

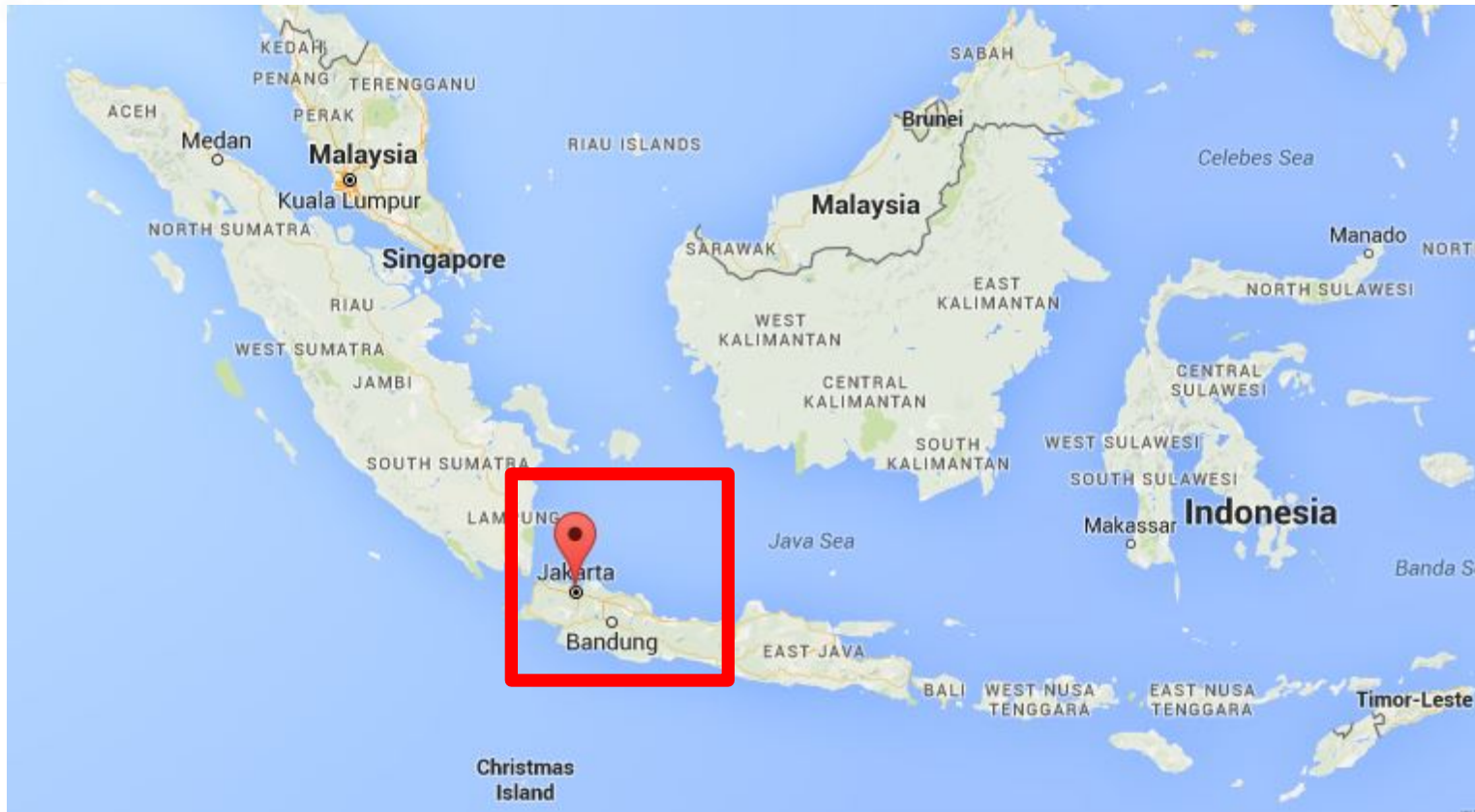
CLIK: Multi-Model Prediction

(<http://clik.apcc21.org>)

Yun-Young Lee
1 June 2016

Maritime Continent

JAVA, SUMATRA, KALIMATAN, SULAWES, TIMOR
Quite complicated and regionally varying climate system.



Jakarta: $107^{\circ} 36' E, 6^{\circ} 55' S$



Q. Rainfall near Jakarta in MJJ, 2016?

Let's produce MME forecast!



Customize your own prediction!

The screenshot shows the 'Prediction' interface of the Clik Climate Information Toolkit. The 'Prediction' tab is highlighted with a yellow circle. The interface is divided into several sections:

- Lead Month:** Radio button for '3Month'.
- When:** Year dropdown set to '2016', Season dropdown set to 'MJJ'.
- Methods:** Radio buttons for 'Deterministic' (selected) and 'Probabilistic'.
- Variables:** Radio buttons for 'PREC' (selected) and 'T850'.
- Model:** A grid of checkboxes for various GCM models: ALL, APCC, COLA, CWB, HMC, IRIF, IRI_CA, MGO, MSC, NASA, NCEP, PNU, POAMA.

A 'Predict & Verify' button is located at the bottom right of the form.

① **WHEN(Year/Month)**

: 3-month lead prediction data is updating every month

② **Variables**

: choose the target variable

③ **Methods**

: 1 deterministic (SCM) and 1 probabilistic (GAUS) MME methods

④ **Models**

: (multiply) select GCM models for a MME prediction

Customize your own prediction!

The screenshot shows the CLIK Prediction interface. At the top, there is a navigation bar with 'Prediction' highlighted in a yellow circle. Below this is a 'Predict' section with several input fields: 'Lead Month' (set to 3Month), 'When' (Year: 2016, Season: MJJ), 'Methods' (Deterministic selected), 'Variables' (PREC selected), and 'Model' (ALL selected). A 'Predict & Verify' button is at the bottom right. Red circles with numbers 1-5 point to these specific elements: 1 points to the '3Month' lead month, 2 to the 'PREC' variable, 3 to the 'Deterministic' method, 4 to the 'ALL' model, and 5 to the 'Predict & Verify' button.

① **WHEN [2016/MJJ]**

: 3-month lead prediction data is updating every month

② **Variables [PREC]**

: choose the target variable

③ **Methods [Deterministic]**

: 1 deterministic (SCM) and 1 probabilistic (GAUS) MME methods

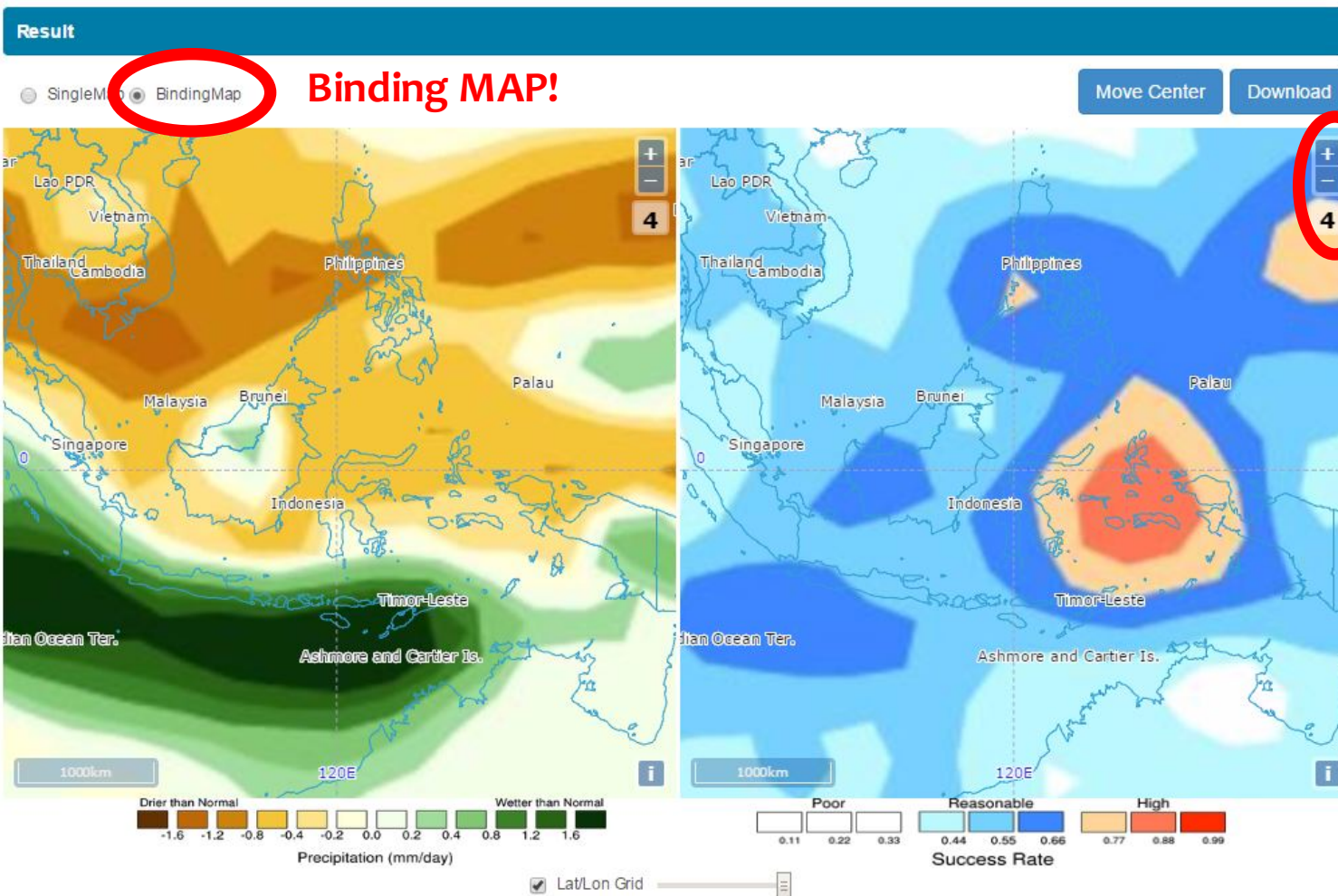
④ **Models [ALL]**

: (multiply) select GCM models for a MME prediction



Resultant Map - DMME

Read the map near Jakarta!



ZOOM IN!

Resultant Map - DMME

Getting quantities!

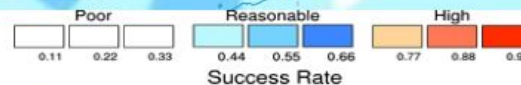
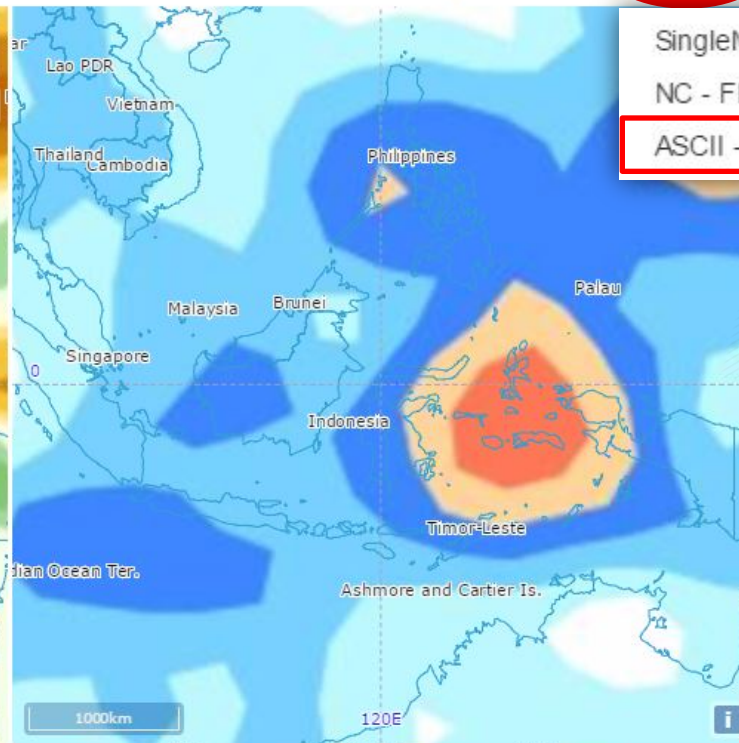
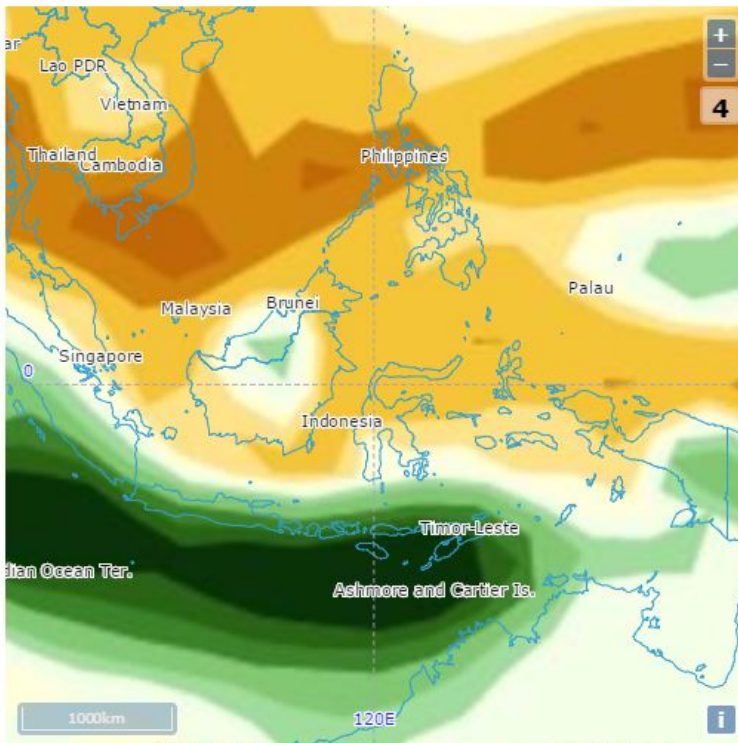
Result

SingleMap BindingMap

Move Center

Download

Download!



Lat/Lon Grid

- SingleMap - PNG
- NC - FILE
- ASCII - FILE



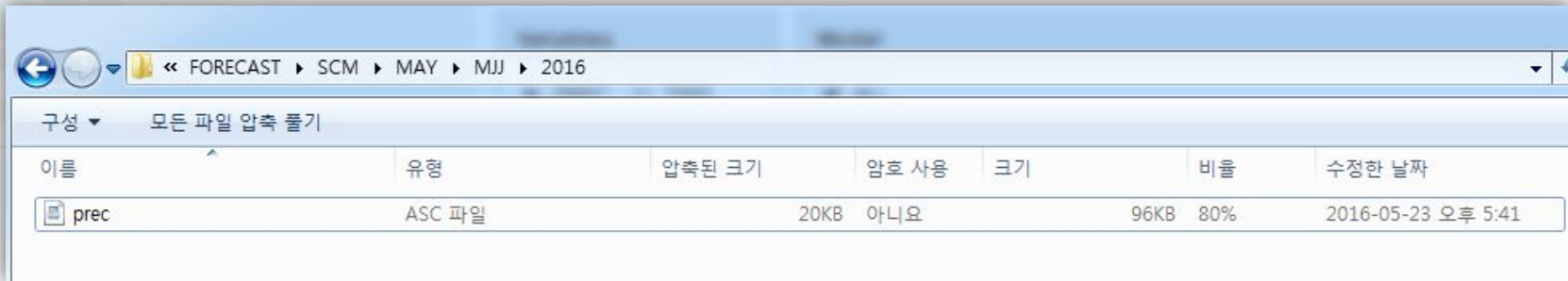
Getting quantities!

이름	유형	압축된 크기	암호 사용	크기	비율	수정한 날짜
prec	ASC 파일	20KB	아니요	96KB	80%	2016-05-23 오후 5:41

```
[Variable=prec] [MME method=SCM] [Models=APCC COLA CWB HMC IRIF IRI_CA  
MGO MSC NASA NCEP PNU POAMA] [Training Period=1983-2002]  
[Longitude=], 0, 2.5, 5, 7.5, 10, 12.5, 15, 17.5, 20, 22.5, 25, 27.5, 30, 32.5, 35,  
37.5, 40, 42.5, 45, 47.5, 50, 52.5, 55, 57.5, 60, 62.5, 65, 67.5, 70, 72.5, 75, 77.5,  
80, 82.5, 85, 87.5, 90, 92.5, 95, 97.5, 100, 102.5, 105, 107.5, 110, 112.5, 115,  
117.5, 120, 122.5, 125, 127.5, 130, 132.5, 135, 137.5, 140, 142.5, 145, 147.5, 150,  
152.5, 155, 157.5, 160, 162.5, 165, 167.5, 170, 172.5, 175, 177.5, 180, 182.5, 185,  
187.5, 190, 192.5, 195, 197.5, 200, 202.5, 205, 207.5, 210, 212.5, 215, 217.5, 220,  
222.5, 225, 227.5, 230, 232.5, 235, 237.5, 240, 242.5, 245, 247.5, 250, 252.5, 255,  
257.5, 260, 262.5, 265, 267.5, 270, 272.5, 275, 277.5, 280, 282.5, 285, 287.5, 290,  
292.5, 295, 297.5, 300, 302.5, 305, 307.5, 310, 312.5, 315, 317.5, 320, 322.5, 325,  
327.5, 330, 332.5, 335, 337.5, 340, 342.5, 345, 347.5, 350, 352.5, 355, 357.5  
[time=2016MJJ] [lat=-90], -0.001, -0.001, -0.002, -0.002, -0.002, -0.002, -  
0.002, -0.002, -0.002, -0.002, -0.002, -0.002, -0.002, -0.002, -0.002, -  
0.001, -0.001, -0.001, -0.001, -0.001, -0.000, 0.000, 0.000, 0.000, 0.000,  
0.001, 0.001, 0.001, 0.001, 0.001, 0.001, 0.001, 0.001, 0.001, 0.001,  
0.001, 0.001, 0.001, 0.002, 0.002, 0.002, 0.002, 0.002, 0.003, 0.003,  
0.003, 0.003, 0.004, 0.004, 0.004, 0.004, 0.004, 0.004, 0.004, 0.004,  
0.004, 0.005, 0.004, 0.003, 0.003, 0.003, 0.002, 0.002, 0.002, 0.001,  
0.000, -0.000, -0.001, -0.003, -0.004, -0.006, -0.007, -0.008, -0.010, -  
0.010, -0.011, -0.013, -0.014, -0.014, -0.014, -0.013, -0.013, -0.012, -  
0.011, -0.010, -0.009, -0.008, -0.006, -0.005, -0.004, -0.002, -0.002,  
0.000, 0.002, 0.003, 0.005, 0.006, 0.007, 0.009, 0.009, 0.009, 0.010,
```

Microsoft EXCEL recommended!

Getting quantities!



Near Jakarta ($107^{\circ} 36' E$, $6^{\circ} 55' S$)
(Longitude=107.5, Latitude=-7.5)

	A	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU
1 [Longitude=]		90	92.5	95	97.5	100	102.5	105	107.5	110	112.5
26 [time=2016MJJ][lat=-30]		0.176	0.117	0.151	0.08	-0.003	-0.066	-0.105	-0.154	-0.184	-0.182
27 [time=2016MJJ][lat=-27.5]		0.171	0.138	0.124	0.029	-0.045	-0.059	-0.081	-0.119	-0.15	-0.117
28 [time=2016MJJ][lat=-25]		0.153	0.141	0.087	-0.014	-0.049	-0.08	-0.09	-0.102	-0.118	0.02
29 [time=2016MJJ][lat=-22.5]		0.091	0.099	0.061	0.01	-0.041	-0.084	-0.13	-0.139	-0.091	0.045
30 [time=2016MJJ][lat=-20]		0.104	0.105	0.061	0.025	0.003	-0.055	-0.049	0.007	0.064	0.161
31 [time=2016MJJ][lat=-17.5]		-0.08	-0.14	-0.162	-0.126	0.044	0.143	0.184	0.273	0.382	0.539
32 [time=2016MJJ][lat=-15]		-0.114	-0.124	-0.097	0.137	0.449	0.641	0.728	0.918	1.01	1.231
33 [time=2016MJJ][lat=-12.5]		0.167	0.382	0.603	0.897	1.07	1.149	1.222	1.364	1.518	1.82
34 [time=2016MJJ][lat=-10]		0.9	1.171	1.445	1.761	2.007	1.917	1.709	1.584	1.649	1.832
35 [time=2016MJJ][lat=-7.5]		1.222	1.409	1.65	2.054	2.215	2.052	1.498	0.947	0.788	0.79
36 [time=2016MJJ][lat=-5]		0.638	0.878	1.175	1.373	1.315	1.163	0.624	0.11	-0.186	-0.217
37 [time=2016MJJ][lat=-2.5]		0.097	0.215	0.523	0.646	0.875	0.414	0.109	-0.279	-0.312	-0.318
38 [time=2016MJJ][lat=0]		0.029	0.033	0.15	0.438	0.363	0.17	-0.316	-0.553	-0.23	0.144
39 [time=2016MJJ][lat=2.5]		0.035	0.013	0.087	0.141	0.143	-0.101	-0.398	-0.57	-0.302	0.361
40 [time=2016MJJ][lat=5]		-0.063	-0.109	0.135	-0.149	-0.214	-0.197	-0.711	-0.954	-0.725	-0.274
41 [time=2016MJJ][lat=7.5]		-0.468	-0.488	-0.452	-0.573	-0.699	-0.902	-1.118	-1.496	-1.346	-0.798

With a different MME method!

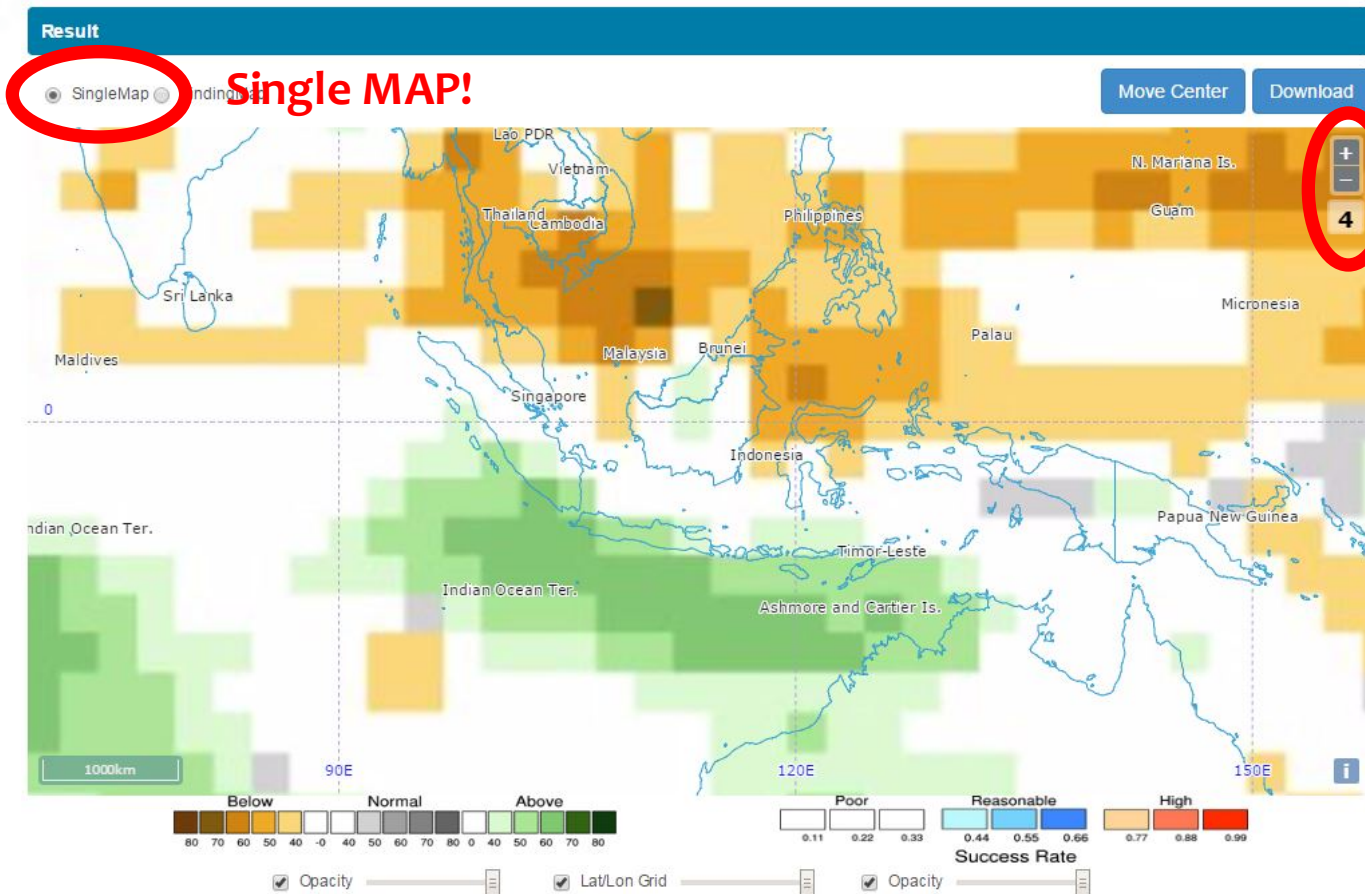
The screenshot shows the CLIK Prediction interface. The navigation bar includes 'Prediction' (highlighted with a yellow circle), 'Downscale', and 'My Page'. The 'Predict' section contains several form fields: 'Lead Month' (set to '3Month', annotated with a red circle '1'), 'When' (Year: '2016', Season: 'MJJ', annotated with a red circle '1'), 'Methods' (set to 'Probabilistic', annotated with a red circle '3'), 'Variables' (set to 'PREC', annotated with a red circle '2'), and 'Model' (with multiple checkboxes selected, annotated with a red circle '4'). A 'Predict & Verify' button is circled in red, with a hand icon pointing to it and the number '5' next to it.

- ① **WHEN** [2016/MJJ]
: 3-month lead prediction data is updating every month
- ② **Variables** [PREC]
: choose the target variable
- ③ **Methods** [Deterministic] → [Probabilistic]
: 3 deterministic and 1 probabilistic MME methods
- ④ **Models** [ALL]
: (multiply) select GCM models for a MME prediction



Resultant Map - PMME

Read the map near Jakarta!



Prediction Uncertainty!

With different model combinations?

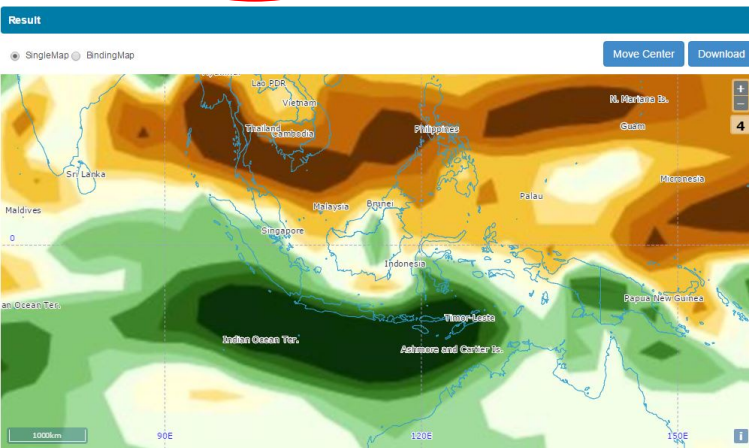
Lead Month: 3Month
When: Year 2016 Season MJJ
Methods: Deterministic Probabilistic

Variables: PREC T850

Model:

<input type="checkbox"/> ALL	<input type="checkbox"/> APCC	<input checked="" type="checkbox"/> COLA	<input type="checkbox"/> CWB	<input type="checkbox"/> HMC
<input checked="" type="checkbox"/> IRIF	<input checked="" type="checkbox"/> IRI_CA	<input type="checkbox"/> MGO	<input type="checkbox"/> MSC	
<input checked="" type="checkbox"/> NASA	<input checked="" type="checkbox"/> NCEP	<input type="checkbox"/> PNU	<input type="checkbox"/> POAMA	

Predict & Verify



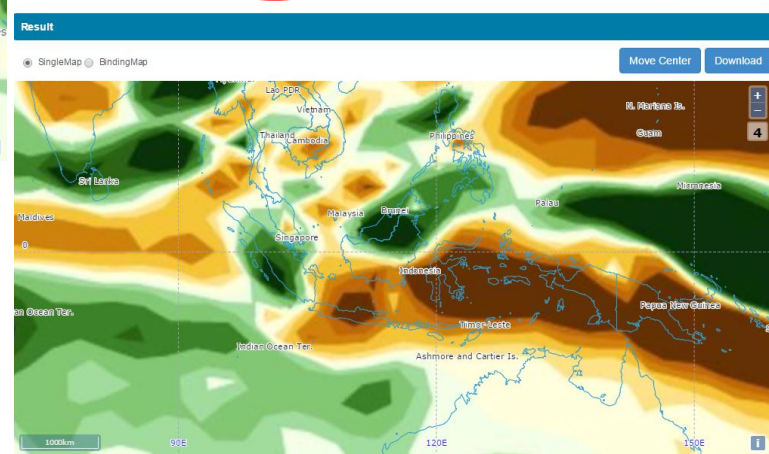
Lead Month: 3Month
When: Year 2016 Season MJJ
Methods: Deterministic Probabilistic

Variables: PREC T850

Model:

<input type="checkbox"/> ALL	<input type="checkbox"/> APCC	<input type="checkbox"/> COLA	<input type="checkbox"/> CWB	<input type="checkbox"/> HMC
<input type="checkbox"/> IRIF	<input type="checkbox"/> IRI_CA	<input type="checkbox"/> MGO	<input type="checkbox"/> MSC	
<input type="checkbox"/> NASA	<input type="checkbox"/> NCEP	<input type="checkbox"/> PNU	<input checked="" type="checkbox"/> POAMA	

Predict & Verify



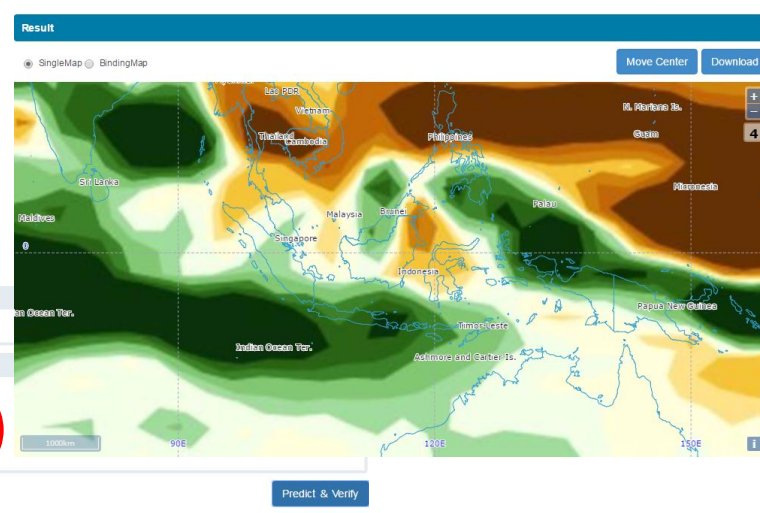
Lead Month: 3Month
When: Year 2016 Season MJJ
Methods: Deterministic Probabilistic

Variables: PREC T850

Model:

<input type="checkbox"/> ALL	<input type="checkbox"/> APCC	<input type="checkbox"/> COLA	<input type="checkbox"/> CWB	<input type="checkbox"/> HMC
<input checked="" type="checkbox"/> IRIF	<input type="checkbox"/> IRI_CA	<input type="checkbox"/> MGO	<input type="checkbox"/> MSC	
<input type="checkbox"/> NASA	<input type="checkbox"/> NCEP	<input checked="" type="checkbox"/> PNU	<input type="checkbox"/> POAMA	

Predict & Verify



CLIK - My Page/Jobs

- ✓ List of jobs requested by yourself
- ✓ Figuring out the details of each job.

The screenshot shows the CLIK web interface. At the top left is the CLIK logo (Climate Information Toolkit). The navigation bar includes 'Prediction', 'Downscale', and 'My Page' (highlighted with a yellow circle). On the right of the navigation bar are 'Logout' and 'Edit' links. Below the navigation bar is the 'My Page' title. A sub-tab 'Jobs' is highlighted with a yellow circle. Below this is a 'System Status' section. A table lists jobs with columns: JOB ID, TYPE, STATE, RESULT DATA, CREATED, and UPDATED. The 'STATE' column for the first job (3864) is 'success' and is circled in red. A hand icon with the word 'CLIK' is pointing to the 'STATE' column. The bottom of the page shows system metrics: 'Processing 0', 'Queued 0', 'Image Processor 14', and 'CPU Usage 16.5 %'.

JOB ID	TYPE	STATE	RESULT DATA	CREATED	UPDATED
3864	Prediction	success	download	2016-05-13 15:40:26	2016-05-13 15:41:08
3851	Prediction	fail		2016-05-13 11:16:03	2016-05-13 11:16:07
3850	Prediction	fail		2016-05-13 10:39:59	2016-05-13 10:40:30
3822	Prediction	fail		2016-04-01 16:56:12	2016-04-01 16:56:21
3821	Prediction	fail		2016-04-01 16:52:45	2016-04-01 16:52:58
3776	Downscale	success	download	2015-12-02 17:49:46	2015-12-02 17:52:29
3775	Downscale	fail		2015-12-02 17:47:18	2015-12-02 17:47:34
3774	Downscale	success	download	2015-12-02 14:57:44	2015-12-02 15:54:35
3773	Downscale	success	download	2015-12-02 14:56:14	2015-12-02 14:57:00
3772	Downscale	fail		2015-12-02 14:54:55	2015-12-02 14:54:59
3771	Downscale	fail		2015-11-30 09:14:31	2015-11-30 09:14:37
3769	Downscale	success	download	2015-11-27 14:56:09	2015-11-27 15:01:06
3765	Downscale	success	download	2015-11-24 19:42:23	2015-11-24 19:47:43
3757	Downscale	fail		2015-11-10 16:16:24	2015-11-10 16:16:27

CLIK - My Page/Jobs

- ✓ What if you want to get quantities after completing predictions?

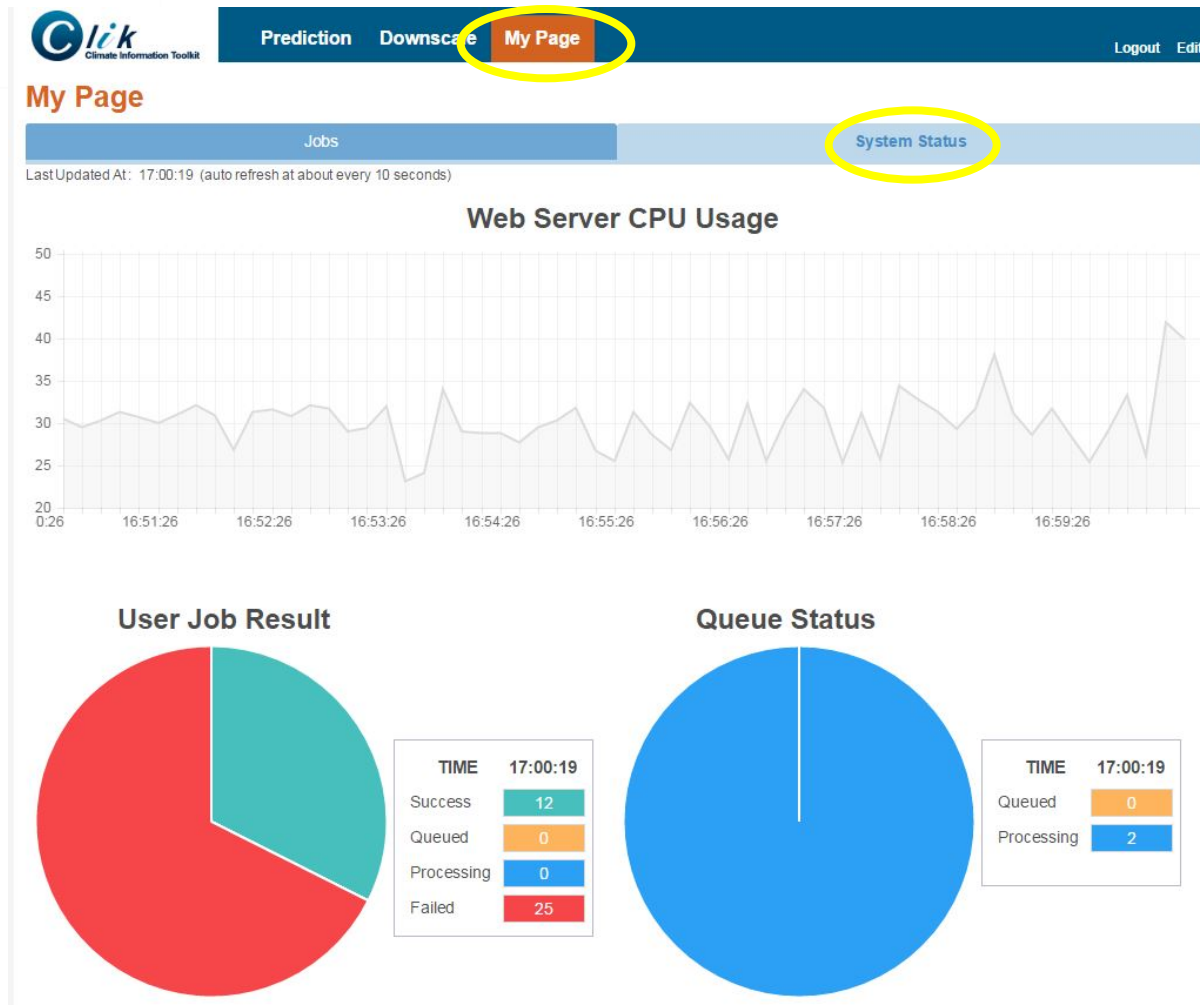
The screenshot shows the CLIK 'My Page' interface. At the top, there is a navigation bar with 'Prediction', 'Downscale', and 'My Page' (highlighted with a yellow circle). To the right of the navigation bar are 'Logout' and 'Edit' links. Below the navigation bar, the page title 'My Page' is displayed. The main content area is divided into two sections: 'Jobs' and 'System Status'. The 'Jobs' section contains a table with columns for 'JOB ID', 'TYPE', 'STATE', 'RESULT DATA', 'CREATED', and 'UPDATED'. The 'System Status' section is currently empty. A hand cursor with the text 'CLIK' is pointing to the 'download' link in the 'RESULT DATA' column of the first row (JOB ID 3864). The 'download' link is circled in red. The table also shows various job statuses like 'success' and 'fail'.

JOB ID	TYPE	STATE	RESULT DATA	CREATED	UPDATED
3864	Prediction	success	download	2016-05-13 15:40:26	2016-05-13 15:41:08
3851	Prediction	fail		2016-05-13 11:16:03	2016-05-13 11:16:07
3850	Prediction	fail		2016-05-13 10:39:59	2016-05-13 10:40:30
3822	Prediction	fail		2016-04-01 16:56:12	2016-04-01 16:56:21
3821	Prediction	fail		2016-04-01 16:52:45	2016-04-01 16:52:58
3776	Downscale	success	download	2015-12-02 17:49:46	2015-12-02 17:52:29
3775	Downscale	fail		2015-12-02 17:47:18	2015-12-02 17:47:34
3774	Downscale	success	download	2015-12-02 14:57:44	2015-12-02 15:54:35
3773	Downscale	success	download	2015-12-02 14:56:14	2015-12-02 14:57:00
3772	Downscale	fail		2015-12-02 14:54:55	2015-12-02 14:54:59
3771	Downscale	fail		2015-11-30 09:14:31	2015-11-30 09:14:37
3769	Downscale	success	download	2015-11-27 14:56:09	2015-11-27 15:01:06
3765	Downscale	success	download	2015-11-24 19:42:23	2015-11-24 19:47:43
3757	Downscale	fail		2015-11-10 16:16:24	2015-11-10 16:16:27

Processing 0 Queued 0 Image Processor 14 CPU Usage 16.5 %

CLIK - My Page/System Status

- ✓ Current CPU usage & queued status
- ✓ Summary of user job results





Q. More or less rainfall near Jakarta in next three month (**JJA, 2016**)?



Exercise 1

Produce the 2016 JJA forecast (PREC)

WHEN [2016/JJA]

Variables [PREC]

Methods [Deterministic]

Models [ALL]



Predict & Verify

0. Read the results map first!
1. Download ASCII-file.
2. Open the file (Microsoft EXCEL recommended).
3. Look over the table and read the value of forecasted PREC (anomaly) near Jakarta (Longitude=107.5 , Latitude=-7.5).

How much PREC?

Exercise 1

Produce the 2016 JJA forecast (PREC)

WHEN [2016/JJA]

Variables [PREC]

Methods [Deterministic]

Models [ALL]



Predict & Verify

0. Read the results map first!
1. Download ASCII-file.
2. Open the file (Microsoft EXCEL recommended).
3. Look over the table and read the value of forecasted PREC (anomaly) near Jakarta (Longitude=107.5 , Latitude=-7.5).

How much PREC?

2.087

Produce the 2016 JJA forecast (PREC)

WHEN [2016/JJA]

Variables [PREC]

Methods [Probabilistic]

Models [ALL]



Predict & Verify

0. Read the results map first!
1. Download ASCII-file.
2. Open the file (Microsoft EXCEL recommended).
3. Look over the table and read the value of forecasted PREC probability near Jakarta (Longitude=107.5 , Latitude=-7.5).

Probability in three tercile bins?

AN (lev=1)	NN(lev=2)	BN(lev=3)

Exercise3

Produce the 2016 JJA forecast (PREC)

WHEN [2016/JJA]
 Variables [PREC]
 Methods [Probabilistic]
 Models [① ALL, ②
 NASA+NCEP+IRI_CA, ③
 APCC+PNU, ④POAMA]



Predict & Verify

0. Read the results map first!
1. Download ASCII-file.
2. Open the file (Microsoft EXCEL recommended).
3. Look over the table and read the value of forecasted PREC probability near Jakarta (Longitude=107.5 , Latitude=-7.5).
4. Fill the below table (with above four model combinations).

Probability in three tercile bins?

	AN (lev=1)	NN (lev=2)	BN (lev=3)
ALL			
NASA+NCEP +IRI_CA			
APCC+PNU			
POAMA			



Thank you.