



3.2.3.8.3

Other Acabable Tile,"

0.00

dillo-

Introduction to the Data Library (DL):

Data Selection in Time

Training Module November 29, 2016 Version 1.0



International Research Institute for Climate and Society (IRI), (2016). Introduction to the Data Library (DL)-Data Selection in Time. November 29, Version 1.0. Palisades: IRI.

This work is licensed under a Creative Commons Attribution-Non Commercial 4.0 International License (http://creativecommons.org/licenses/by-nc/4.0/) and may be adapted or reproduced with attribution to the IRI and for any non-commercial purpose.

CONTENTS

1	Intro	duction to the Data Library (DL) - Data Selection in Time	1
	1.1	Introduction	1
	1.2	Overview	2
	1.3	Access	2
	1.4	Data Selection	2
	1.5	Filters	5
	1.6	[more] Functions	6
	1.7	Summary	10
	1.8	Quiz	10
	1.9	Reference(s)	11

CHAPTER

ONE

INTRODUCTION TO THE DATA LIBRARY (DL) - DATA SELECTION IN TIME

1.1 Introduction

The IRI Climate Data Library is a library of datasets. By library we mean a collection of datasets, collected from various sources, designed to make them more accessible for the library's users (Bluementhal, 2004). For this module we will be expanding on how the users can select data in time. Traditional GIS platforms are now widely used by planners and decision makers in society. However, they are highly-focused on geospatial capabilities and have limited functionality for temporal analysis. Without information on the latter, meaningful inference about the causation of disease outbreaks is impossible (Jacquez 2000). Furthermore, many tools are unable to readily process the vast quantities of space-time data associated with, for example, the outputs of a global climate model. The IRI Climate Data Library overcomes the limitations imposed by GIS platforms by being based on a much more general multi-dimensional data model that includes both space and time dimensions. All datasets, including GIS features (such as points, lines, and polygons) are geo-located and temporally referenced in a uniform framework.

Climate Data Library		
Google" Custom Search		
IRI/LDEO Climate Data Library The IRI Data Library is a powerful and freely accessible online data repository and analysis tool that	IRI Climate and Society Map Room The climate and society maproom is a collection of maps and other figures that monitor climate and societal conditions at present and in the recent past. The maps and figures can be manipulated and are linked to the original data. Even If you are primarily interested in data rather than figures. It is is a god place to see which datasets are particularly useful for monitoring current conditions.	
allows a user to view, analyze, and download nunoreds of terapytes of climate-reliated data through a standard web browser. It is a powerful tool that offers the following capabilities at no cost to the user: • coste any number of datasets; • create analyses of data ranging from simple averaging to more advanced EOF analyses using the Iord Data Analysic I anough from simple averaging to more advanced EOF analyses using the		
 monitor present climate conditions with maps and analyses in the Maproom; 	Data by Source	
create visual representations of data, including animations; download data in a variety of commonly-used <u>formats</u> , including GIS-compatible formats.	Datasets organized by source, i.e. creator and/or provider.	
Latest nom our <u>what's new</u> blog	Data By Category	
	Selected Datasets for particular topics	
	Dataset and Map Room Browser	
	Find datasets and maps organized by many characteristics and keywords	
	Navigating Through the IRI Data Library: A Tutorial	
	The goal of this tutorial is to introduce you to the structure of the Data Library and the many ways to navigate through it.	
	Statistical Techniques in the Data Library: A Tutorial	
	Statistical techniques are essential tools for analyzing large datasets; this statistics tutorial thus covers essential skills for many data library users.	
	Function Index	
	Index for functions that can be used to analyze data within the Data Library.	
	Help Resources	
	The Help Resources include basic and statistics tutorials, function documentation, and other resources to help you get the maximum utility out of the Data Library	

Fig. 1.1: Worldwide IRI Data Library Homepage

1.2 Overview

How is Data Selection in Time categorized?

The Data Selection in Time has 3 levels:

- "Data selection" in time
- "Filters": Climatology: yearly-climatology Anomaly: yearly-anomalies
- [more] Functions: averages in time, e.g., using: boxAverage runningAverage monthlyAverage [on daily data] seasonalAverage [on monthly data]

1.3 Access

The IRI Data Library can be accessed with the following links:

- Worldwide: http://iridl.ldeo.columbia.edu/
- Chile: http://www.climatedatalibrary.cl/
- Venezuela: http://datoteca.ole2.org/
- Uruguay: http://dlibrary.snia.gub.uy/
- Rwanda: http://maproom.meteorwanda.gov.rw/
- Ethiopia: http://www.ethiometmaprooms.gov.et:8082/
- Tanzania: http://maproom.meteo.go.tz/
- Mali: http://197.155.140.164/
- Ghana: http://maps.meteo.gov.gh:89/
- Zambia: http://41.72.104.142/
- Madagascar: http://map.meteomadagascar.mg/
- Peru: http://ons.snirh.gob.pe/
- Niger: http://cradata.agrhymet.ne/
- Kenya (KMD): http://kmddl.meteo.go.ke:8081/
- Kenya (ICPAC): http://digilib.icpac.net/

1.4 Data Selection

For Data Selection manipulation on a variable in a dataset, select "Data Selection" as seen in Figure 1.2.

1.4.1 Data Selection in Time for a Monthly Variables

Figure 1.3, displays the setting ranges for time. Suppose want to select a month, or a season, August for example, or JAS (Jul-Aug-Sep) season. Figure 1.3 shows what to type in the window.

The functions that can be used for these variables are:

• T value VALUE

(C) 3 197.155.140.164/SOURCES/.MaliMeteo/.ENACTS/.rainfall/.MON/.dekadly/.rfe_merged/ (C) 0, Search	☆ 🖻 🛡 🖡 🍘 ≡					
Lata Library MaliMeteo ENACTS rainfall MON dekadly rfe_merged 12.39375W - 4.40625E 9.99375N - 25.21875N T 2214 31 Dec 1982 - 1344 31 Dec 2014 2014 12.39375W - 4.40625E 12.39375W - 4.40625E	Language english =					
Description Views Data Fiters Data Selection Det Files Data Tables Expert Mode	served from <u>197.155.140.164</u>					
SOURCES MailMeteo ENACTS rainfall MON dekadly rfe_merged MaliMeteo ENACTS rainfall MON dekadly rfe_merged: Merged Station-Satellite Rainfall data						
ENACTS rainfall MON dekadly Merged Station-Satellite Rainfall from MaliMeteo: Agence Nationale de la Météorologie du Mali.						
Independent Variables (Grids)						
Time grid: /T (days since 1960-01-01) ordered [(1-10 Jan 1983) (11-20 Jan 1983) (21-31 Jan 1983) (21-31 Dec 2014)] N= 1152 Longitude (longitude) grid: X (degree_east) ordered (12.375W) to (4.3875E) by 0.0375 N= 448 pts :grid Latitude (latitude) grid: Y (degree_north) ordered (10.0125N) to (25.2N) by 0.0375 N= 406 pts :grid	? pts :grid					
Other Info						
CE						

Fig. 1.2: "Data Selection" Directory on Meteo Mali Climate Data Library

🜒 🕲 197.155.140.164/SOURCES/.MallMeteo/.ENACTS/.rainfall/.MON/.dekadly/.rfe_merged/dataselection.ht C]	Q. Search ☆ 🖻 ♥ ♣ 🎓 😕 🚍				
Description Views Data Filters Data Selection Data Files Data Tables Expert Mode					
Data Selection					
You can interactively pick out the data you would like with the Data Viewer.					
You can reduce the amount of data by restricting the range of the grids.					
• grid: X (degree_east) ordered (12.375W) to (4.3875E) by 0.0375 N= 448 pts: grid • grid: X (degree_north) ordered (10.0125N) to (25.2N) by 0.0375 N= 406 pts: grid • grid: T (days since 1960-01-01) ordered [(1-10 Jan 1983) (11-20 Jan 1983) (21-31 Jan 1983) (21-31 Dec 2014)] N= 1152 pts: grid If this is what you want, choose <u>Stop Selecting</u> Setting Ranges If you want to restrict the range along a grid, choose here.					
name range X Longitude 12.375W to 4.3875E X Latitude 10.0125W to 25.5W	Jul ? Jul 1950 to Sep 2000 ?				
T Time 1-10 Jan 1983 to 21-31 Dec 2014 Restrict Ranges	Jul-Sep ? ?				

Fig. 1.3: Setting Ranges in the Data Selection Section for monthly variable

- T value1 value2 value3 ... VALUES
- T first last RANGE

For example:

- T (Aug 1984) VALUE
- T (1-10 Jul) VALUES
- T (Jul) VALUES
- T (Jul 1950) (Jul 2015) RANGE

1.4.2 Example of Syntax for Time Grid Selections (Monthly)

- Monthly:
- grid (Mmm YYYY) VALUE (or VALUES or RANGE)
 - To select data from a single month:
- T (Jan 1981) VALUE
 - To select data from a continuous range of months:

```
T (Jan 1981) (Dec 1985) RANGE
```

• To select all January monthly values:

T (Jan) VALUES

- To select all January monthly values during 1981-1985:
- T (Jan 1981-1985) VALUES
 - To select all January-February-March monthly values:
- T (Jan-Mar) VALUES
 - To select all January-February-March monthly values during 1981-1985:
- T (Jan-Mar 1981-1985) VALUES

1.4.3 Data Selection in Time for a Dakadal Variables

Figure 1.4, displays the setting ranges for time, to select a dekadal variable and Figure 1.4 shows what to type in the window.

1.4.4 Example of Syntax for Time Grid Selections (Daily)

Daily: grid (dd Mmm YYYY) VALUE (or VALUES or RANGE)

• To select data from a single day:

T (01 Jan 1981) VALUE

- To select data from a continuous range of days:
- T (01 Jan 1981) (31 Dec 1985) RANGE
 - To select all January daily values:

T (Jan) VALUES



Fig. 1.4: Setting Ranges in the Data Selection Section for Dekadal Variable

- To select all January daily values during 1981-1985:
- T (Jan 1981-1985) VALUES
 - To select all January-February-March daily values:
- T (Jan-Mar) VALUES
 - To select all January-February-March daily values during 1981-1985:
- T (Jan-Mar 1981-1985) VALUES
 - To select all 1-10 January daily values:
- T (1-10 Jan) VALUES

1.5 Filters

Once the desired data selection is made for time but the user would like to see the seasonal average, at this given stage just using the "Data Selection" is not enough. Hence must use filters to refine results firstly before going to calculate the seasonal mean.

The functions used in the filters are:

- yearly-climatology
- yearly-anomalies

Both these above stated functions work on monthly data where one calculates the monthly (yearly-climatology) climatology and the other function subtracts (yearly-anomalies)

1.5.1 Yearly-Climatology vs Yearly-Anomalies

Say you have a time series, organized in a matrix, where each row is one year, yearly-climatology computes each month's long-term average, or climatology, by averaging each column (Figure 1.5) whereas yearly-anomalies removes

the climatology from the original data matrix (Figure 1.5).



Fig. 1.5: Yearly-Climatology Function vs Yearly-Anomalies Function

1.6 [more] Functions

Now that the data has been selected and filters have been incorporated it is also possible to add more functions which will be shown with examples in this section.

For this example we will be calculating the seasonal mean and for averages in time the following functions are available, e.g., using: * boxAverage * runningAverage * monthlyAverage [on daily data] * seasonalAverage [on monthly data] * [splitstreamgrid]

In order to calculate the average over a season, at least three functions can be used. For example, let us consider the months of Jul-Aug-Sep:

- T (Jul-Sep) 'seasonalAverage'
- T (Jul 1901) last RANGE T 3 'boxAverage' T 12 STEP
- T 3 'runningAverage' T (Jul-Sep 1901) last RANGE T 12 STEP
- With 'seasonalAverage' any number of months can be chosen:

[Ex .: Jul-Sep, May-Oct, Dec-Mar ...]

• With 'BoxAverage', the number of months must divide by 12:

```
[Ex .: 1, 2, 3, 4, 6, not 5]
```

- With 'runningAverage' also, any number of months can be chosen:
- [Ex :: 3, 5, 252 = 21x12 ...]
 - The monthlyAverage function calculates, the monthly average from daily data, dekadal and even bi-monthly.

Help Resources Commentation Commentation	Function monthlyAv	rerage	Canguage- english C	
monthlyAverage				
Converts daily data to monthly data by averaging				
SOURCES .NOAA .NCEP .CPC .FEWS .DAILY .est_prcp 0.9 monthlyAverage Arguments				
/units (mm/day) def	label	type	Description	
OR	dailyvar	variable	daily data to be averaged, with units of units	
SOURCES .NOAA .NCDC .GDCN .TMAX ISTA 253175 VALUE monthlyAverage	minfrac	number	Minimum fraction of data that must be present (i.e., fraction not indicated as missing) within each month in order for each monthly average to be calculated. If minfrac is not present, then a missing value is returned. If minfrac is not given, then the average is calculated regardless of the amount of data present. (optional)	
See Also			monthly average of dailyvar	
Average: : average _boxAverage _dekadalAverage monthlyMAVE _monthlyMAVE _SD _monthlymean pentadAverage _pentadMAVE _pentadmean runningAverage _seasonalAverage _weighted-average weathAverage	monthlyvar	output variable	monthlyvar now has a temporal resolution of months. Note: for variables with units of accumulation (e.g., precipitation), the units are now <i>units</i> /day. This should be changed in the interface as shown in the example below.	

Fig. 1.6: Function Documentation of 'monthlyAverage'



grid: /Y (degree_north) ordered (89.18655N) to (62.81344S) by 0.07272727 N= 2091 pts :grid

Fig. 1.7: NDVI Data of monthlyAverage data

1.6.1 Example of Selection in Space and Time: "how to calculate an index of Sahelian precipitation in Jul-Sep"

For this example the gridded data is obtained from UEA/CRU.

The function documentation changes should be as follows underlined, on the "expert mode" (seen in Figure 1.8).

e iridi.ldeo.columbia.edu/SOURCES/.UEA/.CRU/.TS3p22/.monthly/.pre/	C ⊂ /~pierce/ncview_home_page.html →	☆ 自 ♥ ♣ ♠ ♥ ☰
Data Library Y Y UEA CRU TS3p22 monthly pre 180W - 180 90S - 90N 1901-2013		Language english
Description Views Data Filters Data Selection Data Files Data Tables Expert Mode	sen	ved from IRI/LDEO Climate Data Library
SOURCES UEA CRU TS3p22 monthly pre		
UEA CRU TS3p22 monthly pre: precipitation data		
monthly precipitation from UEA CRU TS3p22: CRU TS3.22: Climatic Research Unit (CRU) Tin by-month Variation in Climate (Jan. 1901 - Dec. 2013).	ne-Series (TS) Version 3.22 of High Res	olution Gridded Data of Month-
Independent Variables (Grids)		
Time (time) grid: /T (months since 1960-01-01) ordered (Jan 1901) to (Dec 2013) by 1.0 N= 1356 pts Longitude (longitude) grid: /X (degree_ast) periodic (179.75W) to (179.75E) by 0.5 N= 720 pts :grid Latitude (latitude) grid: /Y (degree_north) ordered (89.75S) to (89.75N) by 0.5 N= 360 pts :grid	:grid	



Firstly the user must proceed with the "Data Selection" and fill in the desired longitudinal;, latitudinal and time variables as is on Figure 1.9.

Description	Views Data Filters Data Selection Data Files	Data Tables Expert Mode					
Data Sel	Data Selection						
You can intera	actively pick out the data you would like with	the Data Viewer.					
You can redu	ce the amount of data by restricting the range	e of the grids.					
The current	settings for the grids are						
• grid: /X • grid: /Y • grid: /T	grid: /X (degree_east) ordered (19.75W) to (39.75E) by 0.5 N= 120 pts :grid grid: /Y (degree_north) ordered (10.25N) to (19.75N) by 0.5 N= 20 pts :grid grid: /T (months since 1960-01-01) ordered (Jul 1901) to (Sep 2013) by 1.0 N= 1347 pts :grid						
If this is wha	If this is what you want, choose Stop Selecting						
Setting F	Setting Ranges If you want to restrict the range along a grid, choose here.						
name	range						
Y Latitude	10 to 20						
T Time	Jul 1901 to Sep 2013						
	Restrict Ranges						

Fig. 1.9: Data Selection in Space and Time of the Sahel

Once the data is selected the 1347 points grid is a number which includes, all the months of Jul 1901 to September 2013, look at Figure 1.10.

The expert mode is a great way to manually add [X Y] average and a seasonal average of definition (details seen in Figure 1.11)

Description Views Data Filters Data Selection Data Files Data Tables Expert Mode						
Data Selection						
You can interactively pick out the data you would like with the Data Viewer.						
You can reduce the amount of data by restricting the range of the grids.						
The current settings for the grids are grid: /X (degree_east) ordered (19.75W) to (39.75E) by 0.5 N= 120 pts :grid grid: /Y (degree_north) ordered (10.25N) to (19.75N) by 0.5 N= 20 pts :grid grid: /T (months since 1960-01-01) ordered (Jul 1901) to (Sep 2013) by 1.0 N= 1347 pts :grid If this is what you want, choose <u>Stop Selecting</u> Setting Ranges						

If you want to restrict the range along a grid, choose here.

	name	range			
X	Longitude	-20 to 40			
Y	Latitude	10 to 20			
Т	Time	Jul 1901 to Sep 2013			
	Restrict Ranges				

Fig. 1.10: 1347 pts grid explanation

UEA CRU TS3p22 monthly pre X Y Jul 1901 - Sep 2013		english 🗘
Description Views Data Filters Data Selection Data Files Data Tables Expert Mode T X Y		
JEA CRU TS3p22 monthly pre[XYIT] MMM		
SOURCES .UEA .CRU .TS3p22 .monthly .pre Y (10) (20) FANCEEDCES X (-20) (40) FANCEEDCES T (Jul 1901) (Sep 2013) FANCEEDCES		
\square		
OK reset		
<u>ح ک</u>		
Data Library		english 😮
Description Views Data Filters Data Selection Data Files Data Tables Expert Mode		
<u>mean [UEA CRU TS3p22 monthly pre][I T]</u>	manually add	
SOURCES .UEA .CRU .TS3p22 .monthly .pre Y (10) (20) RANGEEDGES	[X Y] average	
X (-20) (40) RANGEEDGES [X Y] average T (Jul 1901) (Sep 2013) RANGEEDGES T (Jul-Sep) SeasonalAverage	and a seasonal average of definition	
	deminion	
OK reset		

Fig. 1.11: Expert Mode of Sahelian monthly precipitation average

1.6.2 Results

Finally using the aforementioned selection processes, the user is able to obtain Figure 1.12, that displays the average monthly precipitation of the Sahel.



Fig. 1.12: Average Monthly Precipitation of the Sahel

But if we add yearly-anomalies filter to the results, by manually adding it on expert mode or using the filters, Figure 1.13 is obtained.

1.7 Summary

From this module the user is expected to have knowledge on how to select data in time and in addition incorporate other functions and or filters to the selection and obtain a visualization of the results desired.

1.8 Quiz

Please answer the following questions using the IRI Data Library

- Q1. What is the difference between yearly climatology and Yearly anomaly ?
- Q2. Where do you include your Time range T in the data selection process?
- Q3. When wanting to include functions which tab do you go to?

1.8.1 Quiz - Answers

A1. Yearly-climatology computes each month's long-term average, or climatology whereas, yearly-anomalies removes the climatology from the original data.



Fig. 1.13: Average Precipitation Yearly Monthly Anomalies of the Sahel

A2. By going into "Data selection" tab then under "Setting Ranges" write down the desired time frame on "Time (T)" and restrict the range along a grid.

A3. The "expert mode" Tab.

1.9 Reference(s)