The S2S Data Base in IRI Data Library: Maprooms and online analysis tools

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With special thanks to:

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International Research Institute for Climate and Society
Earth Institute | Columbia University

Workshop on Predictability, dynamics and applications research using the TIGGE and S2S ensembles
ECMWF | Reading | 2-5 April 2019

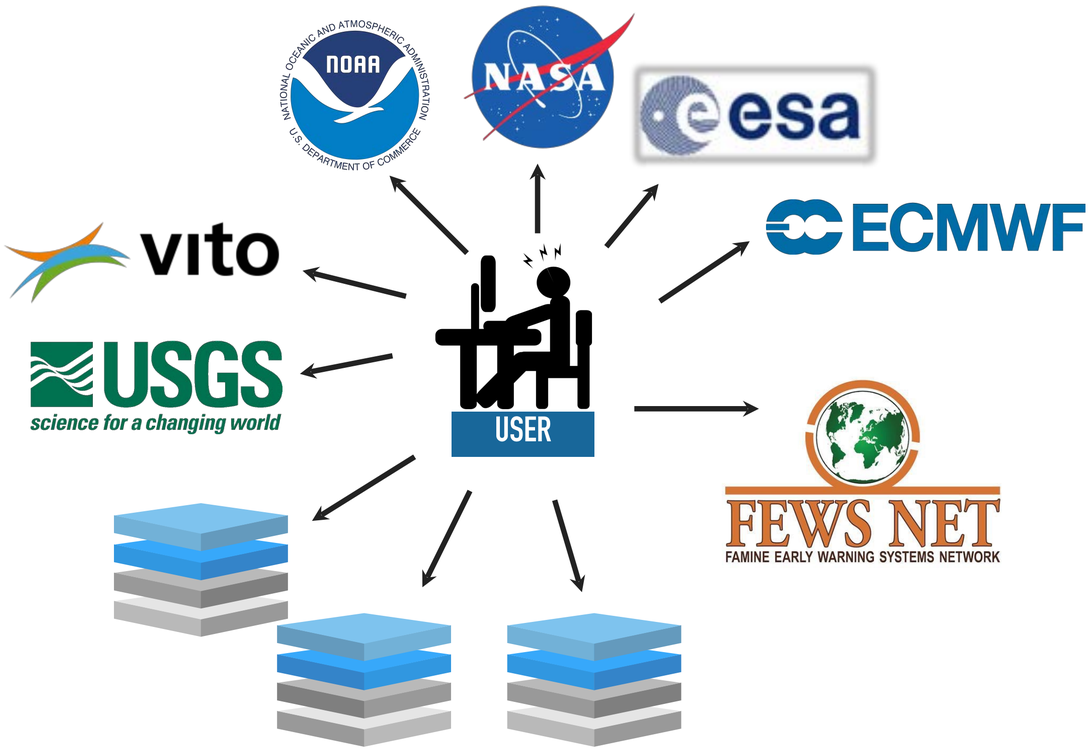
Outline

1. The International Research Institute for Climate and Society Data Library (IRIDL) - Server-side computing

2. S2S database in IRIDL - Holdings and data access

3. Examples of online analysis of S2S forecasts and reforecasts

CENTRAL ACCESS POINT



WHAT DATA DO I NEED?
WHERE CAN I GET THAT DATA?

ADVANTAGES

The Data Library is a powerful open-source and free computational engine that offers a multi-lingual web browser interface that enables users to:

01 Access, manage, combine and manipulate any number of datasets in a uniform temporal and geolocated framework

02 Create analyses of data using a high-level programming language and hundreds of built in functions

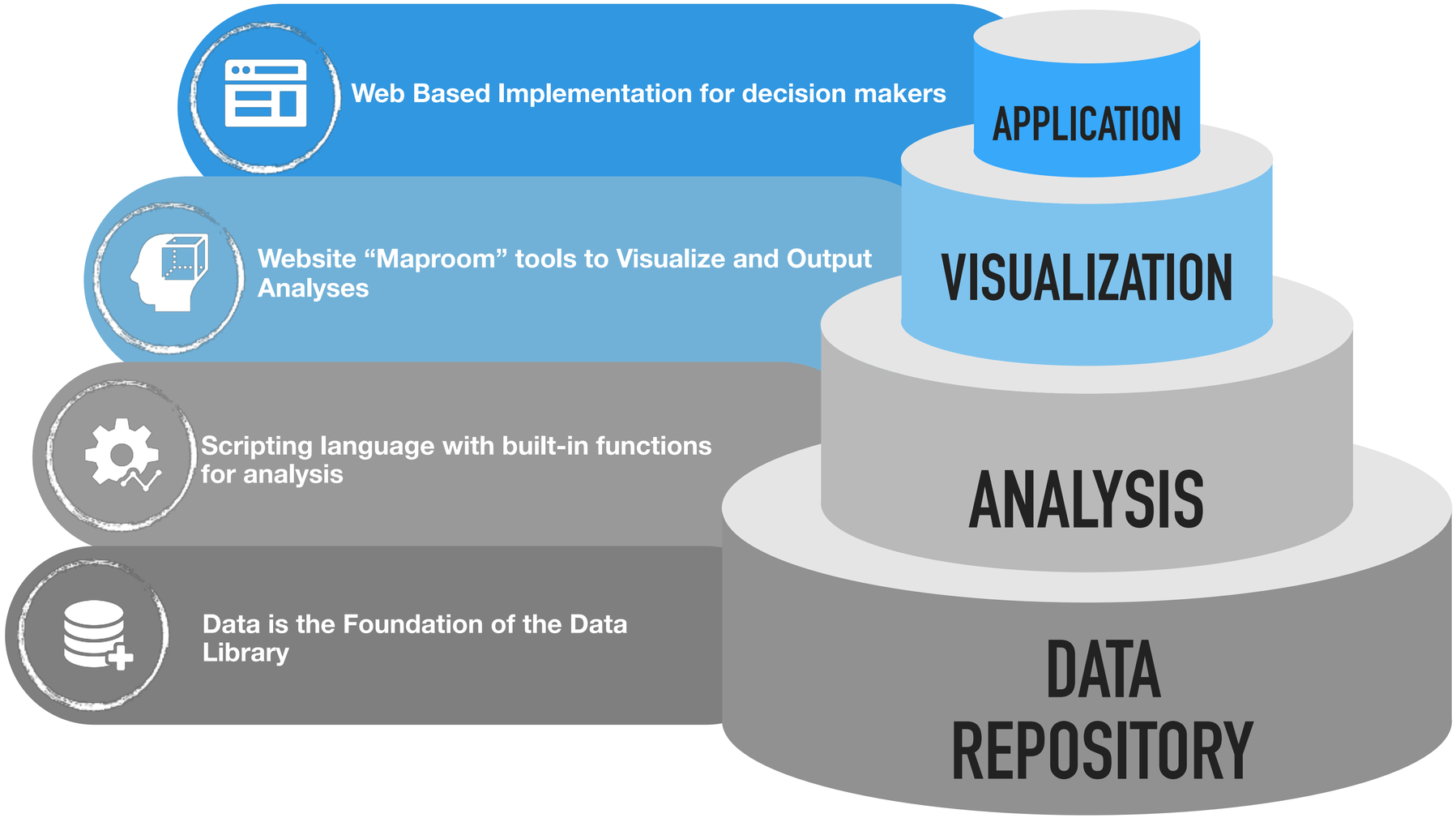
03 Monitor past and present climate/environmental conditions & Forecasts with maps and analyses

04 Create multi-dimensional visual representations of climate and data impacted by climate

05 Customize and download data plots and maps

06 Create lightweight client-side user interfaces (e.g., Maprooms) for use by decision makers.

DATA LIBRARY OVERVIEW



IRI/LDEO Climate Data Library

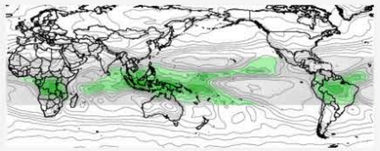
The IRI Data Library is a powerful and freely accessible online data repository and analysis tool that allows a user to view, analyze, and download hundreds of terabytes of climate-related data through a standard web browser.

It is a powerful tool that offers the following capabilities at no cost to the user:

- access any number of datasets;
- create analyses of data ranging from simple averaging to more advanced EOF analyses using the Ingrid Data Analysis Language;
- monitor present climate conditions with maps and analyses in the Maproom;
- create visual representations of data, including animations;
- download data in a variety of commonly-used formats, including GIS-compatible formats.

Latest from our What's New blog

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, this is a good place to see which datasets are particularly useful for monitoring current conditions.

Data by Source

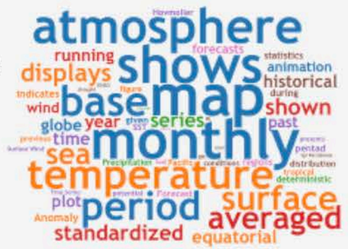
Datasets organized by source, i.e. creator and/or provider.

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

S2S and SubX databases in IRI Data Library

Data Library: ECMWF S2S | Language: english

Description | Expert Mode

served from IRI/LDEO Climate Data Library

SOURCES > ECMWF > S2S

75 TB

ECMWF S2S

ECMWF S2S: WWRP/WCRP Sub-seasonal to Seasonal Prediction Project.

Documents

overview	an outline showing sub-datasets of this dataset
BAMS paper	The Subseasonal to Seasonal (S2S) Prediction Project Database
ECMWF	ECMWF S2S Wiki Page
Model Table	S2S Model Description Table at ECMWF S2S Wiki Page
README	Please see these notes for explanation on accessing and using the S2S Database in the IRI Data Library
S2S Project	WWRP/WCRP S2S Project Page
Wiki	IRI Wiki Page with IRIDL S2S data examples

Datasets and Variables

BOM	BoM POAMA Ensemble.
CMA	Beijing Climate Center (BCC) Climate Prediction System version 1 for S2S.
CNRM	CNRM Ensemble Prediction System.
ECCC	ECCC Ensemble Prediction System.
ECMF	ECMWF Ensemble.
EI	Era Interim Reanalysis.
HMCR	HMCR Ensemble.
ISAC	ISAC-CNR Ensemble.
JMA	JMA Ensemble System.
KMA	KMA Seasonal Prediction System.
NCEP	NCEP CFSv2 Ensemble.
UKMO	UKMO Ensemble Prediction System.

Other Info

license

Acknowledgement: Please add the following Acknowledgement to any publication resulting from the use of the S2S database: "This work is based on S2S data. S2S is a joint initiative of the World Weather Research Programme (WWRP)

Data Library: Models SubX

Description | Expert Mode

SOURCES > Models > SubX

25 TB

Models SubX

Models SubX: Subseasonal Experiment (SubX).

Documents

overview	an outline showing sub-datasets of this dataset
CTB	NOAA Climate Test Bed Website
DataCite DOI Metadata	DOI:10.7916/D8PG249H
SubX Data Information	Model/Data Information from SubX Project Website
SubX Project	SubX Project Website

Datasets and Variables

CESM	Models SubX CESM[**30LCESM1 46LCESM1**]
ECCC	Models SubX ECCC[**GEM**]
EMC	Models SubX EMC[**GEFS**]
ESRL	Models SubX ESRL[**FIMr1p1**]
GMAO	Models SubX GMAO[**GEOS_V2p1**]
NCEP	Models SubX NCEP[**CFSv2**]
NRL	Models SubX NRL[**NESM**]
RSMAS	Models SubX RSMAS[**CCSM4**]

Other Info

id

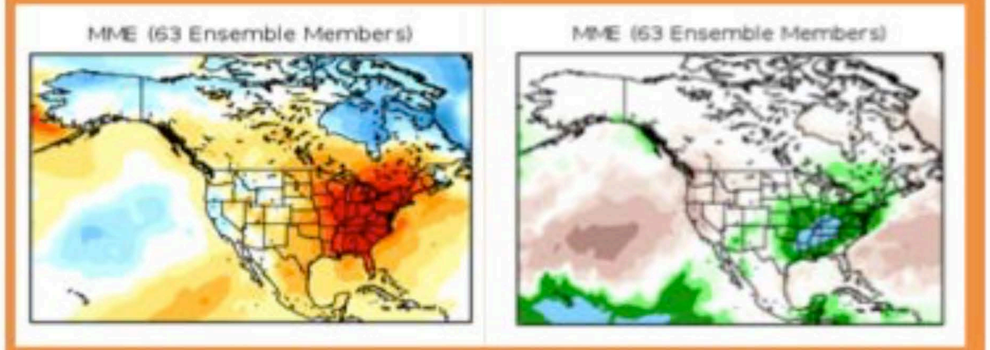
https://doi.org/10.7916/D8PG249H

The Subseasonal eXperiment (SubX)

By the Numbers...

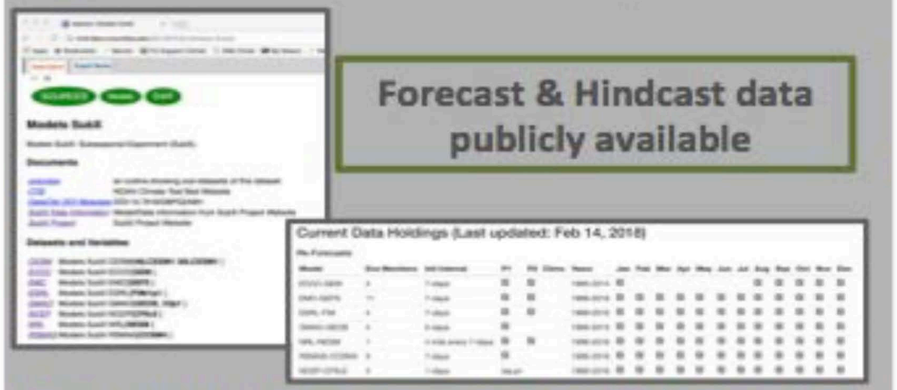
7 Global Models
17 Years of Retrospective Forecasts
1 Year of Real-time Forecasts
3-4 Week guidance for CPC Outlooks

Real-time Multi-model Forecasts



SubX Team

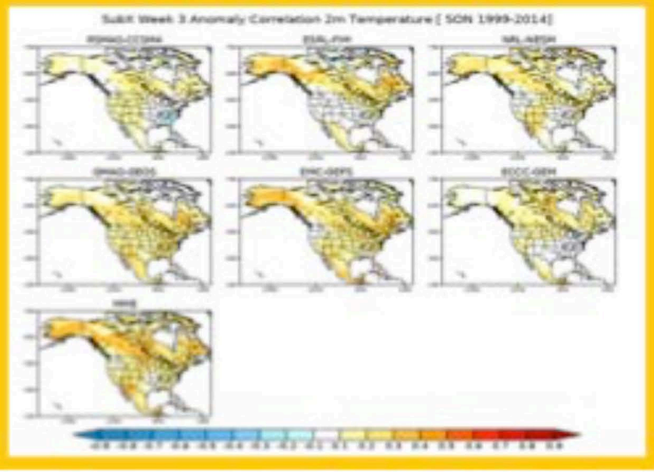
IRI Data Library



Forecast & Hindcast data publicly available

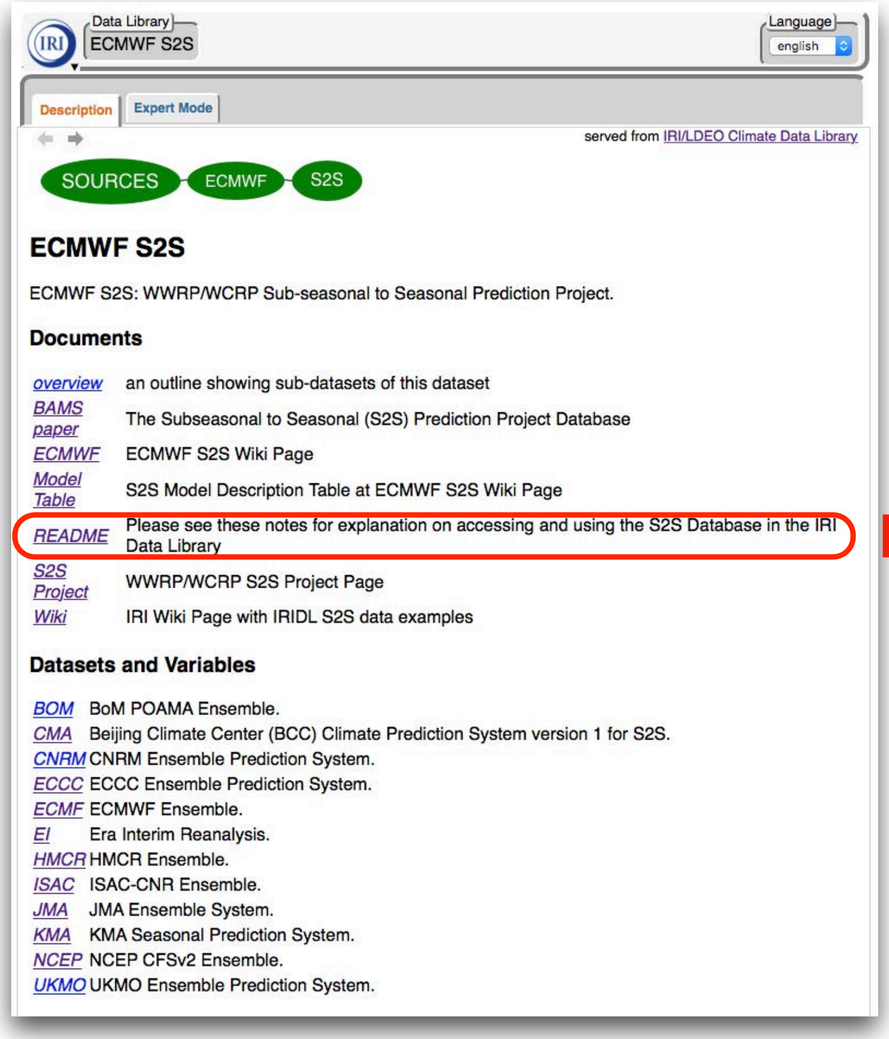
http://iridl.ldeo.columbia.edu/SOURCES/.Models/.SubX/

Skill Evaluation



http://cola.gmu.edu/kpegion/subx

Courtesy of Kathy Pegion



README

README on using the S2S Database in IRI Data Library (Updated Feb 22, 2018)

1. The data is archived under http://iridl.ldeo.columbia.edu/SOURCES/.ECMWF/.S2S/
2. The data is a copy of the data from the ECMWF S2S MARS server and is maintained up to date with the ECMWF server as far as possible.
3. The full S2S dataset should be available, except for the HMCR, ISAC & KMA models which are archived on a 2.5-deg grid, instead of 1.5 deg. The IRI data starts in May 2015.
4. The RMM indices computed by Frederic Vitart are also available. Steve Woolnough & Tetsuo Nakazawa contributed on the validation and format definition.
5. In order to download S2S data from IRI, the user is required to agree to the ECMWF S2S Terms and Conditions, via signing in to the Data Library's authorization framework: Select the "Social" option near the top of the page and then choose from one of the "Persona" sign-in account options in the drop-down menu that appears, such as Google, Facebook, or Twitter to then gain access to the download options.
6. Visualization of the data does not require sign-in.
7. The forecast/reforecast **start time grid** is continuous in days, even when the respective starts are not every day. Non-existent start dates are padded with missing data. Please refer to the model table. https://software.ecmwf.int/wiki/display/S2S/Models
8. For on-the-fly models, the reforecasts have an additional **hdate** grid indicating the reforecast year.
9. Explanation of **Lead grids**:

   Different lead grids are used based upon whether the variable reflects an instantaneous value or the average over a day:

   L: This represents a lead grid for variables with instantaneous values, with the lead grid starting at the initialization (0.), and pointwidth of 0. (except for JMA, where the first step is 0.5, representing a 12-hour forecast, and pointwidth of 0.)

   L1: This represents a lead grid for variables with instantaneous values, with the lead grid starting at lead 1., and pointwidth of 0.

   LA: This represents a lead grid for daily average values starting at lead 0.5, and pointwidth of 1. (except for JMA, where the first step is 1.0, representing 12-36 hour average, and pointwidth of 1.)

Data Library
ECMWF S2S ECMF

Description | Expert Mode

SOURCES > ECMWF > S2S > ECMF

ECMWF S2S ECMF

ECMWF S2S ECMF: ECMWF Ensemble.

Documents

overview an outline showing sub-datasets of this dataset

Datasets and Variables

forecast ECMWF S2S ECMF f
reforecast ECMWF S2S ECMF r

Data Library
ECMWF S2S ECMF forecast perturbed sfc_precip tp
X: 0.75W - 0.75W
Y: 90.75S - 90.75N
S: 14 May 2015 - 10 Mar 2019

Description | Views | Data Filters | Data Selection | Data Files | Data Tables | Expert Mode

SOURCES > ECMWF > S2S > ECMF > forecast > perturbed > sfc_precip > tp

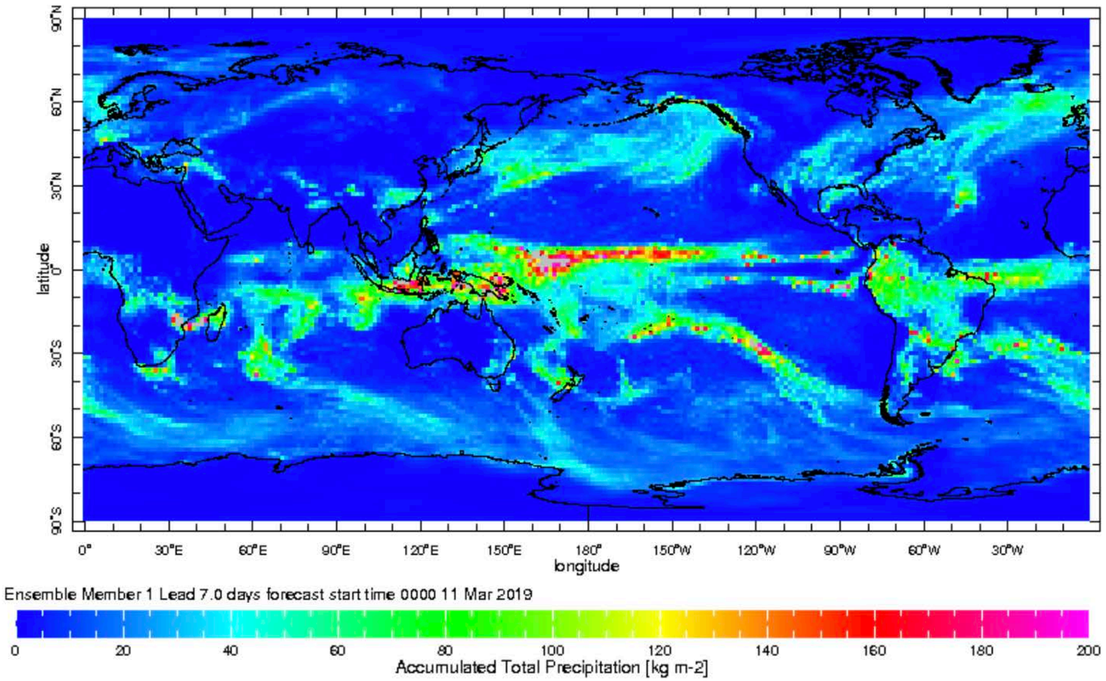
ECMWF S2S ECMF forecast perturbed sfc_precip tp: Accumulated Total Precipitation data

forecast perturbed sfc_precip Accumulated Total Precipitation from ECMWF S2S ECMF: ECMWF Ensemble.

Independent Variables (Grids)

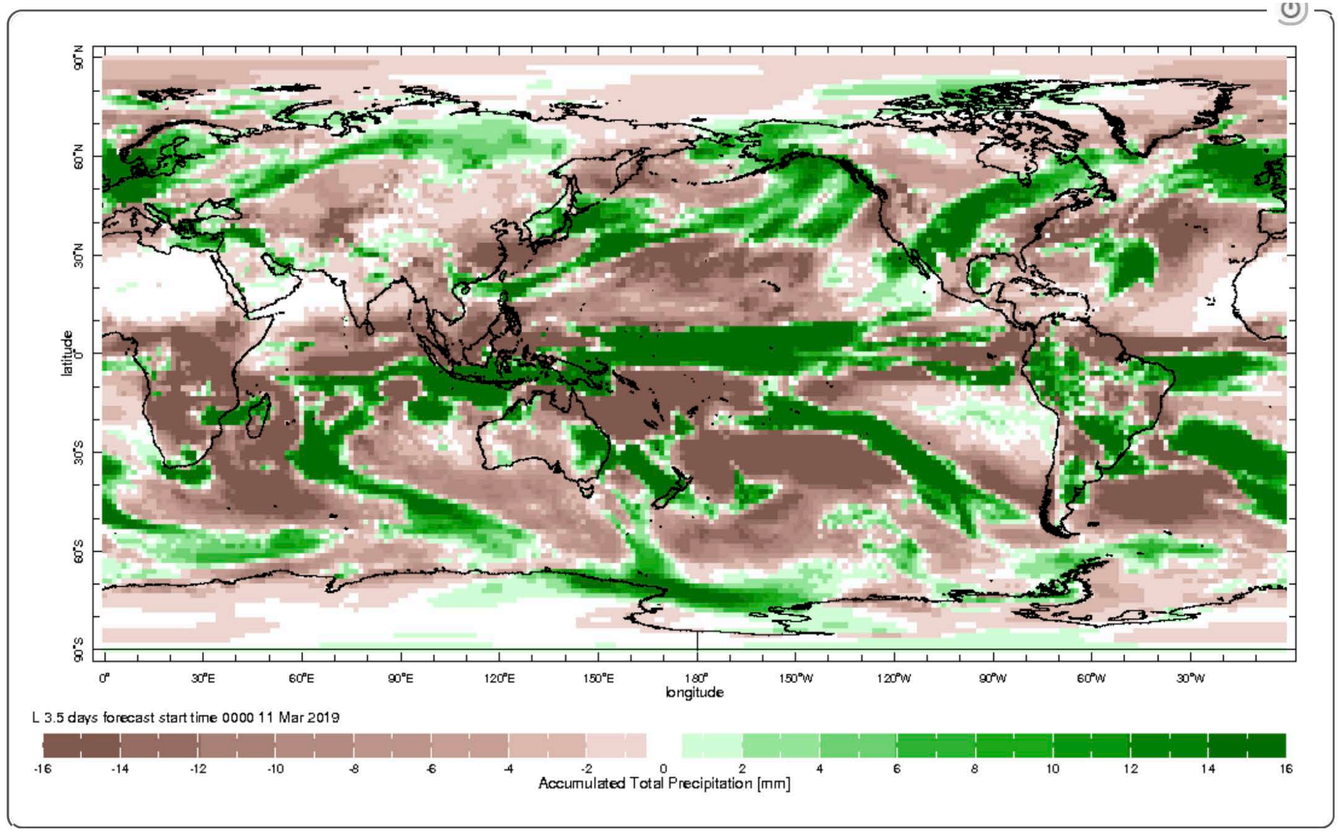
Lead (forecast_period)
grid: /L (days) ordered (0.0 days) to (46.0 days) by 1.0 N= 47 pts :grid
Ensemble Member (realization)
grid: /M (ids) ordered (1) to (50) by 1.0 N= 50 pts :grid
forecast start time (forecast_reference_time)
grid: /S (days since 1960-01-01) ordered [(0000 14 May 2015) (0000 18 May 2015) (0000 21 May 2015) ... (0000 11 Mar 2019)] N= 400 pts :grid
longitude (longitude)

Ensemble Member: 1 [1 | 50]
Lead: 0.0 [7.0] 46.0
forecast start time: 0000 14 May 2015 [0000 11 Mar 2019] 0000 11 Mar 2019



Week 1 Precip
From 11 Mar 2019

Week 1 Precip Ensemble Mean Anomaly from 11 Mar 2019



Map is a URL!

http://iridl.ldeo.columbia.edu/SOURCES/.ECMWF/.S2S/.ECMF/.forecast/.perturbed/.sfc_precip/.tp/S/%280000%2011%20Mar%202019%29/VALUES/%5BM%5Daverage/L/0.0/7.0/VALUES/%5BL%5Ddifferences/SOURCES/.ECMWF/.S2S/.ECMF/.reforecast/.perturbed/.sfc_precip/.tp/S/%280000%2011%20Mar%202019%29/VALUES/%5BM%5Daverage/L/0.0/7.0/VALUES/%5BL%5Ddifferences/%5Bhdate%5Daverage/sub/c://name//water_density/def/998/%28kg/m3%29/:c/div/%28mm%29/unitconvert/prcp_anomaly/Y/-90/90/RANGE/X/Y/fig:/colors/thinnish/solid/coasts_gaz/:fig//plotborder+72+psdef//plotaxislength+432+psdef/#expert

Ingrid Code

```
SOURCES .ECMWF .S2S .ECMF .forecast .
perturbed .sfc_precip .tp
  S (0000 11 Mar 2019) VALUES
  [M]average
  L 0.0 7.0 VALUES
  [L]differences

SOURCES .ECMWF .S2S .ECMF .reforecast
.perturbed .sfc_precip .tp
   S (0000 11 Mar 2019) VALUES
   [M]average
   L 0.0 7.0 VALUES
   [L]differences
   [hdate]average
   sub
  c:
   /name /water_density def
   998 (kg/m3) :c
   div
  (mm) unitconvert
  prcp_anomaly
  Y -90 90 RANGE
  X Y fig: colors thinnish solid
coasts_gaz :fig
```

load

start

ensem

leads

accum

load

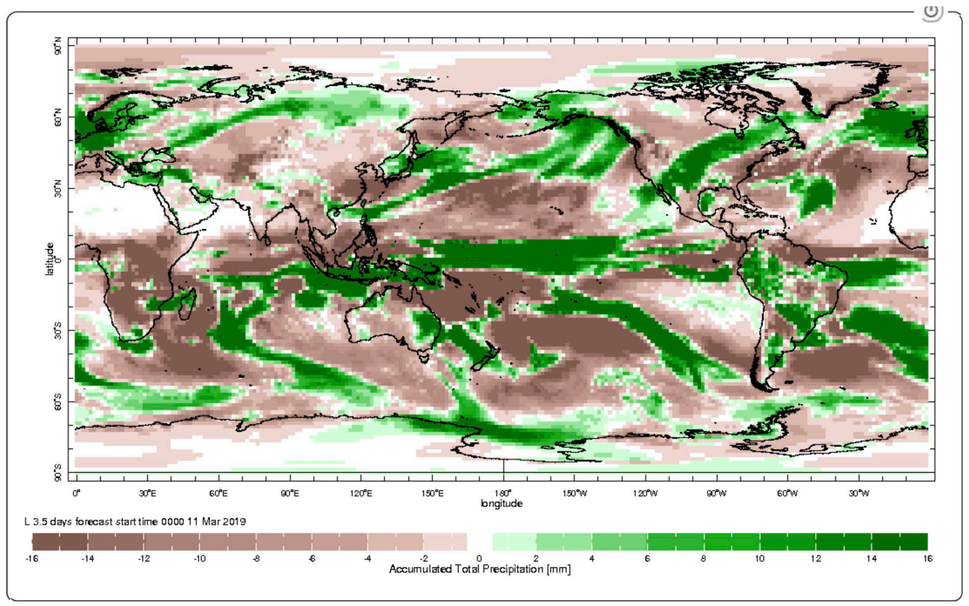
start

ensem

leads

climo

cbar



Data Download

Description | Views | Data Filters | Data Selection | Data Files | Data Tables | Expert Mode

[mean (ECMWF S2S ECMF forecast perturbed sfc_precip tp) - mean mean (ECMWF S2S ECMF reforecast perturbed sfc_precip tp)] / water_density 3.5 days 0000 11 Mar 2019 Data Files

This dataset has bytes (116160 0.1107788MB) of data in it, which should give you a rough idea of the size of any file that you ask for.

Download Data To Specific Software

ingrid	The Postscript-based software on which the Data Library is built.
CPT	Climate Predictability Tool More information
ferret	Interactive computer visualization and analysis software. More information
GrADS	Grid Analysis and Display System More information
matlab	Data analysis and visualization software. More information
NCL	NCAR Command Language More information
WinDisp	A public domain software package for the display and analysis of satellite images, maps and associated databases, with an emphasis on early wa for food security. More information

Other Available File Formats

Full Information Formats These files contain all of the available metadata.	
OPeNDAP	A system which downloads data directly to software, such as matlab, Ferret, GrADS, etc. Specific instructions are available in the above. Note: OPeNDAP was formerly known as DODS (Distributed Oceanographic Data System). More Information
netCDF (network Common Data Form)	A commonly supported self-describing data format. More Information

Authentication

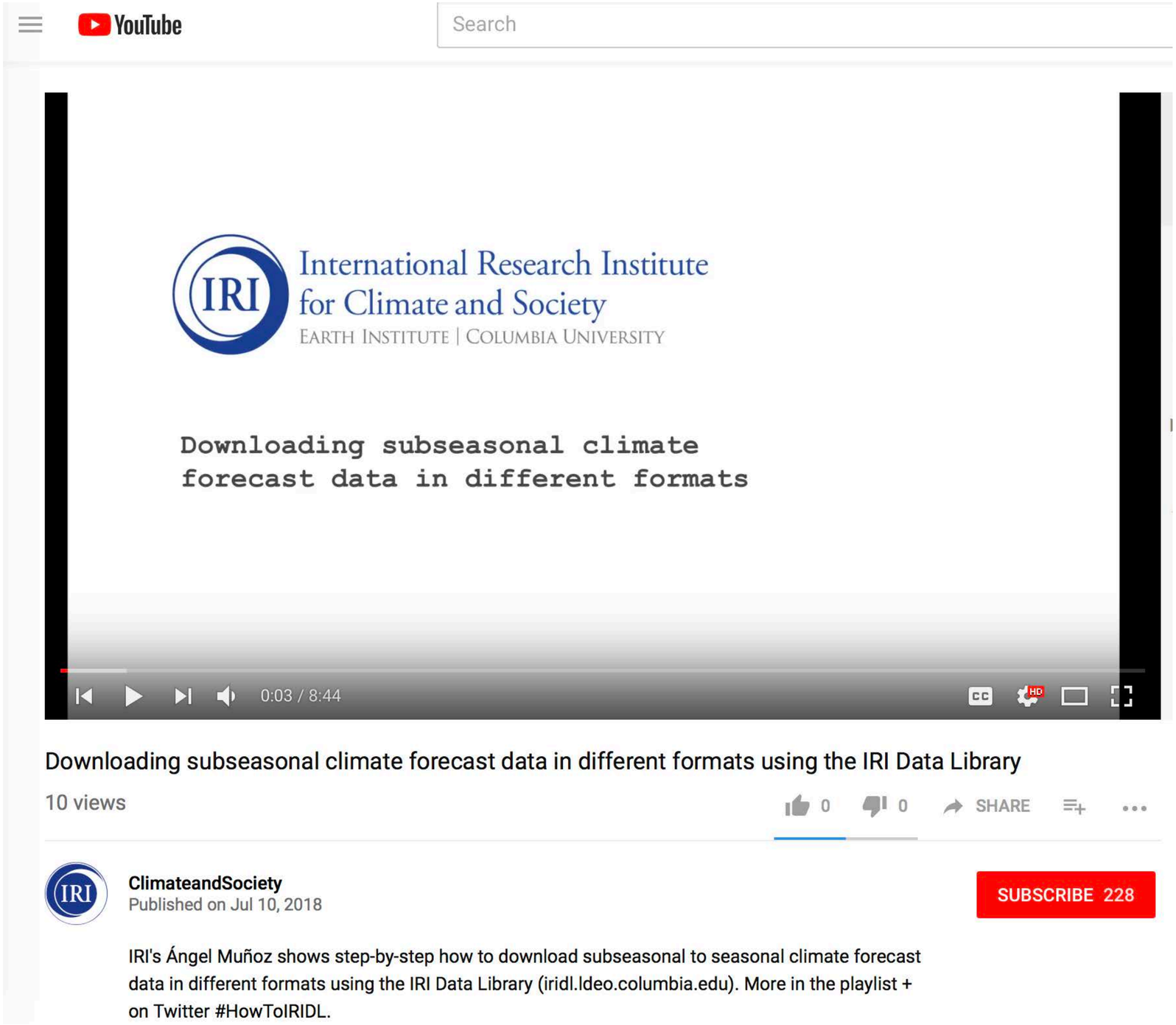
Local | OpenID | Social

Social sign in

Google

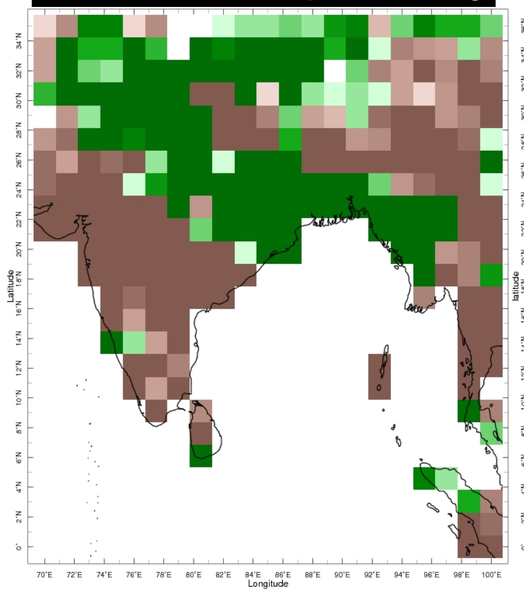
Sign in | Cancel

Tutorial Videos

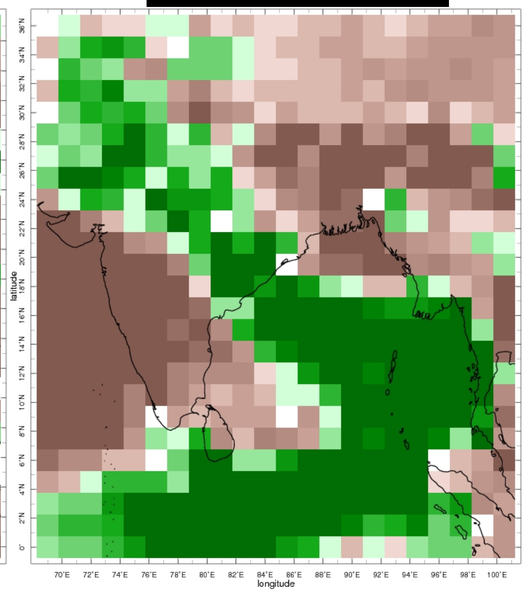


Example: Active episode of Indian summer Monsoon

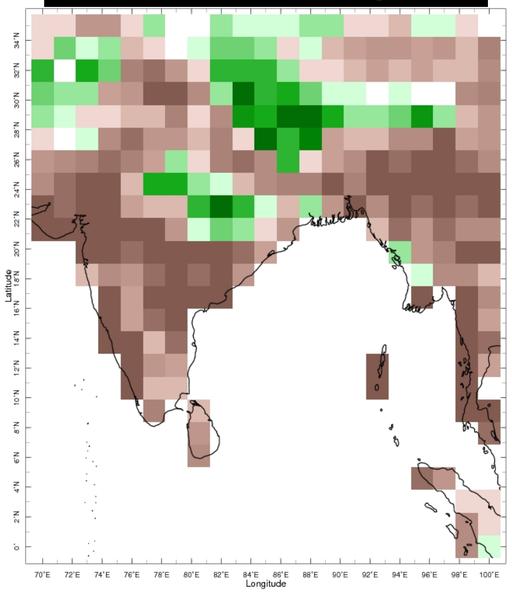
Observed Precip Anomaly



Week 3 Forecast



MJO Phase 8 Composite



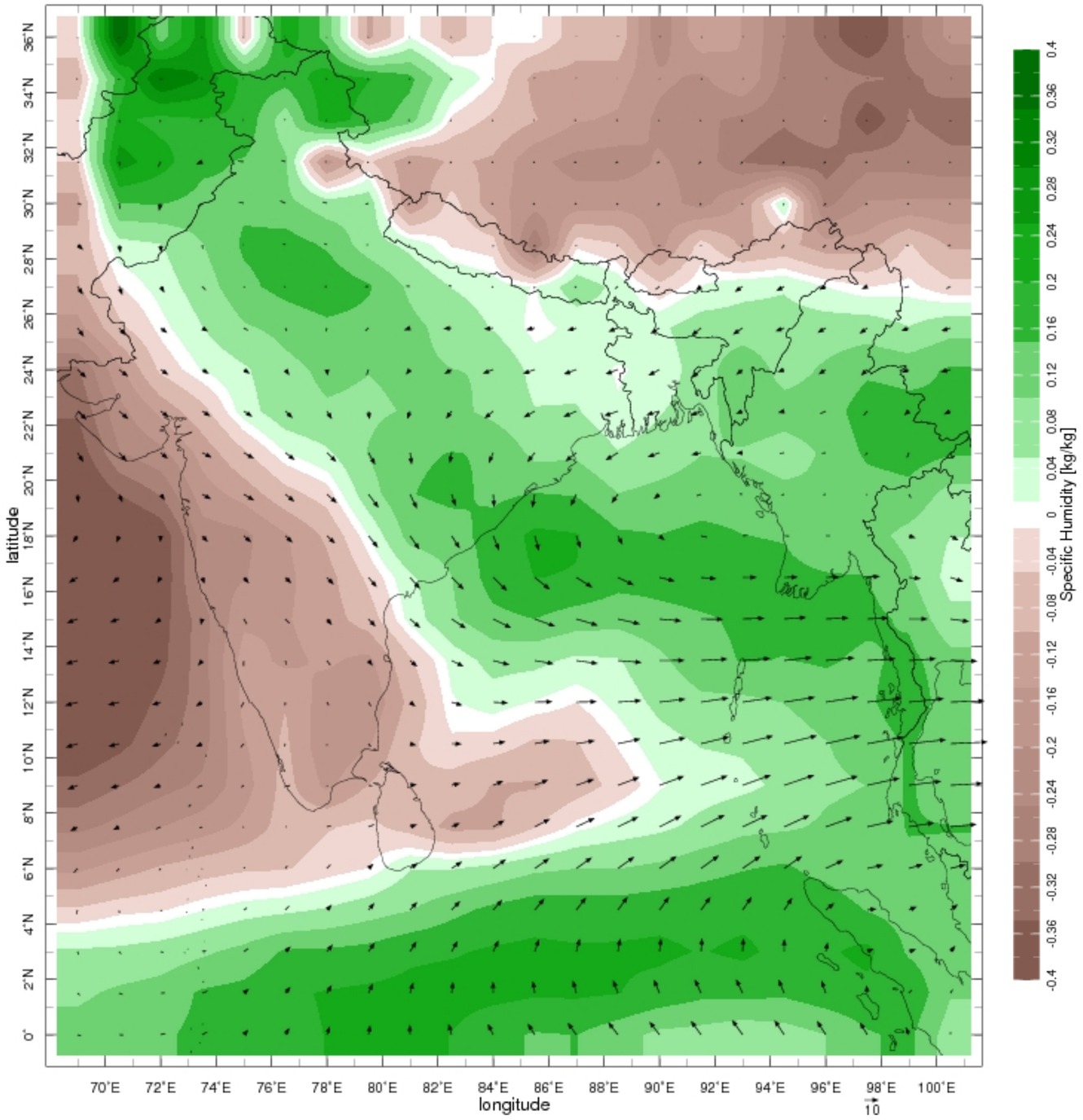

```
SOURCES .ECMWF .S2S .ECMF .forecast .perturbed .sfc_precip .tp
 Y (0N) (35N) RANGE
 X (70E) (100E) RANGE
 S (0000 22 Jun 2015) VALUES
 [M]average
 L (14.0) (21.0) VALUES
 [L]differences

SOURCES .ECMWF .S2S .ECMF .reforecast .perturbed .sfc_precip .tp
  Y (0N) (35N) RANGE
  X (70E) (100E) RANGE
  S (0000 22 Jun 2015) VALUES
  [M]average
  L (14.0) (21.0) VALUES
  [L]differences
  [hdate]average
  sub
```

Week 3 Forecast Code

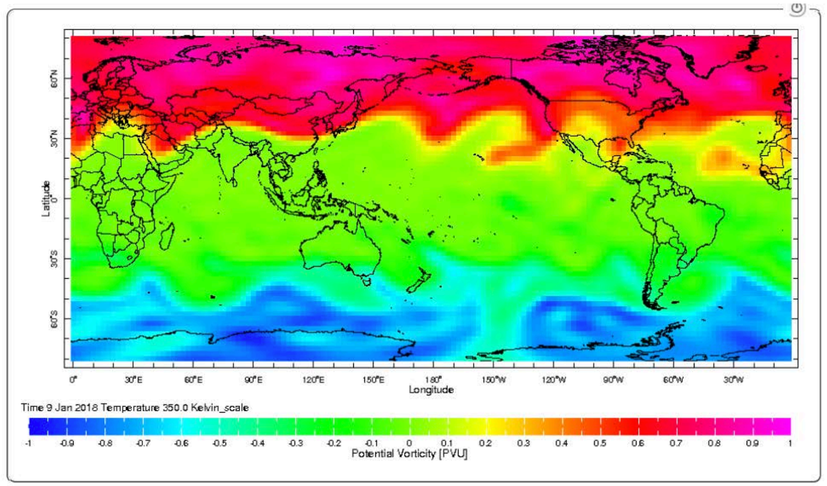
MJO Phase 8 Composite Code

```
SOURCES .UCSB .CHIRPS .v2p0 .daily-
improved .global .0p25 .prcp
  T (1 Jan 1995) (31 Dec 2014) RANGE
  X 70 1.5 100 GRID
  Y 0 1.5 35 GRID
  a: SOURCES .BoM .MJO .RMM .phase
     T (1 Jan 1995) (31 Dec 2014) RANGE
     classifyby
    T (Jun-Jul) seasonalAverage
    [T]average
    :a:
     T (Jun-Jul) seasonalAverage
     [T]average
     :a
   sub
```



ECMWF week-3 forecast anomalies of vertically integrated moisture flux (vectors) and vertically integrated specific humidity (colors)

Isentropic Potential Vorticity From Reanalysis data



SOURCES NOAA NCEP-NCAR CDAS-1 DAILY Intrinsic PressureLevel v T (9 Jan 2018) VALUES [X] partial div 110000.0 div sub add mul -1 mul add

Y cosd [Y] partial 110000.0 div [X Y] 1.0 0.0 regridAverage sind

u T (9 Jan 2018) VALUES

temp T (9 Jan 2018) VALUES mul [P] partial 100.0 div

P ln eexp ln eexp mul [X] partial div 110000.0 div [X Y] 1.0 0.0 regridAverage mul sub

[P] partial 100.0 div

ln eexp mul [Y] partial 110000.0 div mul

[P] partial 100.0 div

1000000.0 mul

Y -80 80 RANGE

Y -80 80 RANGE mul

ln eexp

P 350 320 310 toS

Semantic language description

http://wiki.iri.columbia.edu/index.php?n=Climate.S2S-IRIDL

Latin America
Project Integration
Ceara Resource Page
Colombia DNP
Chile-Coquimbo
Paute Basin, Ecuador

Climate Pages
ACToday Countries
Bangladesh
Vietnam

Past S2S Trainings
ICTP S2S
Teleconnections
Workshop 2017
S2S SE Asia
SCIPEA East Africa
ICTP/WCRP School
S2S Exercise
Central Africa S2S

Other Country Climate Pages
India
Indonesia
Iran
Ethiopia
Kenya
West Africa
SE South America
Indonesia NTT
Philippines
Brazil

Global
Floods work
Downscaling Methods
DMIP

Resources for using the WWRP/WCRP S2S Project Database from IRI Data Library

A a large subset of the WWRP/WCRP S2S Project Database available online in the IRI/LDEO Climate Data Library: http://iridl.ldeo.columbia.edu/SOURCES/.ECMWF/.S2S/ We hope this will provide a valuable addition to the two official archiving centers at ECMWF & CMA, and we plan in future to make various derived products available there too.

In addition to the S2S project data, the SubX project data are archived in IRIDL here: http://iridl.ldeo.columbia.edu/SOURCES/.Models/.SubX/

Please see the README file at the top of the page for notes on accessing & manipulating the data. We are still ironing out some of the kinks, so please let us know if you encounter any problems. Most of the data should be there, though there may be delays in updating the data.

Data holdings status: (21 Dec 2018) 72TB Detailed breakdown
Data access stats: Oct 2018

This page contains Ingrid scripts as additional resources for accessing and manipulating the data.

Script access from unix command line, Matlab, R and Python

An access key is required in order to download S2S data from the command line. To obtain one, please:

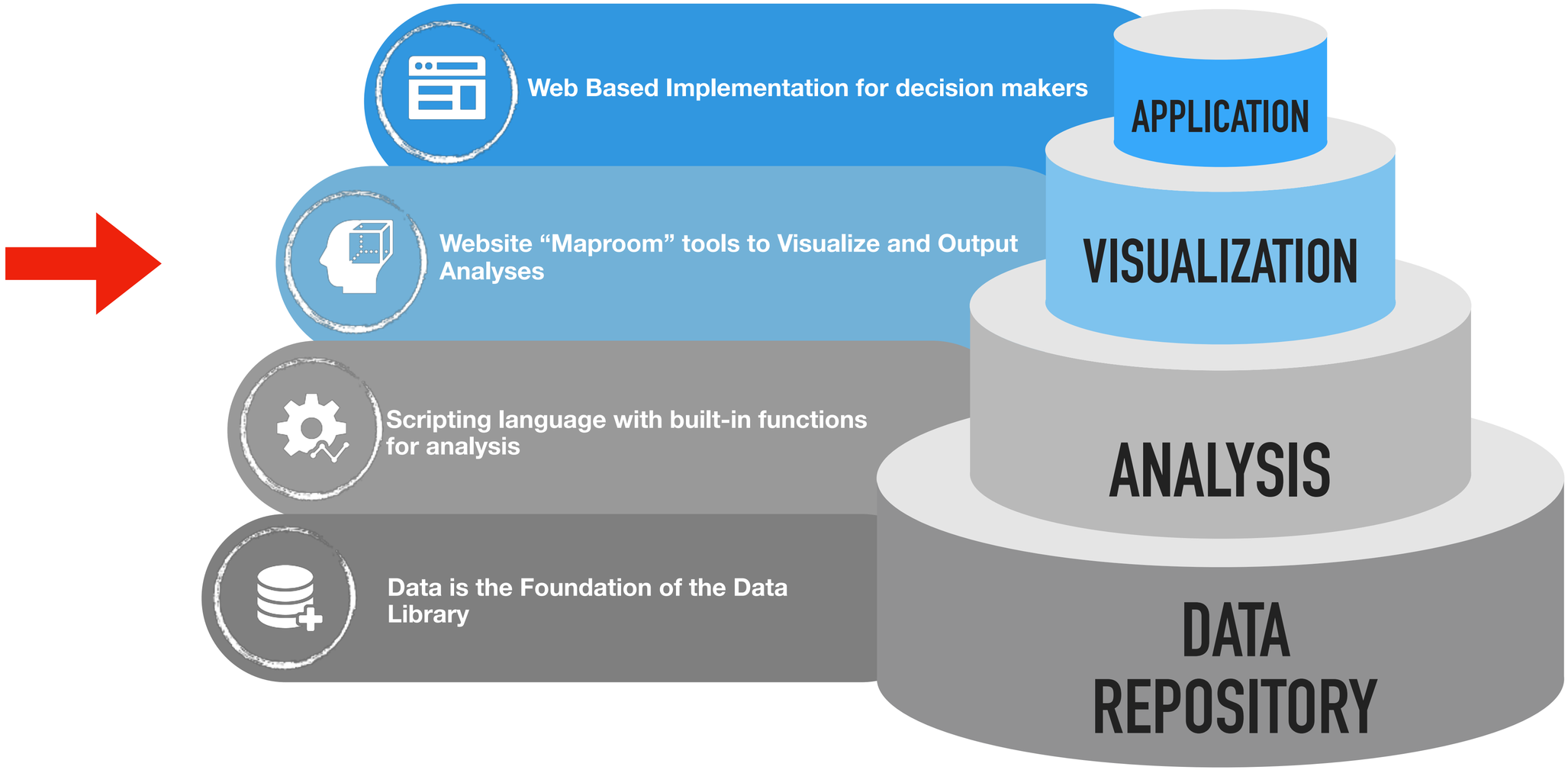
1. Firstly sign the S2S terms and conditions by downloading any test data via the "Data Files" tab on the data library page, e.g. dataURL.
2. Secondly, send an email to help@iri.columbia.edu, stating that you are requesting an access key for S2S data, and including the email address that you used to sign the terms and conditions. You will be sent an access key.

Follow this example using `curl` to download the data:

```
curl -k -b '__dlauth_id=xxxyyyyzzz' 'dataURL' > file.nc
```

where xxxyyyyzzz is your key, and file.nc is your preferred name of the output NETCDF file.

DATA LIBRARY OVERVIEW

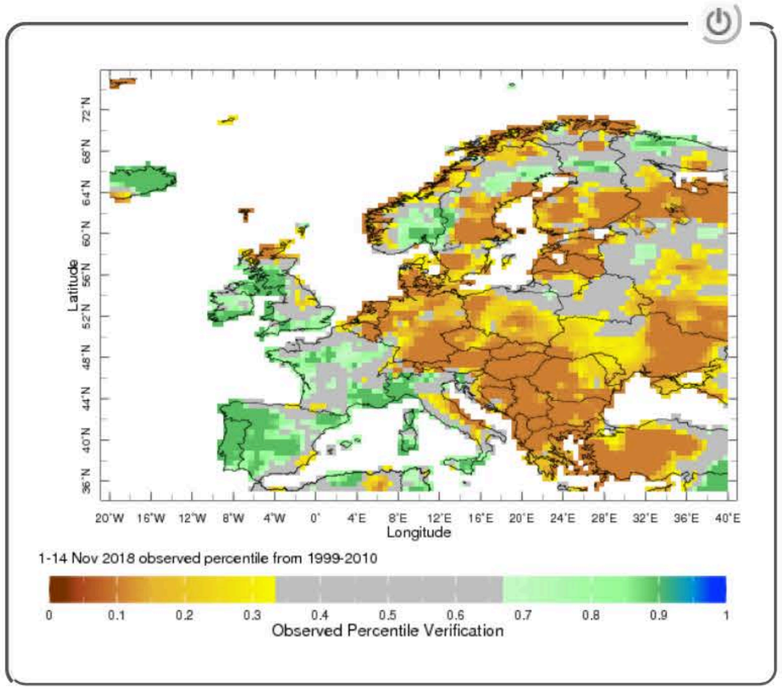


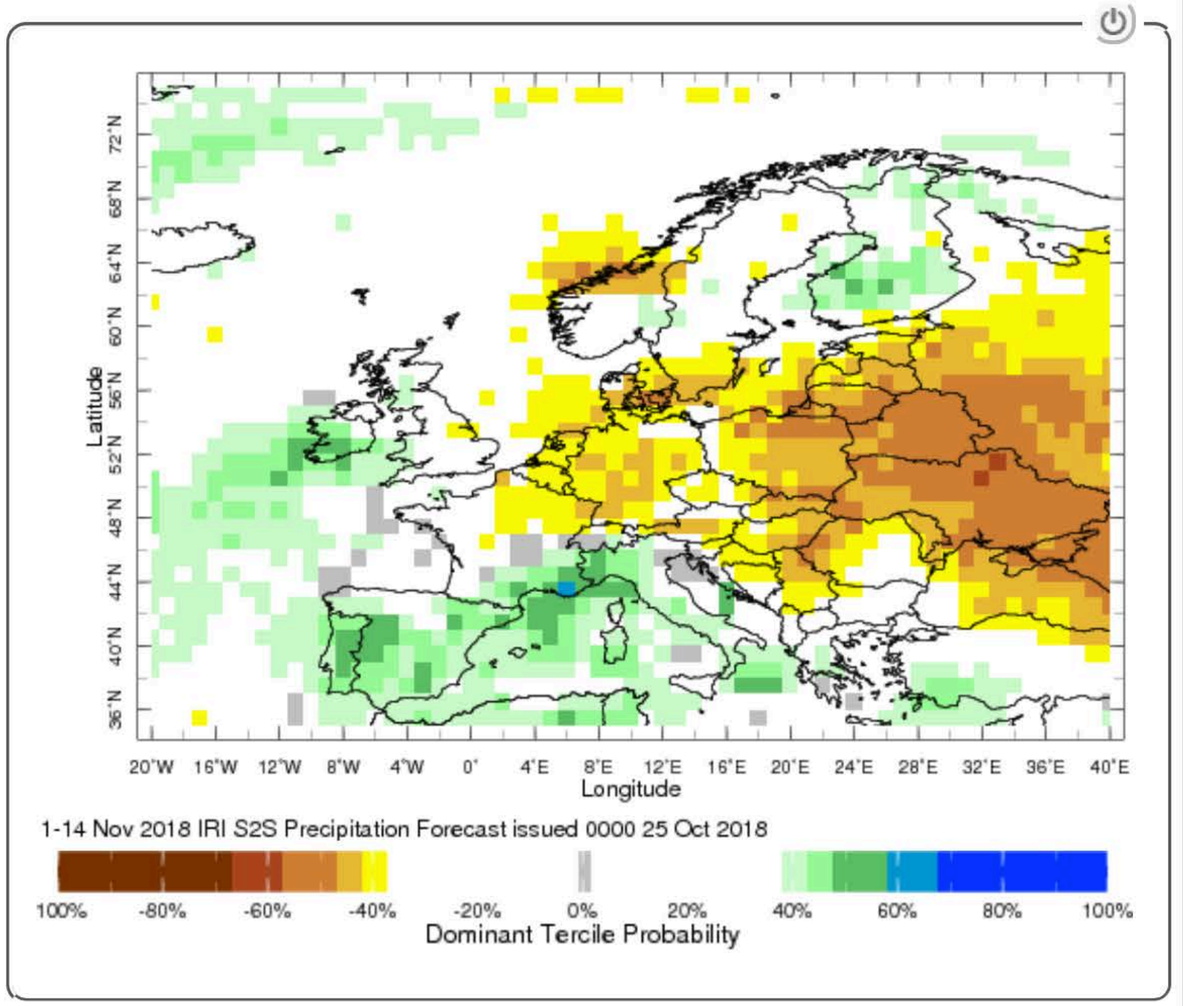
S2S Forecast Maprooms

Climate: Subseasonal Forecasts | S2S Lagged Forecasts: Precipitation Probability Forecast | Region: Europe | Forecast Issued: 0000 25 Oct 2018 | Target Period: 1-14 Nov 2018

Description | Dataset Documentation | Instructions | Contact Us

Precipitation Probability Forecast



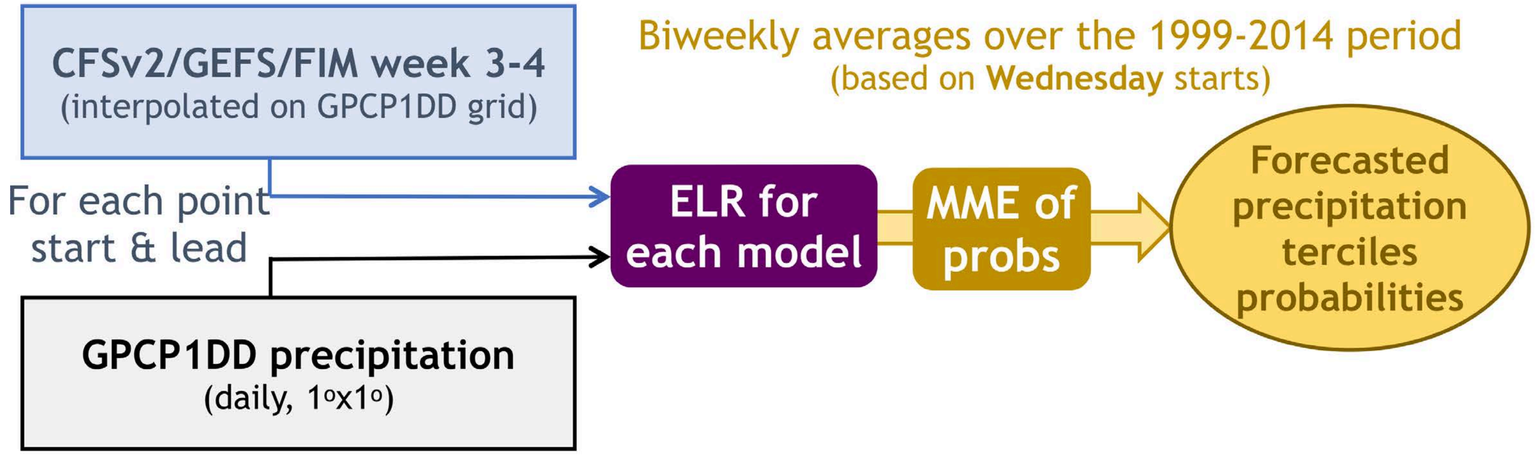


Calibrated Subseasonal Tercile categories precipitation forecasts lagged behind real time from the S2S database.

The default map shows the latest forecast for weeks 2-3 ahead (i.e. the 14-day Thursday-Wednesday target period, 8 to 21 days after the forecast is issued), as probability of the dominant tercile category. Previous forecasts can be viewed through the control bar menu. The weeks 3-4 forecast (i.e. the 14-day target period, 15 to 28 days after the forecast is issued) is also available. The smaller side map shows a verification of the forecast in current view as the observed tercile values according to the 1999-2010 training period of the calibration of the forecast. New forecasts are issued weekly on Thursdays but are released on a monthly basis. Please note that these forecasts are “lagged”, i.e. they are not available in real time.

Forecast MME Design

Vigaud et al. (2017, MWR)

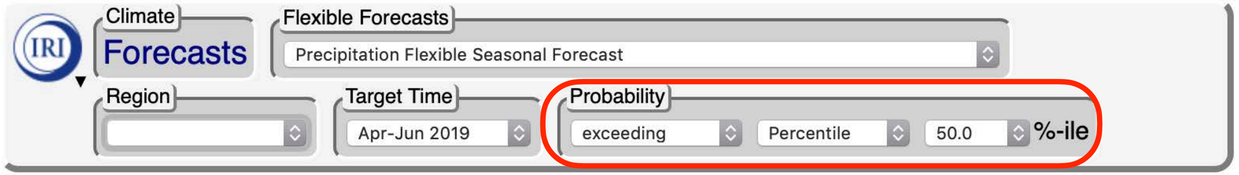


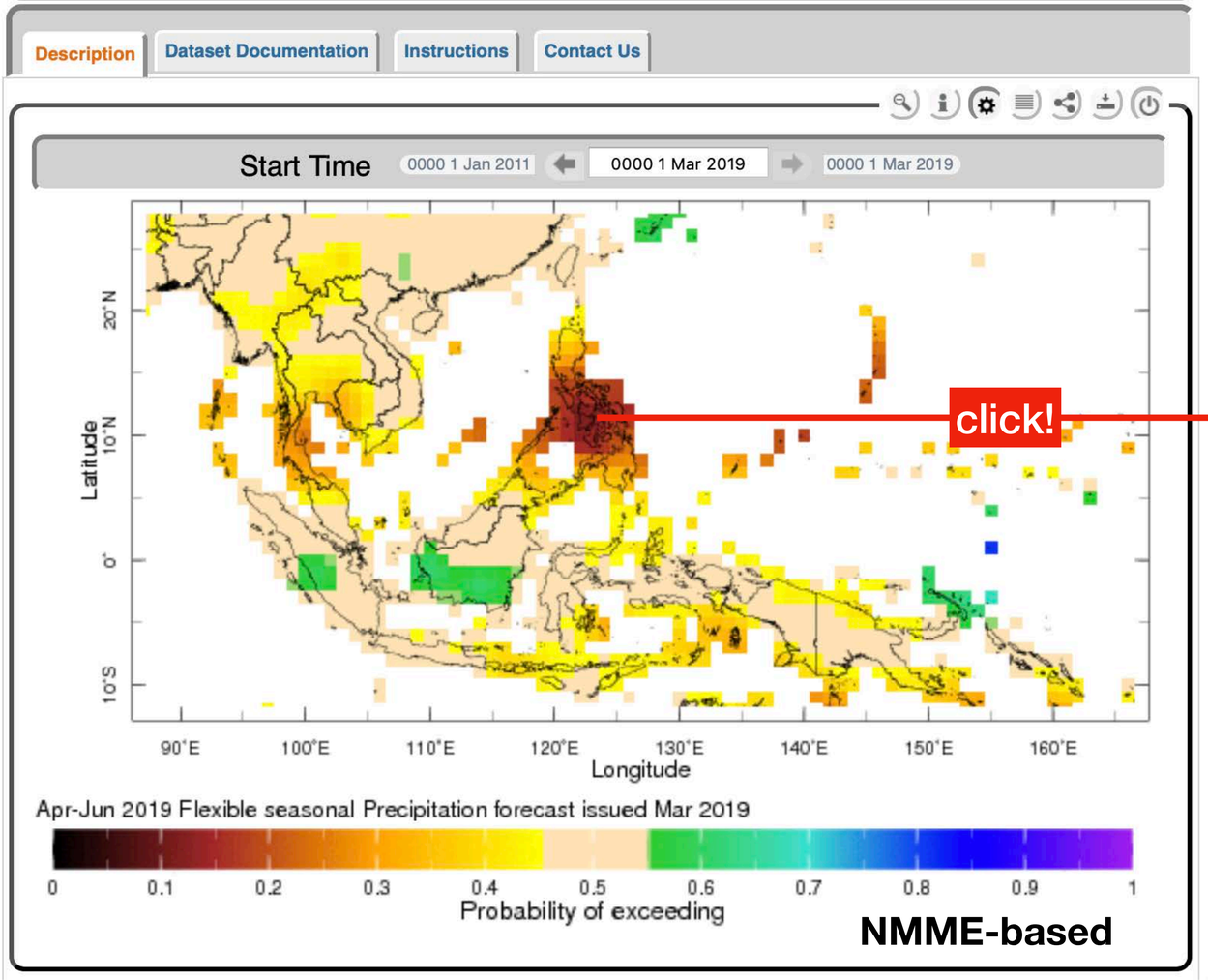
Extended Logistic Regression

$$\ln\left[\frac{p}{1-p}\right] = f(x) + g(q) \quad \text{with} \quad p = Pr\{V \leq q\}$$

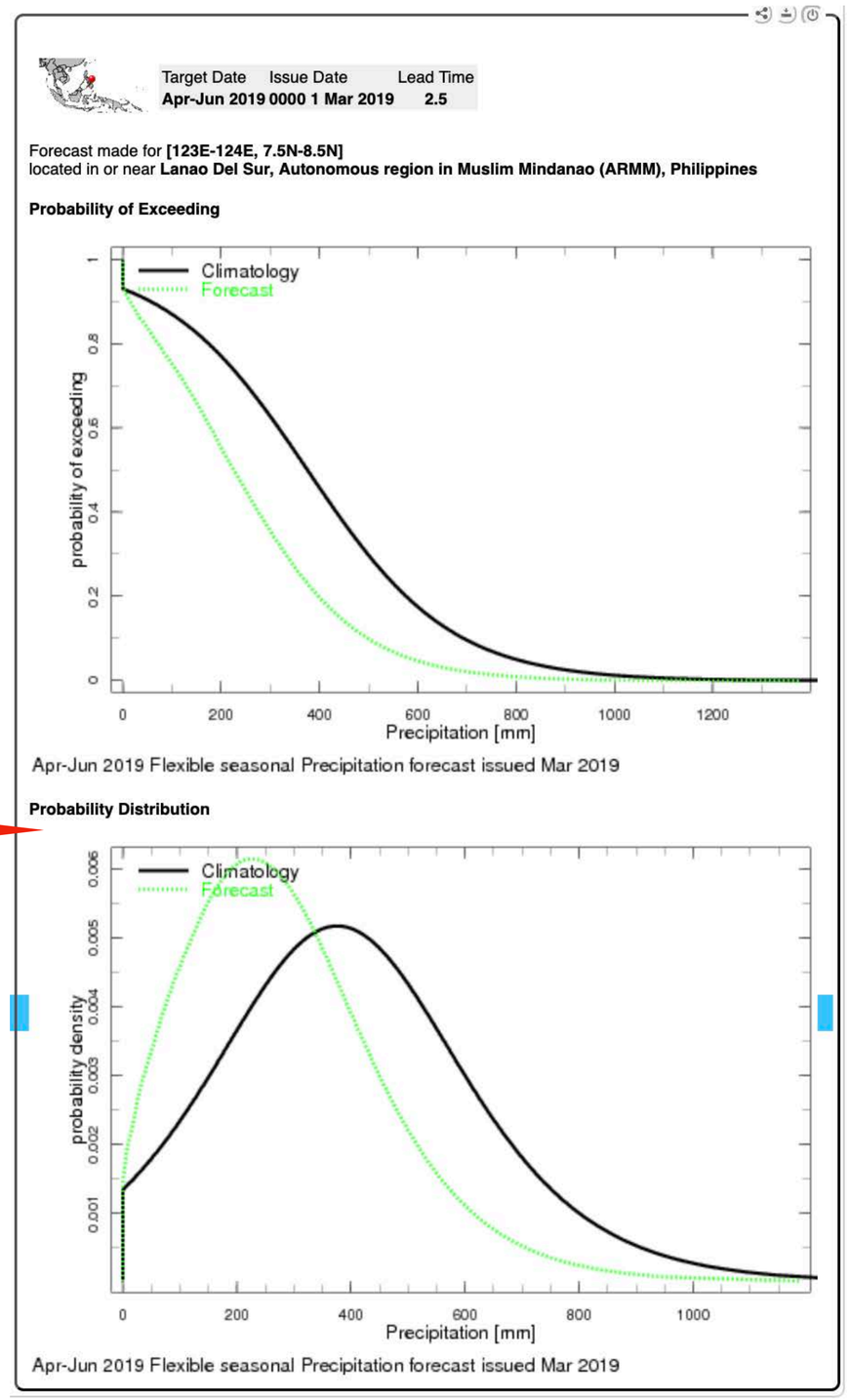
$$\text{and} \begin{cases} f(x) = b_0 + b_1 \overline{x}_{ens} \\ g(q) = b_2 q \end{cases}$$

Flexible Format Seasonal Forecast Maprooms





click!



Seasonal Forecast Datasets

Data Library: Models NMME | Language: english

Description | Expert Mode

served from IRI/LDEO Climate Data Library

SOURCES > Models > NMME

Models NMME

Models NMME: North American Multi-Model Ensemble (NMME).

Documents

overview	an outline showing sub-datasets of this dataset
CTB home	Climate Test Bed NMME Page
NMME Description	North American Multi-Model Ensemble: Improving NOAA's Seasonal Prediction Capability
NMME Home	Information about the NMME project from CPC

Semantic Documents

auxinfo.owl

Datasets and Variables

Cansips	Models NMME Cansips[**FORECAST**]
CMC1-CanCM3	Models NMME CMC1-CanCM3[**FORECAST HINDCAST**]
CMC2-CanCM4	Models NMME CMC2-CanCM4[**FORECAST HINDCAST**]
COLA-RSMAS-CCSM3	Models NMME COLA-RSMAS-CCSM3[**MONTHLY mc8210 sc8210**]
COLA-RSMAS-CCSM4	Models NMME COLA-RSMAS-CCSM4[**MONTHLY mc8210 sc8210**]
CPC-CMAP	Models NMME CPC-CMAP[**prate**]
CPC-CMAP-URD	Models NMME CPC-CMAP-URD[**prate**]
CPC-PRECIP	Models NMME CPC-PRECIP[**prate**]
GFDL-CM2p1	Models NMME GFDL-CM2p1[**MONTHLY**]
GFDL-CM2p1-aer04	Models NMME GFDL-CM2p1-aer04[**MONTHLY mc8210 sc8210**]
GFDL-CM2p5-FLOR-A06	Models NMME GFDL-CM2p5-FLOR-A06[**mc8110 MONTHLY sc8110**]
GFDL-CM2p5-FLOR-B01	Models NMME GFDL-CM2p5-FLOR-B01[**mc8110 MONTHLY sc8110**]
GHCN_CAMS	Models NMME GHCN_CAMS[**temp updated**]
IRI-ECHAM4p5-AnomalyCoupled	Models NMME IRI-ECHAM4p5-AnomalyCoupled[**MONTHLY**]
IRI-ECHAM4p5-DirectCoupled	Models NMME IRI-ECHAM4p5-DirectCoupled[**MONTHLY**]
LSMASK	Models NMME LSMASK[**land**]
NASA-GEOSS2S	Models NMME NASA-GEOSS2S[**FORECAST HINDCAST**]
NASA-GMAO	Models NMME NASA-GMAO[**MONTHLY**]
NASA-GMAO-062012	Models NMME NASA-GMAO-062012[**mc8110 MONTHLY sc8110**]
NCAR-CESM1	Models NMME NCAR-CESM1[**FORECAST HINDCAST**]
NCDC-OISST	Models NMME NCDC-OISST[**sst**]
NCEP-CFSv1	Models NMME NCEP-CFSv1[**MONTHLY**]
NCEP-CFSv2	Models NMME NCEP-CFSv2[**FORECAST HINDCAST**]
Olv2_SST	Models NMME Olv2_SST[**sst**]

Other Info

ACKNOWLEDGEMENTS

In order to document NMME-Phase II data impact and enable continuing support, users of NMME data are expected to acknowledge NMME data and the participating modeling groups. The NMME model output should be referred to as "the NMME System Phase II data [https://www.earthsystemgrid.org/search.html?Project=NMME]." In publications, users should include a table (referred to below as Table XX) listing the models and institutions that provided model output used in the NMME-Phase II system, as well as the digital object identifier of publications documenting the models, where "Table XX" in the paper should list the models and modeling groups that provided the NMME data. In addition, an

Data Library: EU Copernicus CDS C3S

Description | Expert Mode

SOURCES > EU > Copernicus > CDS > C3S

EU Copernicus CDS C3S

EU Copernicus CDS C3S: Copernicus Climate Change Service.

Documents

overview	an outline showing sub-datasets of this dataset
home page	Copernicus Climate Change Service
license	Licence Agreement to Use Copernicus Products

Datasets and Variables

CMCC	EU Copernicus CDS C3S CMCC[**SPSv3**]
DWD	EU Copernicus CDS C3S DWD[**GCFS2p0**]
ECMWF	EU Copernicus CDS C3S ECMWF[**SEAS5**]
Meteo_France	EU Copernicus CDS C3S Meteo_France[**System5 Sys**

Data Library: EU Copernicus CDS C3S ECMWF SEAS5 forecast | Language: english

Description | Views | Data Selection | Data Files | Data Tables | Expert Mode

served from IRI/LDEO Climate Data Library

SOURCES > EU > Copernicus > CDS > C3S > ECMWF > SEAS5 > forecast

EU Copernicus CDS C3S ECMWF SEAS5 forecast

ECMWF SEAS5 forecast from EU Copernicus CDS C3S: Copernicus Climate Change Service.

Documents

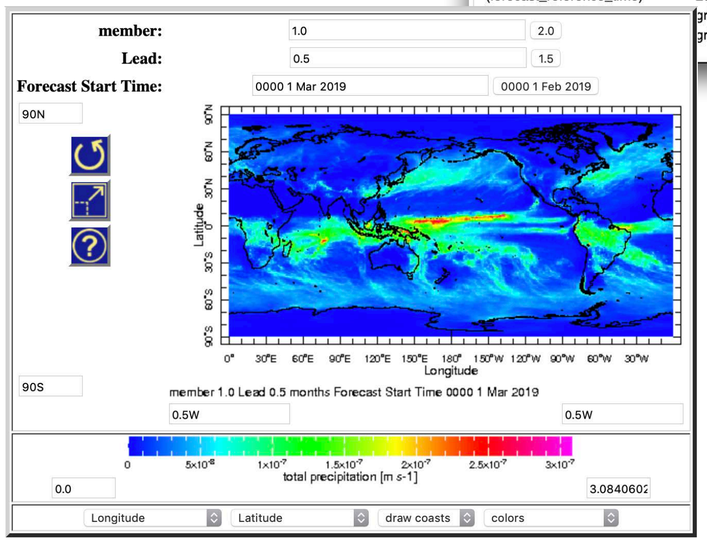
outline	an outline showing all sub-datasets and variables contained in this dataset
license	Licence Agreement to Use Copernicus Products
source	Data Downloaded from the Copernicus Climate Change Service, implemented by ECMWF

Datasets and Variables

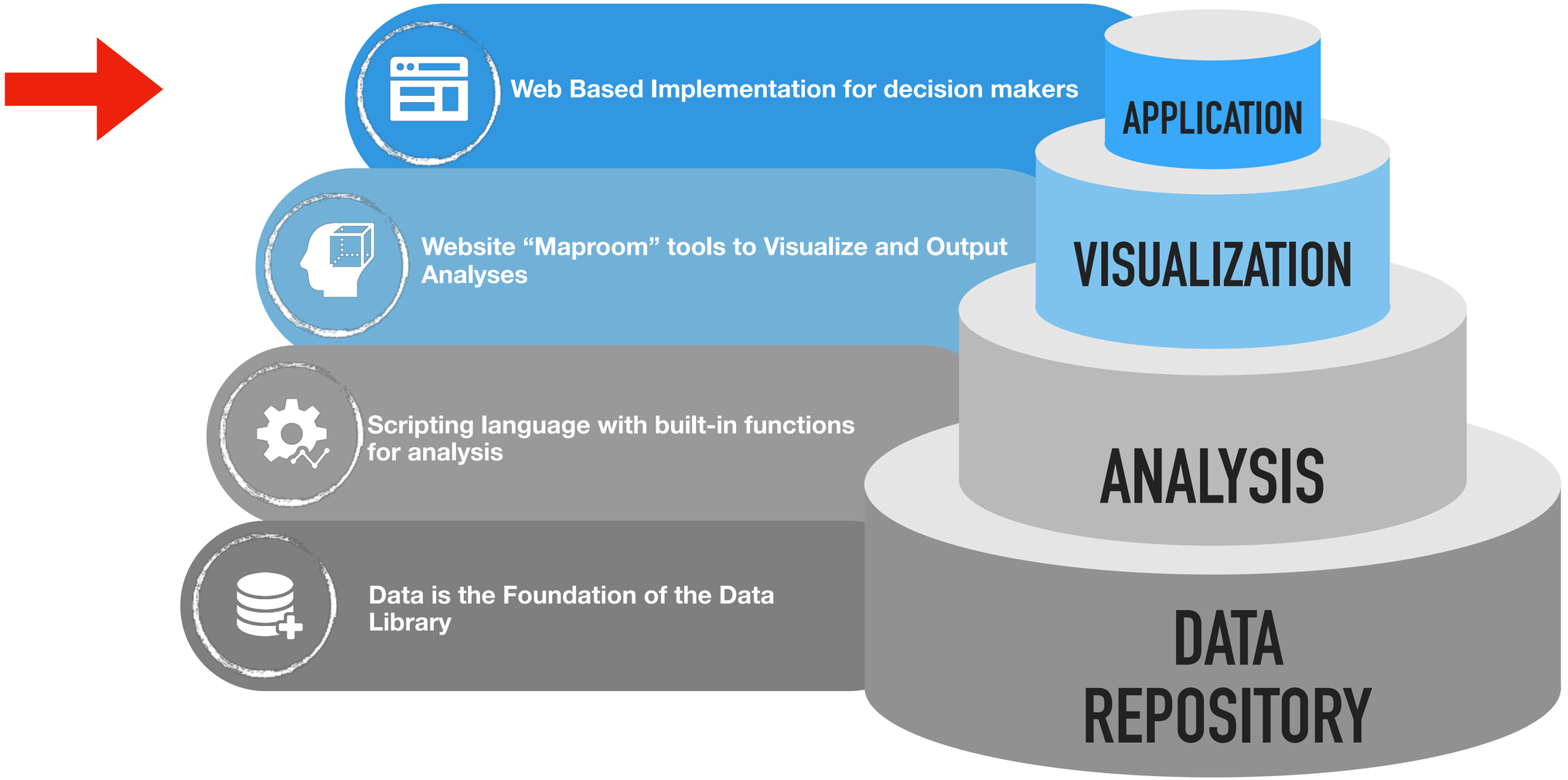
total precipitation	EU Copernicus CDS C3S ECMWF SEAS5 forecast prcp[X Y I M L S]
sea surface temperature	EU Copernicus CDS C3S ECMWF SEAS5 forecast sst[X Y I M L S]
Time	EU Copernicus CDS C3S ECMWF SEAS5 forecast T[S L I]
2-meter temperature	EU Copernicus CDS C3S ECMWF SEAS5 forecast t2m[X Y I M L S]
U-component of wind	EU Copernicus CDS C3S ECMWF SEAS5 forecast ua[X Y I P M L S]
V-component of wind	EU Copernicus CDS C3S ECMWF SEAS5 forecast va[X Y I P M L S]
geopotential	EU Copernicus CDS C3S ECMWF SEAS5 forecast z[X Y I P M L S]

Independent Variables (Grids)

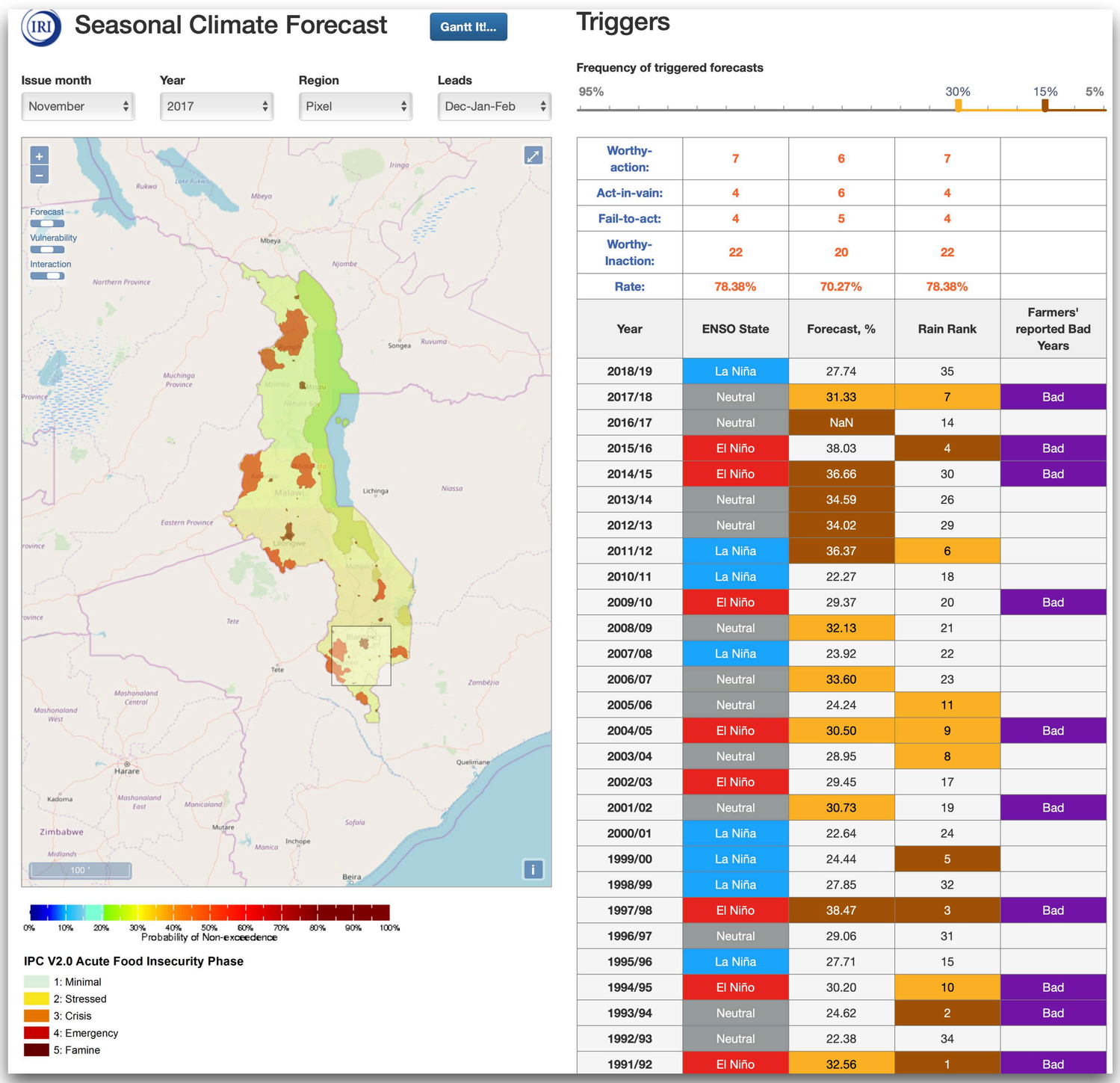
Lead (forecast_period)	grid: /L (months) ordered (0.5 months) to (5.5 months) by 1.0 N= 6 pts :grid
member	grid: /M (unitless) ordered (1.0) to (51.0) by 1.0 N= 51 pts :grid
Pressure Level (air_pressure)	grid: /P (hPa) ordered [(925) (850) (700) (500) (400) (300) (200) (100) (50) (30) (10)] :grid
Forecast Start Time (forecast_reference_time)	grid: /S (months since 1960-01-01) ordered (0000 1 Sep 2017) to (0000 1 Mar 2019) by 1.0 N= 19 pts :grid
	grid: /X (degree_east) periodic (0) to (1W) by 1.0 N= 360 pts :grid
	grid: /Y (degree_north) ordered (90N) to (90S) by 1.0 N= 181 pts :grid



DATA LIBRARY OVERVIEW



Web-based Application for Forecast-Based Financing



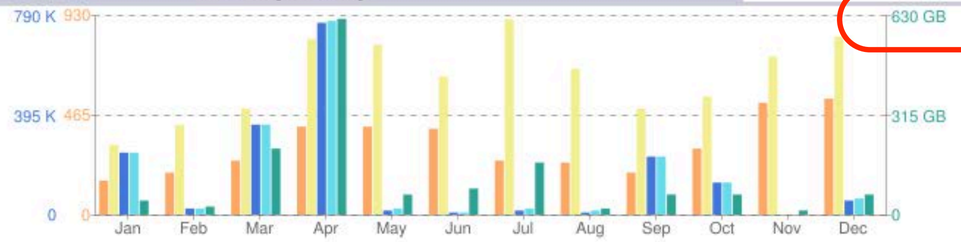
Worthy-action:	7	6	7	
Act-in-vain:	4	6	4	
Fail-to-act:	4	5	4	
Worthy-Inaction:	22	20	22	
Rate:	78.38%	70.27%	78.38%	
Year	ENSO State	Forecast, %	Rain Rank	Farmers' reported Bad Years
2018/19	La Niña	27.74	35	
2017/18	Neutral	31.33	7	Bad
2016/17	Neutral	NaN	14	
2015/16	El Niño	38.03	4	Bad
2014/15	El Niño	36.66	30	Bad
2013/14	Neutral	34.59	26	
2012/13	Neutral	34.02	29	
2011/12	La Niña	36.37	6	
2010/11	La Niña	22.27	18	
2009/10	El Niño	29.37	20	Bad
2008/09	Neutral	32.13	21	
2007/08	La Niña	23.92	22	
2006/07	Neutral	33.60	23	
2005/06	Neutral	24.24	11	
2004/05	El Niño	30.50	9	Bad
2003/04	Neutral	28.95	8	
2002/03	El Niño	29.45	17	
2001/02	Neutral	30.73	19	Bad
2000/01	La Niña	22.64	24	
1999/00	La Niña	24.44	5	
1998/99	La Niña	27.85	32	
1997/98	El Niño	38.47	3	Bad
1996/97	Neutral	29.06	31	
1995/96	La Niña	27.71	15	
1994/95	El Niño	30.20	10	Bad
1993/94	Neutral	24.62	2	Bad
1992/93	Neutral	22.38	34	
1991/92	El Niño	32.56	1	Bad

D. Osgood, IRI

Data Library Web Analytics, 2018

S2S

Monthly history



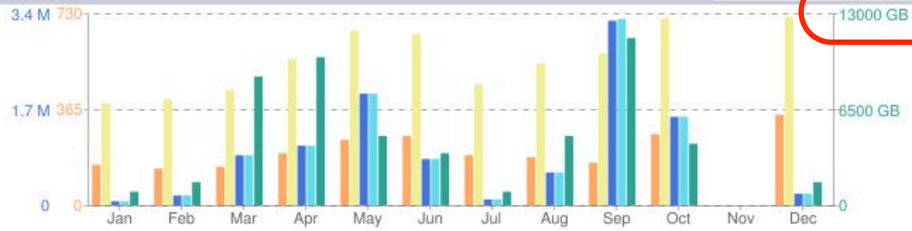
Month	Unique visitors	Number of visits	Pages	Hits	Bandwidth
Jan 2018	169	336	249,453	251,241	44.88 GB
Feb 2018	203	430	26,112	27,180	26.45 GB
Mar 2018	255	501	361,390	364,457	198.84 GB
Apr 2018	416	830	769,062	780,554	586.27 GB
May 2018	414	804	19,752	24,093	61.43 GB
Jun 2018	407	654	13,160	15,253	77.90 GB
Jul 2018	258	928	22,398	30,534	160.14 GB
Aug 2018	252	692	15,553	19,368	22.54 GB
Sep 2018	203	503	235,890	237,786	65.39 GB
Oct 2018	311	561	128,930	131,180	61.64 GB
Nov 2018	535	750	3,716	5,201	12.49 GB
Dec 2018	549	845	63,158	65,528	62.61 GB
Total	3,972	7,834	1,908,574	1,952,375	1380.59 GB

Referring Sites by Domain Name - top 25

- Full list	Pages	Hits
iridl.ldeo.columbia.edu	28966	52324
datoteca.ole2.org	1333	11766
wiki.iri.columbia.edu	271	271
s2sprediction.net	209	209
www.s2sprediction.net	103	103
10.28.1.250	26	26
www.google.com	16	16
www.baidu.com	13	13
scipea.iri.columbia.edu	11	11
cpo.noaa.gov	8	8
wwww.s2sprediction.net	7	7
127.0.0.1:8888	5	7
mapps2s.atmos.colostate.edu	5	5
bagiankecilmeteorologi.blogspot.co.id	3	3

SubX

Monthly history



Month	Unique visitors	Number of visits	Pages	Hits	Bandwidth
Jan 2018	156	394	96,924	98,937	942.55 GB
Feb 2018	147	410	198,121	202,771	1578.94 GB
Mar 2018	155	448	938,004	939,517	8760.12 GB
Apr 2018	204	568	1,104,055	1,105,523	10123.53 GB
May 2018	255	679	2,032,587	2,033,616	4783.12 GB
Jun 2018	270	659	854,136	855,454	3622.15 GB
Jul 2018	195	469	111,658	113,891	960.19 GB
Aug 2018	192	553	612,345	613,218	4809.17 GB
Sep 2018	170	585	3,394,948	3,395,800	11444.45 GB
Oct 2018	278	718	1,632,084	1,634,240	4186.76 GB
Nov 2018	1	1	1	1	8.70 MB
Dec 2018	354	728	239,767	240,374	1577.83 GB
Total	2,377	6,212	11,214,630	11,233,342	52788.83 GB

Referring Sites by Domain Name - top 25

- Full list	Pages	Hits
iridl.ldeo.columbia.edu	43118	57585
cola.gmu.edu	486	486
gfs2geo1.ldeo.columbia.edu	55	73
yandex.ru	23	23
cpo.noaa.gov	23	23
s2sprediction.net	23	23
gfs2geo2.ldeo.columbia.edu	22	48
www.cpc.ncep.noaa.gov	18	18
www.emc.ncep.noaa.gov	17	17
www.google.com	14	14
127.0.0.2	11	66
wiki.iri.columbia.edu	11	11
www.s2sprediction.net	7	7

Summary

- Over 2/3 of the S2S database is archived at IRI, including MJO indices
- Kept up to date
- Allows server-side and “lazy” computation to analyze the data according to user requests (eg weekly averaged anomalies of ensemble means, EOFs …)
- Good for low-bandwidth situations
- OpenDAP

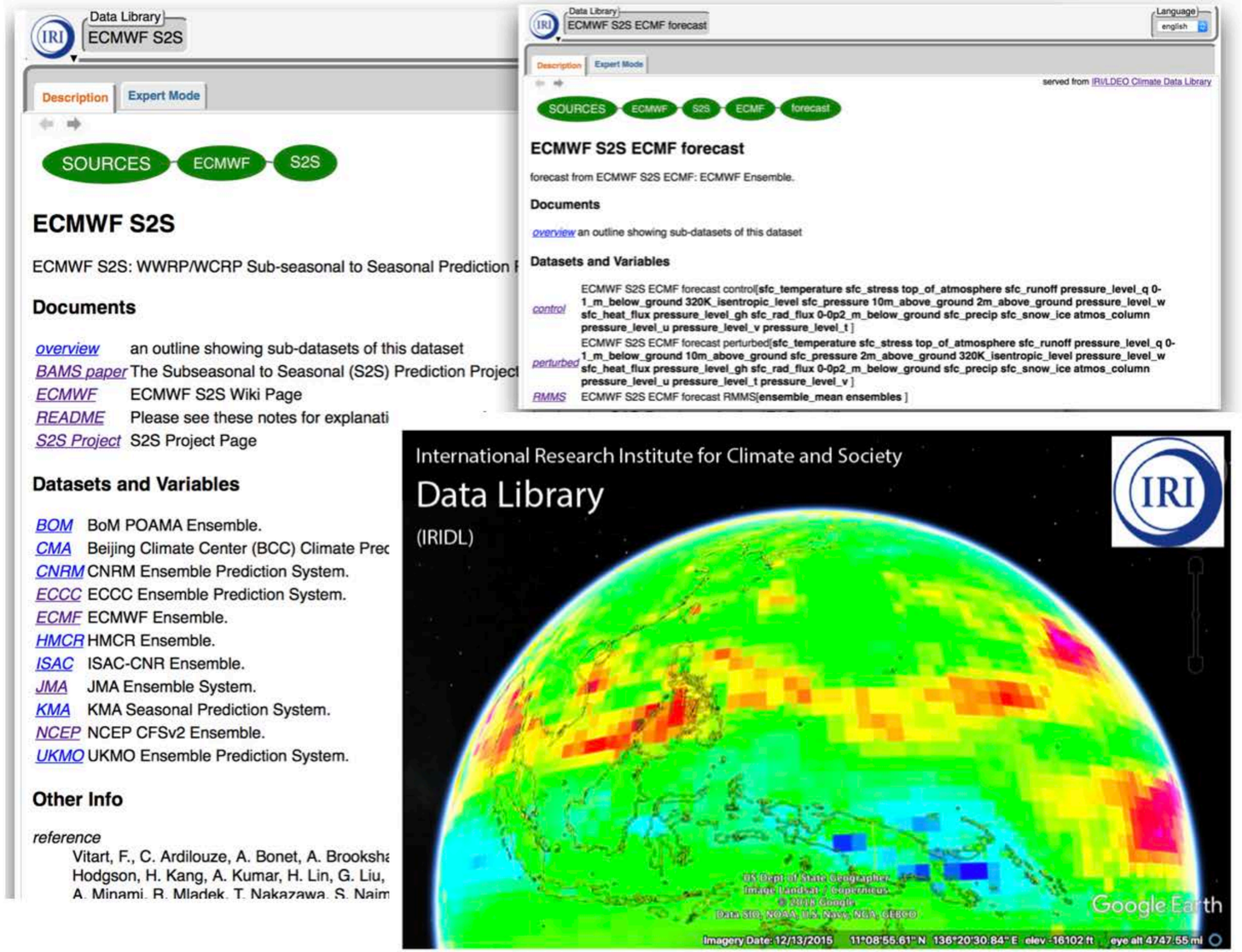


Figure 1. Visualization of an S2S forecast using Google Earth. Data was post-processed and downloaded from the IRI Data Library.