CLIK: Multi-Model Prediction
(http://clik.apcc21.org)

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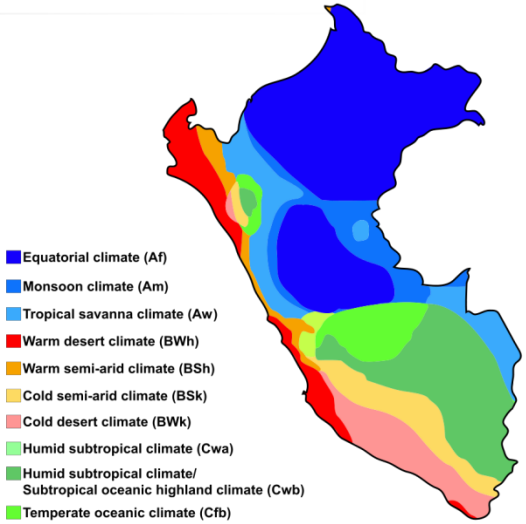
8 Sep 2016

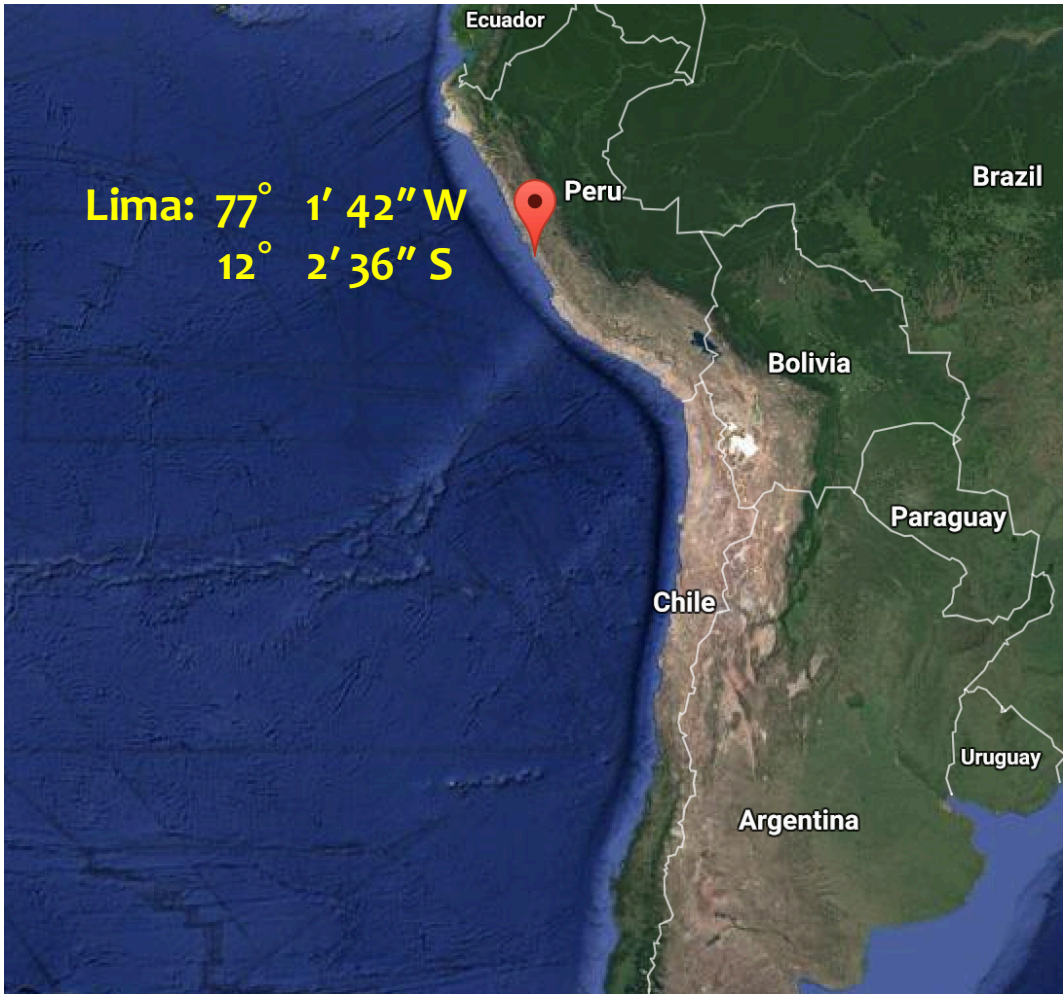
APCC APEC CLIMATE CENTER

Western South America

Quite complicated and regionaly varying climate system.

Peru map of Köppen climate classification



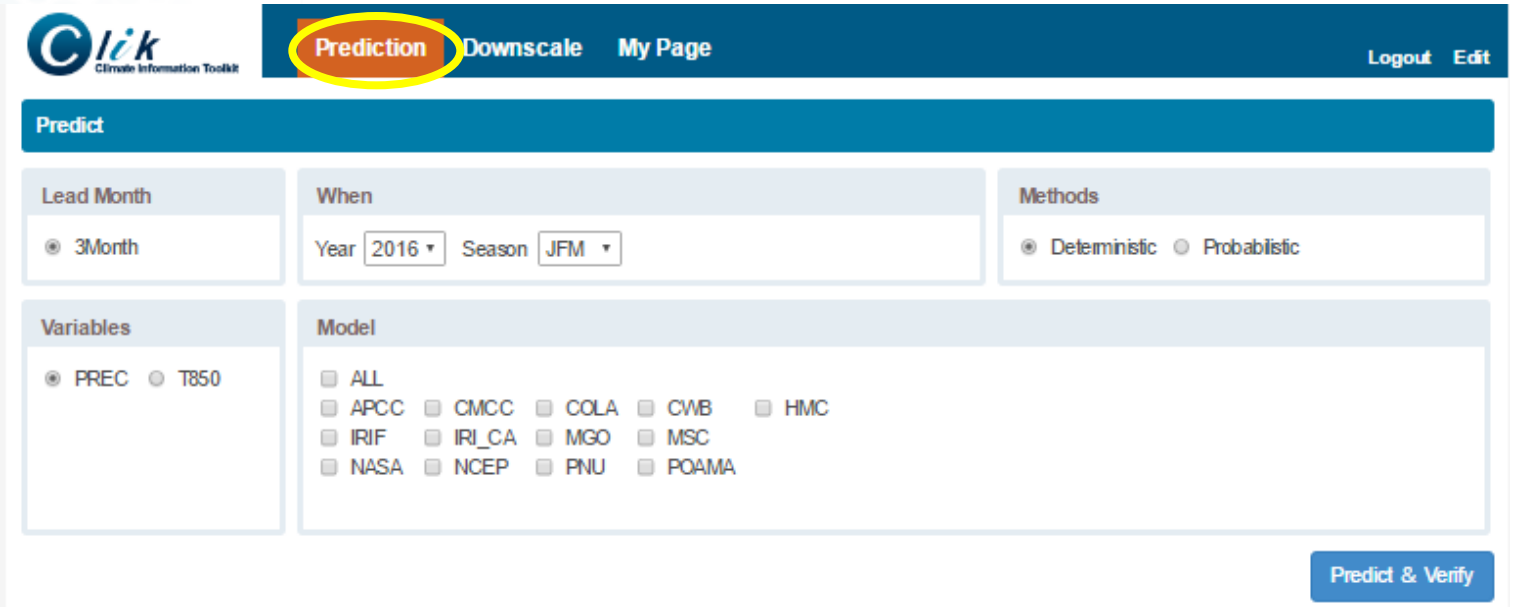


Q. Rainfall near Lima in JFM, 2016?

Let's produce MME forecast!

http://clik.apcc21.org

Customize your own prediction!



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

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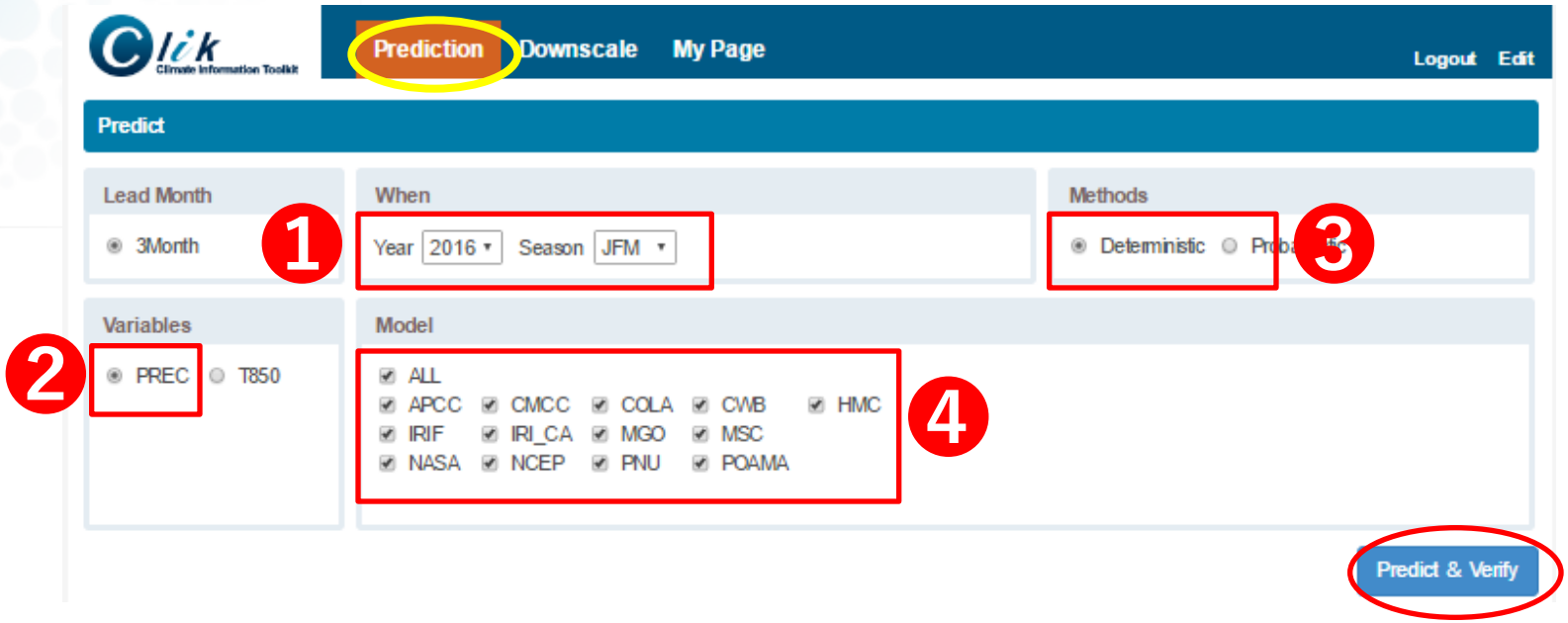
Customize your own prediction!



① **WHEN [2016/JFM]**
: 3-month lead prediction data is updating every month

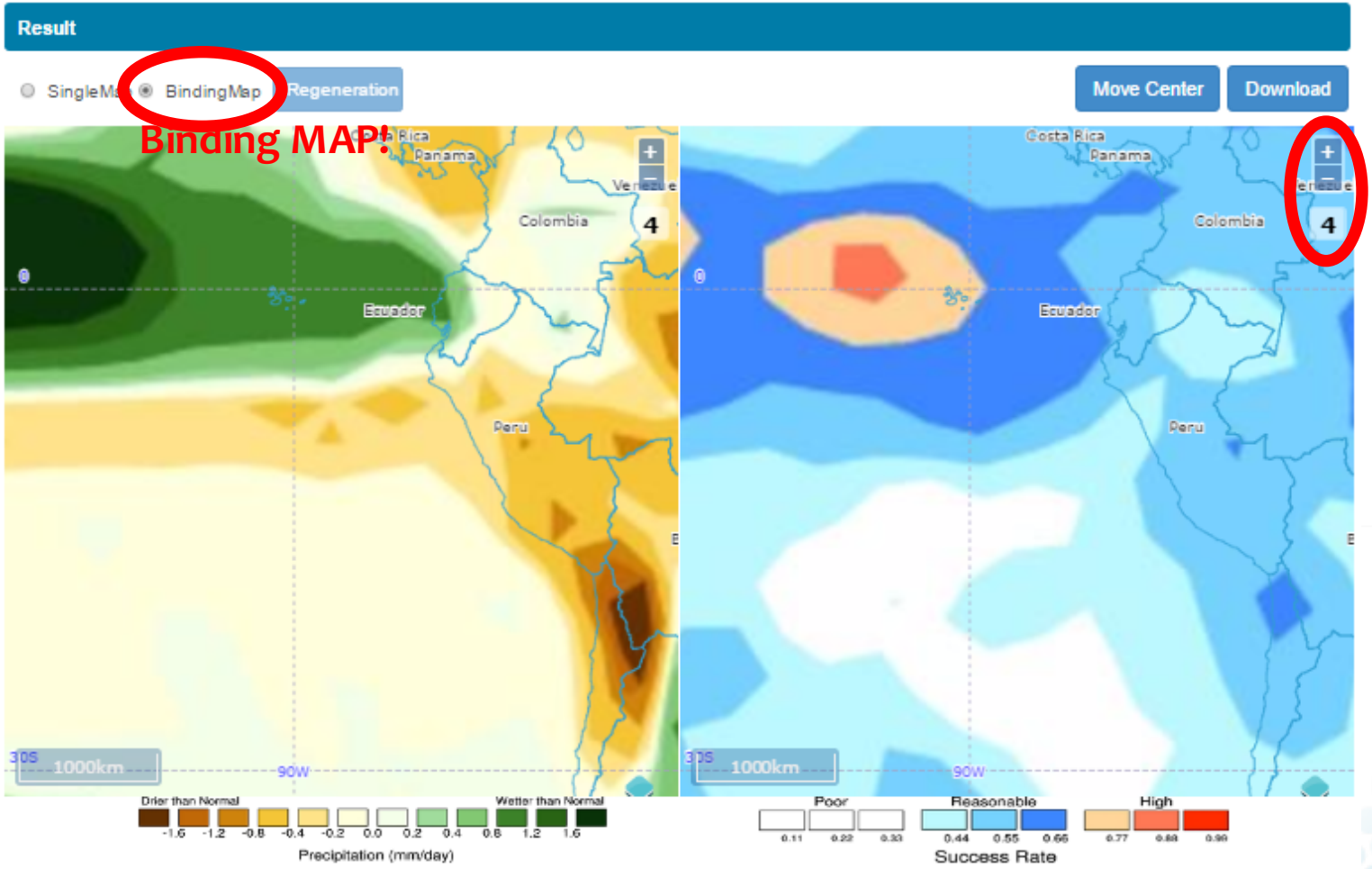
② **Variables [PREC]**
: choose the target variable

③ **Methods [Deterministic]**
: 1 deterministic (SCM) and 1 probabilistic (GAUS) MME methods

④ **Models [ALL]**
: (multiply) select GCM models for a MME prediction

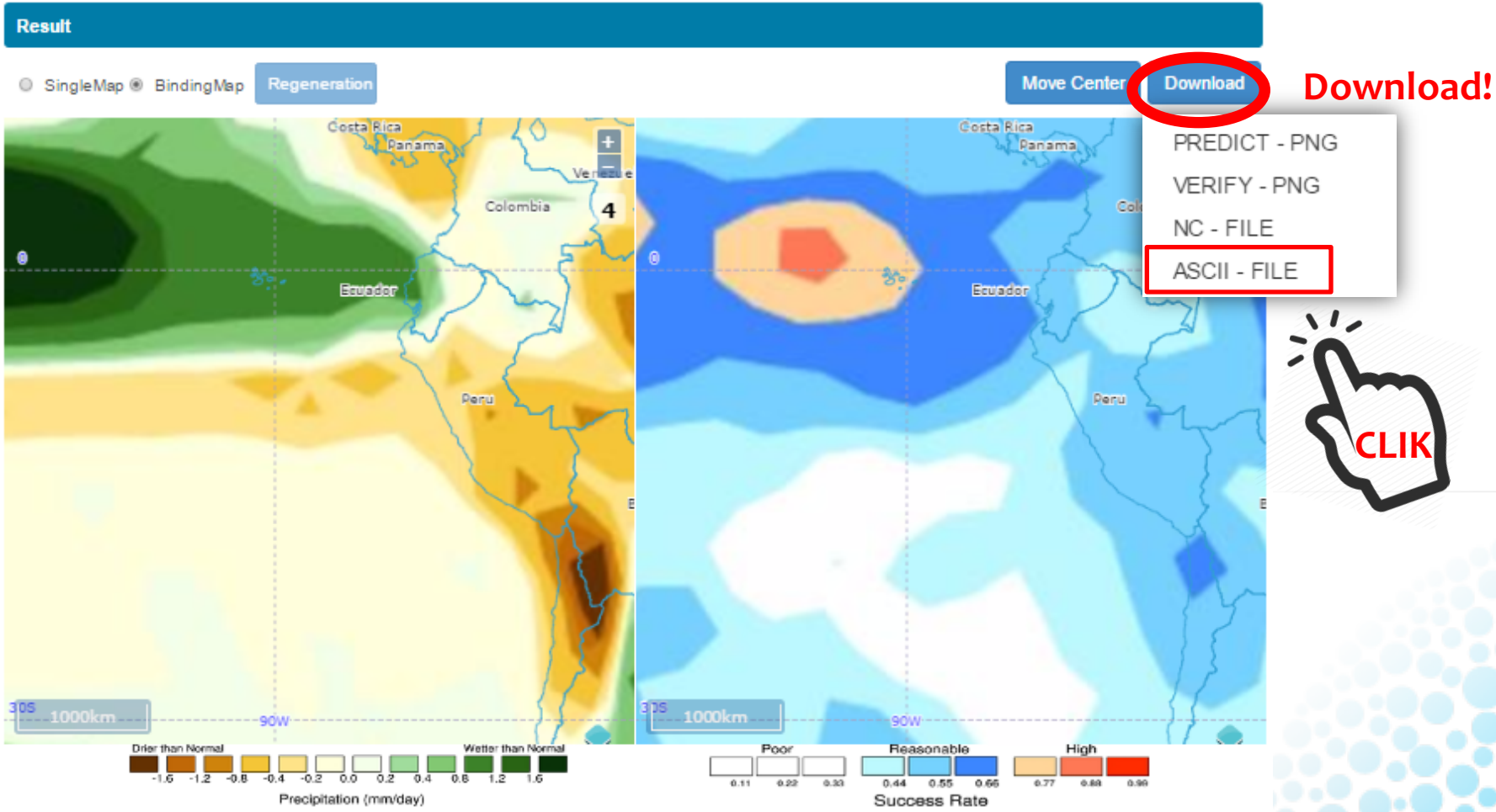
Resultant Map - DMME

Read the map near Lima!

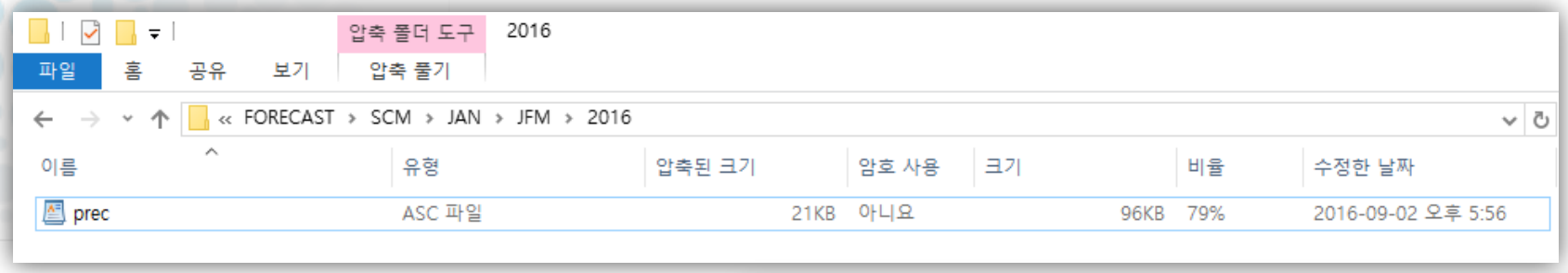


Resultant Map - DMME

Getting quantities!



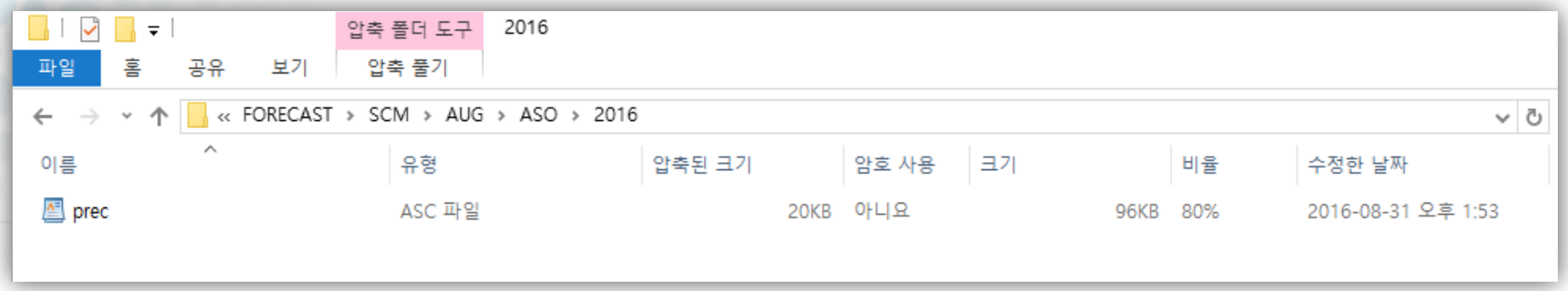
Getting quantities!



***Microsoft EXCEL* recommended!**

[Variable=prec] [MME method=SCM] [Models=APCC CMCC 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=2016JFM] [lat=-90], 0.003, 0.002, 0.002, 0.002, 0.003, 0.003, 0.003, 0.003, 0.002, 0.002, 0.002, 0.002, 0.002, 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, 0.005, 0.004, 0.005, 0.006, 0.005, 0.005, 0.005, 0.006, 0.006, 0.005, 0.005, 0.006, 0.006, 0.007, 0.007, 0.007, 0.007, 0.007, 0.008, 0.008, 0.008, 0.008, 0.009, 0.009, 0.009, 0.009, 0.009, 0.010, 0.009, 0.008, 0.007, 0.006, 0.005, 0.004, 0.003,
0.000, -0.000, -0.002, -0.004, -0.006, -0.007, -0.009, -0.011, -0.012, -0.013, -0.015, -0.015, -0.015, -0.014, -0.013, -0.013, -0.010, -0.009, -0.007, -0.004, -0.001, 0.000, 0.002, 0.005, 0.006, 0.008, 0.009, 0.010, 0.010, 0.009, 0.010, 0.011, 0.011, 0.010, 0.010, 0.012, 0.013, 0.013, 0.012, 0.012, 0.011, 0.011, 0.010, 0.010, 0.009, 0.008, 0.007, 0.007,

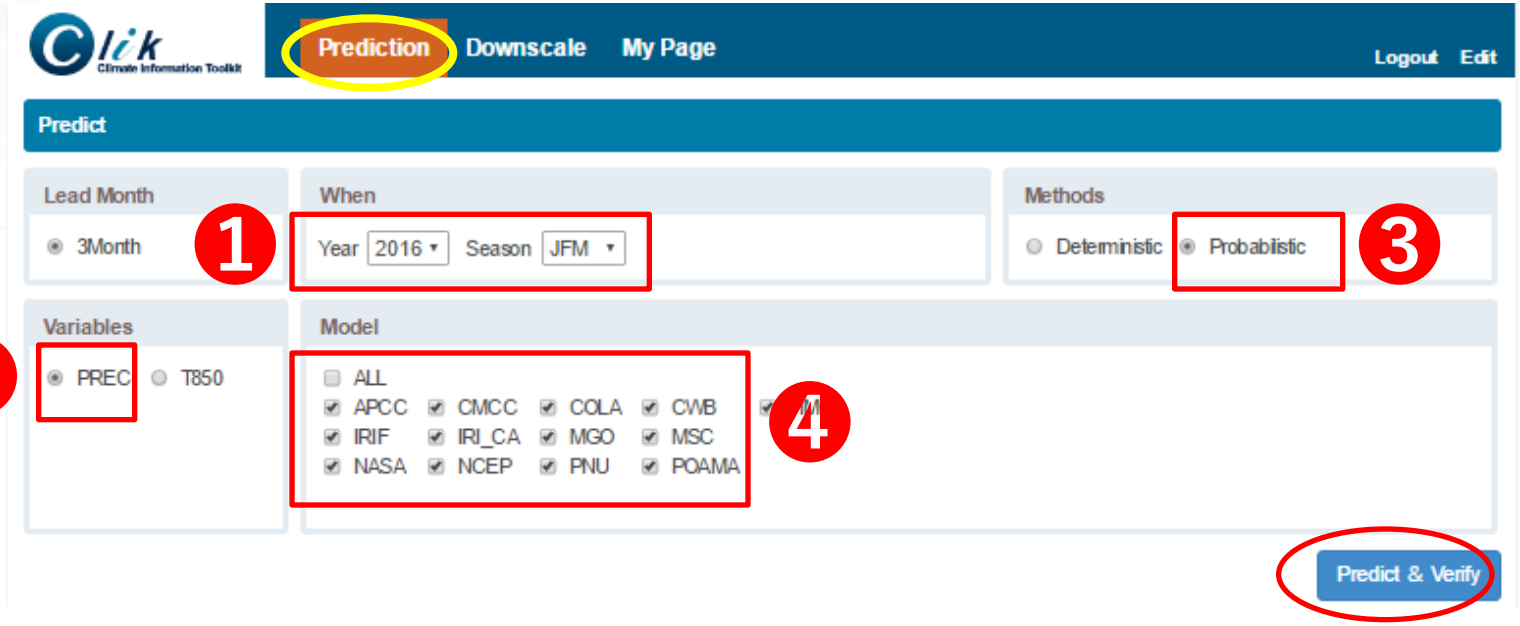
Getting quantities!



Near Lima (77° 1′ 42″ W, 12° 2′ 36″ S)?
(Longitude=282.5 (77.5W), Latitude=-12.5)

	A	DF	DG	DH	DI	DJ	DK	DL	DM	DN	DO
1	[Variable=prec][MME meth										
2	[Longitude=]	270	272.5	275	277.5	280	282.5	285	287.5	290	292.5
21	[time=2016JFM][lat=-45]	-0.15	-0.16	-0.202	-0.234	-0.288	-0.4	-0.65	-0.613	-0.069	0.104
22	[time=2016JFM][lat=-42.5]	-0.047	-0.064	-0.108	-0.126	-0.146	-0.25	-0.336	-0.475	-0.015	0.205
23	[time=2016JFM][lat=-40]	0.026	-0.027	-0.058	-0.059	-0.052	-0.099	-0.142	-0.227	0.097	0.383
24	[time=2016JFM][lat=-37.5]	0.032	-0.011	0.001	0.006	0.005	-0.009	-0.032	-0.068	0.153	0.469
25	[time=2016JFM][lat=-35]	-0.021	-0.016	0.004	-0.01	-0.011	-0.007	-0.012	-0.006	0.085	0.417
26	[time=2016JFM][lat=-32.5]	0.026	0.023	0.008	-0.01	0.011	0.01	0.01	0.013	-0.066	0.197
27	[time=2016JFM][lat=-30]	0.004	-0.005	0.006	0.002	0.016	0.012	0.022	-0.002	-0.344	-0.194
28	[time=2016JFM][lat=-27.5]	-0.006	-0.001	0.001	-0.017	-0.008	-0.001	0.013	-0.025	-0.574	-0.907
29	[time=2016JFM][lat=-25]	-0.014	0.006	0	-0.025	-0.025	-0.03	-0.014	-0.028	-0.545	-1.774
30	[time=2016JFM][lat=-22.5]	-0.027	-0.011	-0.005	-0.017	-0.038	-0.034	-0.002	-0.048	-0.68	-2.484
31	[time=2016JFM][lat=-20]	-0.031	-0.021	-0.015	-0.042	-0.022	0.011	0.034	-0.117	-1.251	-2.607
32	[time=2016JFM][lat=-17.5]	-0.018	-0.042	-0.061	-0.048	-0.025	-0.049	-0.191	-0.731	-1.304	-1.005
33	[time=2016JFM][lat=-15]	-0.056	-0.101	-0.092	-0.026	-0.028	-0.195	-0.653	-0.965	-0.558	-0.29
34	[time=2016JFM][lat=-12.5]	-0.141	-0.211	-0.167	-0.037	-0.221	-0.255	-0.489	-0.724	-0.318	-0.614
35	[time=2016JFM][lat=-10]	-0.358	-0.433	-0.323	-0.267	-0.339	-0.31	-0.875	-0.519	-0.78	-1.03
36	[time=2016JFM][lat=-7.5]	-0.489	-0.379	-0.421	-0.622	-0.199	-0.483	-0.328	-0.419	-0.357	-0.32
37	[time=2016JFM][lat=-5]	0.482	0.62	0.159	-0.23	-0.041	-0.377	-0.201	-0.054	-0.052	-0.204
38	[time=2016JFM][lat=-2.5]	0.926	1.002	0.808	0.643	0.789	-0.041	-0.062	0.301	0.017	-0.589
39	[time=2016JFM][lat=0]	1.116	1.12	1.063	1.116	1.146	-0.046	-0.135	0.089	-0.19	-0.632

With a different MME method!



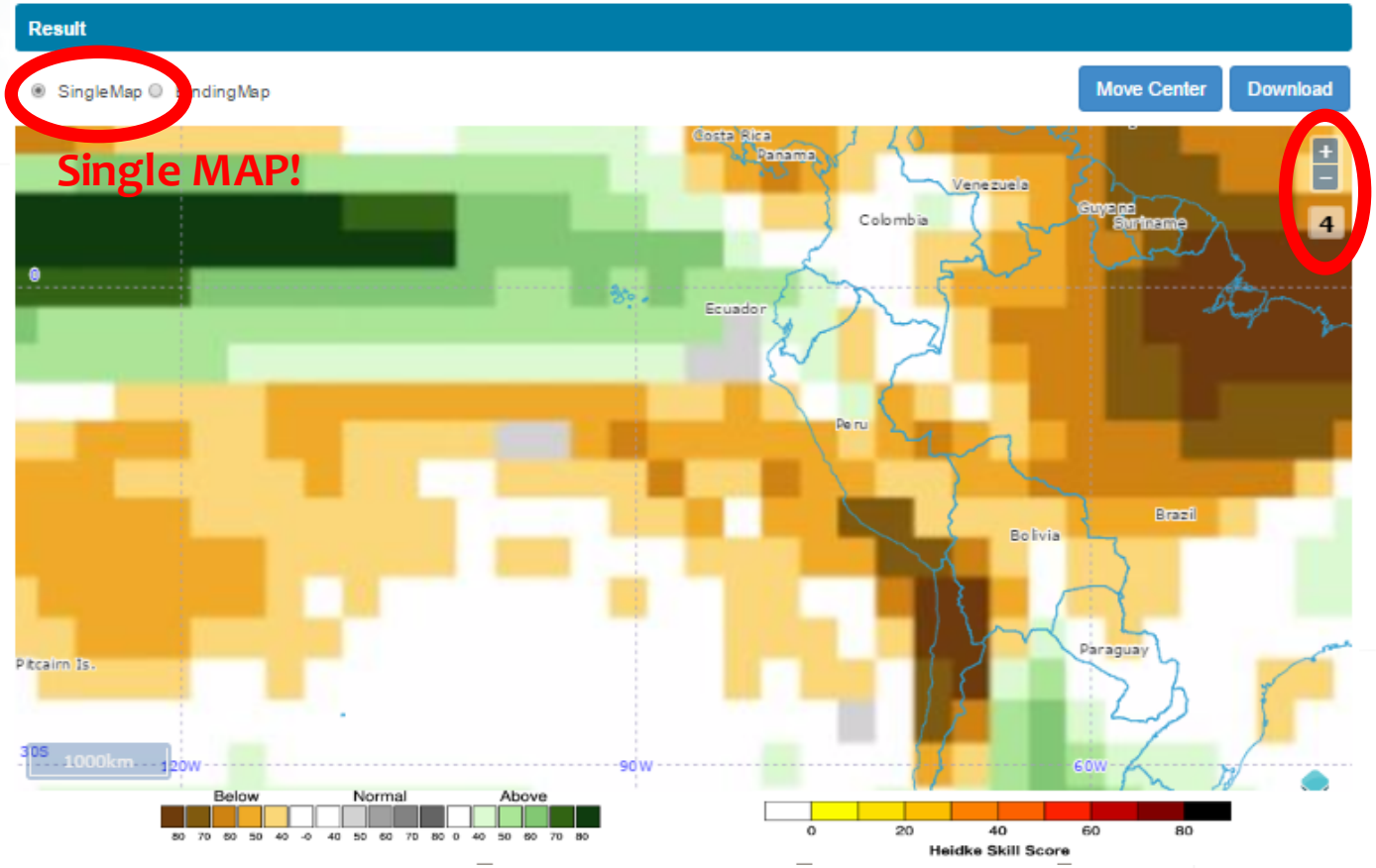
① **WHEN [2016/ASO]**
: 3-month lead prediction data is updating every month

② **Variables [PREC]**
: choose the target variable

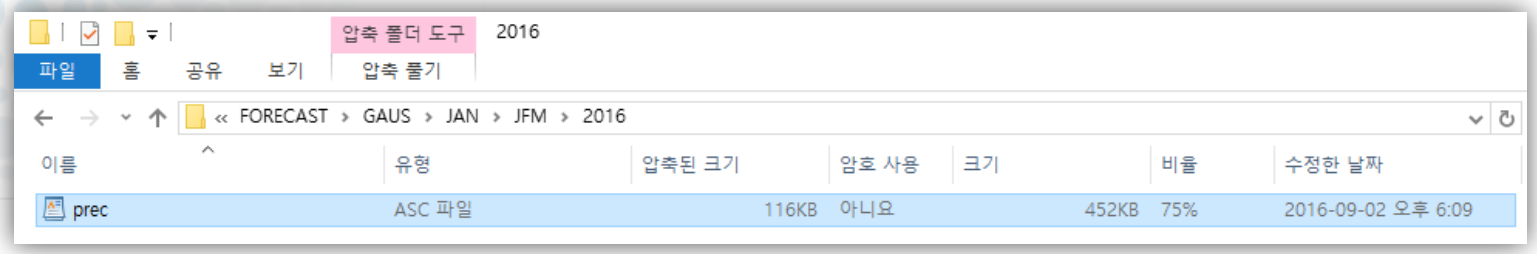
③ **Methods [Deterministic] → [Probabilistic]**
: 3 deterministic and 1 probabilistic MME methods

④ **Models [ALL]**
: (multiply) select GCM models for a MME prediction

Resultant Map - PMME



Getting quantities!



Near Lima (77° 1′ 42″ W, 12° 2′ 36″ S)?
(Longitude=282.5 , Latitude=-12.5)

Lev1 ➔ AN: 21.793%
Lev2 ➔ NN: 19.702%
Lev3 ➔ BN: 58.505%

	A	DF	DG	DH	DI	DJ	DK	DL	DM	DN	DO
1	[Variable=prec][MME method=GA										
2	[Longitude=]	270	272.5	275	277.5	280	282.5	285	287.5	290	292.
27	[time=2016JFM][lev=1][lat=-30]	36.3	31.36	31.069	32.757	41.142	39.178	41.117	39.612	18.901	27.35
28	[time=2016JFM][lev=1][lat=-27.5]	28.98	30.401	32.125	28.284	31.455	31.455	31.612	30.987	5.319	11.78
29	[time=2016JFM][lev=1][lat=-25]	27.037	32.969	35.901	24.146	28.892	23.13	25.393	26.878	4.007	1.80
30	[time=2016JFM][lev=1][lat=-22.5]	26.629	31.049	34.587	26.763	26.489	19.442	28.148	18.786	10.677	1.42
31	[time=2016JFM][lev=1][lat=-20]	28.546	30.569	34.608	24.901	27.047	34.803	36.43	22.759	0.45	4.76
32	[time=2016JFM][lev=1][lat=-17.5]	31.691	28.885	24.21	23.904	25.607	20.951	16.121	6.811	6.603	15.54
33	[time=2016JFM][lev=1][lat=-15]	27.154	19.474	17.056	33.504	22.718	20.087	10.689	14.163	28.759	38.04
34	[time=2016JFM][lev=1][lat=-12.5]	16.969	8.558	13.7	22.55	17.119	21.793	20.272	27.909	34.454	21.55
35	[time=2016JFM][lev=1][lat=-10]	6.408	3.541	12.715	13.748	21.542	23.107	28.936	24.33	15.466	16.82
36	[time=2016JFM][lev=1][lat=-7.5]	15.421	17.931	14.926	13.987	25.856	33.744	41.54	23.831	18.726	32.09
37	[time=2016JFM][lev=1][lat=-5]	45.661	47.88	31.218	18.833	29.443	43.165	34.931	29.926	34.759	33.57
38	[time=2016JFM][lev=1][lat=-2.5]	56.338	52.431	50.631	37.62	45.358	49.961	35.106	37.804	38.38	24.97
39	[time=2016JFM][lev=1][lat=0]	58.266	60.216	57.981	52.853	55.996	43.551	38.796	34.851	26.345	20.63
40	[time=2016JFM][lev=1][lat=2.5]	61.274	62.783	61.427	49.502	32.312	39.558	39.155	37.824	29.989	20.26
41	[time=2016JFM][lev=1][lat=5]	50.777	46.366	43.418	35.254	22.961	26.761	35.047	36.009	45.21	34.47
42	[time=2016JFM][lev=1][lat=7.5]	48.361	40.504	28.644	20.909	12.525	18.557	23.779	27.66	34.659	32.70
43	[time=2016JFM][lev=1][lat=10]	40.911	33.59	17.954	16.116	16.671	8.704	15.5	22.106	23.292	14.1
44	[time=2016JFM][lev=1][lat=12.5]	26.262	27.978	17.403	11.559	12.073	10.871	13.776	13.788	10.63	3.61
45	[time=2016JFM][lev=1][lat=15]	41.008	43.618	30.522	8.419	7.589	10.893	12.029	11.961	10.046	9.85

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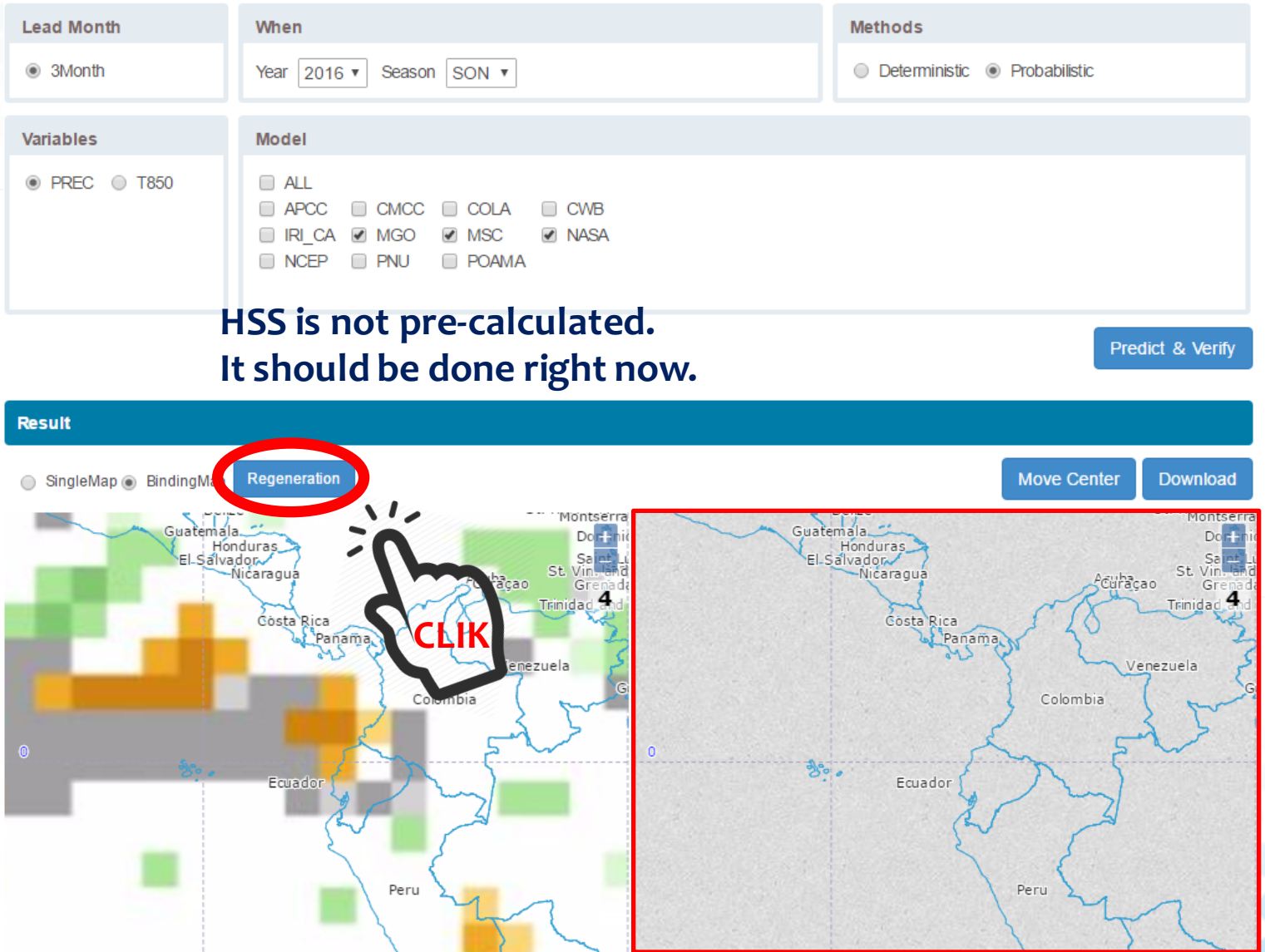
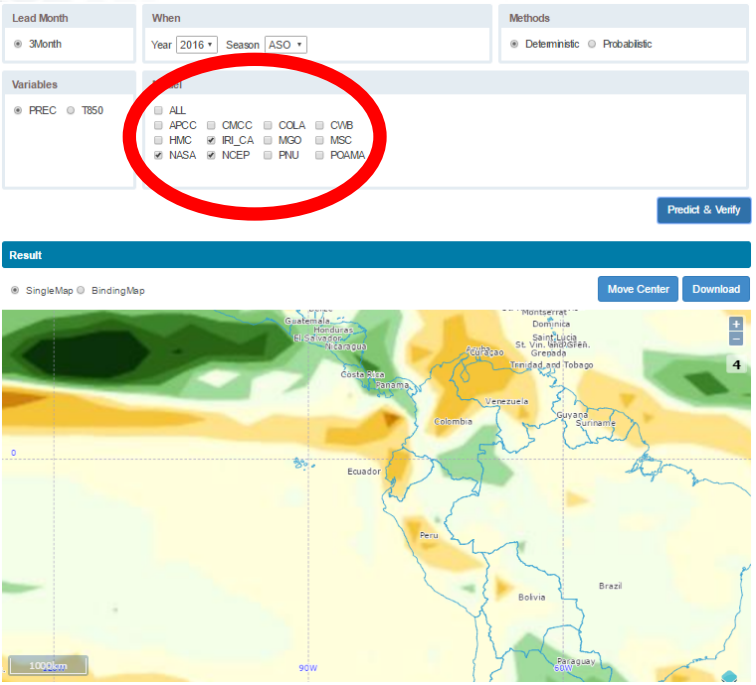
NO skill (HSS) map?

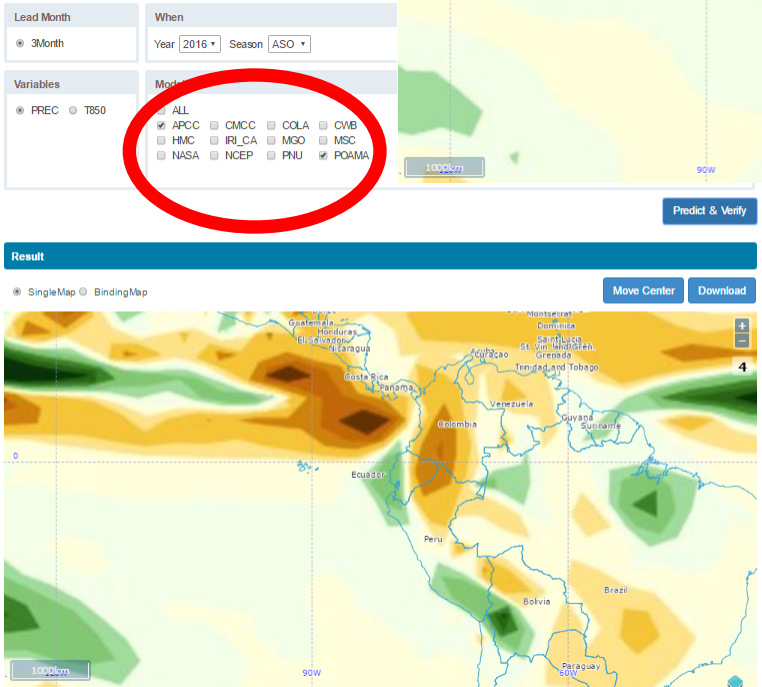


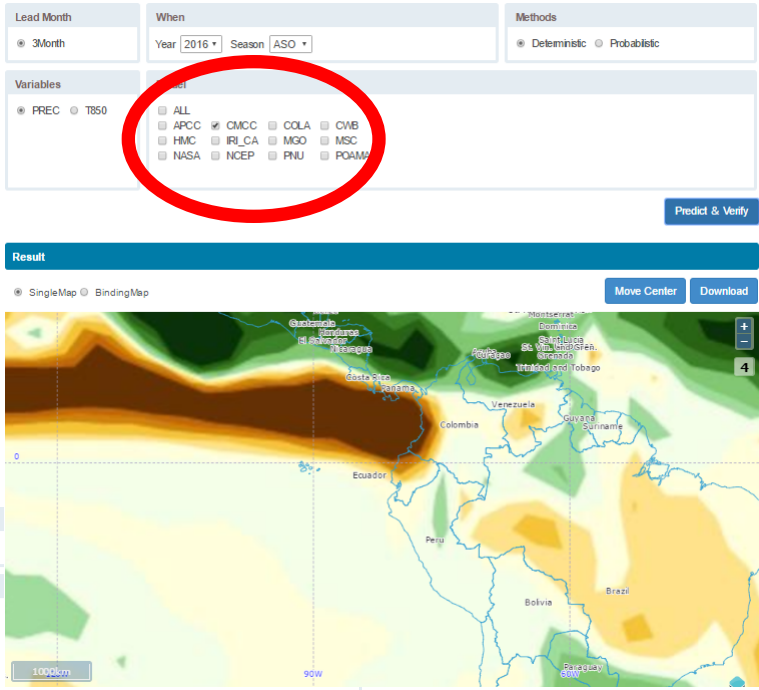
http://clik.apcc21.org

Prediction Uncertainty!

With different model combinations?



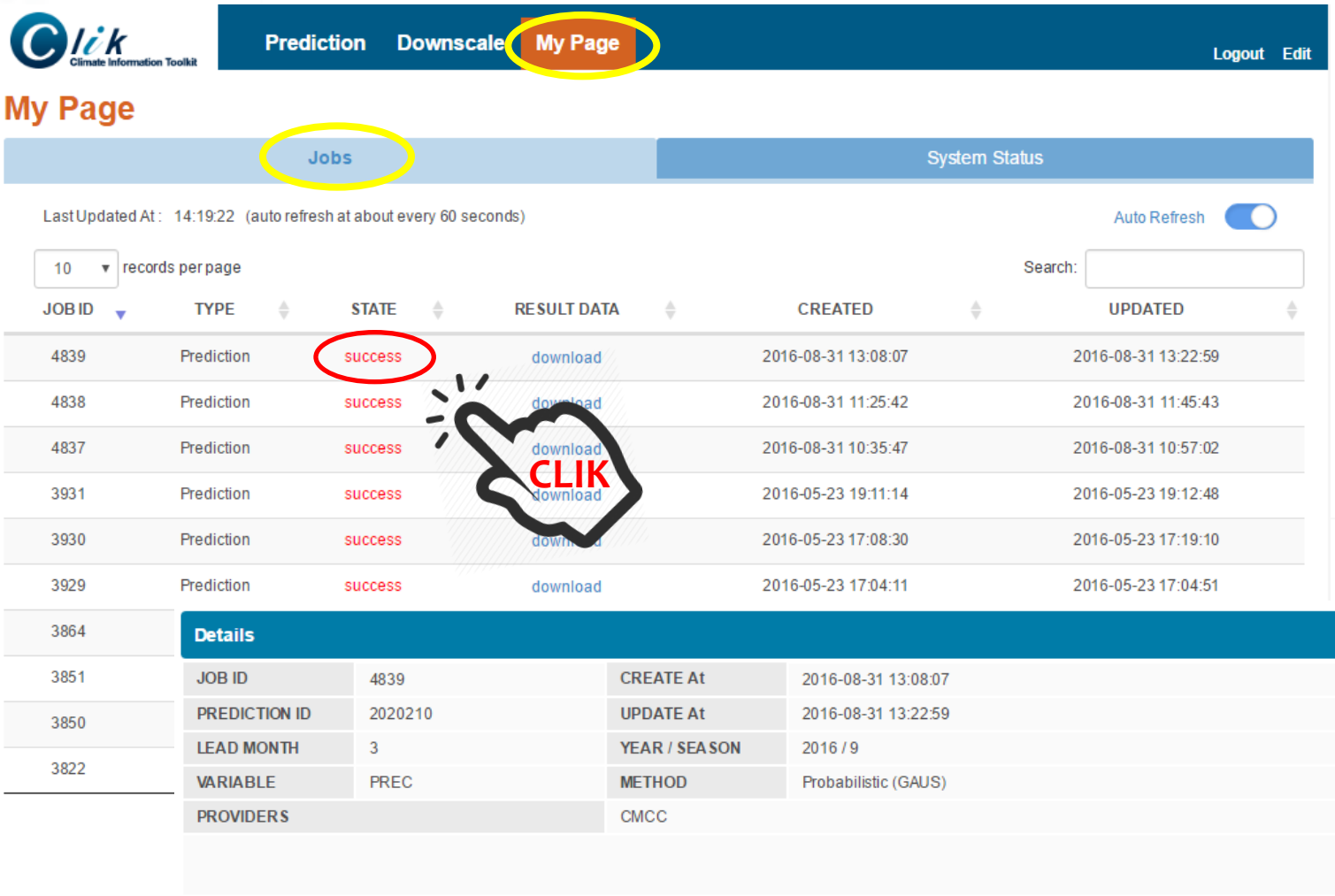




http://clik.apcc21.org

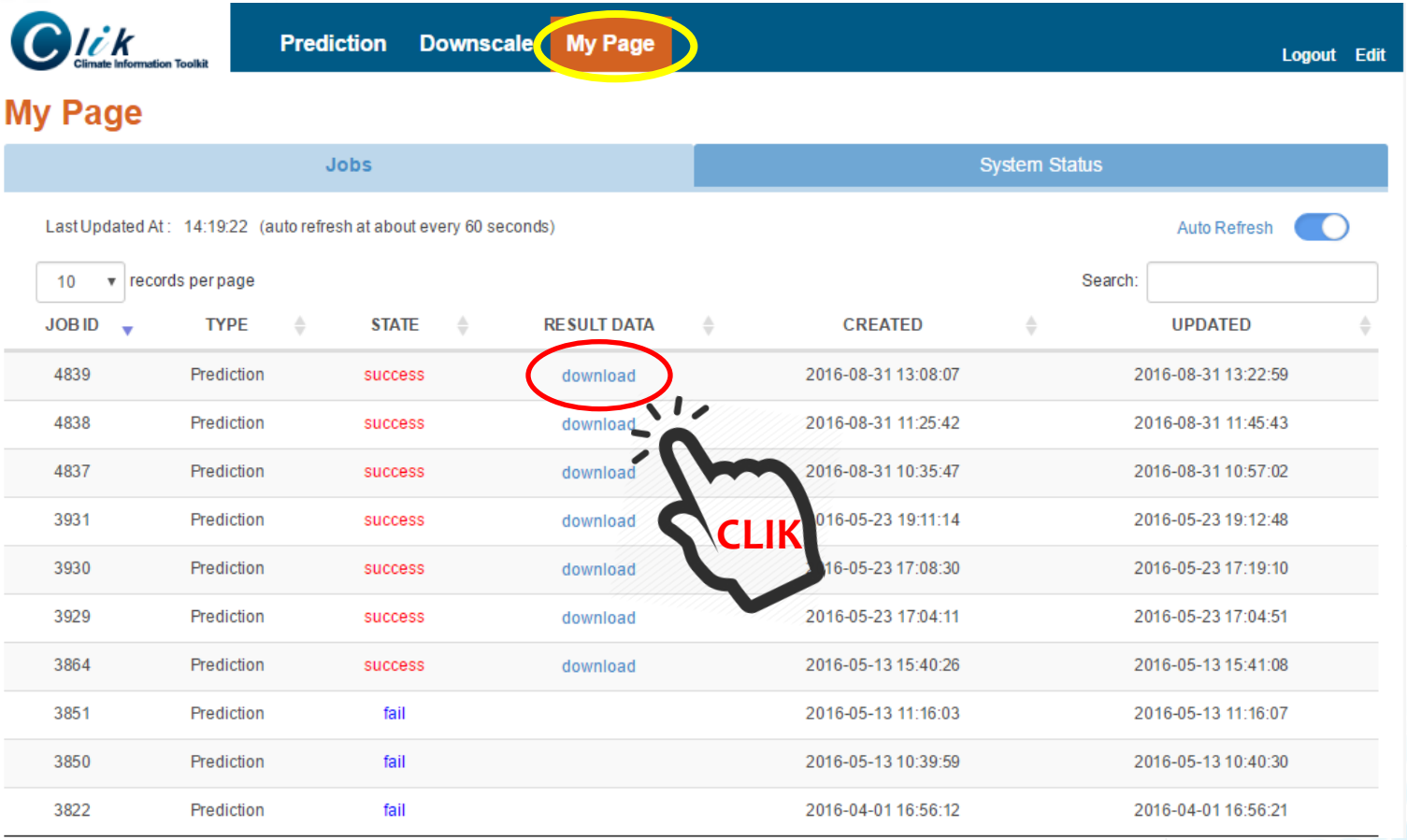
CLIK - My Page/Jobs

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



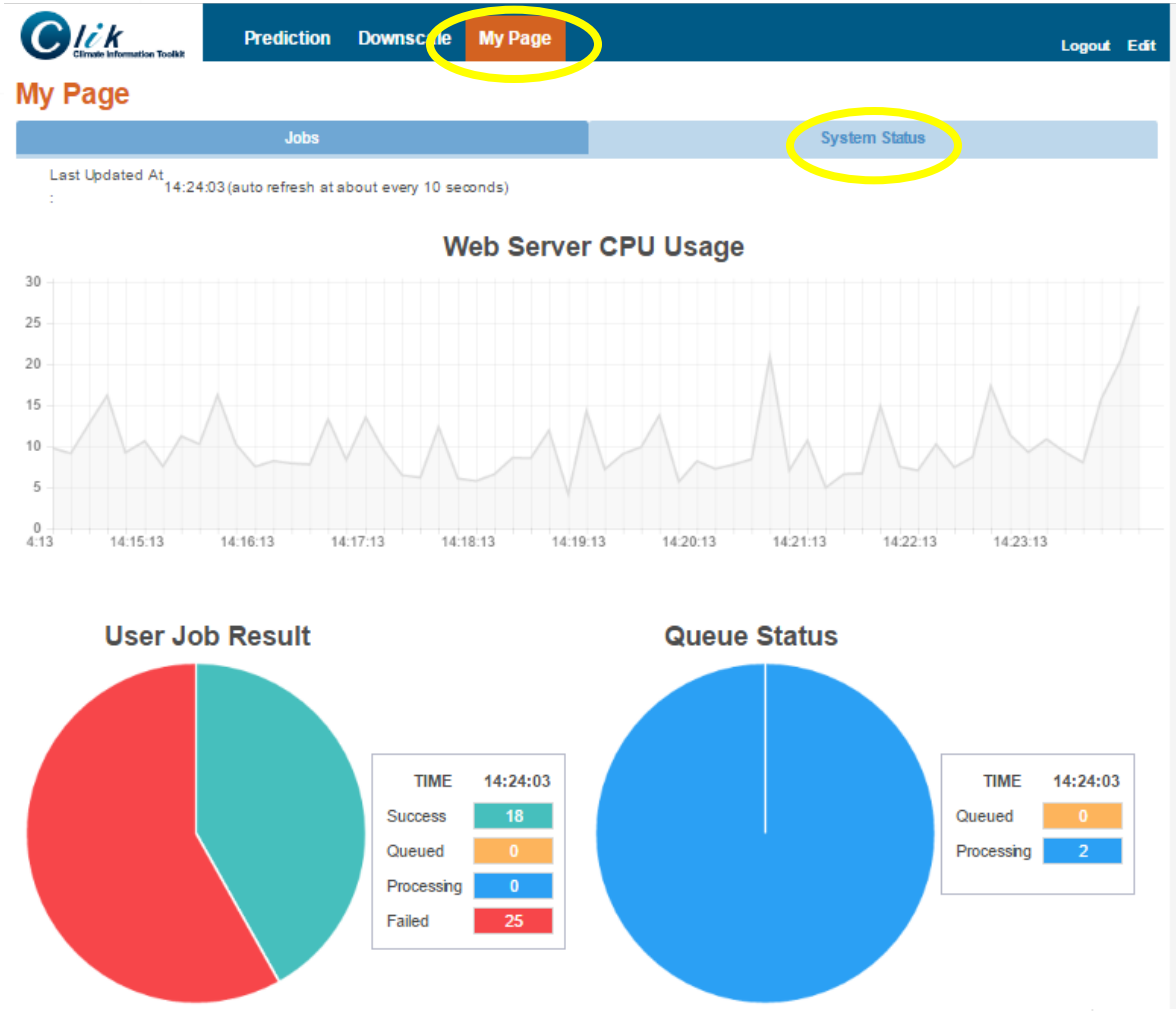
CLIK - My Page/Jobs

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



CLIK - My Page/System Status

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



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

Exercise1

Produce the 2016 SON forecast (PREC)

WHEN [2016/SON]
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 Lima (Longitude=282.5 , Latitude=-12.5).

How much PREC?

Exercise1

Produce the 2016 SON forecast (PREC)

WHEN [2016/SON]
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 Lima (Longitude=282.5 , Latitude=-12.5).

How much PREC? **0.074**

Exercise2

Produce the 2016 SON forecast (PREC)

WHEN [2016/SON]
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 Lima (Longitude=282.5 , Latitude=-12.5).

Probability in three tercile bins?

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

Exercise3

Produce the 2016 SON forecast (PREC)

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

→ 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 Lima (Longitude=282.5 , Latitude=-12.5).
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+POAMA			
CMCC			


Thank you.

Lev4?

Near Lima (77° 1′ 42″ W, 12° 2′ 36″ S)?
(Longitude=282.5 , Latitude=-12.5)

lev1 ➔ AN: 30.275%
lev2 ➔ NN: 35.08%
lev3 ➔ BN: 34.646%

lev4 ➔ final tercile category (drawn)
lev4 >100 : AN with (lev4-100)%
0 < lev4 < 100 : NN with lev4 %
lev4 <0 : BN with (-1)*lev4%

lev4 = 1E+20 : eq. chance (IDK)

	A	DJ	DK	DL	DM	DN	DO	DP	DQ	DR
1	[Variable=prec][MME method=GAU									
2	[Longitude=]	280	282.5	285	287.5	290	292.5	295	297.5	300
18	[time=2016ASO][lev=1][lat=-52.5]	35.55	37.384	38.266	41.39	45.761	26.169	21.592	20.855	20.741
19	[time=2016ASO][lev=1][lat=-50]	36.819	38.206	38.341	43.809	41.959	27.25	20.461	16.943	15.841
20	[time=2016ASO][lev=1][lat=-47.5]	41.685	38.95	37.957	40.161	38.158	32.799	19.093	13.689	16.903
21	[time=2016ASO][lev=1][lat=-45]	38.146	31.548	29.295	31.856	30.925	29.402	21.804	16.956	19.37
22	[time=2016ASO][lev=1][lat=-42.5]	31.545	25.755	23.7	24.519	24.109	30.445	25.905	18.803	19.783
23	[time=2016ASO][lev=1][lat=-40]	28.019	26.111	22.132	18.341	22.784	35.341	32.378	27.291	25.589
24	[time=2016ASO][lev=1][lat=-37.5]	26.778	21.643	17.902	16.701	21.362	37.787	37.724	34.343	33.878
25	[time=2016ASO][lev=1][lat=-35]	21.188	17.499	16.041	15.13	15.313	35.297	39.77	38.113	40.445
26	[time=2016ASO][lev=1][lat=-32.5]	19.453	17.148	15.503	10.858	13.225	36.951	43.891	42.386	43.316
27	[time=2016ASO][lev=1][lat=-30]	18.138	23.237	22.99	14.244	14.469	34.852	48.13	44.151	42.587
28	[time=2016ASO][lev=1][lat=-27.5]	24.898	31.26	26.933	20.094	17.424	28.172	50.199	45.868	43.551
29	[time=2016ASO][lev=1][lat=-25]	31.051	33.138	28.373	16.841	17.171	30.063	47.189	40.102	39.266
30	[time=2016ASO][lev=1][lat=-22.5]	29.658	28.932	25.431	21.356	25.472	26.762	45.766	35.742	31.555
31	[time=2016ASO][lev=1][lat=-20]	25.486	22.348	26.653	28.003	24.985	36.549	40.49	30.367	28.789
32	[time=2016ASO][lev=1][lat=-17.5]	22.374	22.637	24.991	25.464	36.277	40.171	33.9	26.954	23.758
33	[time=2016ASO][lev=1][lat=-15]	26.406	29.073	29.465	36.019	38.944	29.923	27.393	28.158	26.874
34	[time=2016ASO][lev=1][lat=-12.5]	30.098	30.275	31.122	24.683	23.178	24.34	35.779	30.524	28.035
35	[time=2016ASO][lev=1][lat=-10]	32.609	34.145	25.331	24.14	24.496	27.698	29.537	28.678	25.764
36	[time=2016ASO][lev=1][lat=-7.5]	30.958	28.829	33.805	28.904	27.996	27.418	28.017	28.405	28.484