

[mulsum](#) Returns A*B multiplied and summed along independent variables. If independent variable is an array of independent variables, sums over all of them

N [normalize](#) Divides var1 by var2. Points less than minimum in var2 become NaN in the output

[normalizeddistrib1D](#) Returns the normalized frequency distribution of a set of data for a specified range and step interval.

[normalizeddistrib2D](#) Computes the distribution of A vs B (see distrib2D) and then renormalizes by the integral along B. This new variable has the property that the integral along B is 1

O [openquery](#) Opens a query

[openqueryby](#) Opens a query indexed by indexvar

P [pad0](#) pads beginning and end of stream along ordered grid with a length of pl steps of grid with mean value, ie the zeroth derivative order boundary constraint.

[pad1](#) pads beginning and end of stream along ordered grid with a length of pl steps of grid by y-axis reflection symmetry at each extremity point stream, ie the first derivative order boundary constraint.

[pad2](#) pads beginning and end of stream along ordered grid with a length of pl steps of grid by pi-rotation symmetry at each extremity point of stream, ie the second derivative order boundary constraint.

[pairsums](#) Pairwise sums along independent variable of variable. This is the variable equivalent of integralgrid

[partial](#) Takes partial derivative of variable along grid

[partialeast](#) Applies zonal derivative to variable in spectral coordinates

[partialnorth](#) Applies meridional derivative to variable in spectral coordinates

[partitiongrid](#) splits an independent variable into two parts: a coarse scale grid and a fine-scale subgrid. The two ivars point to each other with sophisticates and isSophisticatedBy.

Search

- The maprooms are designed to be found and understood by a search engine

But we also have our RDF-based search

- The maprooms are semantically tagged using RDF/A
- We have an RDF-crawler with inferencing to gather metadata
- uicore (maproom clientside) interface code talks with a SPARQL service point (sesame server)

- Function documentation
- comprehensible terms
- faceted browser

All very much works-in-progress



Faceted Browser

IRI/LDEO **Climate Data Library** Data Library **Faceted Browser** Taxa Maproom Search Items Map Room Language english

Analysis

- Anomaly (1)
- Climatology (6)
- Spatial Average (1)
- Standardized (1)

Disease

- Malaria** (15)
 - Endemic Malaria (4)
 - Epidemic Malaria (10)

Location

- Political World (14)
- Africa (14)

Phenomena

- Drought (1)
- Precipitation (10)
- Vegetation (1)

Product Type

- Interactive Tool (9)
- Static (6)

Quantity

- NDVI (1)
- Precipitation Rate (9)
- Relative Humidity (1)
- Temperature (8)
- WASP (1)

Realm

- Atmosphere (10)
- Land Surface (4)
- Planetary Surface (4)

Sector

- Climate (14)
- Health** (15)

Spatial Resolution

- Gridded (3)
- Spatial Average (1)

Time

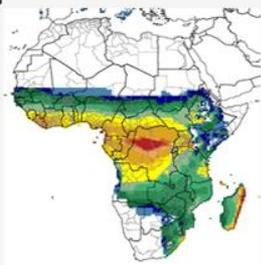
- Dekad (3)
- 8-Day (2)
- Monthly (7)

Vertical Location

- Surface (4)

Climate and Malaria in Africa

Economic development has played an enormous role in shaping the current global distribution of malaria. Where malaria is not adequately controlled, however, its distribution and seasonality are closely related to seasonal characteristics of the climate.



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Faceted Browser

 IRI/LDEO
Climate Data Library

Data Library
Faceted Browser

Taxa
Distinguishing Characteristics ▾

Items
dataset ▾

Language
english ▾

Fundamental Quantity

- MassContent (7)
- Rate (17)

Institution

- Canadian Centre for Climate Modelling and Analysis (55)
- COLA (23)
- IRI (12)
- NASA (7)
- NOAA (51)
 - GFDL (35)
 - NCEP (16)
- RSMAS (23)

Model

- CanCM (55)
 - CanCM3 (27)
 - CanCM4 (28)
- CCSM (23)
 - CCSM3 (12)
 - CCSM4 (11)
- CFS (16)
 - CFSv1 (6)
 - CFSv2 (10)
- ECHAM4.5 (12)
- CM (35)
 - CM2p1 (6)
 - CM2p1-aer04 (11)
 - CM2p5-FLOR-A06 (9)
 - CM2p5-FLOR-B01 (9)
- GMAO (7)

Project

- NMME** (172)

Quantity

- runoff_flux (4)
- Classification (1)
 - LandCover (1)
- Geopotential Height (5)
- Precipitation Rate (17)
- Pressure (4)
 - Atmospheric Pressure (4)
- Soil Moisture Content (7)
- Temperature (57)
 - Air Temperature (39)
 - Sea Surface Temperature (17)
 - Total Temperature (17)
- Time (16)
- Velocity (9)
 - Meridional Velocity (5)
 - Northward Wind (5)
 - Zonal Velocity (4)
 - Eastward Wind (4)

Realm

- Atmosphere (74)
- Planetary Surface (18)
- Sea Surface (17)
- Soil Layer (7)
- Water Surface (17)

Spatial Resolution

Time Span

- 1948-01/2011-04 (2)
- 1979-01/2010-10 (2)
- 1980-03/2016-01 (16)
- 1981-01/2010-08 (5)
- 1981-01/2011-11 (25)
- 1981-01/2013-01 (6)
- 1981-01/2015-10 (10)
- 1982/2010 (4)
- 1982/2014 (2)
- 1982-01/2011-09 (5)

[4 more](#)

Vertical Location

- Surface (18)

Standard Name

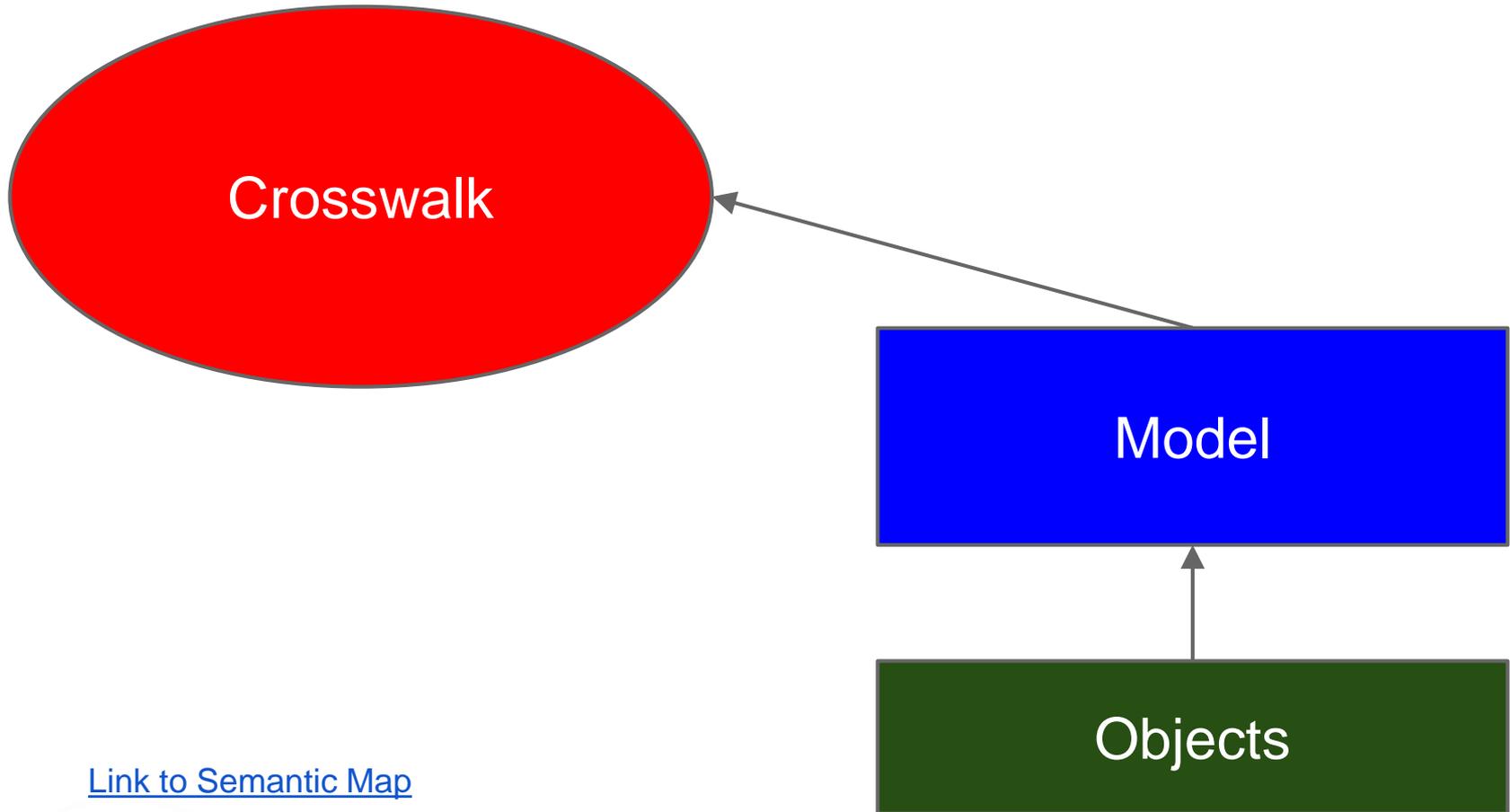
- air_pressure (4)
- air_pressure_at_sea_level
- air_temperature (39)
- eastward_wind (4)
- geopotential_height (5)
- lwe_precipitation_rate (17)
- moisture_content_of_soil_layer (7)
- northward_wind (5)
- runoff_flux (4)
- sea_surface_temperature (6)
- soil_moisture_content (7)
- time (16)

Models NMME D

Models NMME from SOURCES: the IRI/LDEO collection of climate data



Semantic Mapping



[Link to Semantic Map](#)



Git packages

code and content

- ingrid
- maproom
- dlentries
- dldoc

- maproom_template
- uicore
- semantic_tools
- pure, jsonld.js, miconf, dlsquid, and others

