

LBA-MIP: Preliminary Carbon Cycle Analysis

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LBA-MIP Workshop

02-03 May 2008



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But First-What About Data?

- Thanks to Gustavo (and Brad?) for preparing data
- Binary Data cube can be difficult to deal with
- Units/Variable names?
- What about netCDF?
 - Self-Descriptive data structure
 - Compatible with MATLAB, R
- Since I'm bringing this up, I'm offering to do some work



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Carbon Cycle Metrics

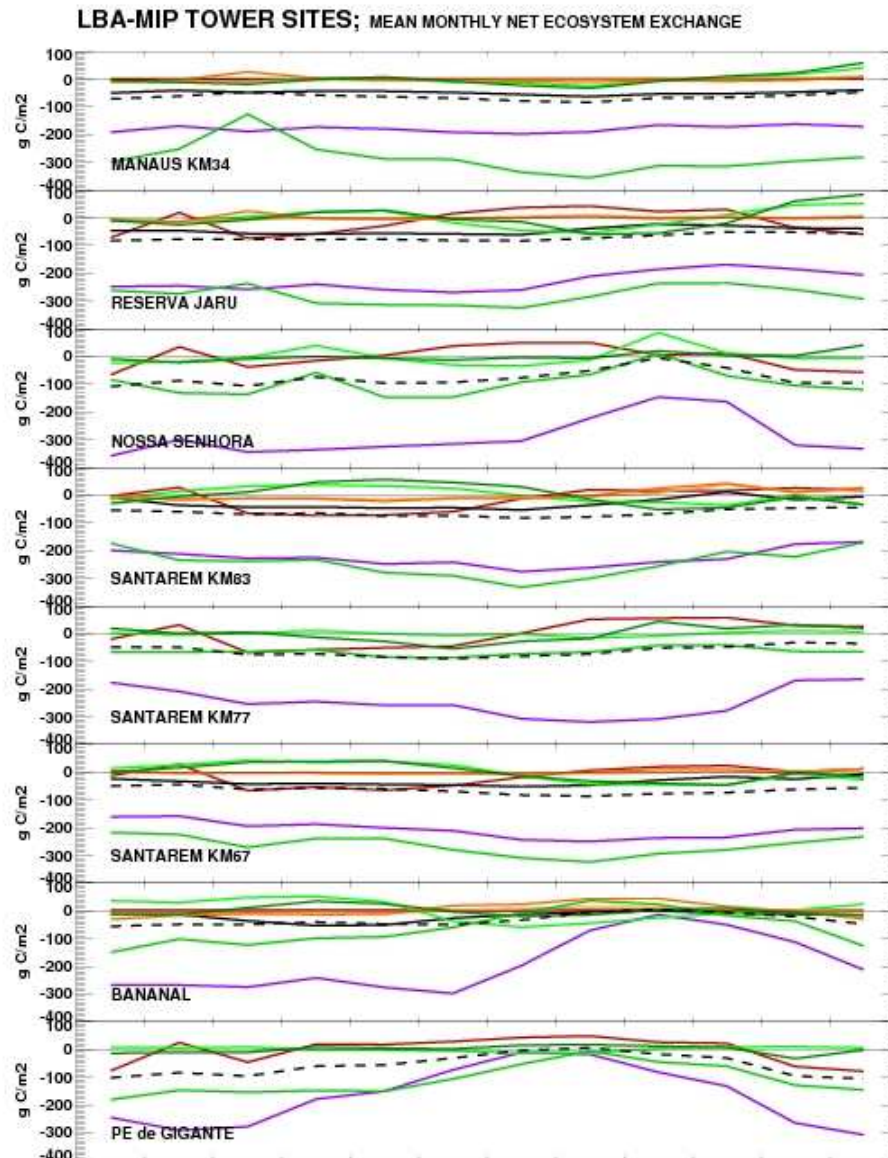
- Individual tower site and regional carbon cycle
 - Mean annual cycle (Salvador, 2007)
 - Diurnal Cycle
 - 'Synoptic' Scale variability
 - Interrannual variability
 - Biomass
 - Source/Sink?



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Mean Monthly NEE



COLOR TABLE

CLM3.0
CLM3.5
CLM3dp
CLM3gw
CLM3ootb
DGVM3.5
ibis
Noah_DV
Noah_STD
SiB_CASA
spa.c
spa.modis
SSiB2
SiB3

- This is what I showed in Salvador in 2007
- Can't do this kind of plot with 30 or more models participating...

This Time Around...

- More Models; 30 of them
- I did not evaluate mean annual cycles- we will want to revisit this
- Did not look at individual towers: lumped all towers together
- Have to be creative about visualization; suggestions?



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Observations: Availability of NEE data

- I have tower flux data, from an alternative source (use only for LBA-MIP, not generally released) that I've been using
- Natalia: reprocessed data?

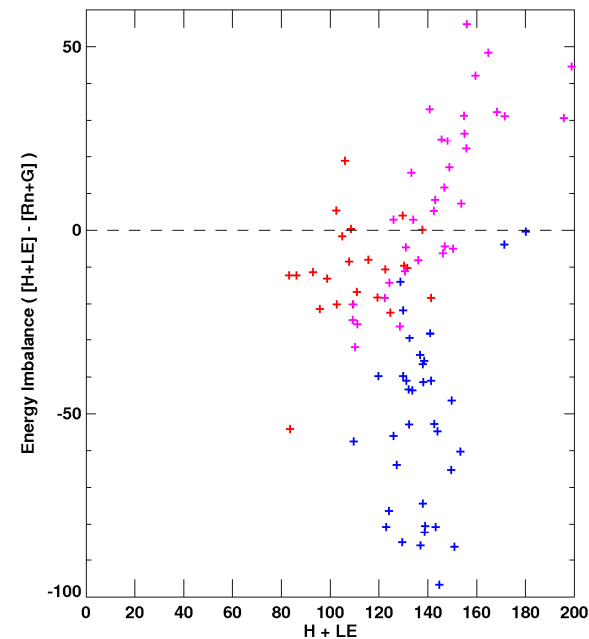


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Observations: Energy Balance

- Example: Forest Sites only
- Monthly mean H , LE , R_{net} , G
- Closure not good: this will affect analysis



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What Metrics/Statistics Should we use?

- Time constraints this week: NEE only
 - In Future, hope to use H, LE and BR to assist analysis
- Taylor Plots
- Simple Statistics Following Colello et al (1998)
 - SEE, NSEE
 - BIAS (slope), Intercept

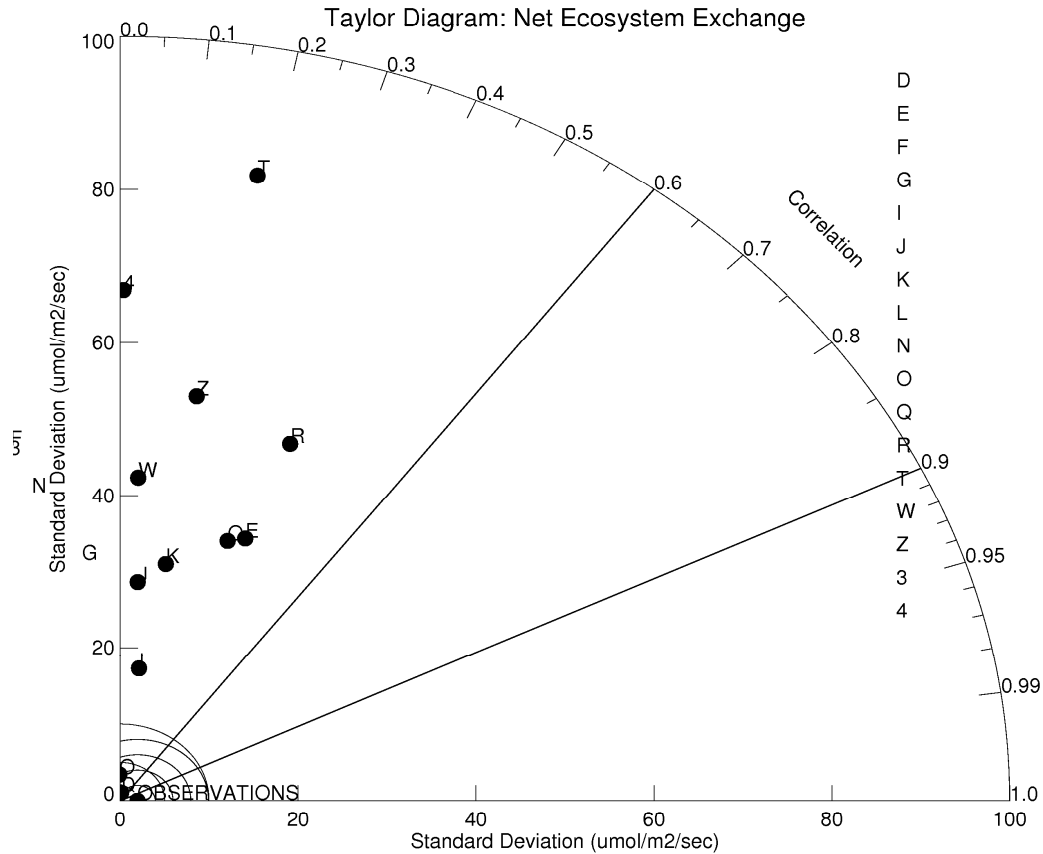


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Monthly Average (Seasonal Cycle, Interrannual Variability)

1	BIOMEBGC	D
2	SiB3	E
3	LPJ	F
4	HYLAND	G
5	SPASTD	I
6	SPAMOD	J
7	SPAPHEN	K
8	CLM35c	L
9	SiBCASA	N
10	ORCHIDEE	O
11	VISITC2	Q
12	VISITC3	R
13	IBIS	T
14	CLM3DP	W
15	NOAHDV	Z
16	LPJ2	3
17	LM3V	4

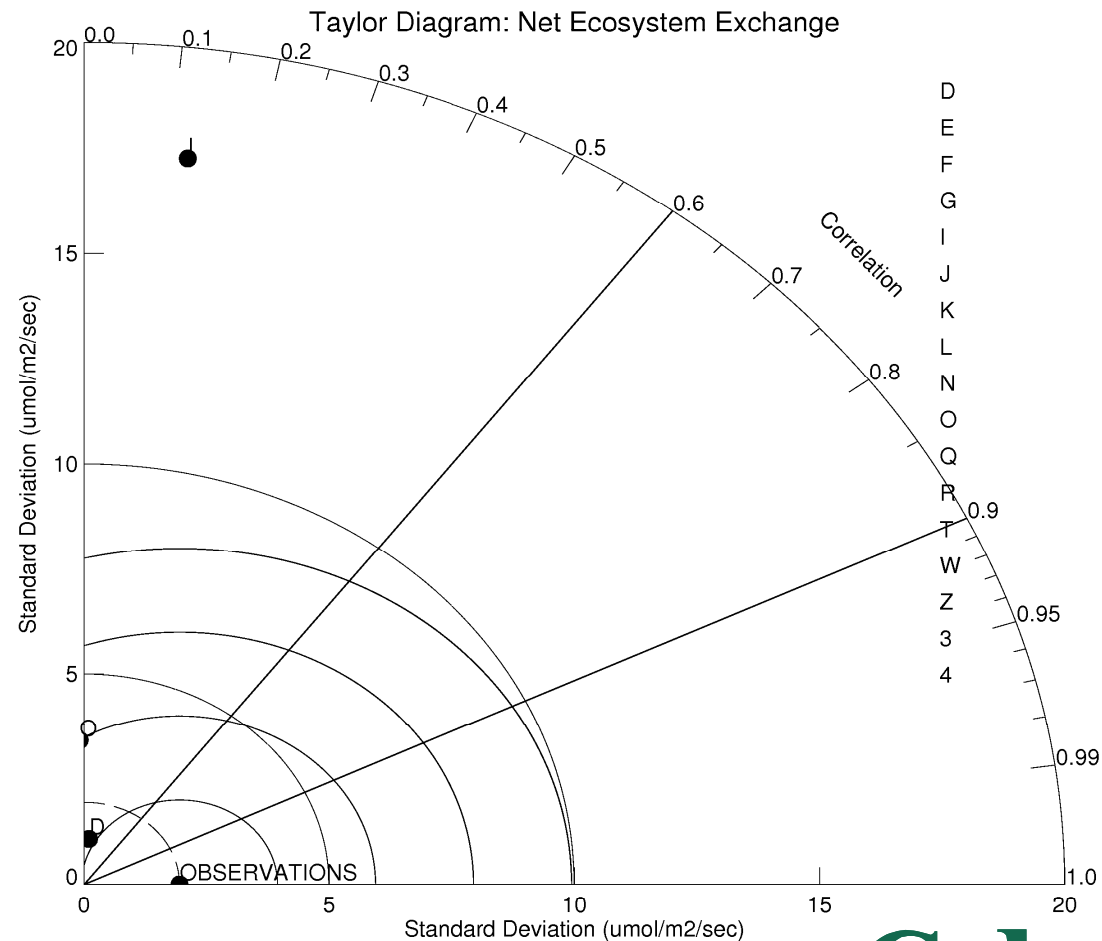


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Monthly Average (continued)

- 1 BIOMEBGC D
- 2 SiB3 E
- 3 LPJ F
- 4 HYLAND G
- 5 SPASTD I
- 6 SPAMOD J
- 7 SPAPHEN K
- 8 CLM35c L
- 9 SiBCASA N
- 10 ORCHIDEE O
- 11 VISITC2 Q
- 12 VISITC3 R
- 13 IBIS T
- 14 CLM3DP W
- 15 NOAHDV Z
- 16 LPJ2 3
- 17 LM3V 4



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Simple Statistics: monthly means

MODEL	# POINTS	SEE	NSEE	BIAS	INTER
BIOMEBGC	82	1.5577	1.1305	0.1837	0.0355
SiB3	123	37.0487	16.7977	7.2989	0.0284
LPJ	125	56.7548	25.9344	-6.4491	21.4346
HYLAND	126	32.2071	14.7524	-2.2505	-3.3153
SPASTD	83	17.2219	12.4959	3.929	2.7634
SPAMOD	83	28.8783	20.9535	3.6586	4.7002
SPAPHEN	83	31.1578	22.6074	9.53	3.1326
CLM35c	81	345.3792	250.2142	18.0272	-287.6833
SiBCASA	124	59.0709	26.888	-5.15	-46.9551
ORCHIDEE	126	4.0024	1.8333	-0.0472	-0.7492
VISITC2	126	48.0793	22.0226	6.2576	-26.9351
VISITC3	126	66.0819	30.2687	9.9027	-34.2068
IBIS	126	88.3198	40.4547	8.002	35.9647
CLM3DP	124	43.486	19.7941	1.0502	-8.9918
NOAHDV	126	236.9593	108.5387	4.4579	-225.6267
LPJ2	125	56.2881	25.7212	-6.4705	22.4831
LM3V	126	67.3818	30.8641	0.1871	4.4816

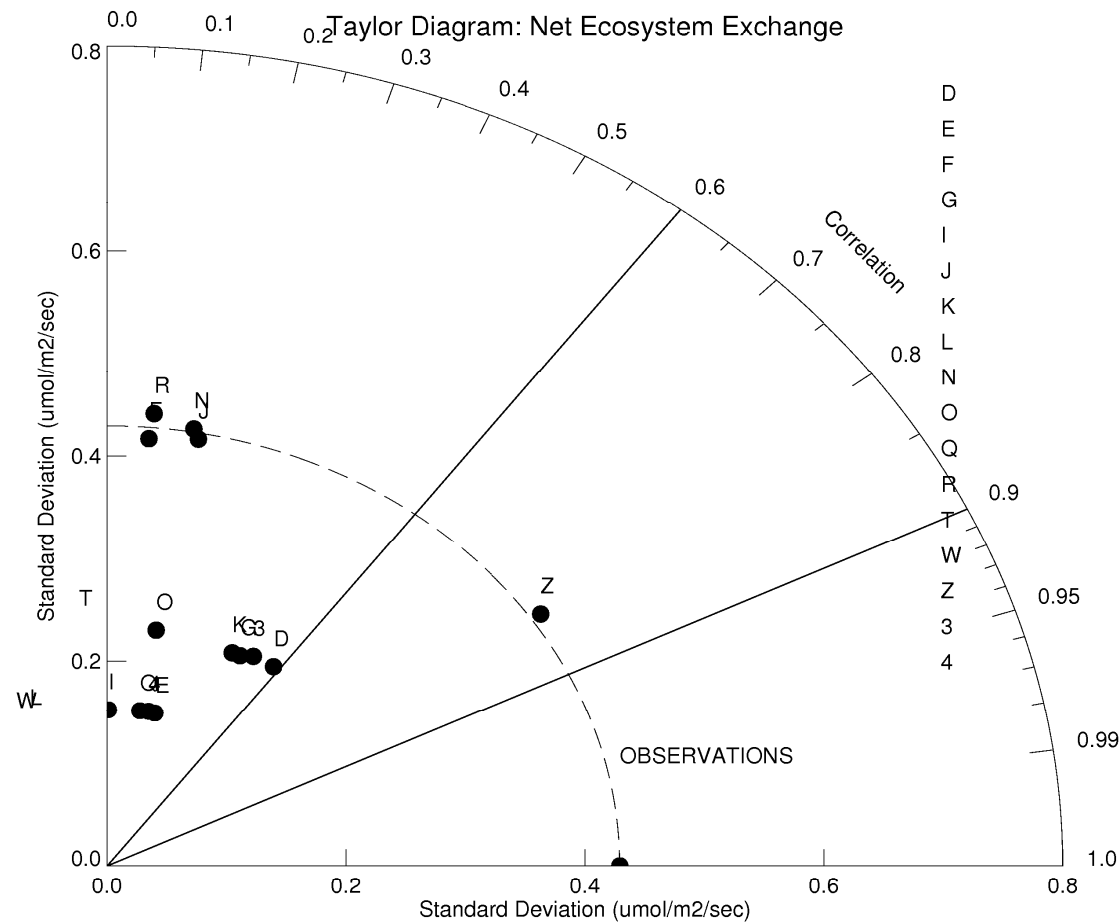


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Aggregation: Daily

- 1 BIOMEBGC D
- 2 SiB3 E
- 3 LPJ F
- 4 HYLAND G
- 5 SPASTD I
- 6 SPAMOD J
- 7 SPAPHEN K
- 8 CLM35c L
- 9 SiBCASA N
- 10 ORCHIDEE O
- 11 VISITC2 Q
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- 16 LPJ2 3
- 17 LM3V 4



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Stats: Daily

MODEL	# POINTS	SEE	NSEE	BIAS	INTER
BIOMEBGC	2814	17.8338	5.4775	-2.8032	-0.2041
SiB3	11904	7.9403	1.0923	-0.1455	-0.9174
LPJ	11904	7.2626	0.9991	0.0042	-0.0339
HYLAND	2738	3.5551	1.008	0.0003	0.0009
SPASTD	11896	7.2806	1.0015	0.0418	0.1746
SPAMOD	2814	17.9972	4.8472	-2.1476	-0.2333
SPAPHEN	10805	7.1374	1.005	0.0709	0.3844
CLM35c	8252	6.5291	1.0111	-0.0123	-0.0502
SiBCASA	7517	6.7143	1.0596	-0.0436	0.038
ORCHIDEE	8252	6.5447	1.0135	-0.0178	-0.1344
VISITC2	9338	8.3718	1.2697	1.1986	-1.8641
VISITC3	11898	6.3798	0.8777	0.0605	-0.8623
IBIS	11904	7.2595	0.9987	0.0007	-0.0075
CLM3DP	11904	6.601	0.9081	0.0955	-0.2476

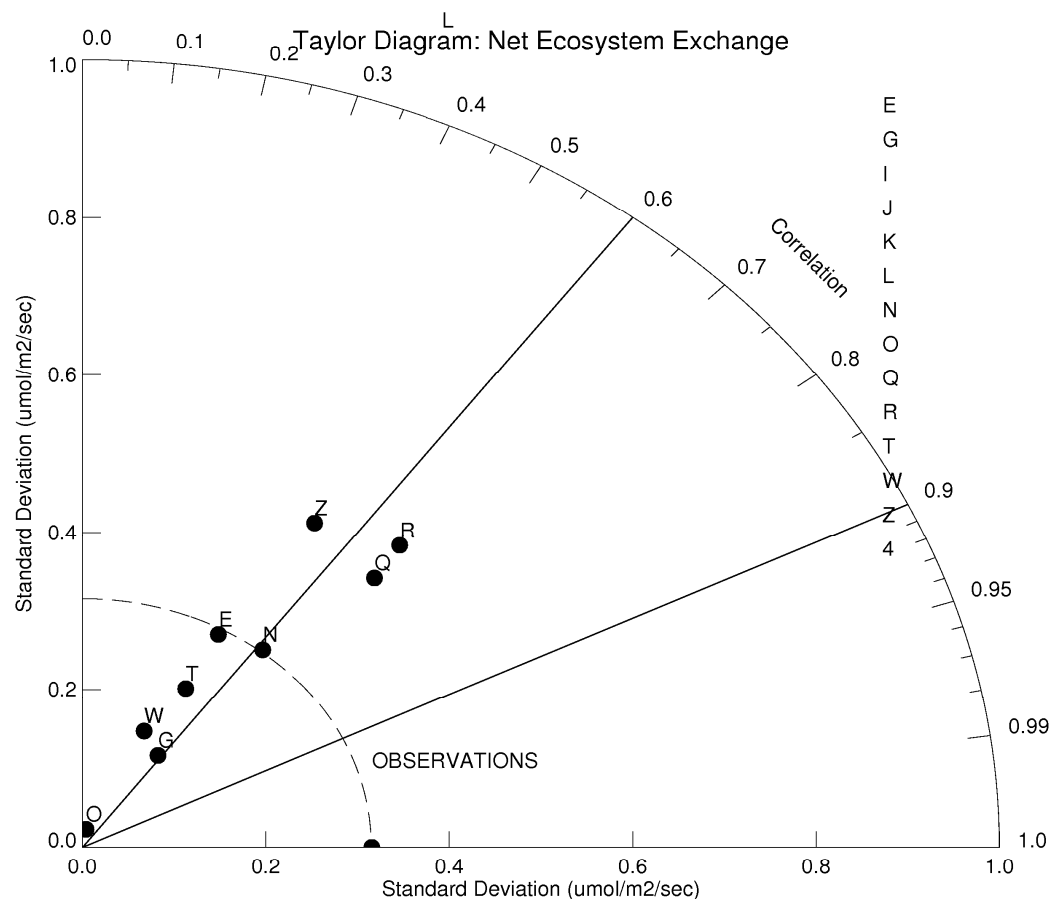


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Hourly Samples: Diurnal Cycle

1	SiB3	E
2	HYLAND	G
3	SPASTD	I
4	SPAMOD	J
5	SPAPHEN	K
6	CLM35c	L
7	SiBCASA	N
8	ORCHIDEE	O
9	VISITC2	Q
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Still more stats: hourly

MODEL	# POINTS	SEE	NSEE	BIAS	INTER
SiB3	133841	0.3178	1.0054	0.4702	0.0011
HYLAND	133853	0.2612	0.8264	0.2609	0.0058
SPASTD	110031	0.5291	1.651	-0.5181	-0.0054
SPAMOD	110031	0.5523	1.7235	-0.558	-0.0053
SPAPHEN	110031	0.5579	1.7409	-0.5601	-0.0077
CLM35c	110016	1.0237	3.1949	1.4653	-0.1634
SiBCASA	133842	0.2782	0.8801	0.623	-0.0282
ORCHIDEE	133853	0.3131	0.9906	0.012	-0.0004
VISITC2	133853	0.342	1.0818	1.0089	-0.0104
VISITC3	133853	0.3854	1.2192	1.0963	-0.021
IBIS	133853	0.288	0.9111	0.3573	0.0242
CLM3DP	133842	0.2885	0.9127	0.213	-0.0077
NOAHDV	133853	0.4505	1.4251	0.8023	-0.1747
LM3V	133853	0.6021	1.9047	-0.6652	-0.0044



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Some Impressions/thoughts

- No Single Model Dominated-that's good
- Stratification:
 - Model Physics
 - Model Performance
 - Tower characteristics



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