Summary of the fitted operating models

ABT-MSE

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OM design

Factor 1: Future Recruitment

1: West - Hockey stick, East - '83+ B-H h=0.98
2: West - B-H h estimated, East - '83+ B-H h=0.7
3: West - Hockey stock changes to B-H after 10 yrs, East - 83+ B-H with h=0.98 changes to '50-82 B-H with h=0.98 after 10 years

Factor 2: Current Abundance

A: West - Best estimates of SSB
B: Western Area SSB matches VPA
C: Eastern Area SSB inc as VPA

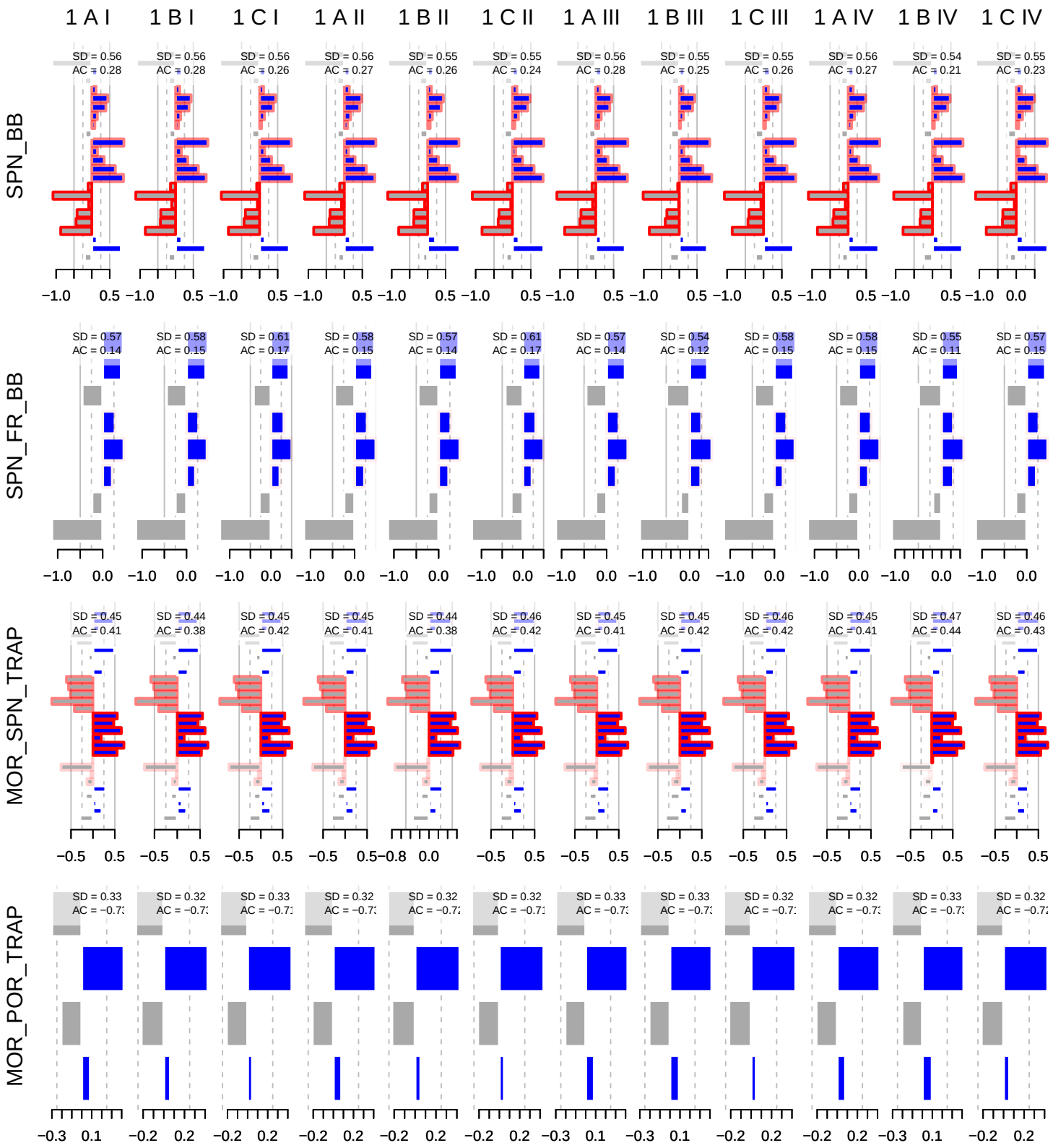
Factor 3: Natural Mortality / Maturity

I: Younger spawning, High M
II: Younger spawning, Low M
III: Older spawning, High M
IV: Older spawning, Low M

Design matrix

OM No.	Future Recruitment	Current Abundance	Maturity / M
1	1	A	I
2	2	A	I
3	3	A	I
4	1	B	I
5	2	B	I
6	3	B	I
7	1	C	I
8	2	C	I
9	3	C	I
10	1	A	II
11	2	A	II
12	3	A	II
13	1	B	II
14	2	B	II
15	3	B	II
16	1	C	II
17	2	C	II
18	3	C	II
19	1	A	III
20	2	A	III
21	3	A	III
22	1	B	III
23	2	B	III
24	3	B	III
25	1	C	III
26	2	C	III
27	3	C	III
28	1	A	IV
29	2	A	IV
30	3	A	IV
31	1	B	IV
32	2	B	IV
33	3	B	IV
34	1	C	IV
35	2	C	IV
36	3	C	IV

Residuals in indices

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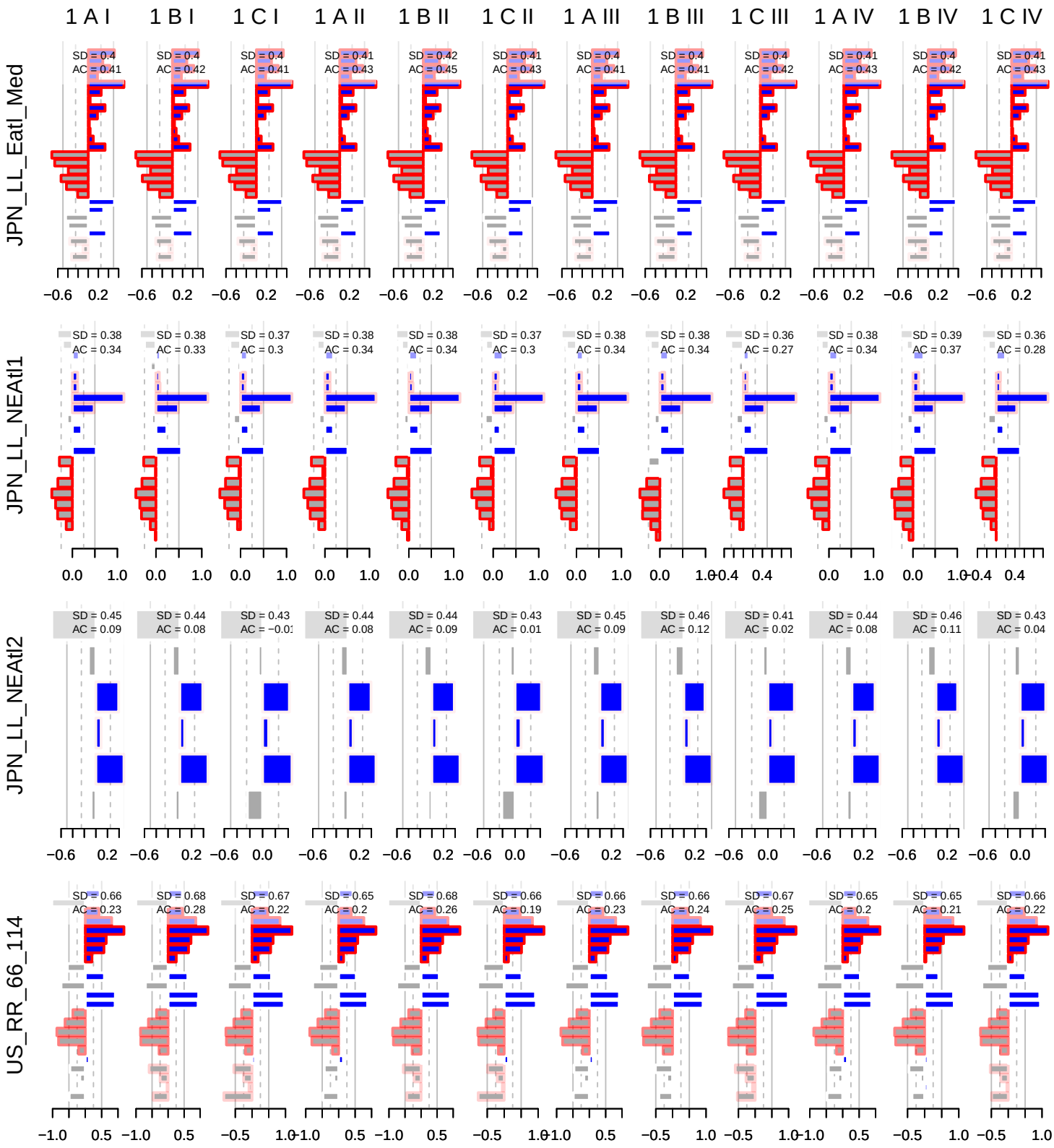
1 A I
1 B I
1 C I
1 A II
1 B II
1 C II
1 A III
1 B III
1 C III
1 A IV
1 B IV
1 C IV
JPN_LL_EatI_Med
JPN_LL_NEAtl1
JPN_LL_NEAtl2
US_RR_66_114

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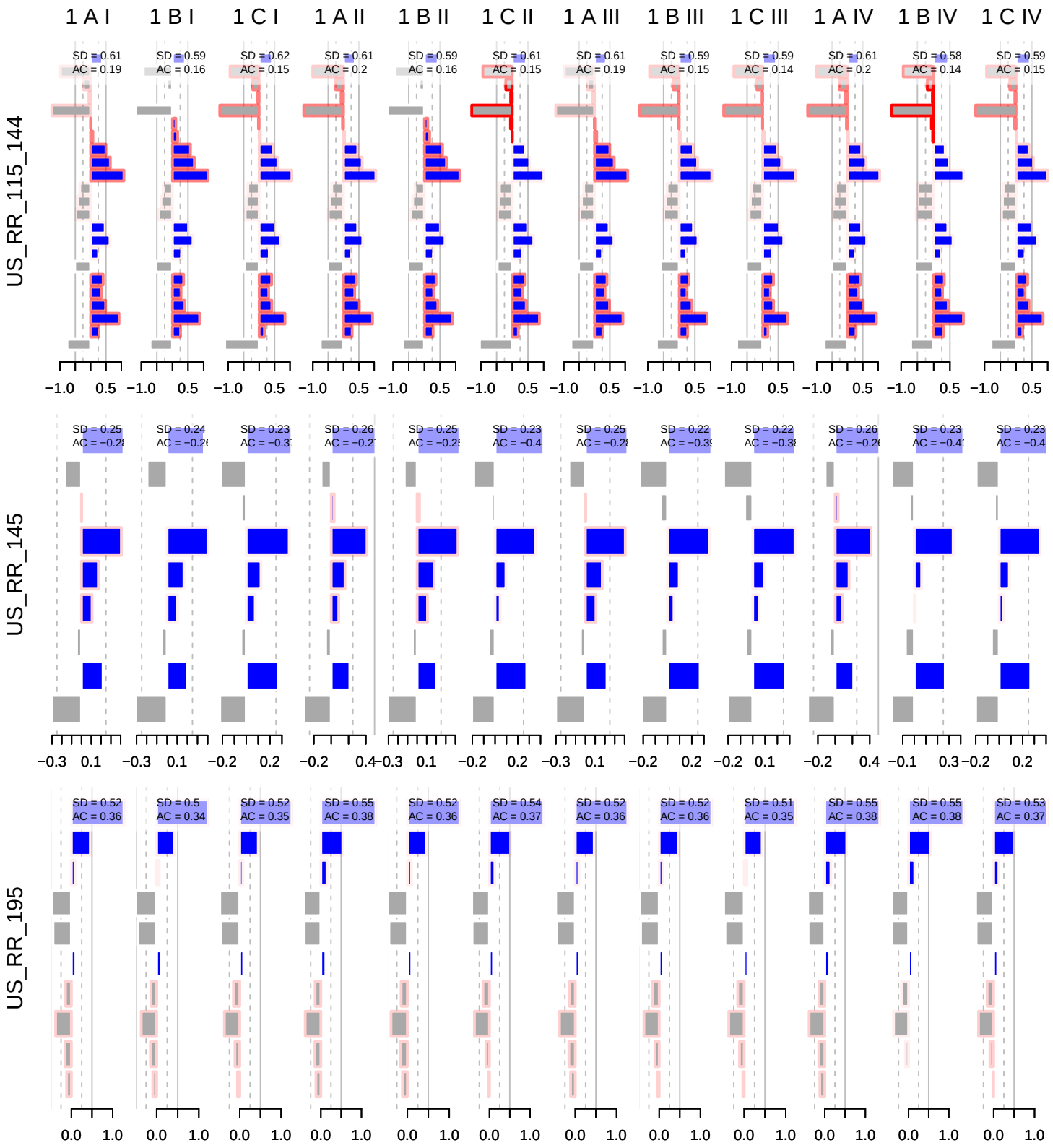
1 A I
1 B I
1 C I
1 A II
1 B II
1 C II
1 A III
1 B III
1 C III
1 A IV
1 B IV
1 C IV
US_RR_115_144
US_RR_145
US_RR_195

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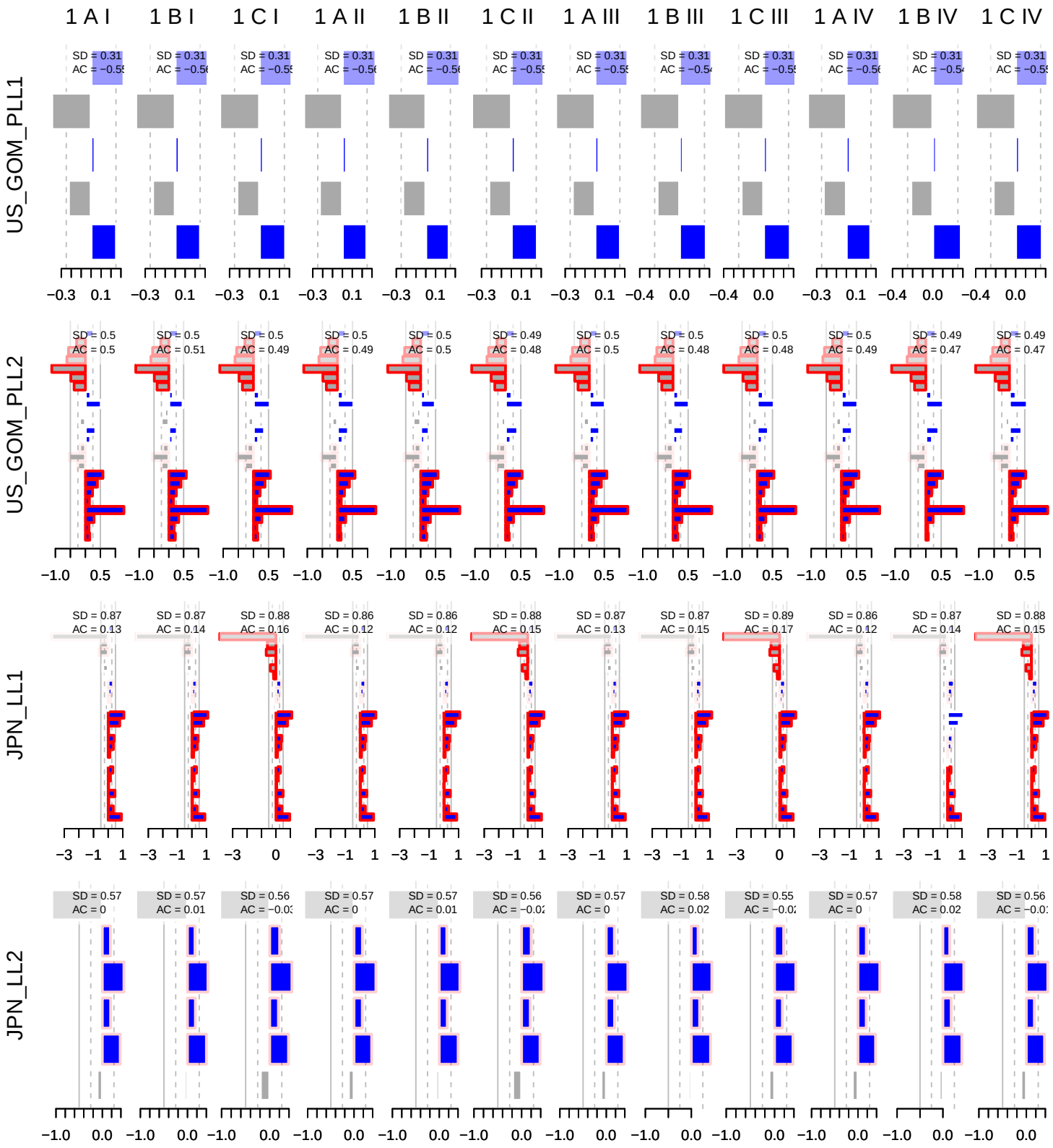
1 A I
1 B I
1 C I
1 A II
1 B II
1 C II
1 A III
1 B III
1 C III
1 A IV
1 B IV
1 C IV
US_GOM_PLL1
US_GOM_PLL2
JPN_LL1
JPN_LL2

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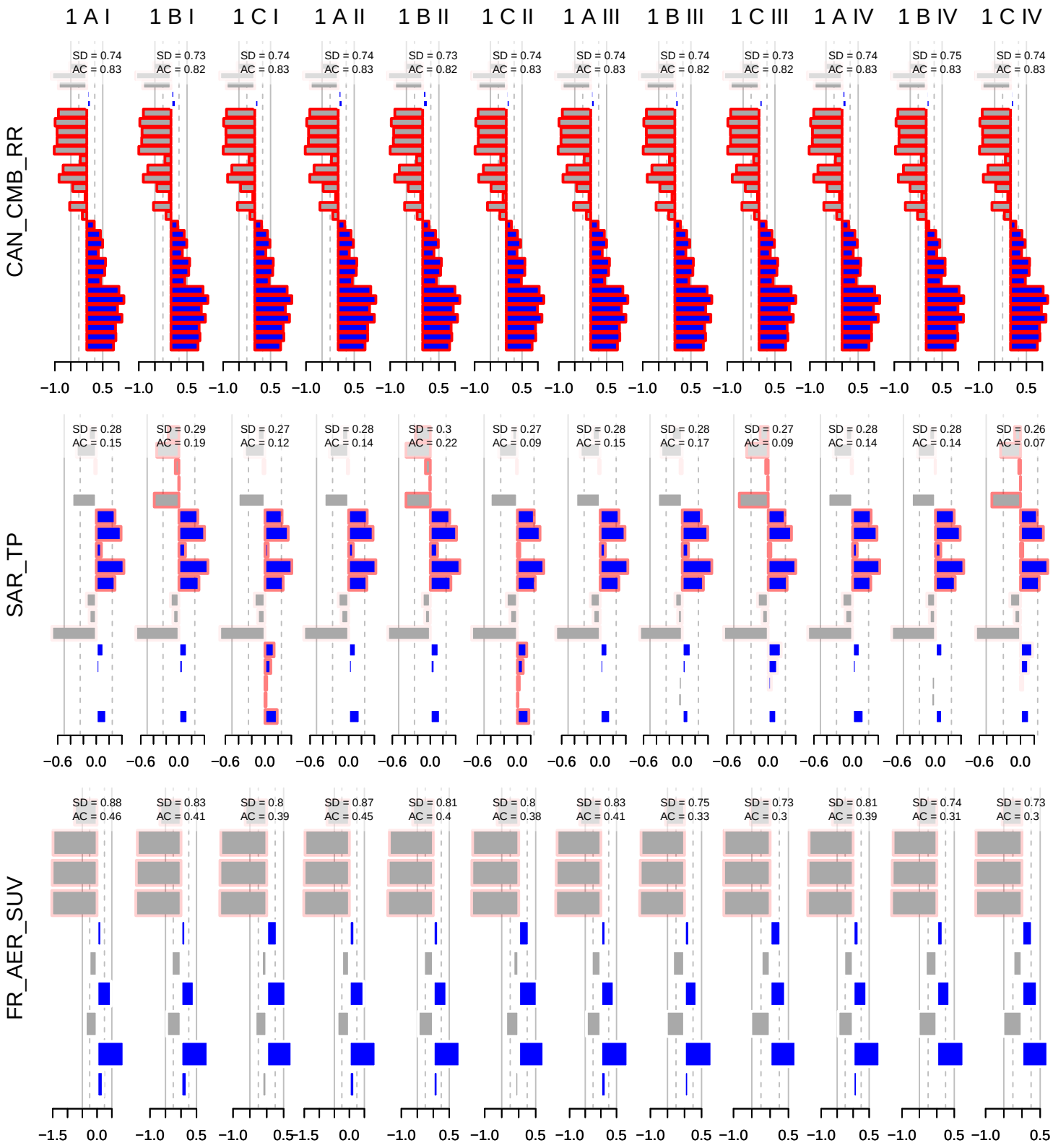


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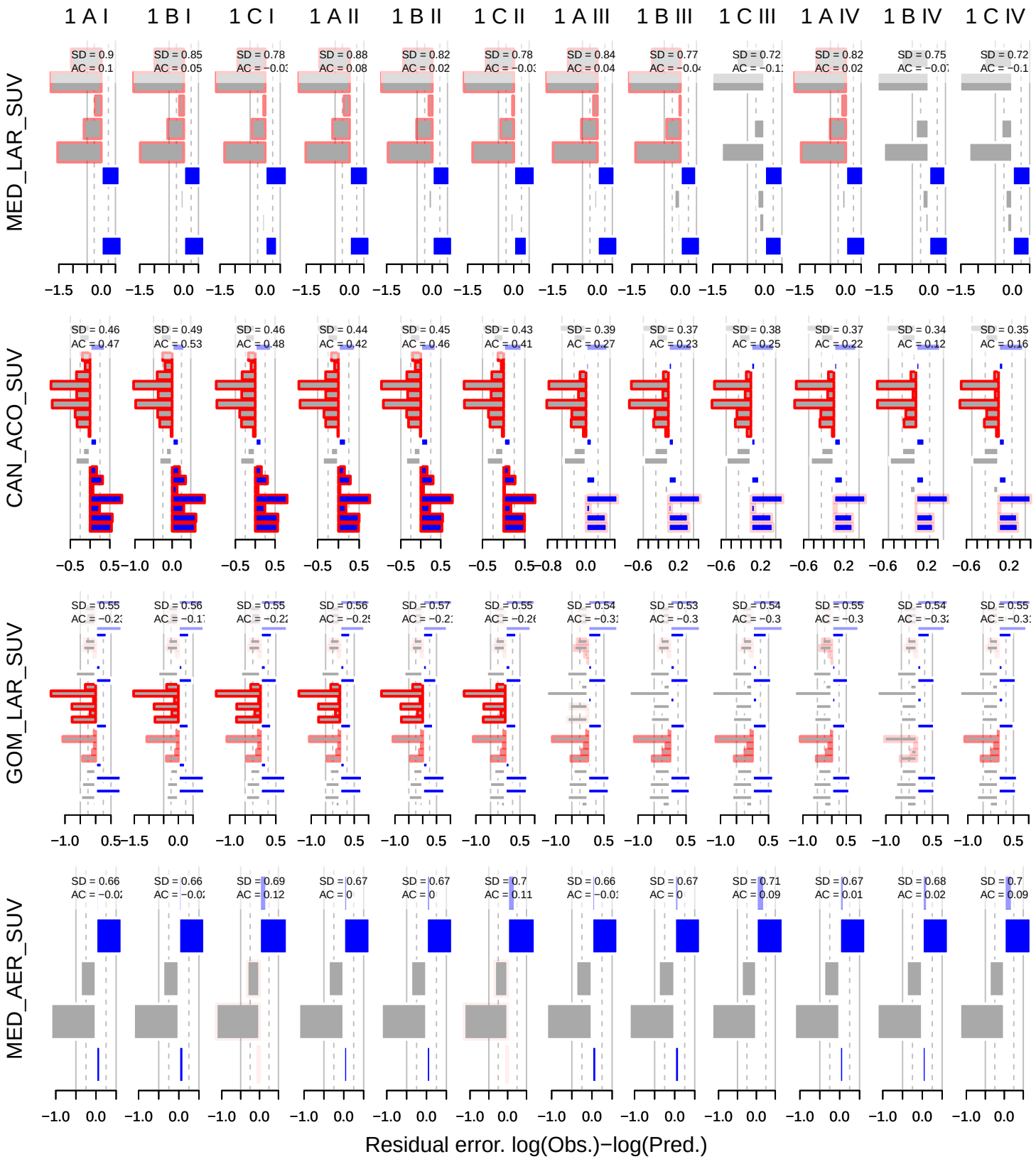

1 A I
1 B I
1 C I
1 A II
1 B II
1 C II
1 A III
1 B III
1 C III
1 A IV
1 B IV
1 C IV
MED_LAR_SUV
CAN_ACO_SUV
GOM_LAR_SUV
MED_AER_SUV
Residual error. log(Obs.)−log(Pred.)

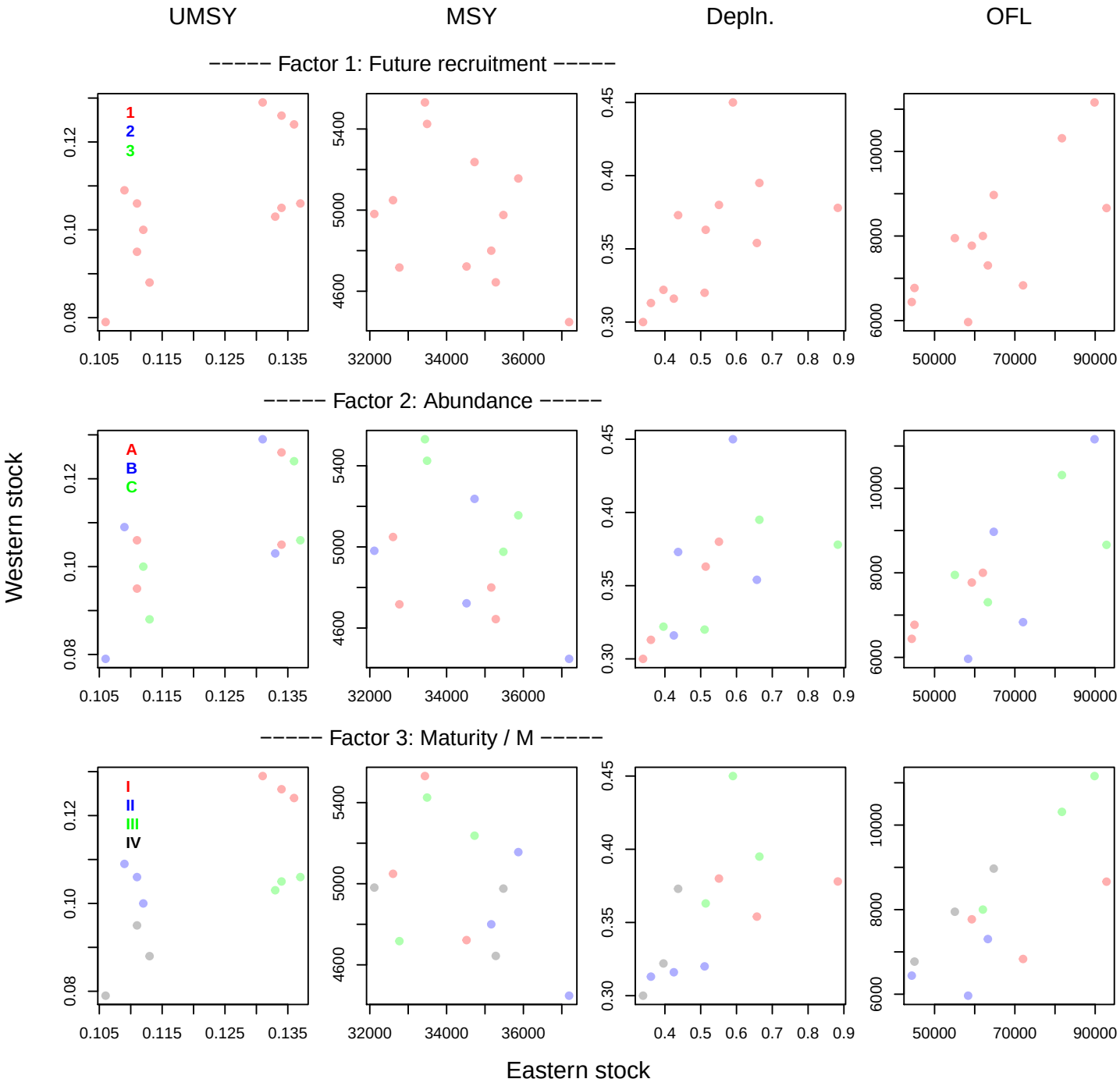
Model estimates / reference points for Eastern stock

OM	MSY	FMSYa	UMSY	BMSY	SSBMSY	BMSY_B0	SSBrel	recMSY	D	Dep	SSB	OFL
1	32605	0.277	0.134	244111	217423	0.304	0.278	0.963	0.507	0.551	394007	59278
4	34520	0.31	0.131	262779	234704	0.31	0.284	0.962	0.608	0.657	491194	72043
7	33436	0.264	0.136	245120	217755	0.299	0.272	0.965	0.807	0.883	606383	92832
10	35163	0.149	0.111	317989	296088	0.31	0.29	0.98	0.338	0.361	371817	44324
13	37190	0.151	0.109	340547	317520	0.315	0.294	0.975	0.4	0.425	499195	58358
16	35868	0.142	0.112	319035	296418	0.302	0.282	0.981	0.475	0.511	524929	63278
19	32771	0.279	0.134	244228	185949	0.304	0.249	0.968	0.474	0.514	352464	62033
22	34728	0.209	0.133	261131	198600	0.298	0.243	0.955	0.548	0.59	513767	89846
25	33492	0.268	0.137	243756	184201	0.298	0.242	0.971	0.613	0.664	450784	81725
28	35281	0.15	0.111	317545	266656	0.31	0.27	0.983	0.318	0.339	340483	45006
31	32118	0.124	0.106	301929	254350	0.307	0.268	0.968	0.413	0.437	514510	64740
34	35479	0.141	0.113	314764	263064	0.302	0.261	0.984	0.371	0.396	407162	55052

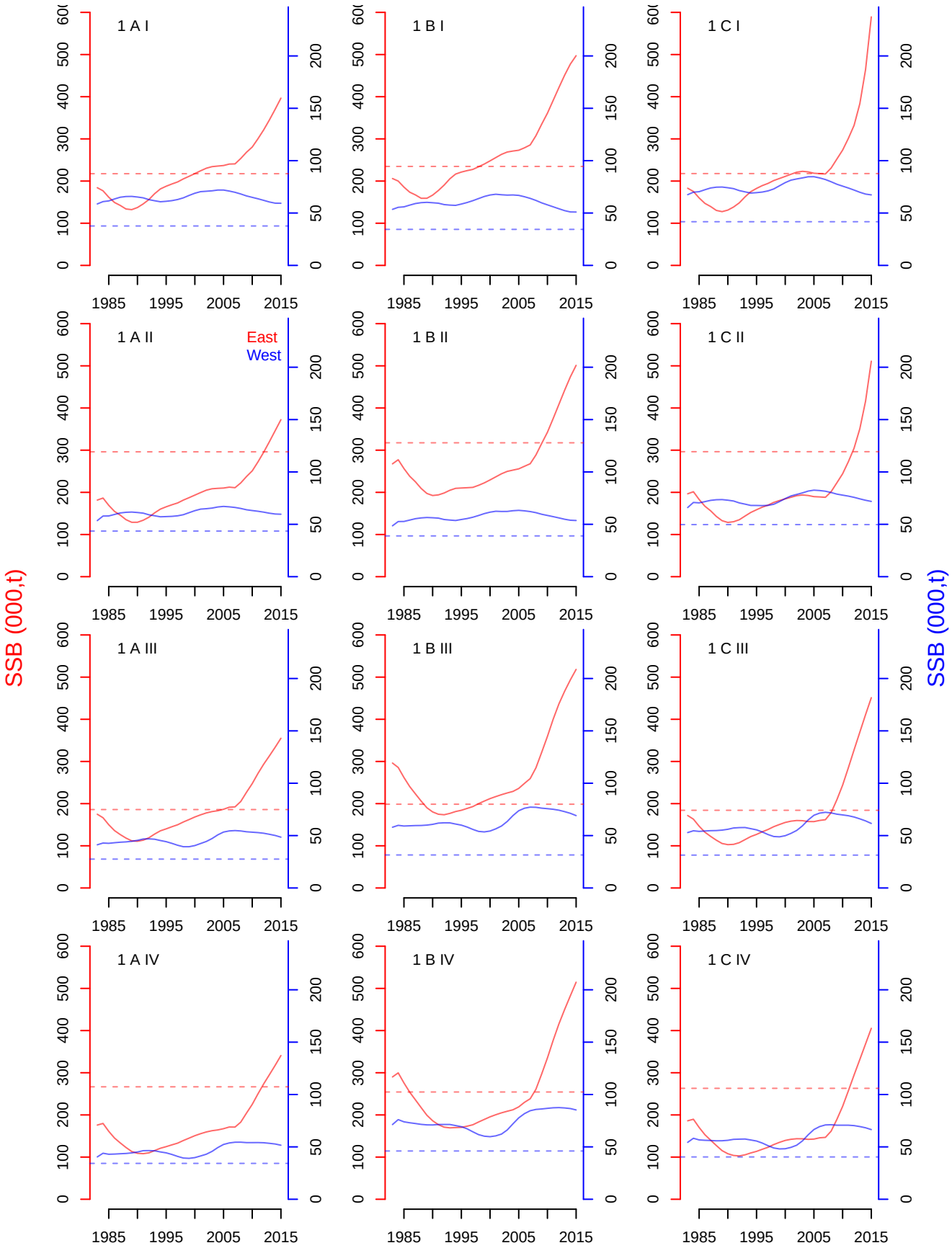
Model estimates / reference points for Western stock

OM	MSY	FMSYa	UMSY	BMSY	SSBMSY	BMSY_B0	SSBrel	recMSY	D	Dep	SSB	OFL
1	5049	0.209	0.126	40180	37643	0.325	0.309	0.882	0.347	0.38	57777	7771
4	4722	0.235	0.129	36728	34387	0.324	0.308	0.89	0.323	0.354	49593	6833
7	5531	0.195	0.124	44495	41705	0.325	0.309	0.874	0.346	0.378	65470	8661
10	4800	0.131	0.106	45416	43553	0.327	0.314	0.898	0.291	0.313	58249	6439
13	4448	0.141	0.109	40635	38929	0.323	0.31	0.908	0.294	0.316	52424	5965
16	5156	0.115	0.1	51779	49733	0.334	0.321	0.881	0.299	0.32	70153	7304
19	4717	0.165	0.105	44871	27547	0.363	0.268	0.858	0.332	0.363	46782	8001
22	5237	0.134	0.103	50999	31518	0.359	0.267	0.852	0.417	0.45	66957	11159
25	5425	0.157	0.106	51281	31368	0.36	0.265	0.858	0.363	0.395	59508	10312
28	4644	0.116	0.095	48734	34257	0.352	0.279	0.886	0.278	0.3	50103	6771
31	4981	0.085	0.079	62701	46076	0.372	0.309	0.844	0.352	0.373	83438	8970
34	4976	0.1	0.088	56349	40387	0.36	0.292	0.867	0.301	0.322	64746	7950

MSY reference points



SSB trends


1 A I
1 B I
1 C I
1 A II
East
West
1 B II
1 C II
1 A III
1 B III
1 C III
1 A IV
1 B IV
1 C IV
SSB (000,t)
SSB (000,t)
0
100
200
300
400
500
600
0
50
100
150
200
1985
1995
2005
2015