Validation of the JRA-55 based data set: Comparison with buoy observations

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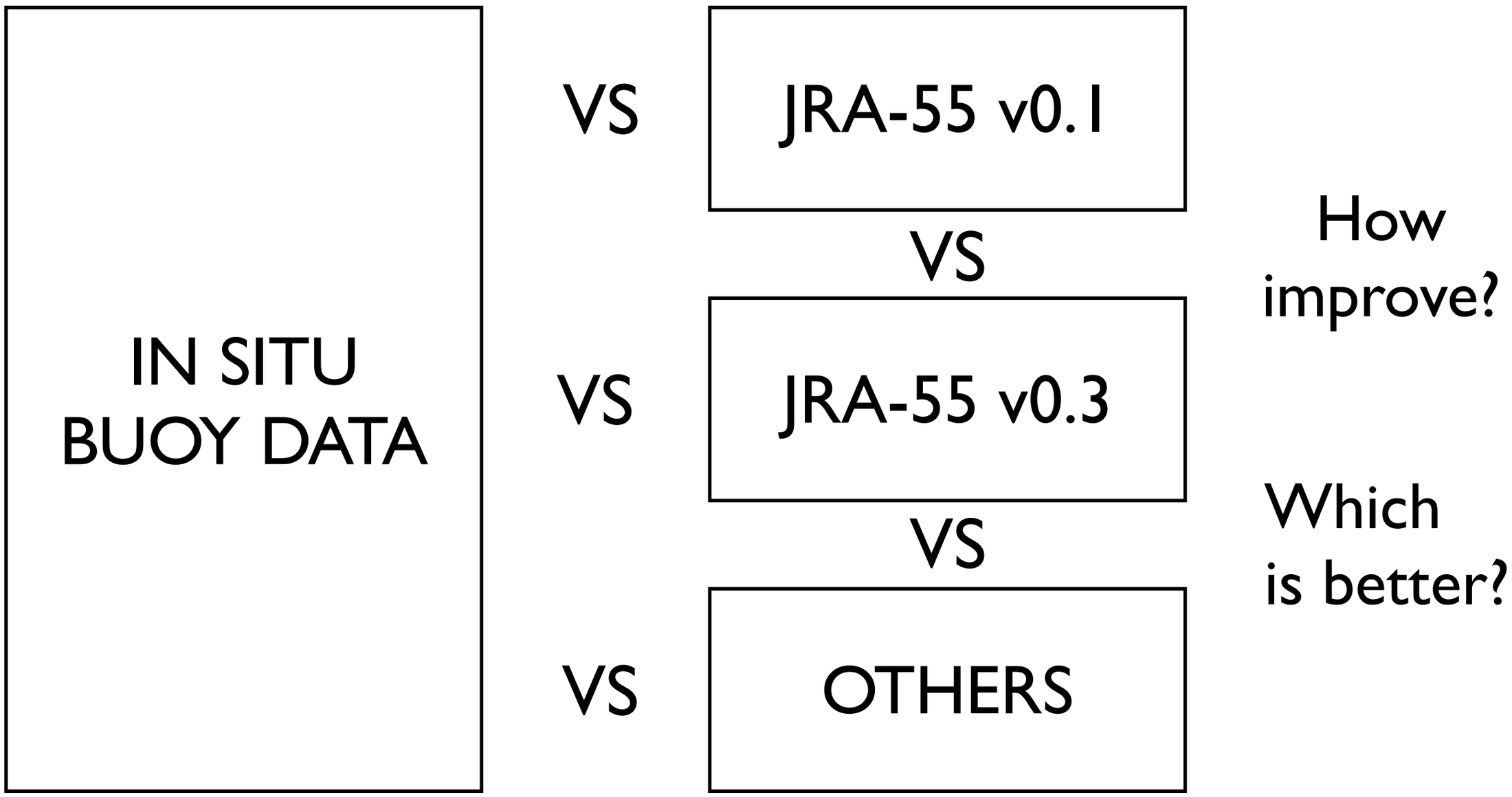
OMDP extended meeting
JAMSTEC@Yokohama

Objectives


IN SITU
BUOY DATA
VS
JRA-55 v0.1
VS
JRA-55 v0.3
VS
OTHERS
VS
How
improve?
Which
is better?

Outline

JRA-55 based data

Other reanalysis and satellite based data

Buoy observation data

Flux calculation/ Comparison strategy

Results

Versions of JRA-55 base data

Ver 0.1: unadjusted JRA55

Ver 0.2: adjusted JRA55 (Mar 2015)

Ver 0.3: adjusted JRA55 (Dec 2015)

Versions of JRA-55 base data

Ver 0.1: unadjusted JRA55

Ver 0.2: adjusted JRA55 (Mar 2015)

Ver 0.3: adjusted JRA55 (Dec 2015)

Other reanalysis and satellite based data

NRA-1: NCEP/NCAR reanalysis

Kalnay et al. (1996)

J-OFURO3: satellite-derived air-sea flux

Preliminary version (V0.0.4, not public yet)

OAFlux: satellite and reanalysis air-sea flux

Yu and Weller (2007)

	JRA-55	NRA-1	J-OFURO3	OAFlux
spatial grid	TL319 (~55km)	T62 (~180km)	0.25 degree	1.0 degree
temporal	3-hourly	6-hourly	daily	daily
wind	vector	vector	scalar	scalar
	⇩	⇩		
	scalar	scalar		
	daily	daily		

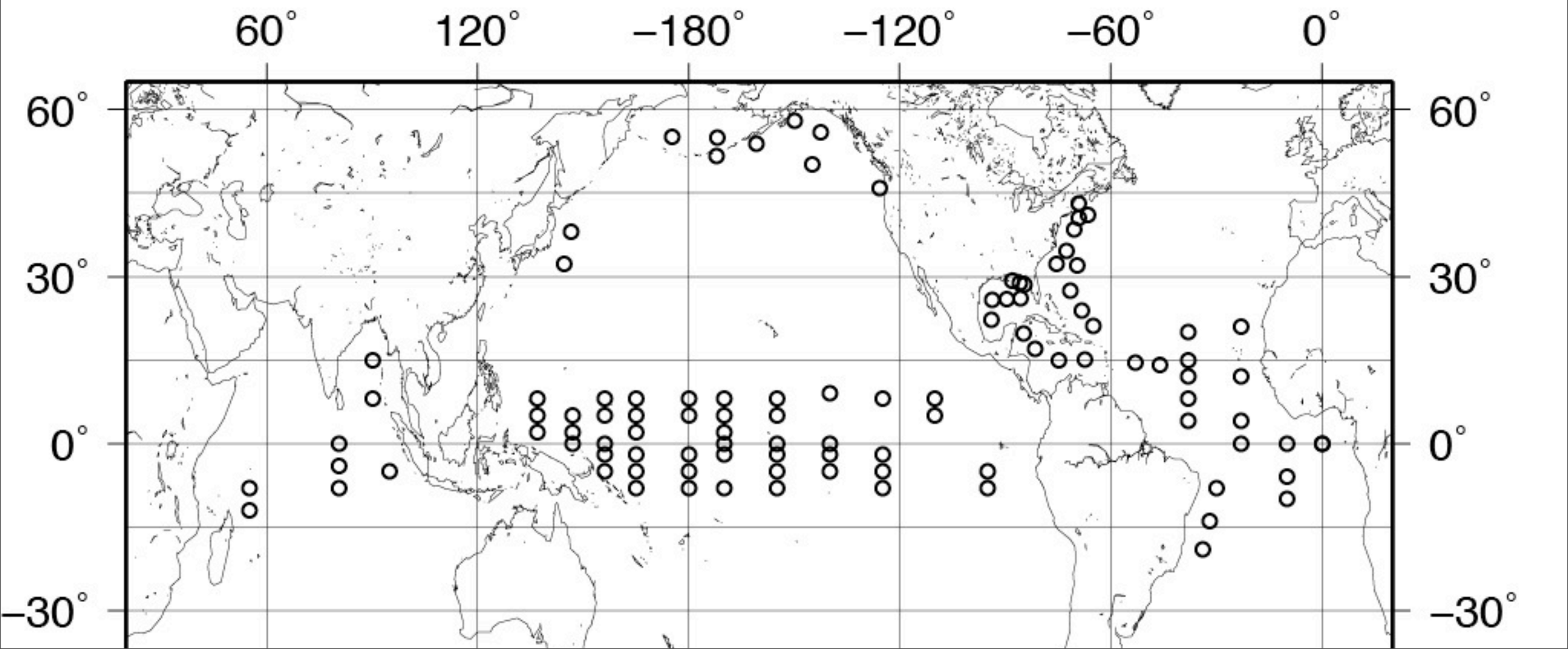
Variables:

name	description	unit
LHF	latent heat flux	W/m^2
SHF	sensible heat flux	W/m^2
WND	scalar wind speed	m/s
QA	specific humidity	g/kg
TA	air-temperature	deg.C
SST	sea surface temperature	deg.C

Buoy observation data

104 buoys over the global oceans

TAO/TRITON
NDBC
KEO/JKEO
PIRATA
RAMMA

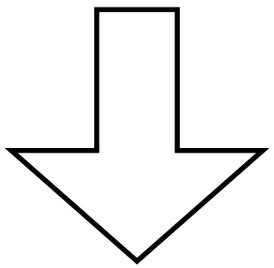


Buoy observation data

104 buoys over the global oceans

TAO/TRITON	PIRATA
NDBC	RAMMA
KEO/JKEO	

Hourly or 10 min. data



Daily mean data

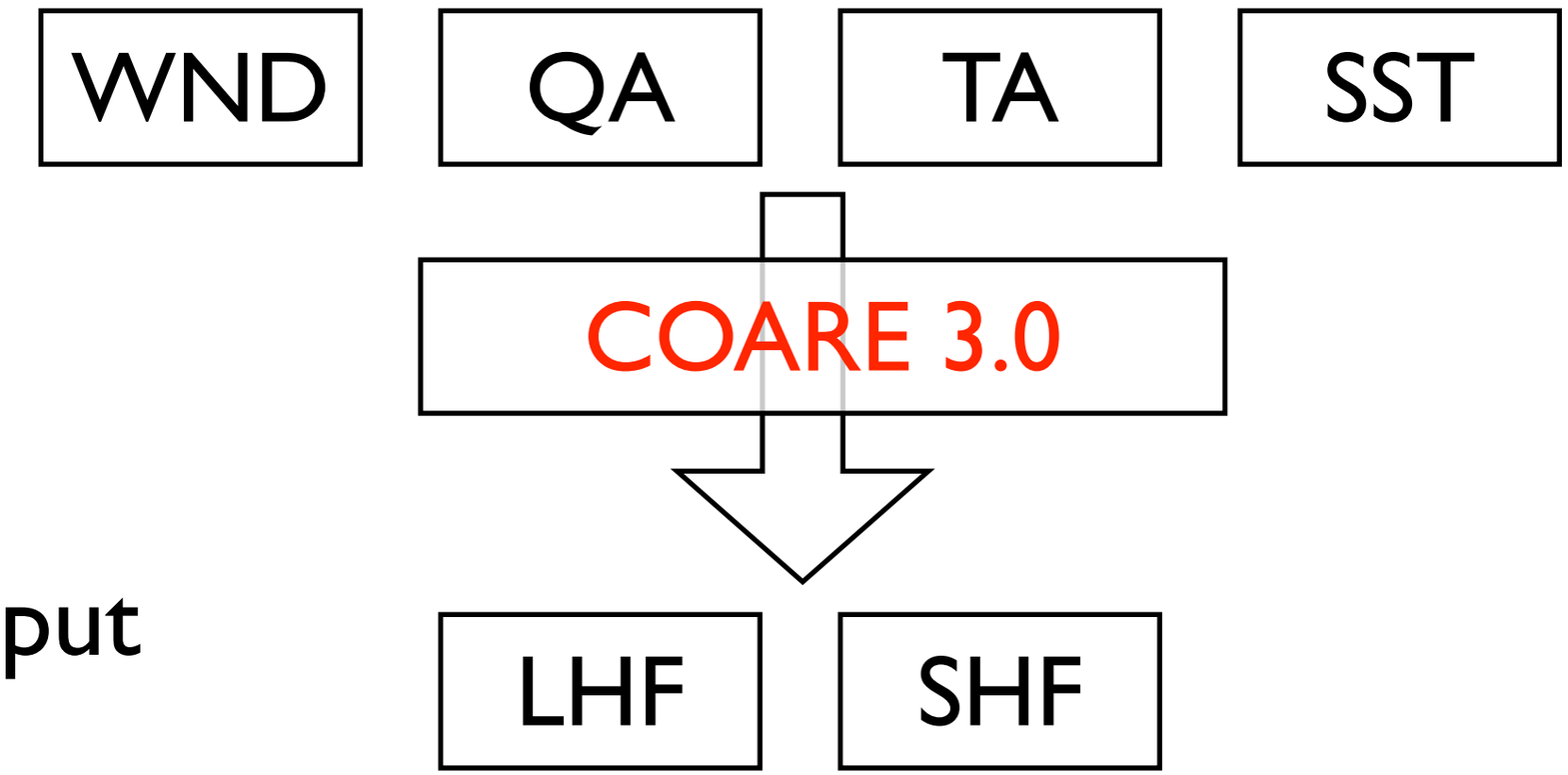
Flux calculation

COARE 3.0 Fairall et al. 2003

Without any corrections for skin temperature

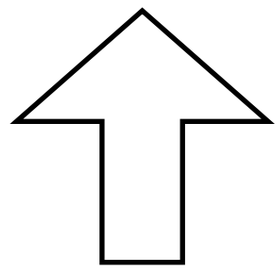
COMMON to all flux calculations in PRODUCTS and BUOY

Input: daily means for each variable and obs. height

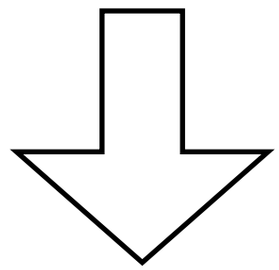


Direction of flux

positive = upward



negative = downward



Comparison with buoy

daily mean basis

Period: from 1 January 2008 to 31 December 2008

Match-up:

match-up data were obtained from global gridded data by linear interpolation at buoy location

Obs. Height difference:

unified to value at 10m by COARE 3.0

Statistics:

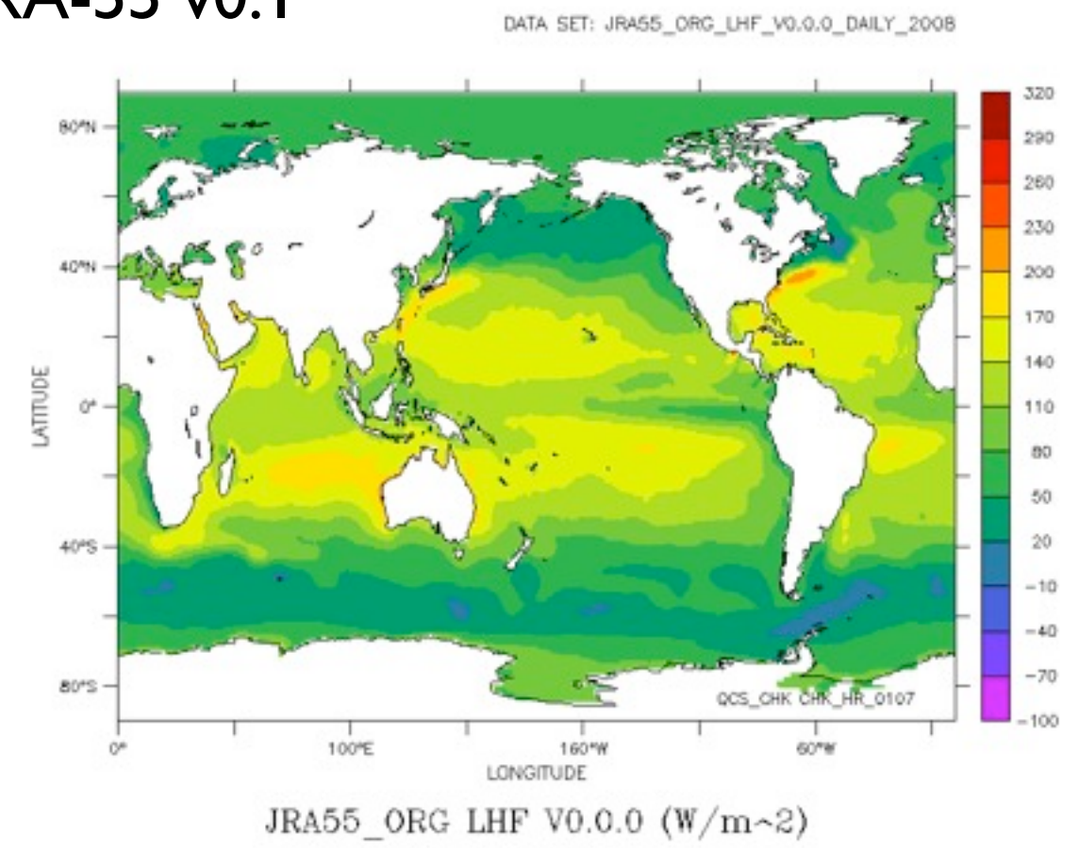
BIAS (PRODUCT minus BUOY)

RMSD

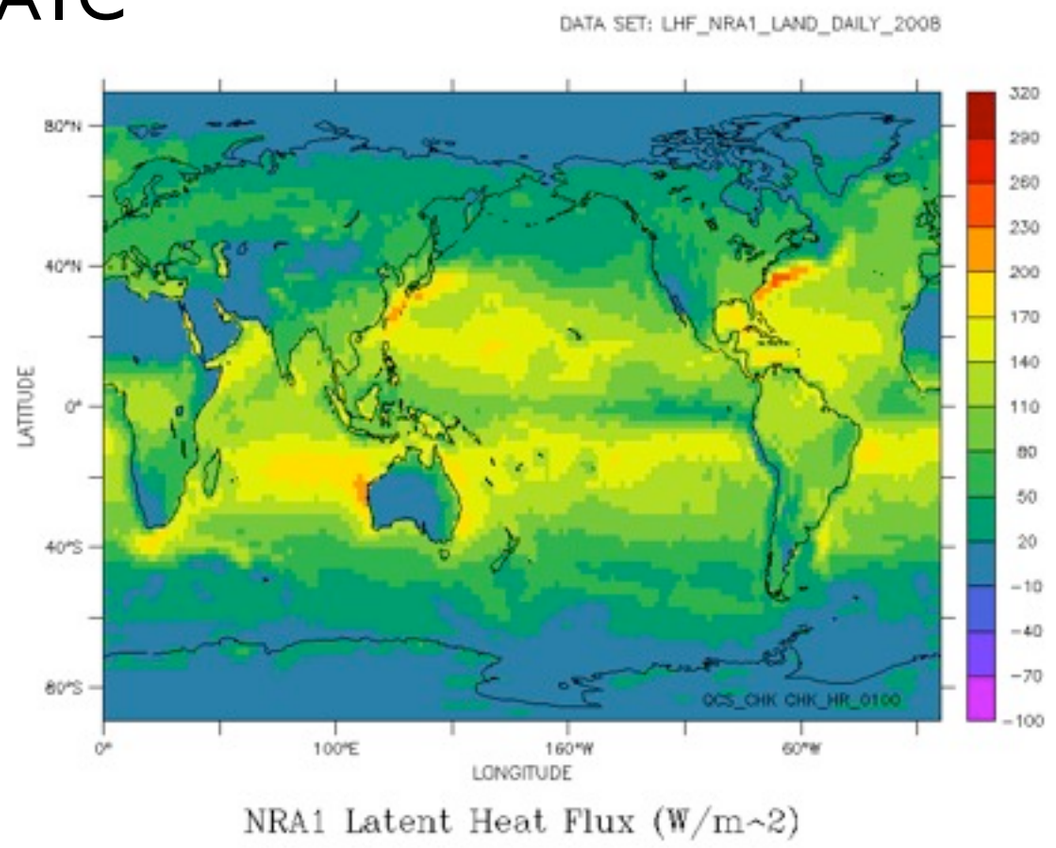
Results

name	description	unit
LHF	latent heat flux	W/m^2
SHF	sensible heat flux	W/m^2
WND	scalar wind speed	m/s
QA	specific humidity	g/kg
TA	air-temperature	deg.C
SST	sea surface temperature	deg.C

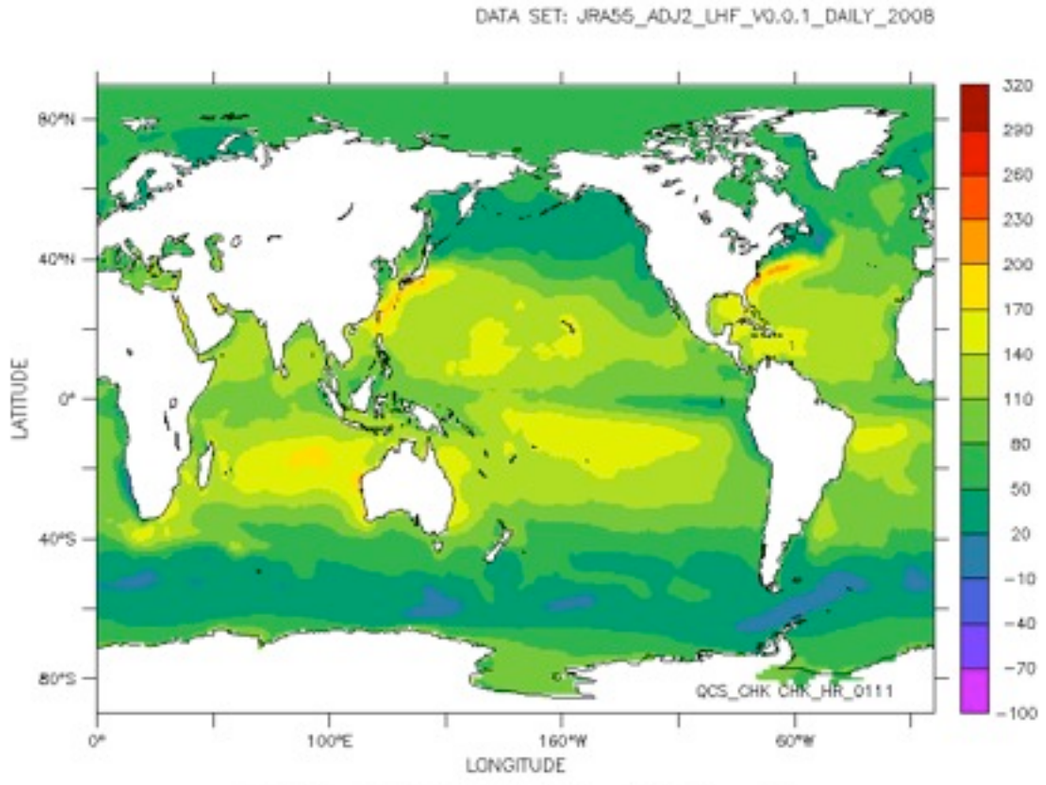
JRA-55 v0.1



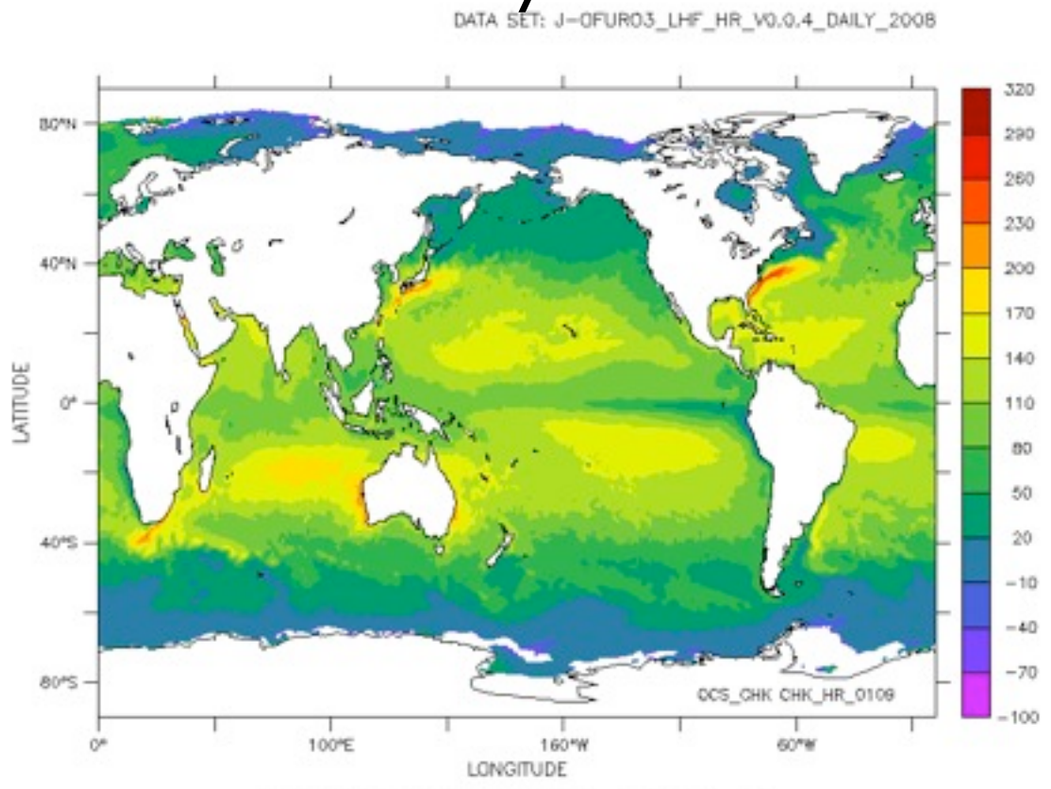
NRA1C



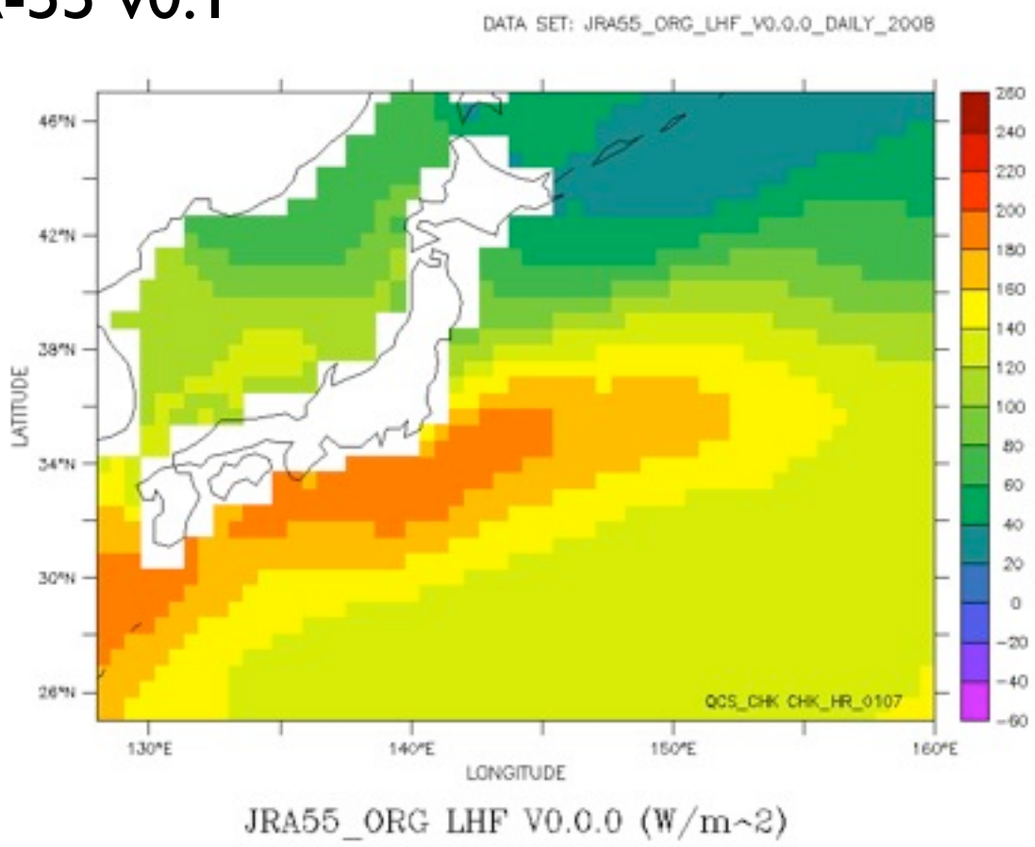
JRA-55 v0.3



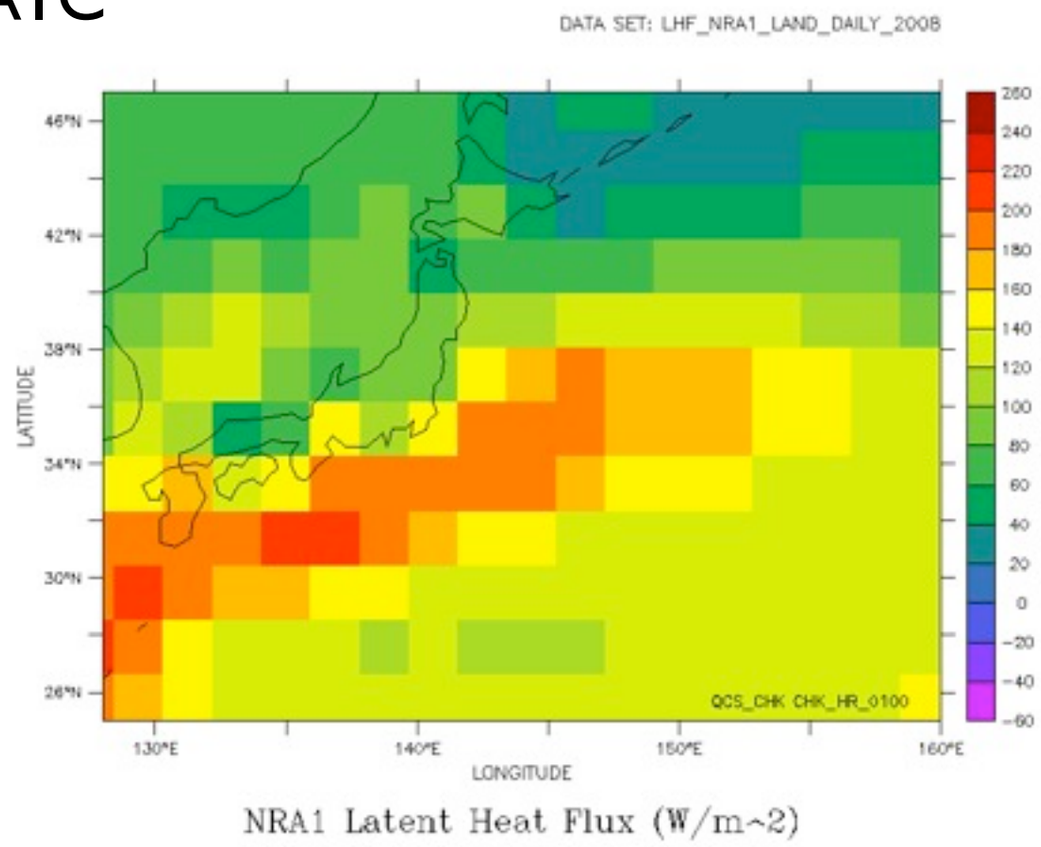
J-OFURO3 Preliminary



JRA-55 v0.1



NRA1C



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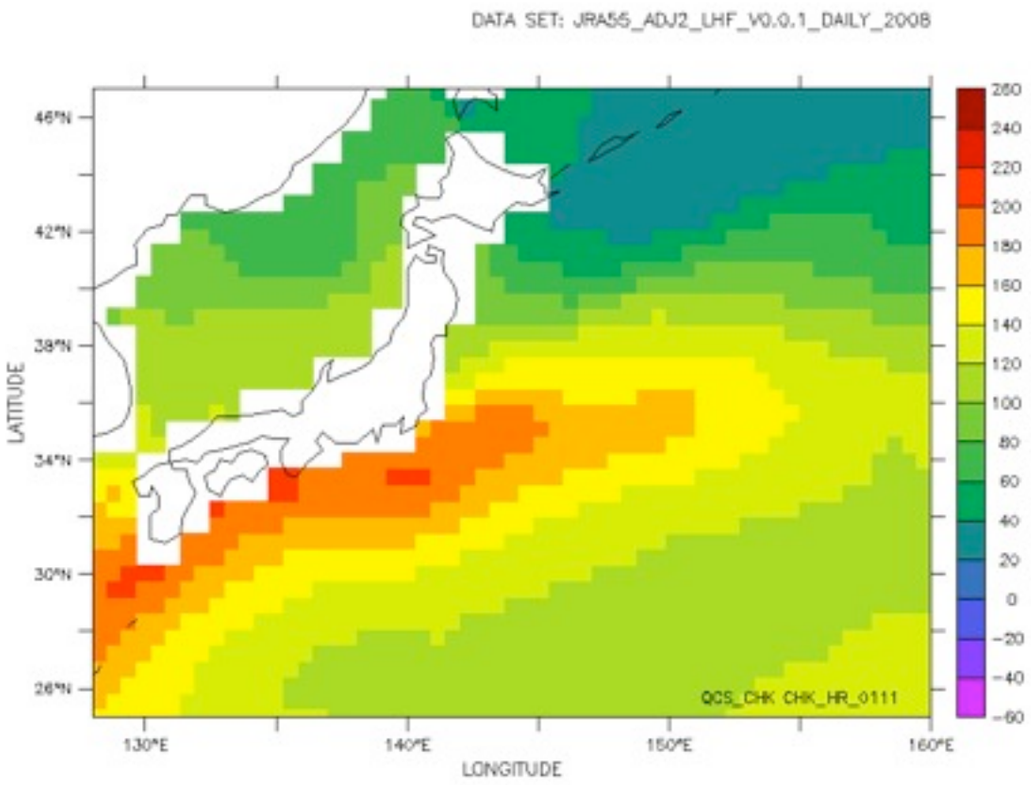
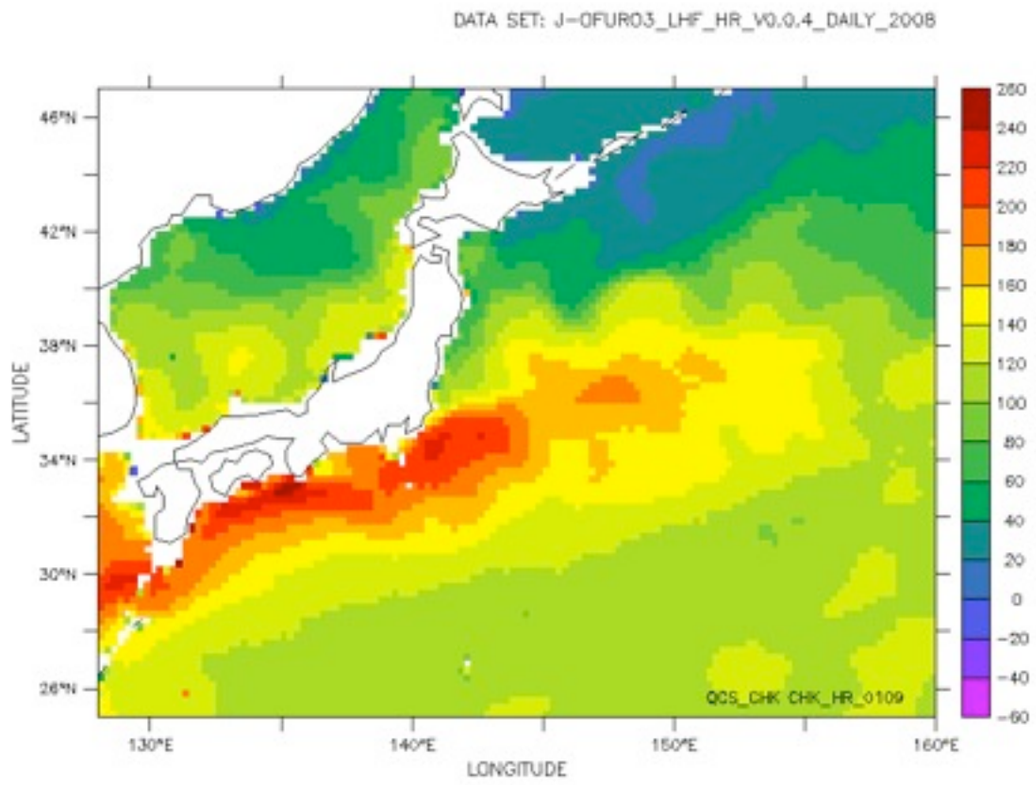


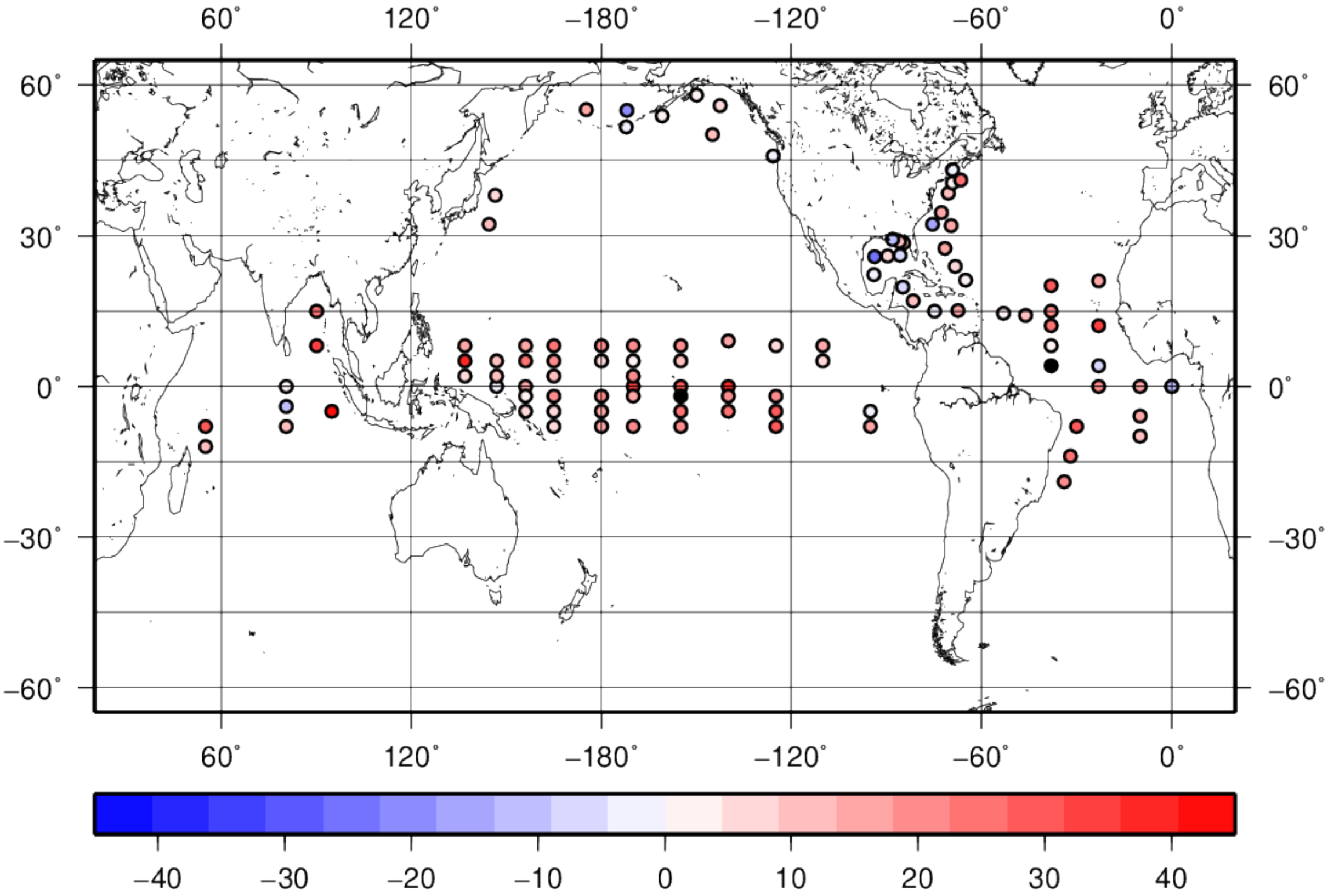
J-OFURO3 Preliminary



JRA-55 Ver. 0.1

BIAS

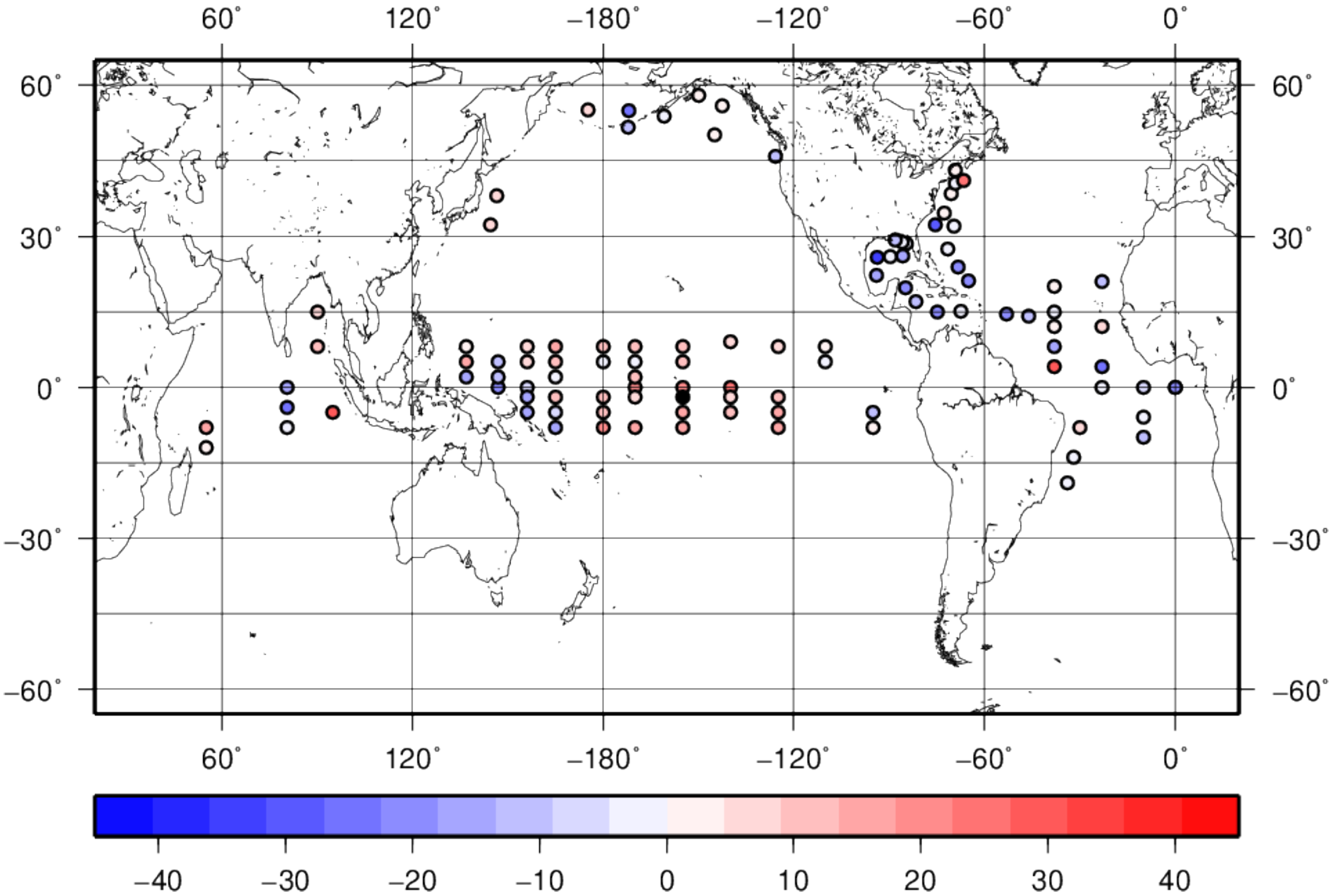
LHF W/m^2



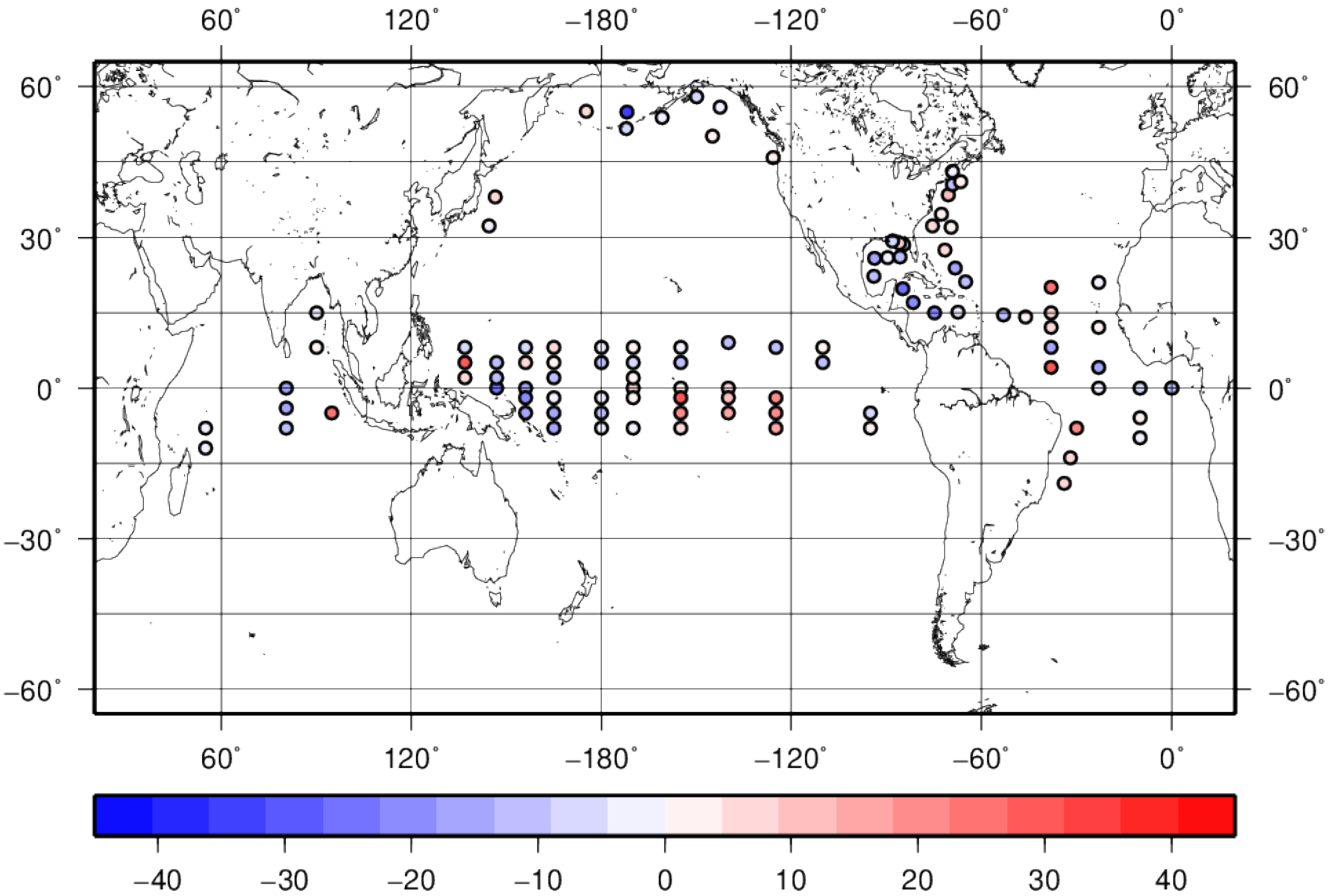
JRA-55 Ver. 0.3

BIAS

LHF W/m^2



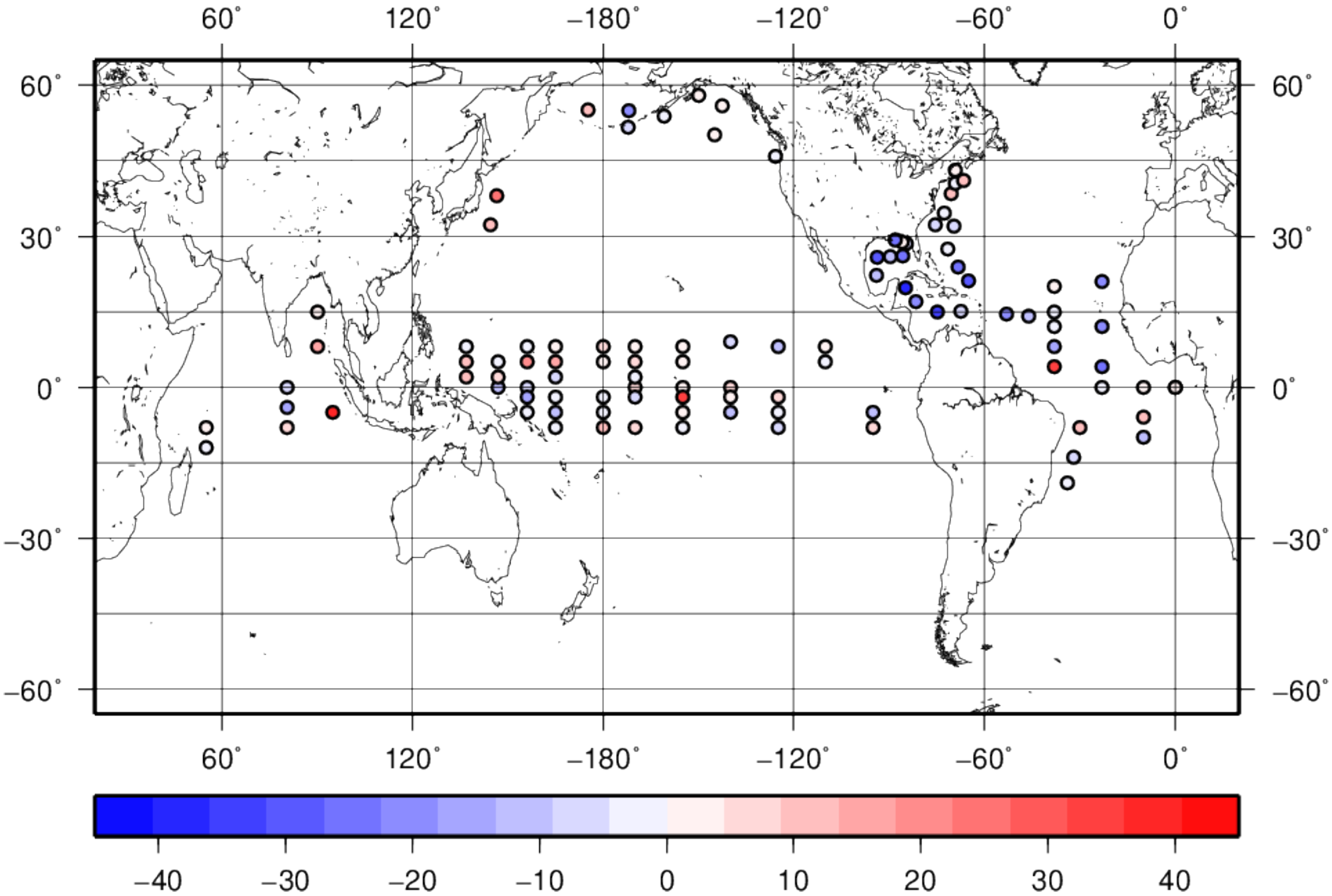
J-OFURO3 BIAS LHF W/m²



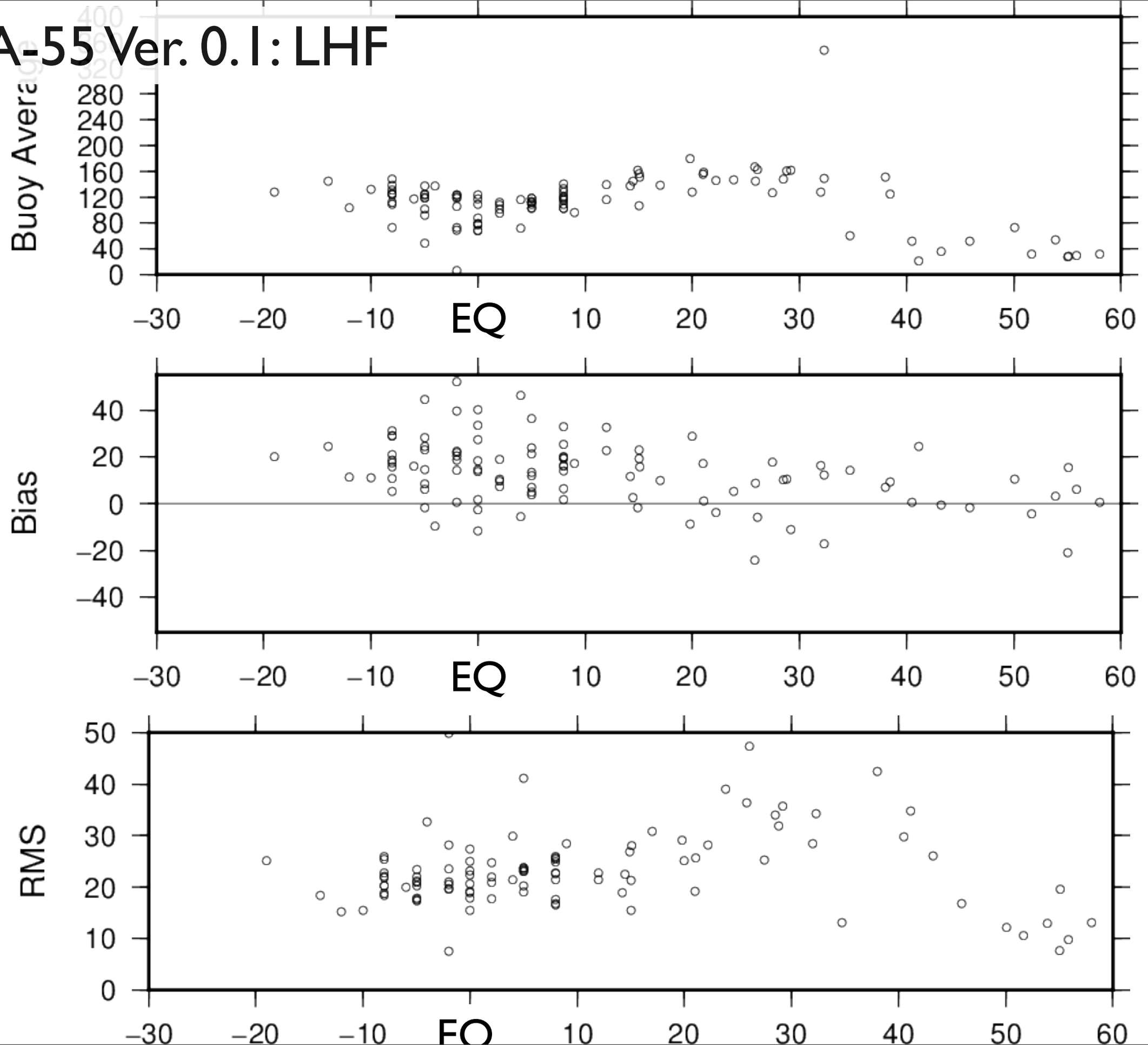
OAFlux

BIAS

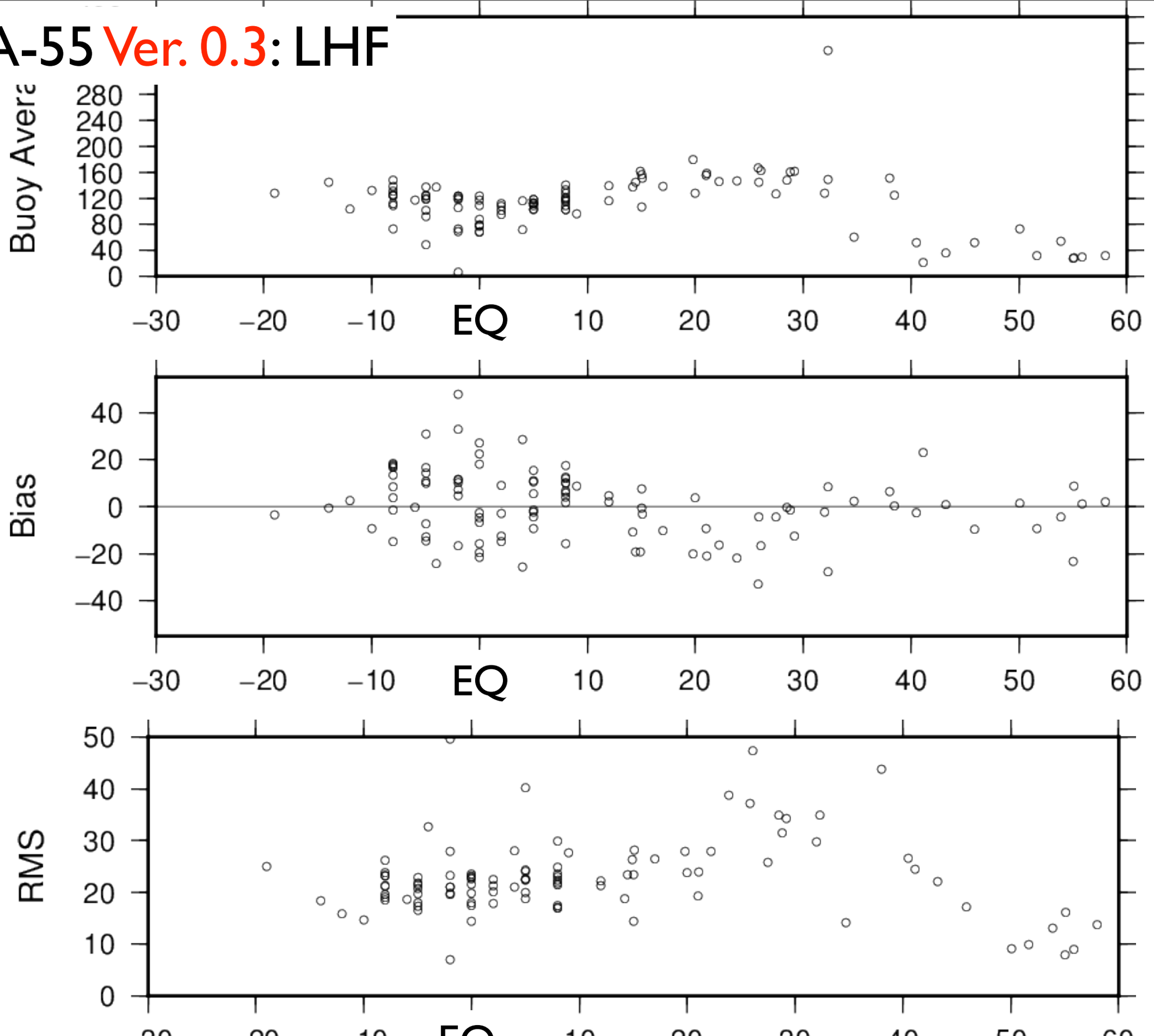
LHF W/m^2



JRA-55 Ver. 0.1: LHF



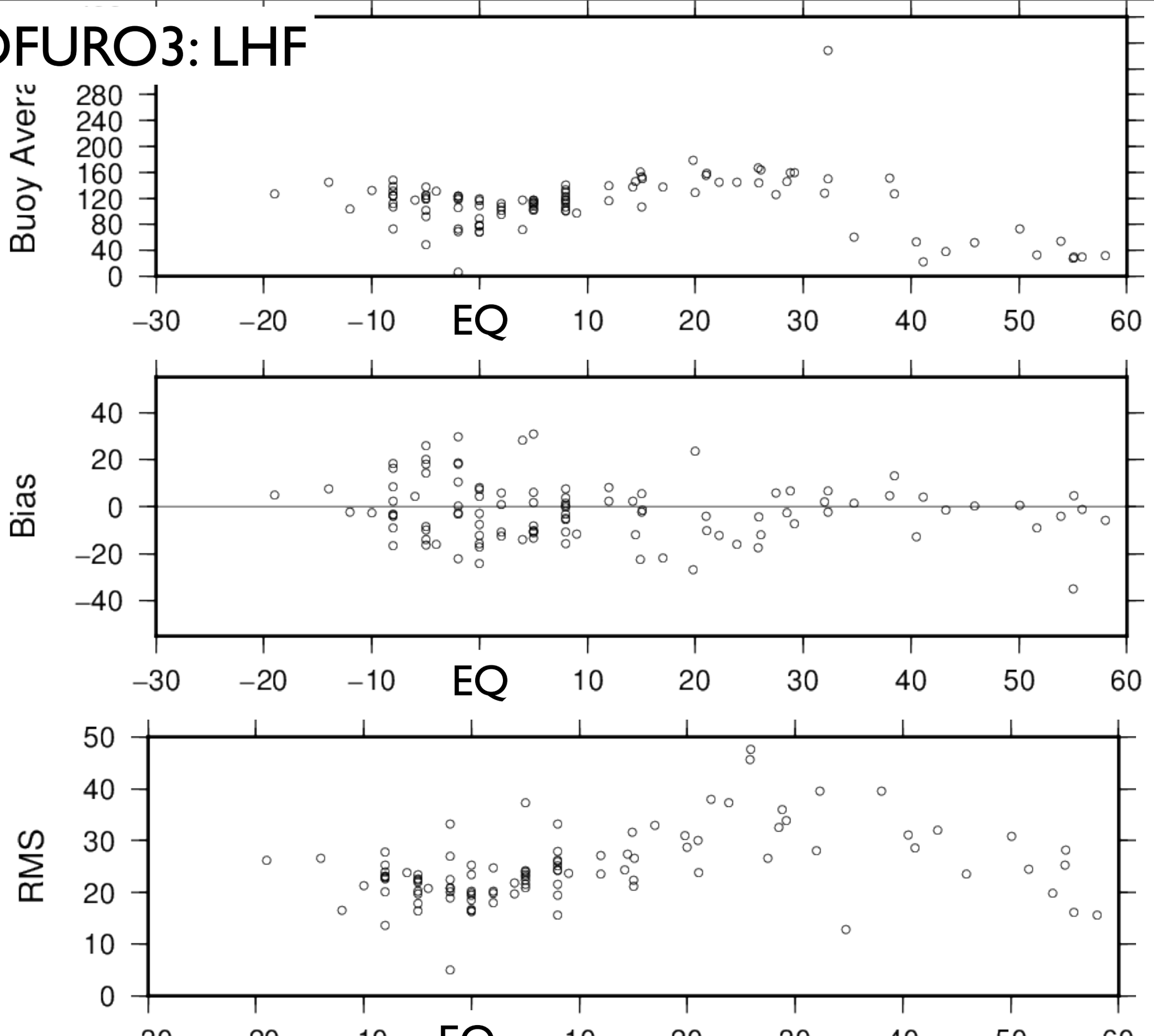
JRA-55 Ver. 0.3: LHF



NRA-1: LHF

Latitude [deg]

J-OFURO3: LHF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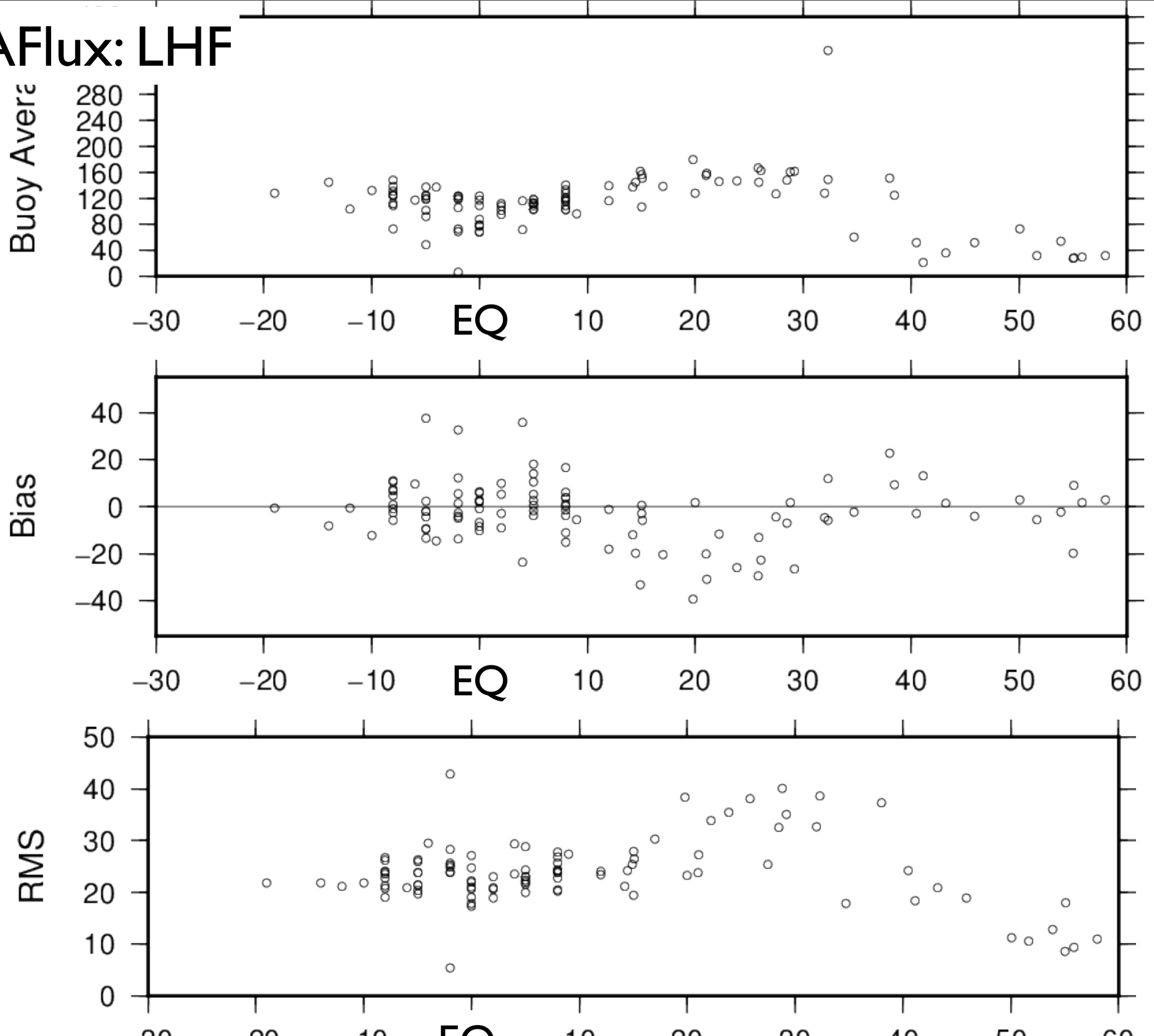
Latitude [deg]

OAFlux: LHF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Results

name	description	unit
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SHF	sensible heat flux	W/m^2
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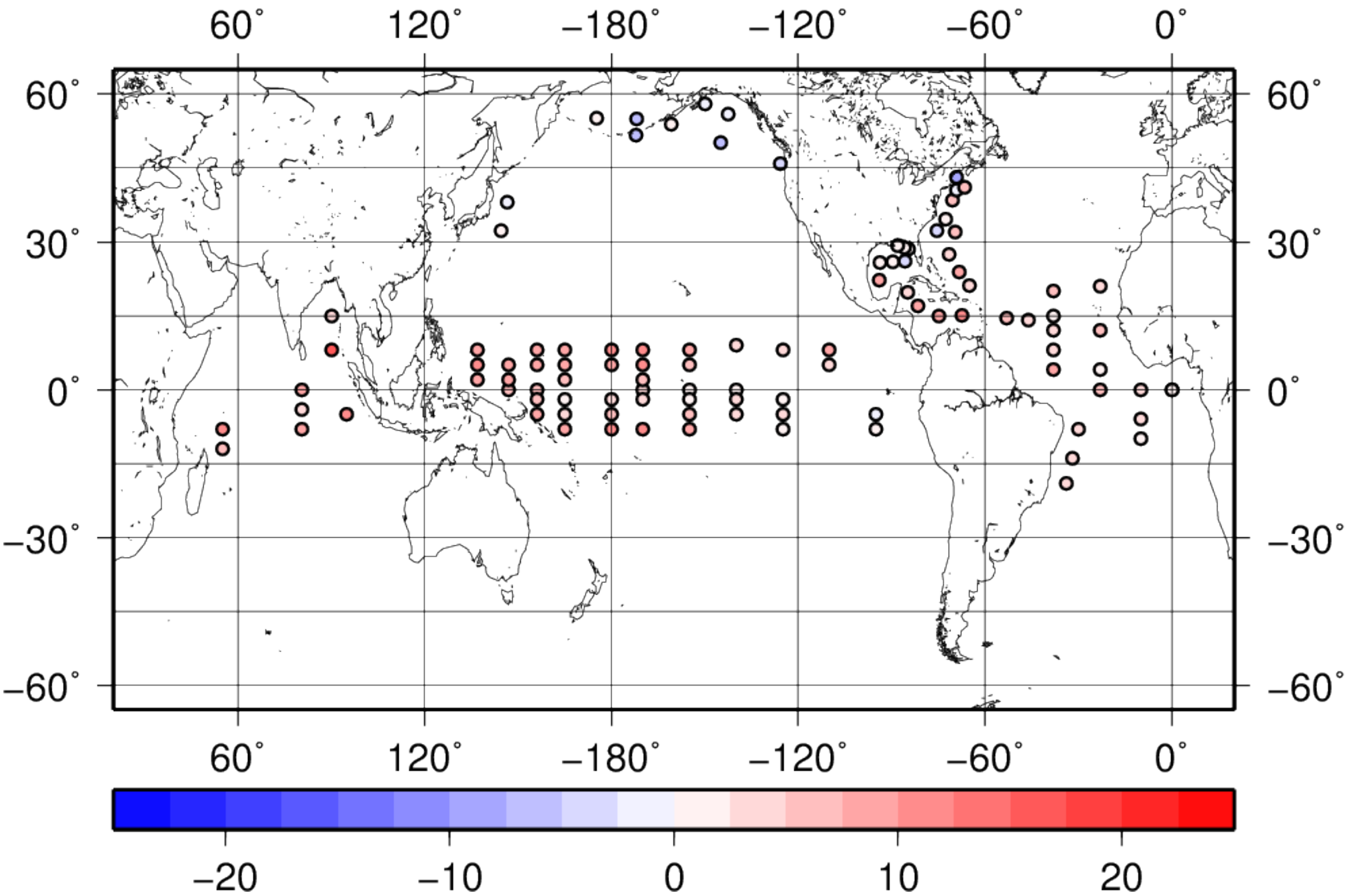
JRA-55 Ver. 0.1

BIAS

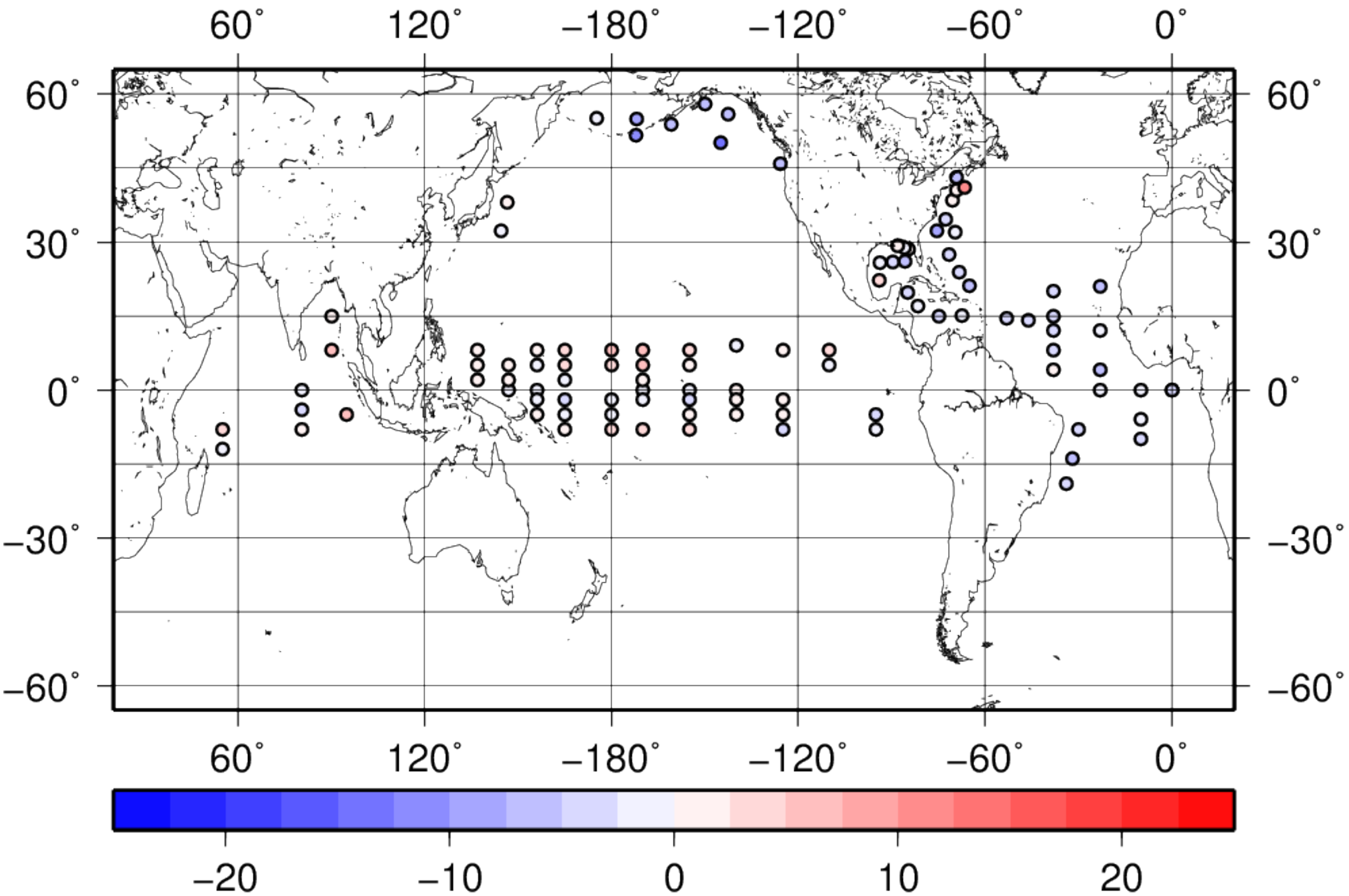
SHF W/m^2



JRA-55 Ver. 0.3

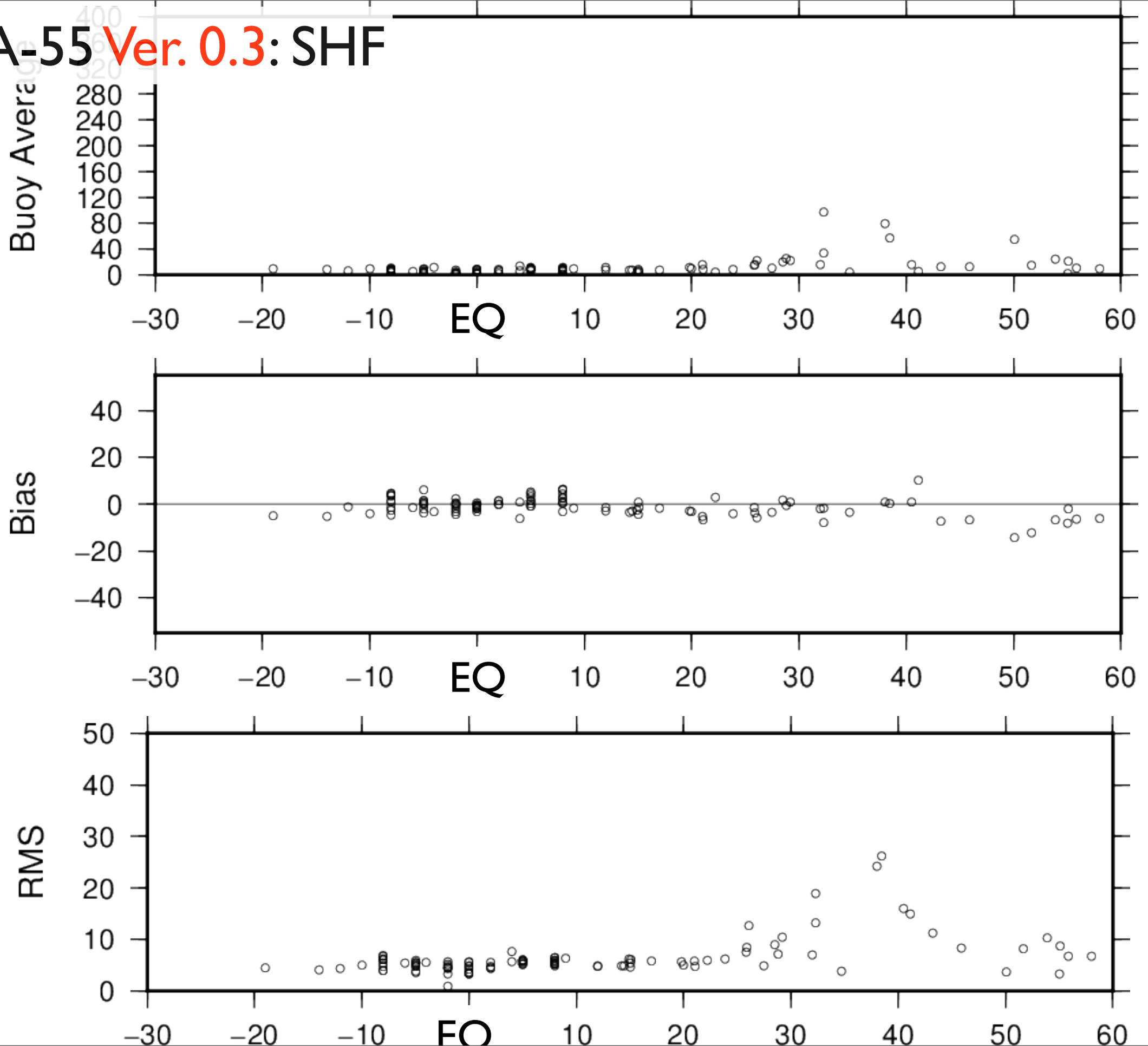
BIAS

SHF W/m^2

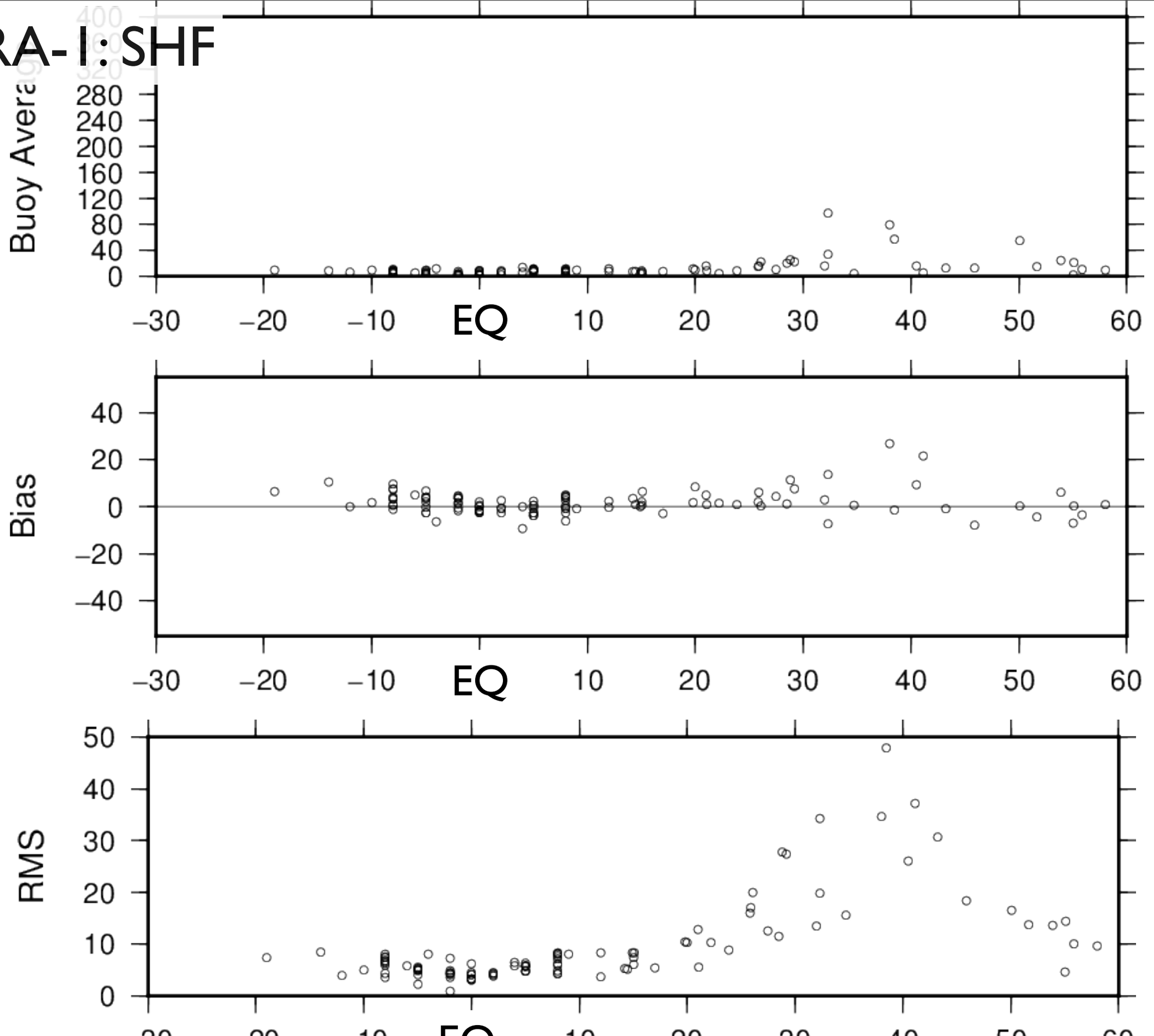


JRA-55 Ver. 0.1: SHF

JRA-55 Ver. 0.3: SHF



NRA-I: SHF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Latitude [deg]

Results

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WND	scalar wind speed	m/s
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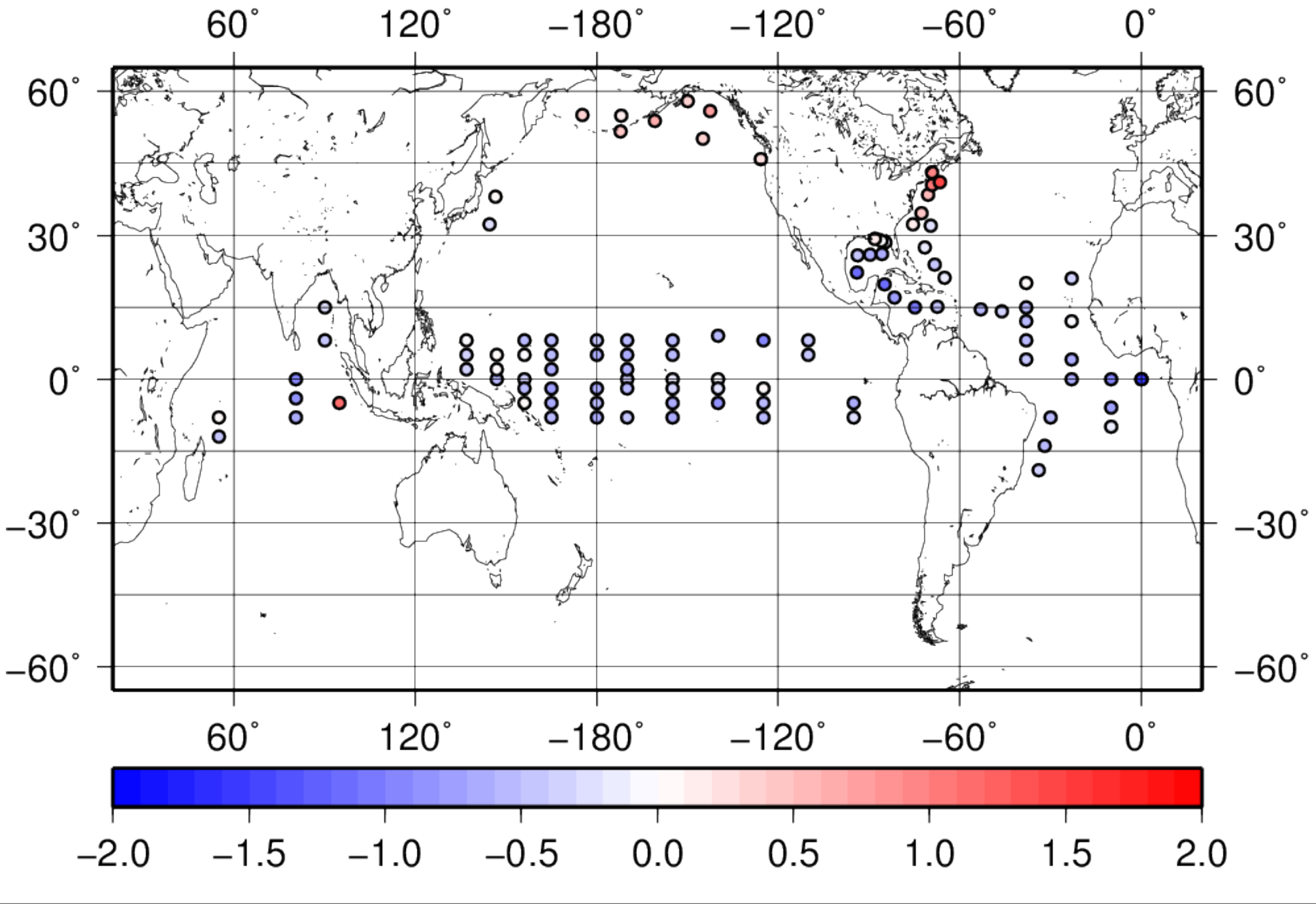
JRA-55 Ver. 0.1

BIAS

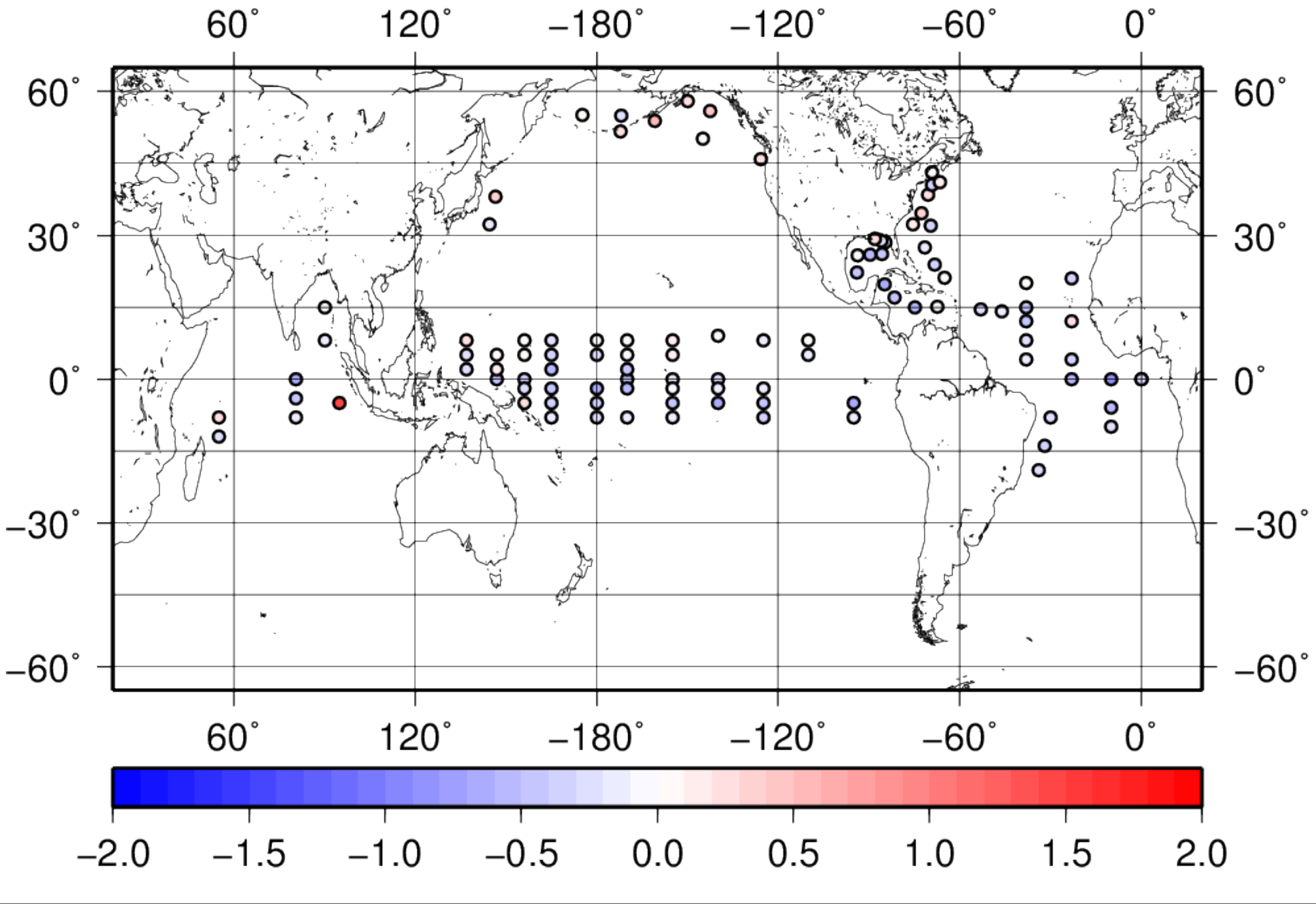
WND m/s



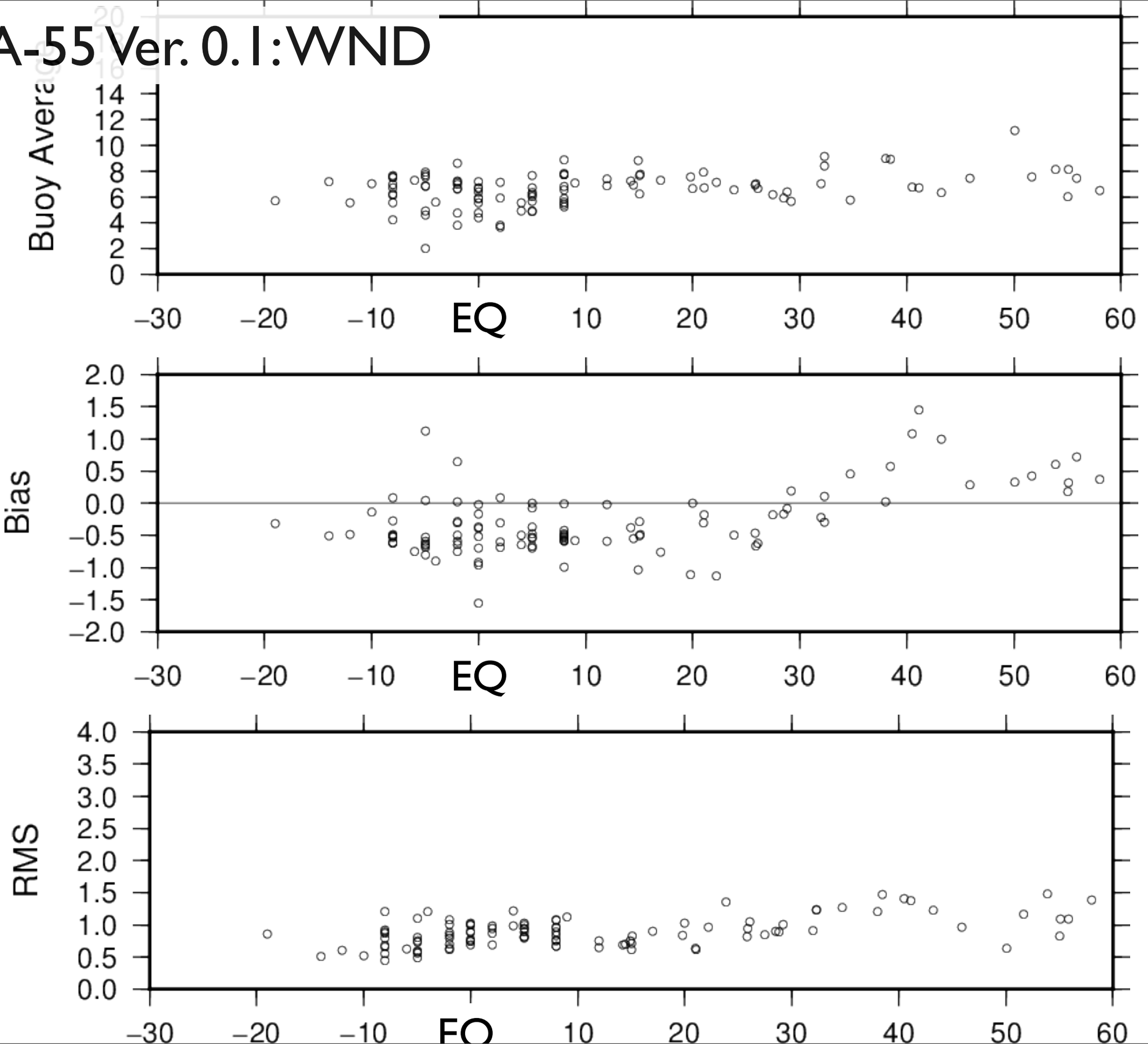
JRA-55 Ver. 0.3

BIAS

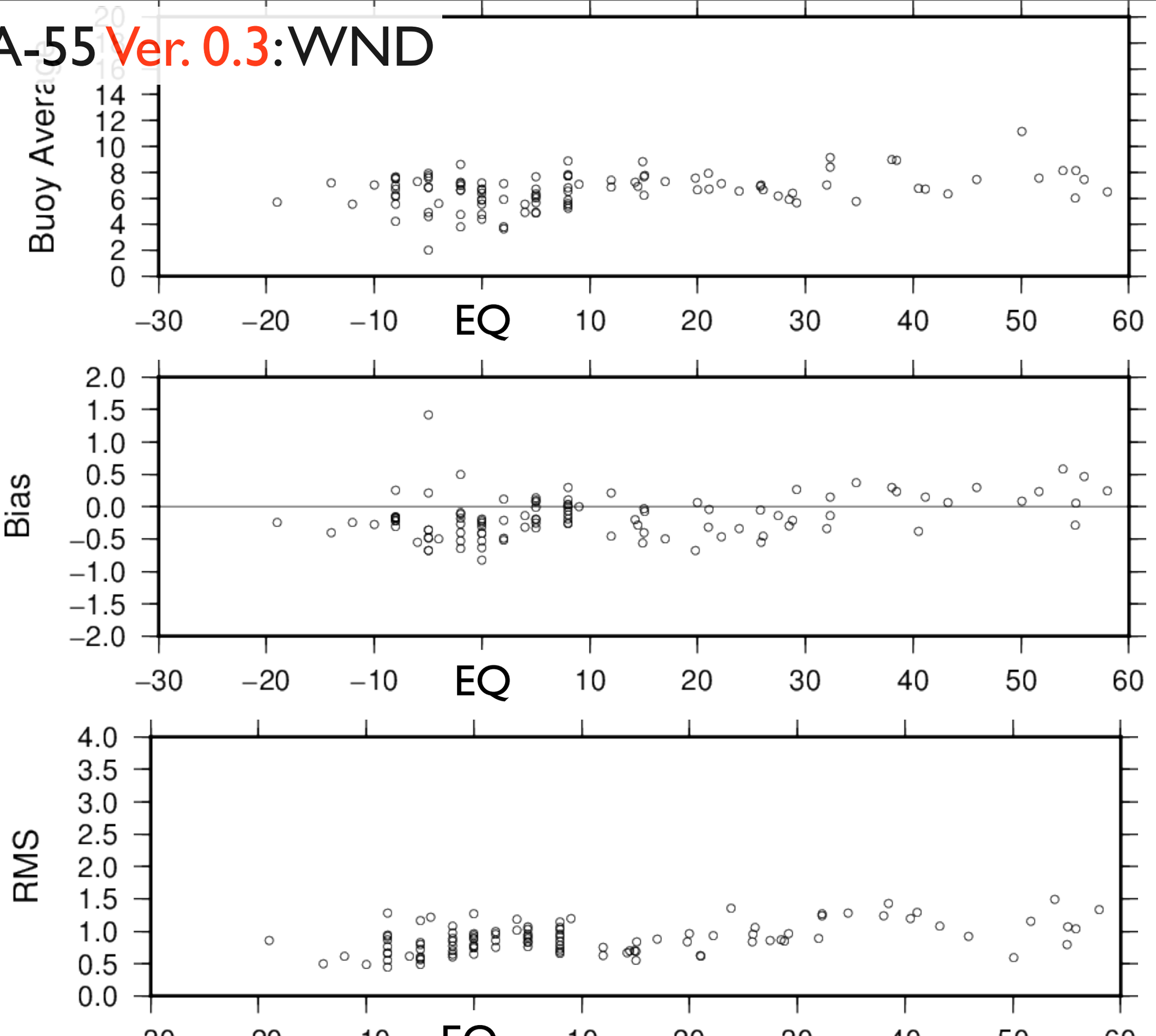
WND m/s



JRA-55 Ver. 0.1: WND



JRA-55 Ver. 0.3: WND



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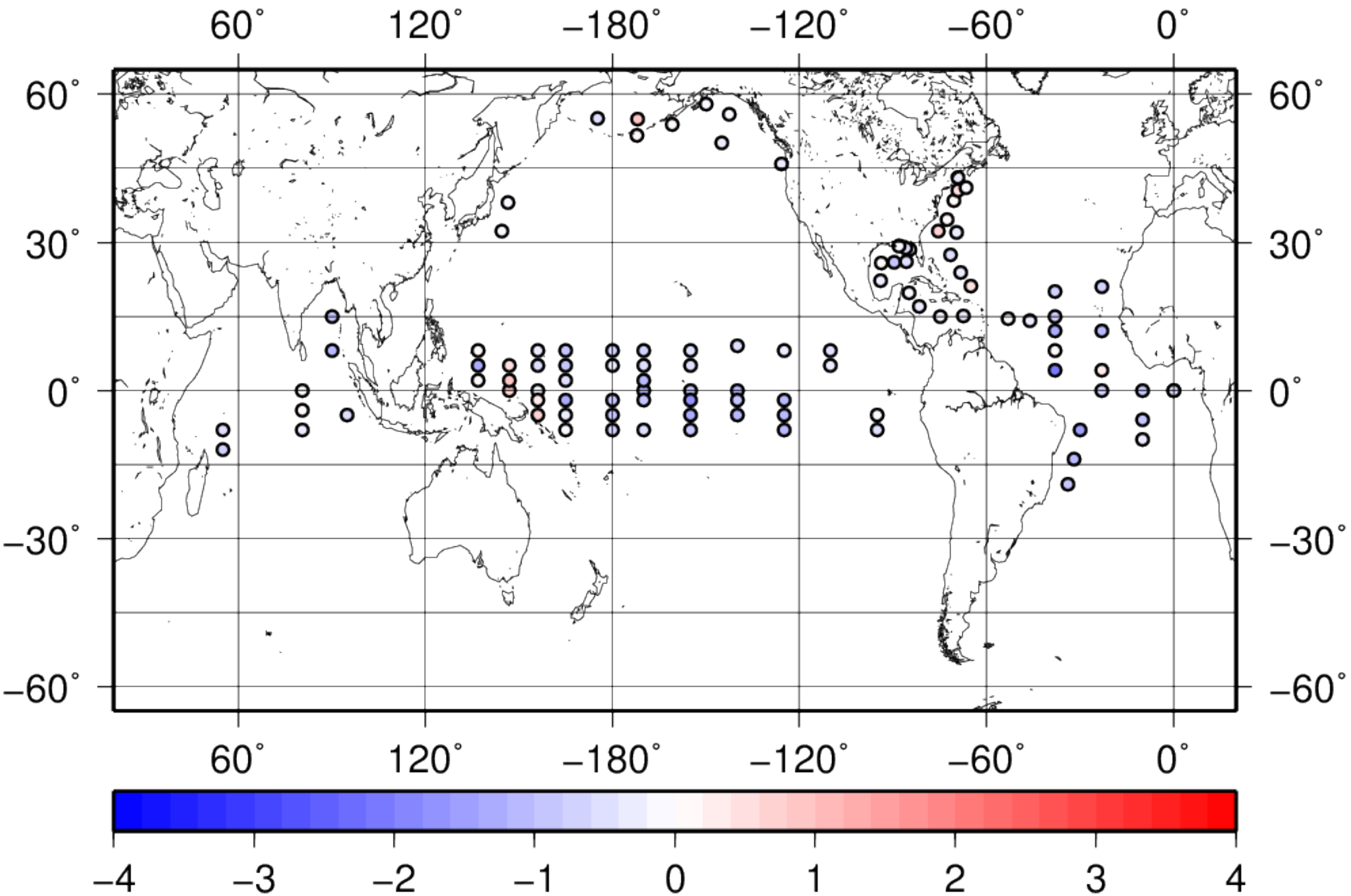
JRA-55 Ver. 0.1

BIAS

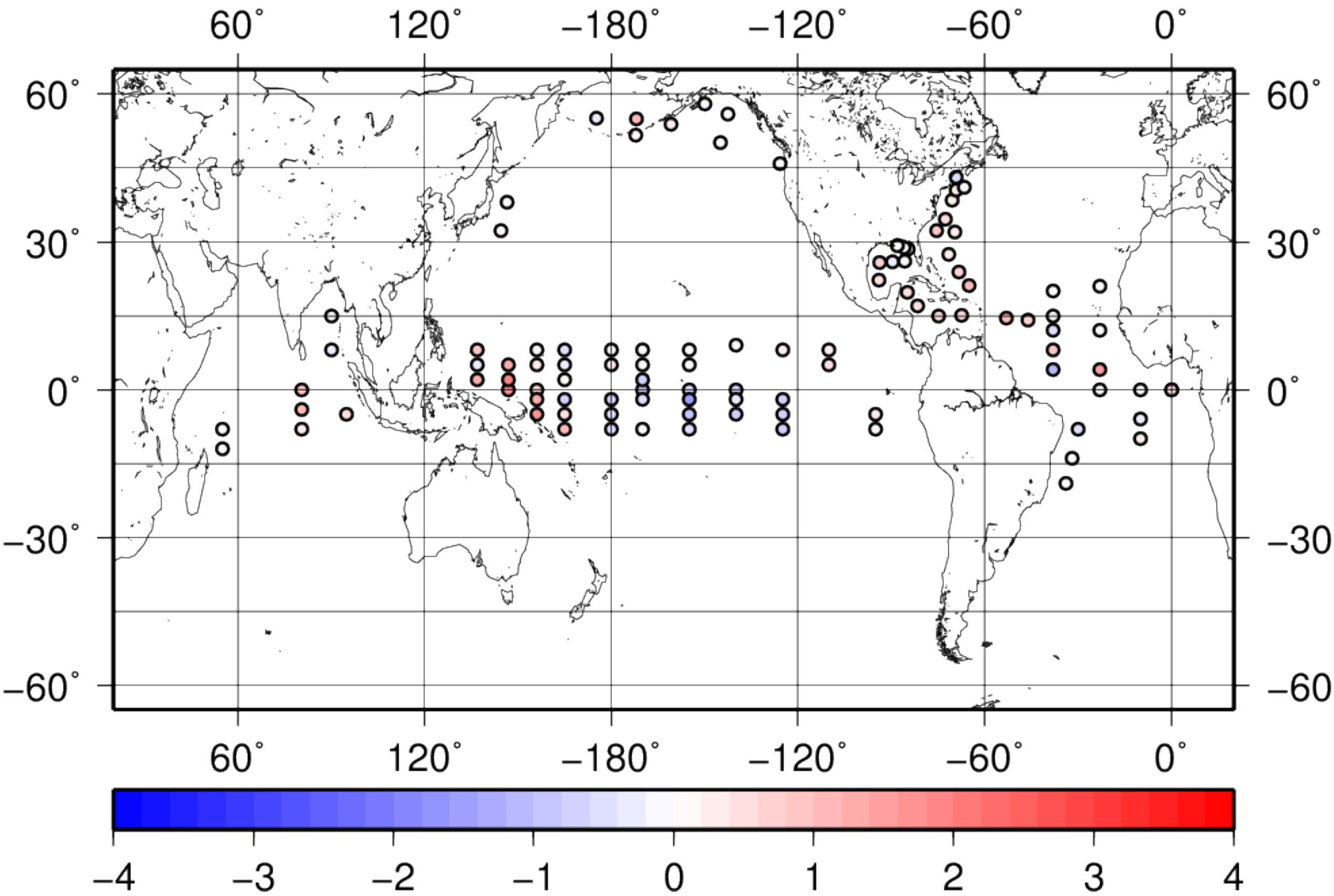
QA g/kg



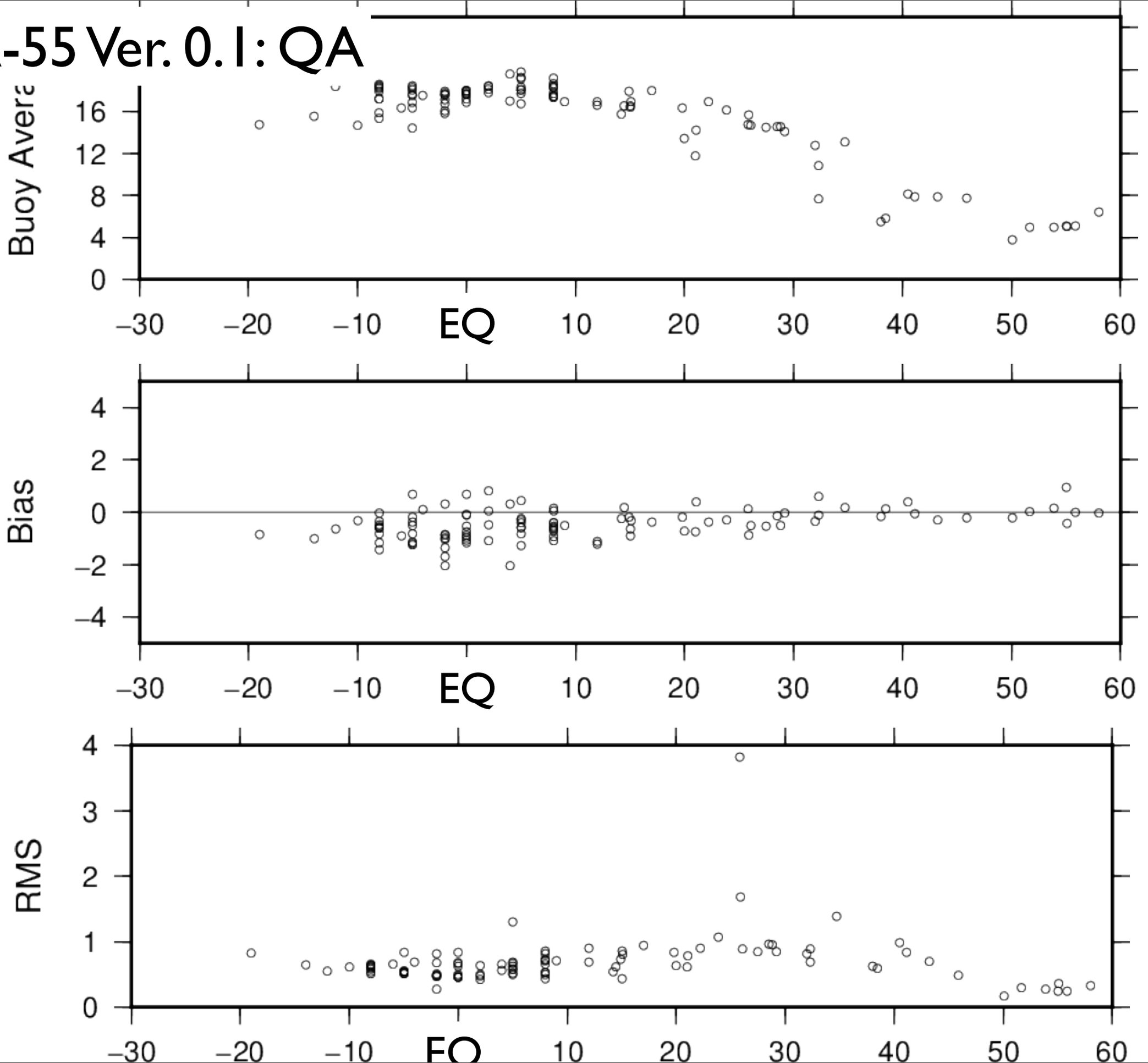
JRA-55 Ver. 0.3

BIAS

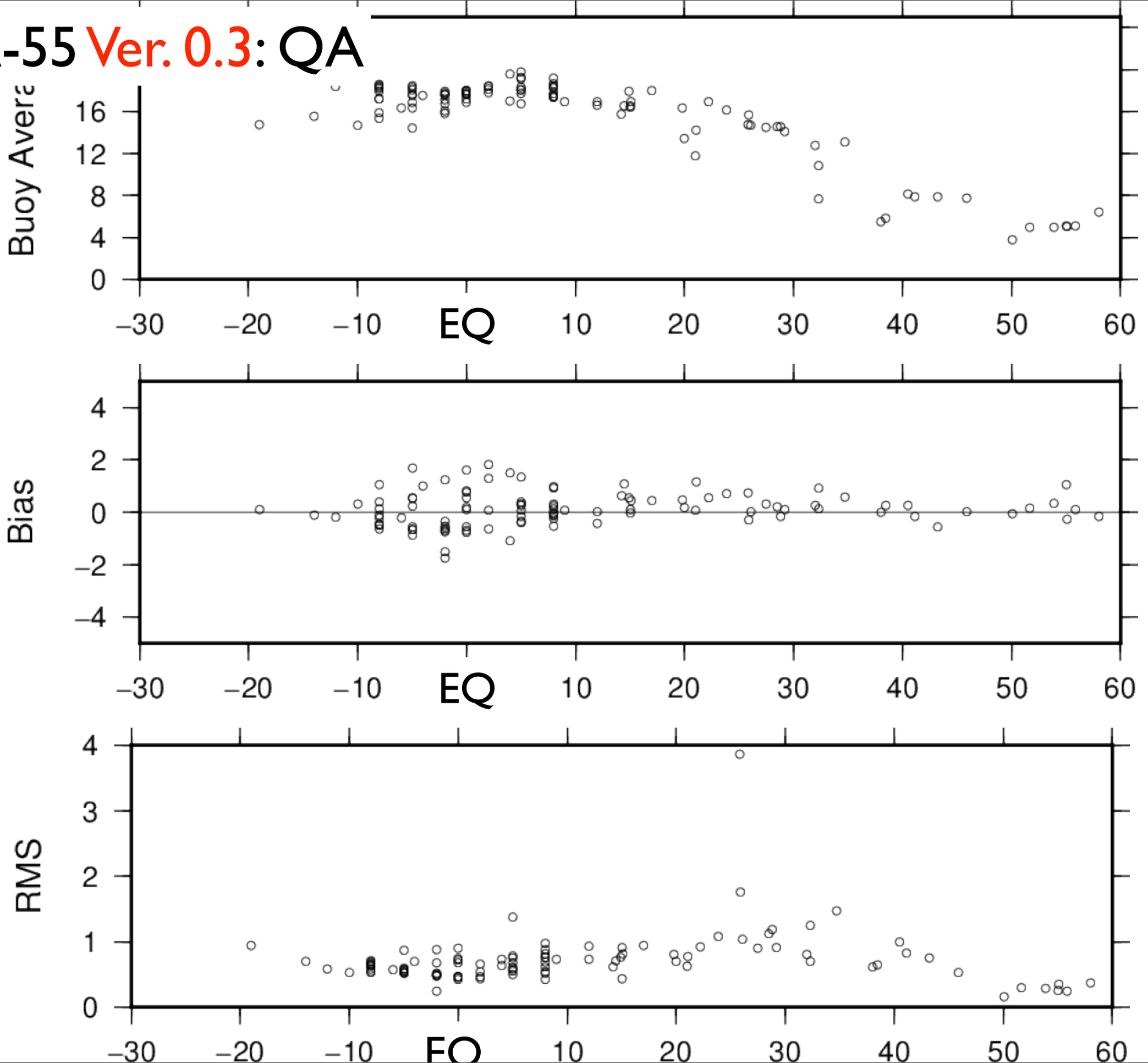
QA g/kg



JRA-55 Ver. 0.1: QA



JRA-55 Ver. 0.3: QA



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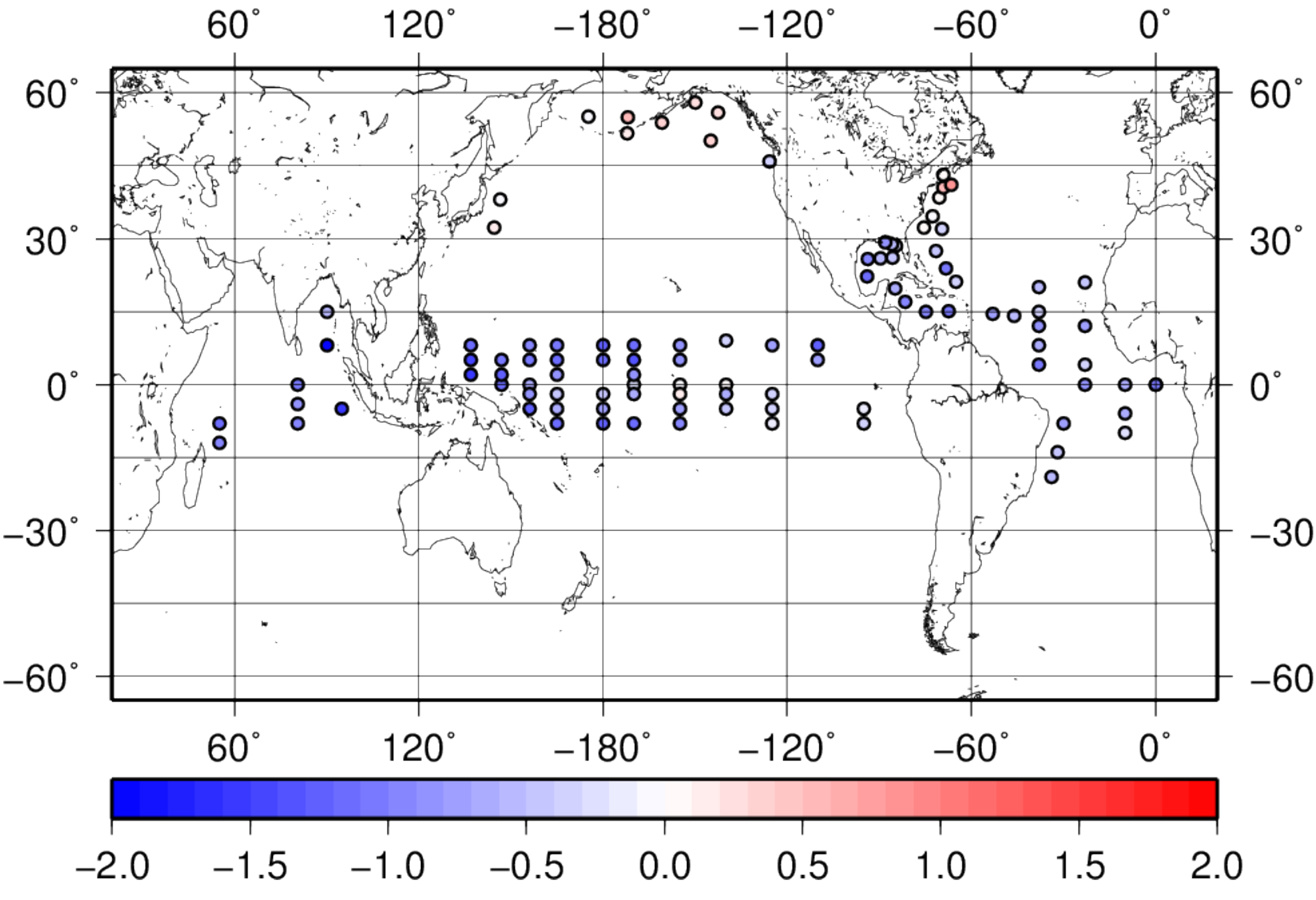
JRA-55 Ver. 0.1

BIAS

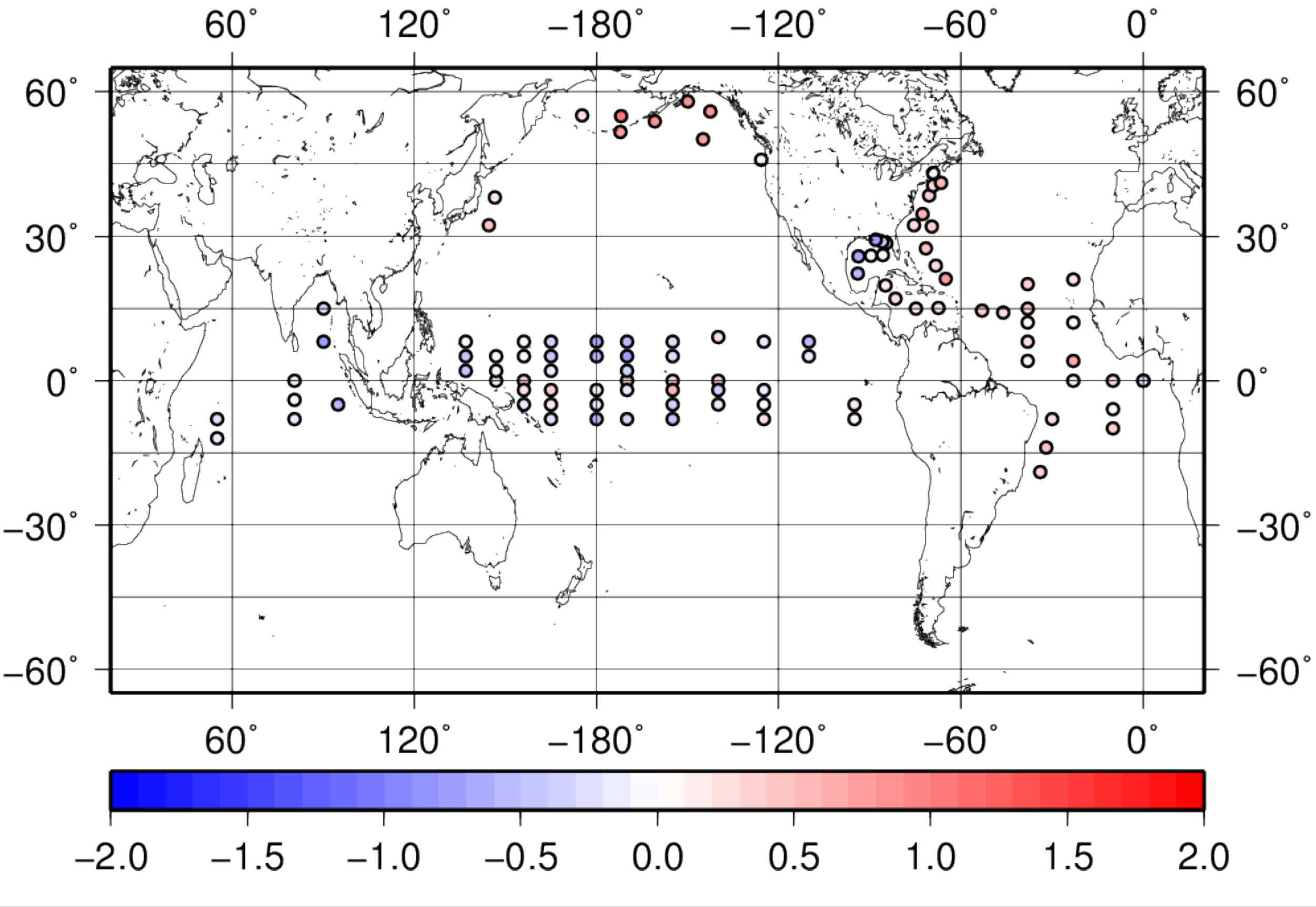
TA g/kg



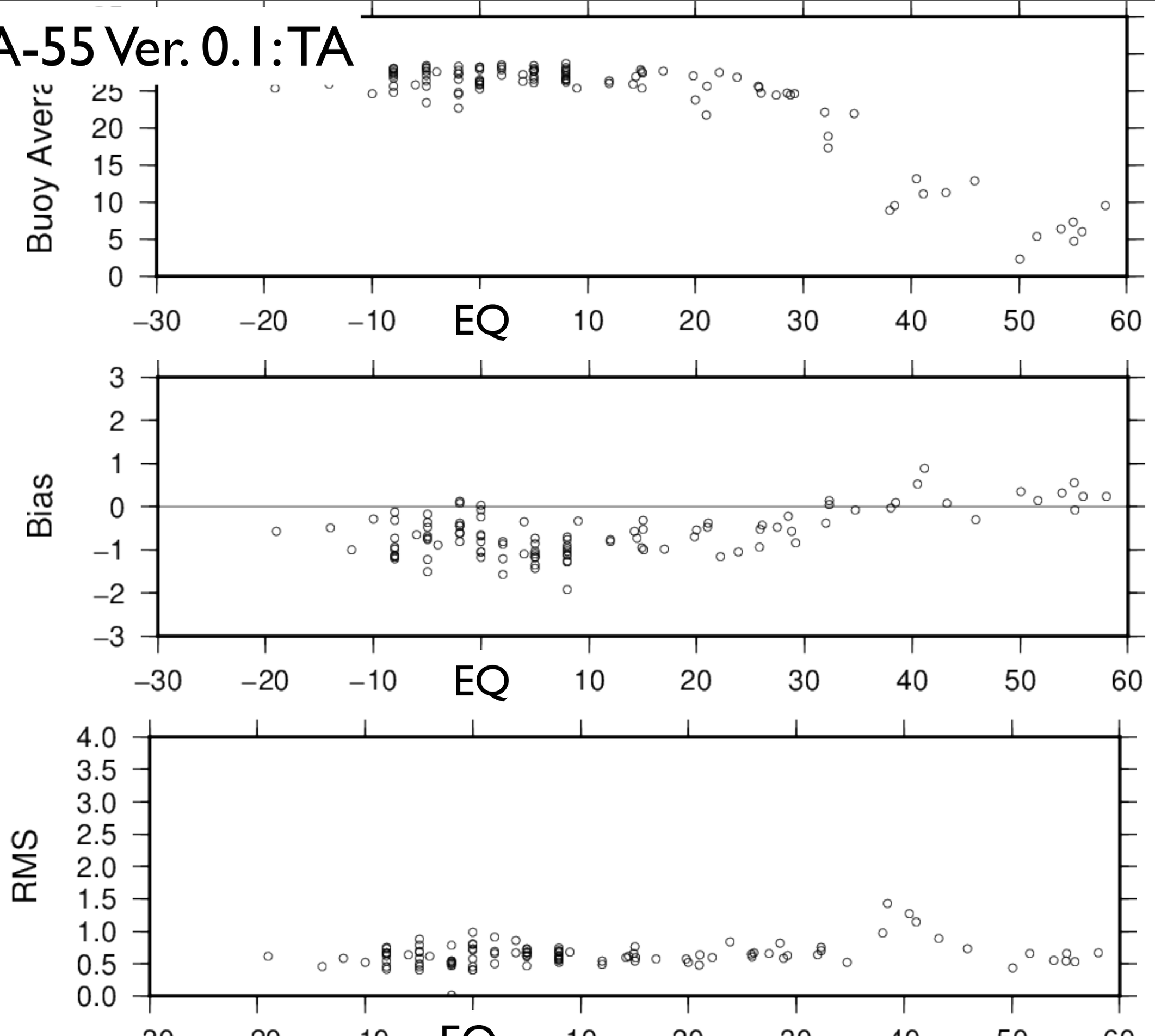
JRA-55 Ver. 0.3

BIAS

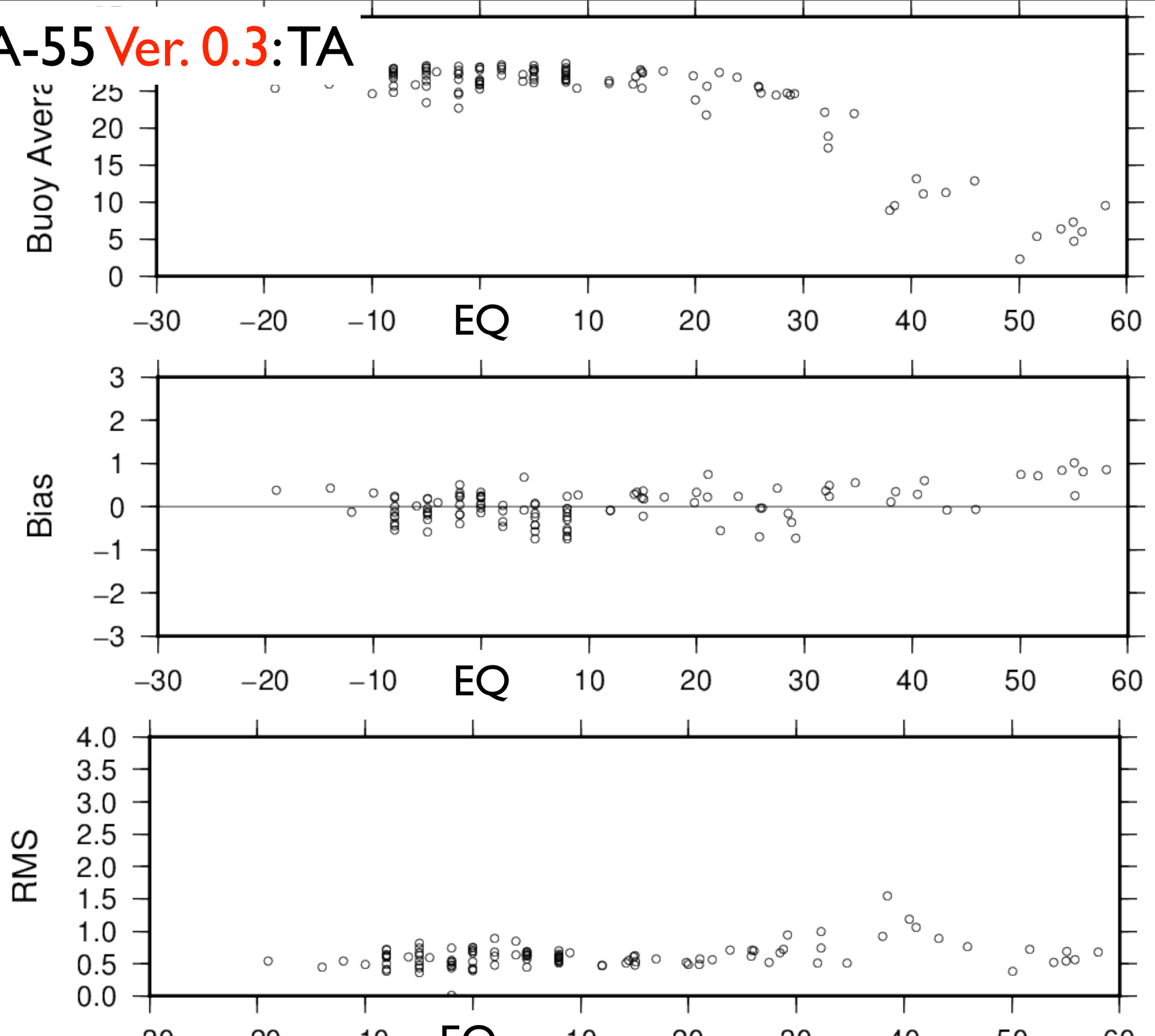
TA g/kg



JRA-55 Ver. 0.1: TA



JRA-55 Ver. 0.3: TA



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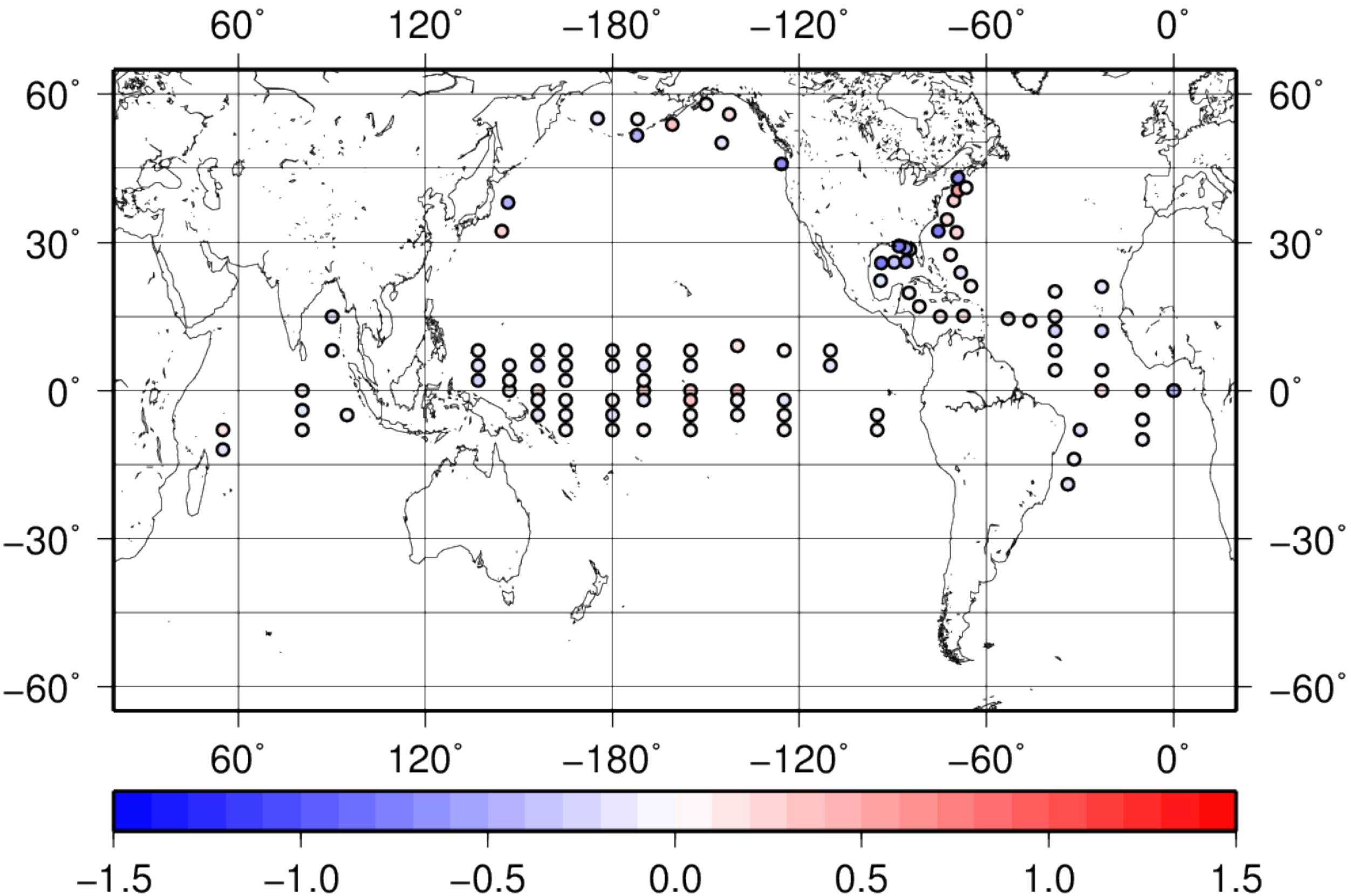
JRA-55 COBE SST

BIAS

SST ℃



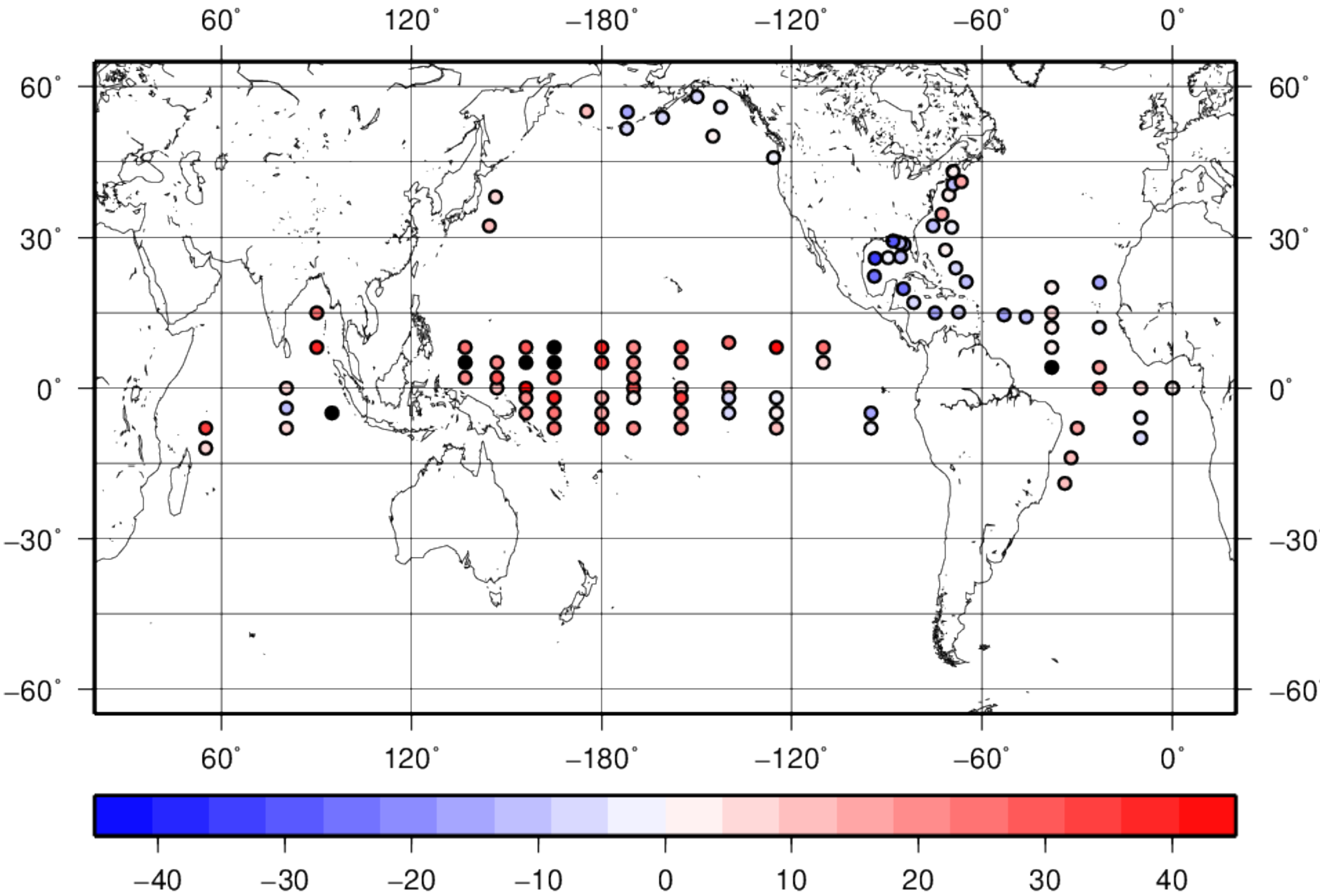
Summary

Variable	v0.1	→	v0.3
LHF	positive bias		improved
SHF	positive bias		improved
WND	Tropics: negative bias High lat: positive bias		negative bias
QA	dry bias		improved
TA	cold bias		improved
SST	large bias in mid-latitude		

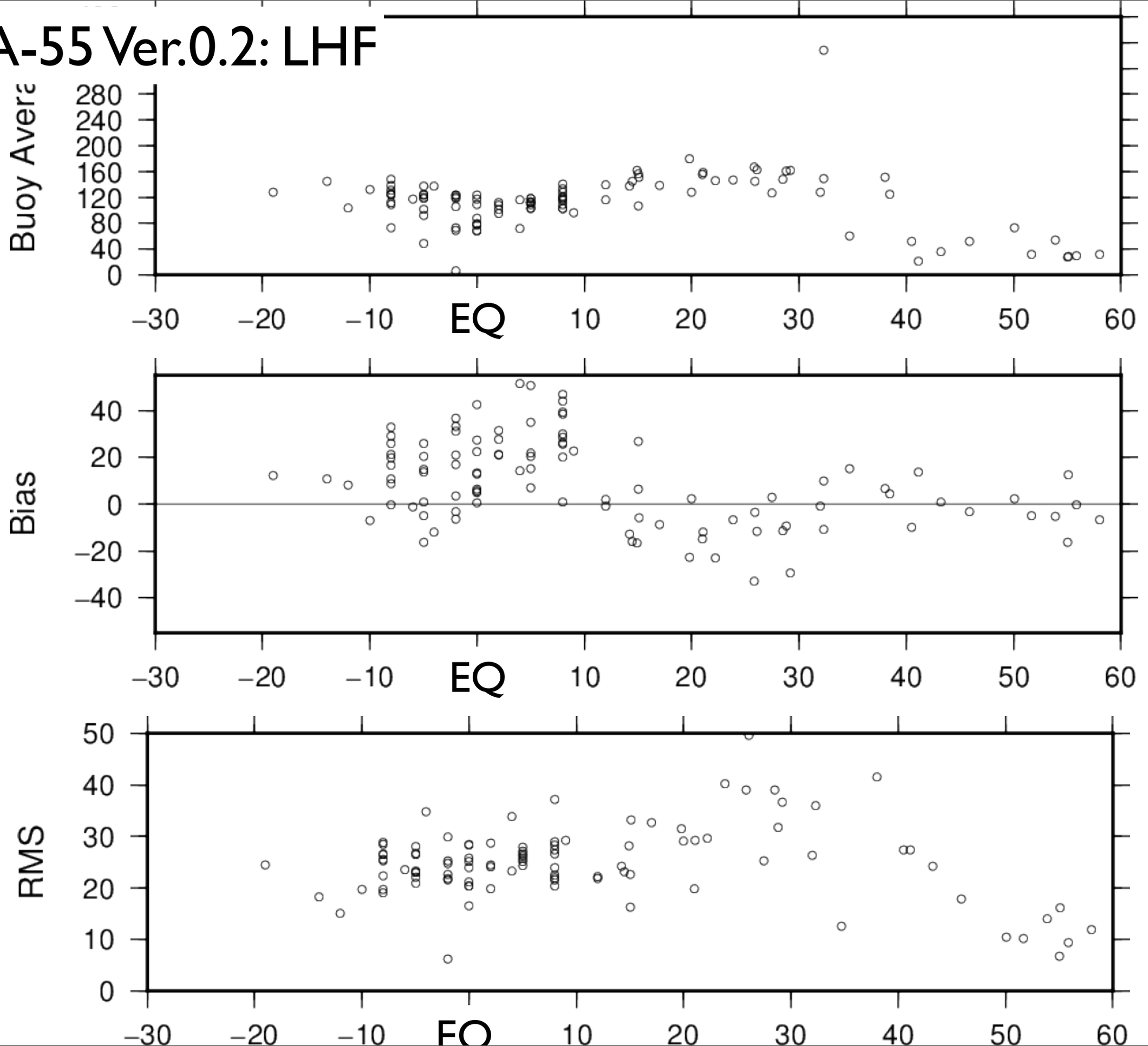
Validation of the JRA-55 based data set: Comparison with buoy observations

Appendix

JRA-55 Ver.0.2: LHF

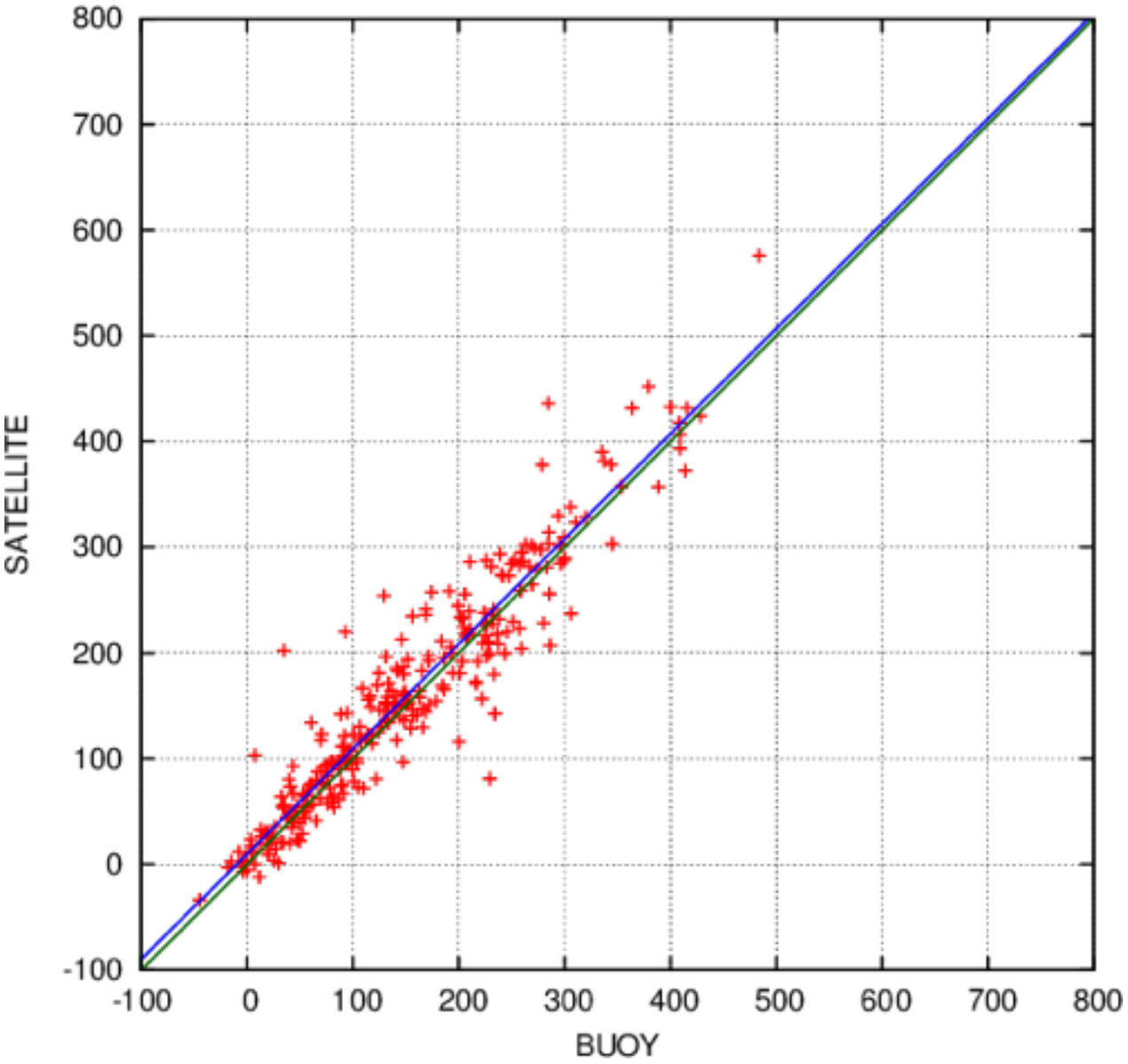


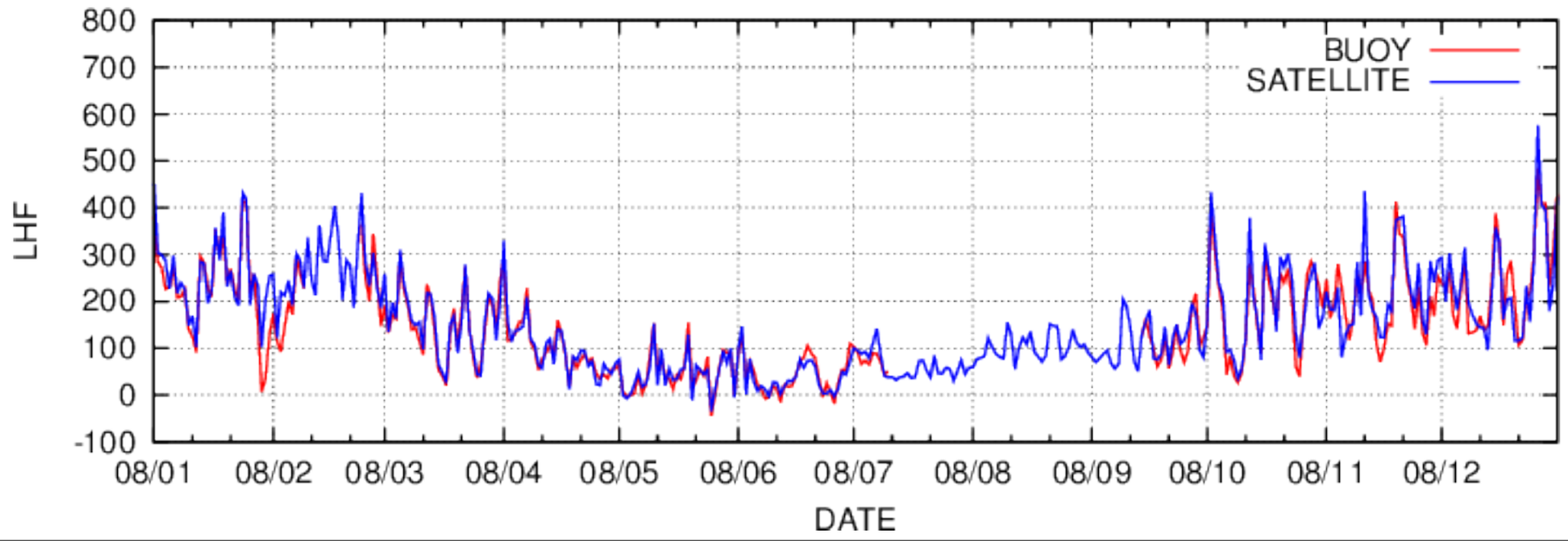
JRA-55 Ver.0.2: LHF



JRA-55 v0.3

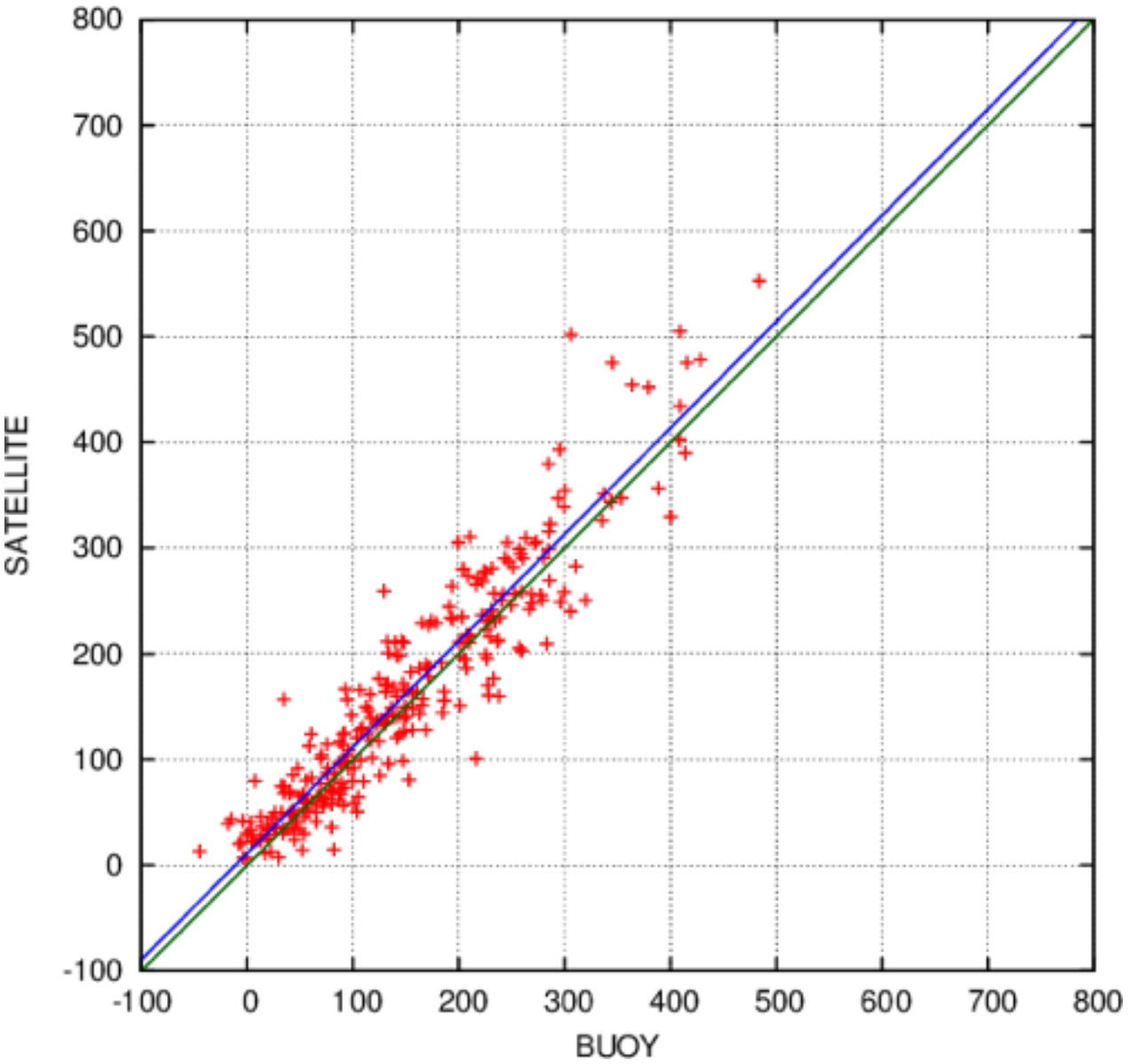
@KEO (32N, 146.5E)

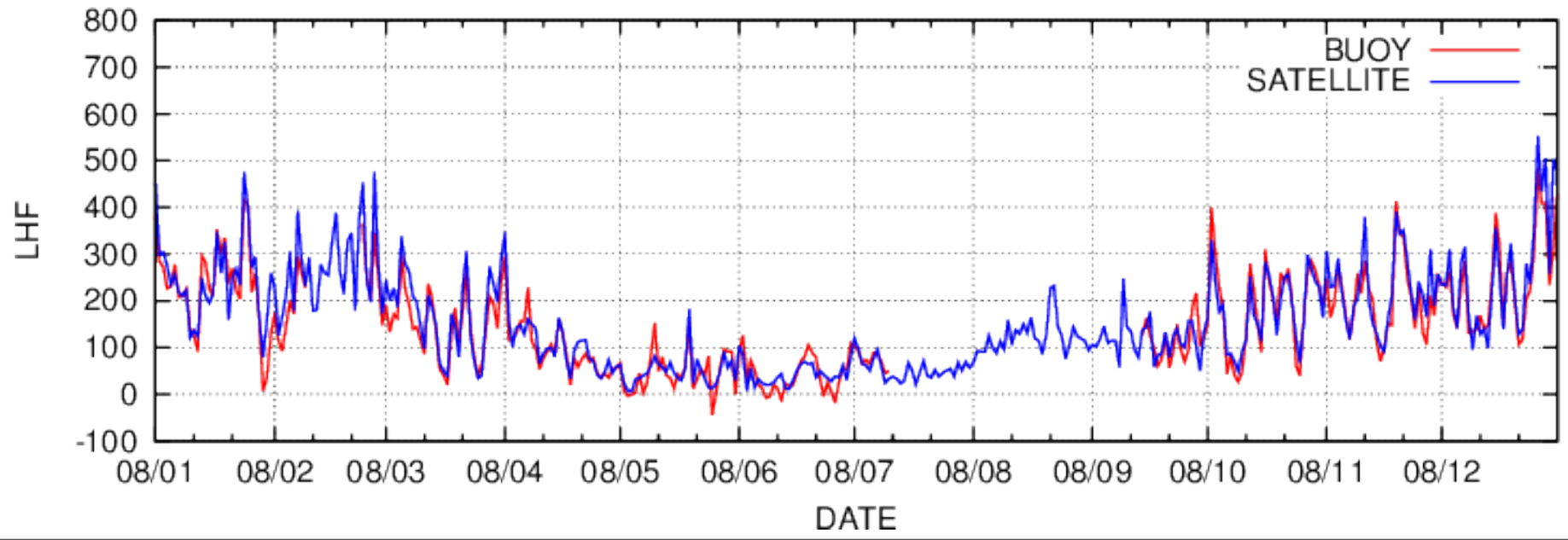


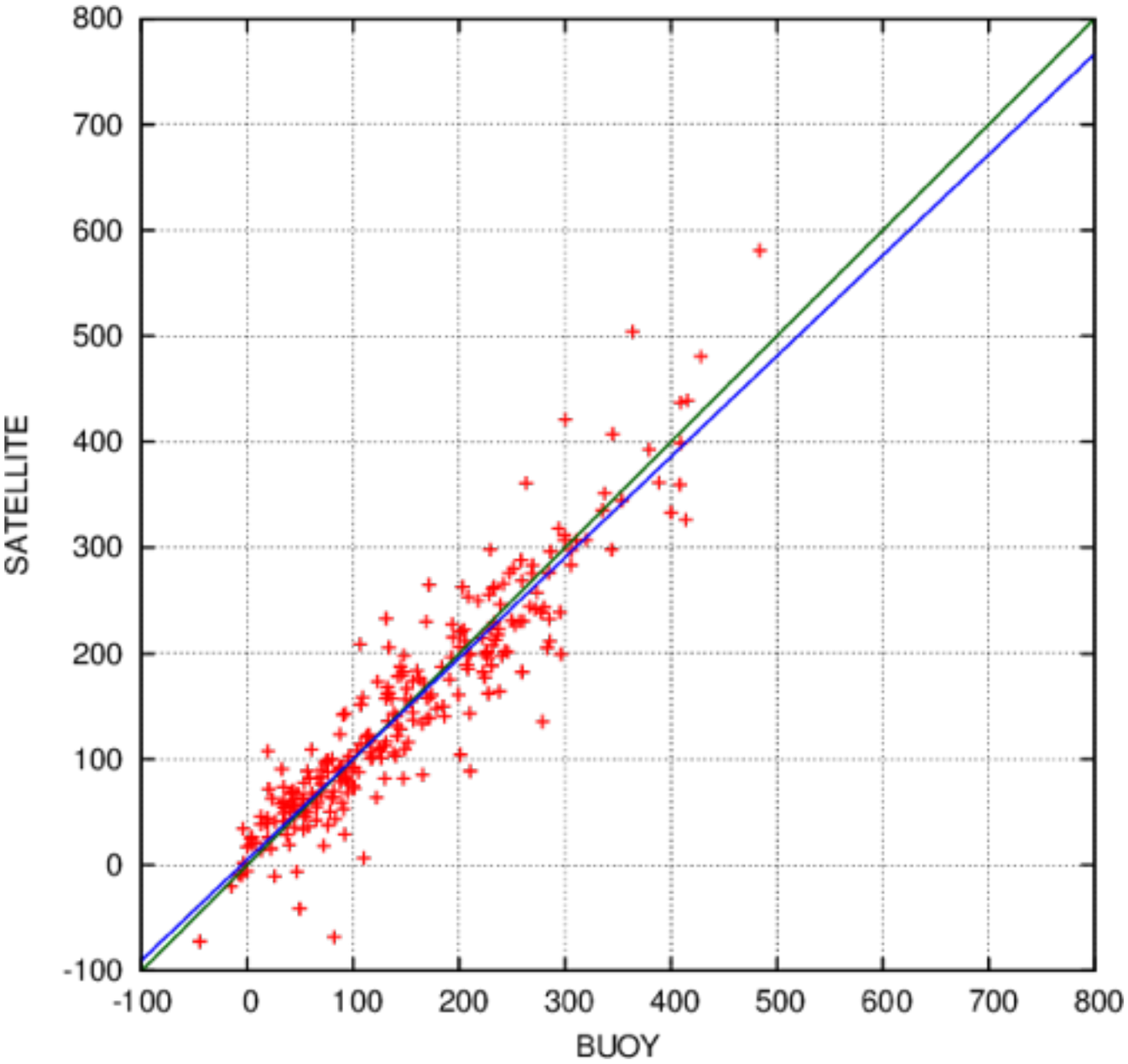


OAFlux

@KEO (32N, 146.5E)

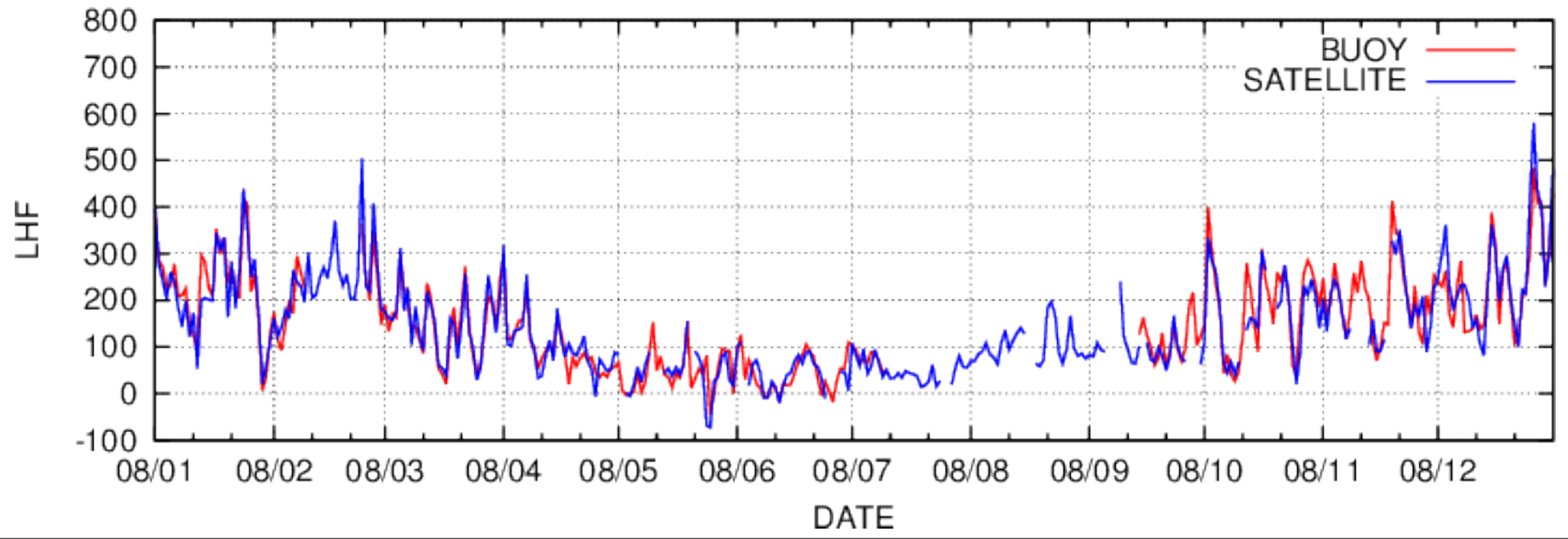






J-OFURO3 Preliminary

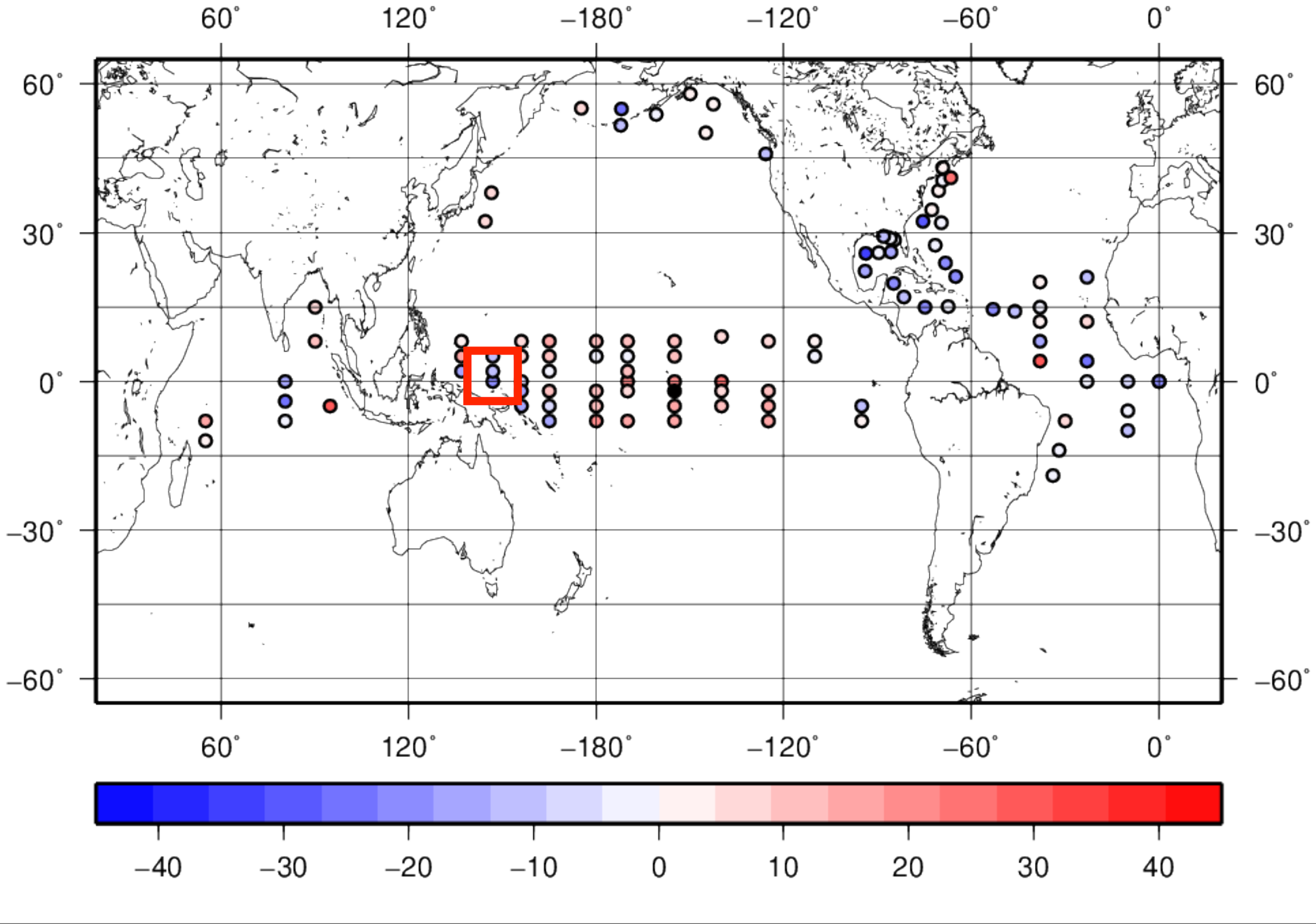
@KEO (32N, 146.5E)



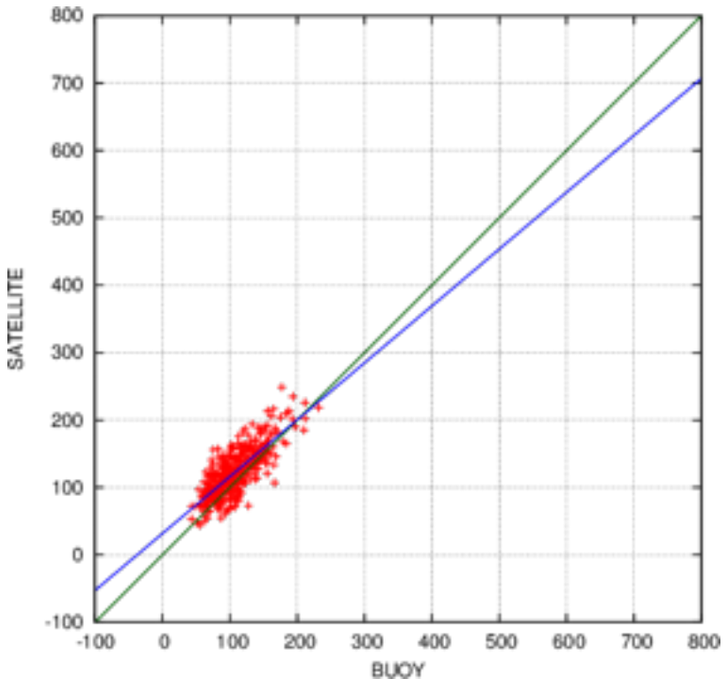
JRA-55 Ver. 0.3

BIAS

LHF W/m^2

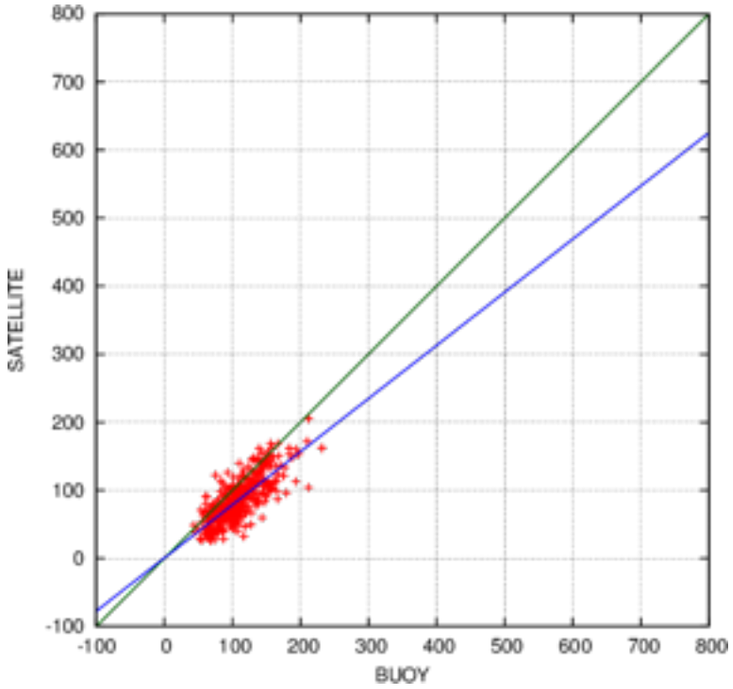


JRA-55 ORG



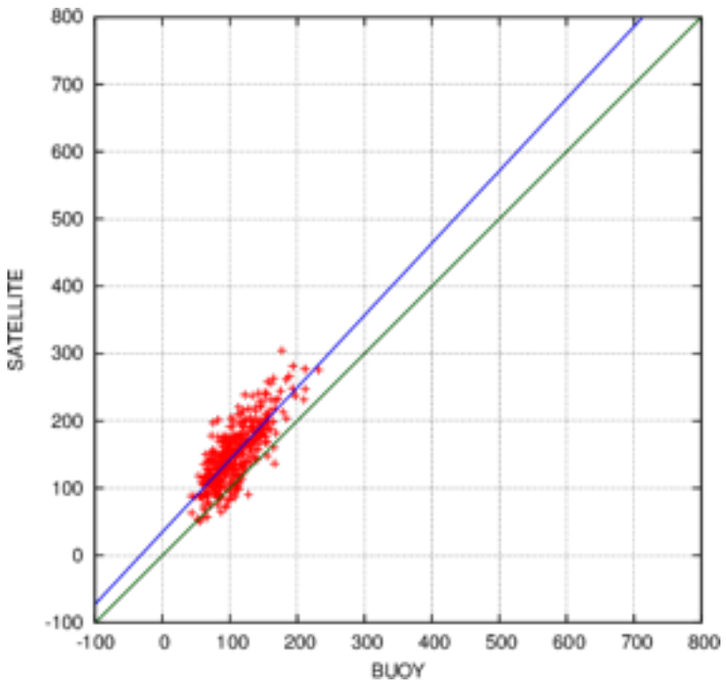
number of data : 363
Buoy average : 108.624
Satellite average : 123.134
Bias : 14.509
RMS error : 23.119
Correlation : 0.776
Regression : 31.496 + 0.844 * x

NRA1C



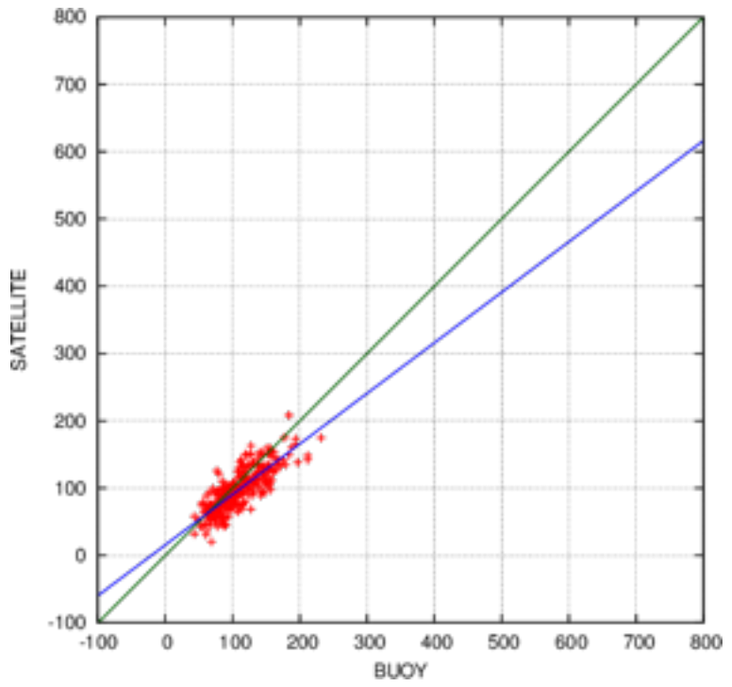
number of data : 363
Buoy average : 108.624
Satellite average : 85.127
Bias : -23.497
RMS error : 21.959
Correlation : 0.778
Regression : 0.296 + 0.781 * x

JRA-55 v0.2



number of data : 363
Buoy average : 108.624
Satellite average : 151.220
Bias : 42.595
RMS error : 28.327
Correlation : 0.781
Regression : 34.662 + 1.073 * x

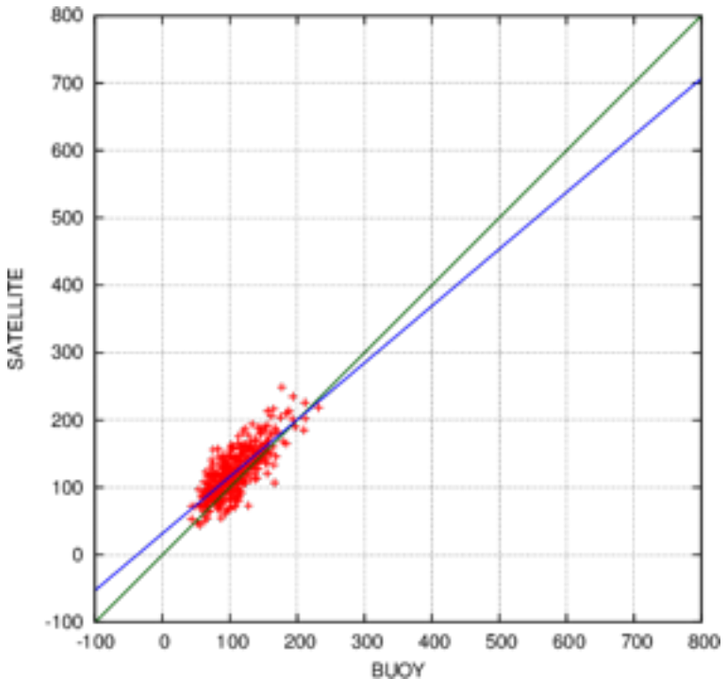
J-OFURO3 Preliminary



number of data : 297
Buoy average : 109.501
Satellite average : 97.588
Bias : -11.913
RMS error : 20.066
Correlation : 0.809
Regression : 15.378 + 0.751 * x

LHF@0n156e

JRA-55 ORG



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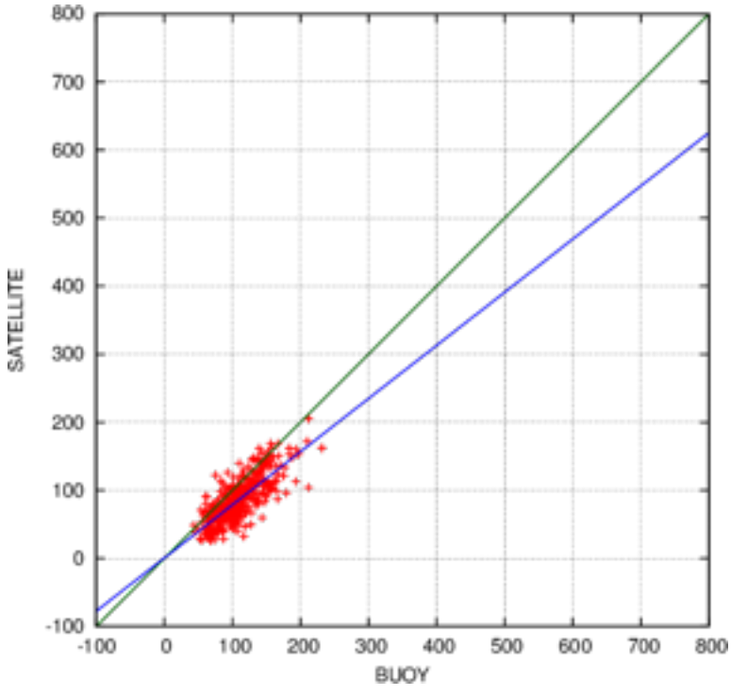
Bias : 14.509
RMS error : 23.119
Correlation : 0.776
Regression : 31.496 + 0.844 * x

NRA1C



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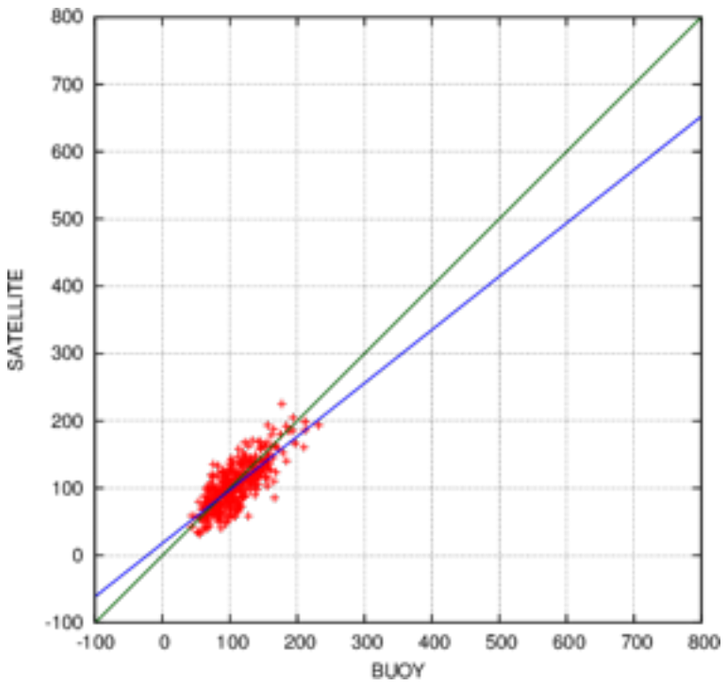
Buoy average : 108.624
Satellite average : 85.127
Bias : -23.497
RMS error : 21.959
Correlation : 0.778
Regression : 0.296 + 0.781 * x

JRA-55 v0.3



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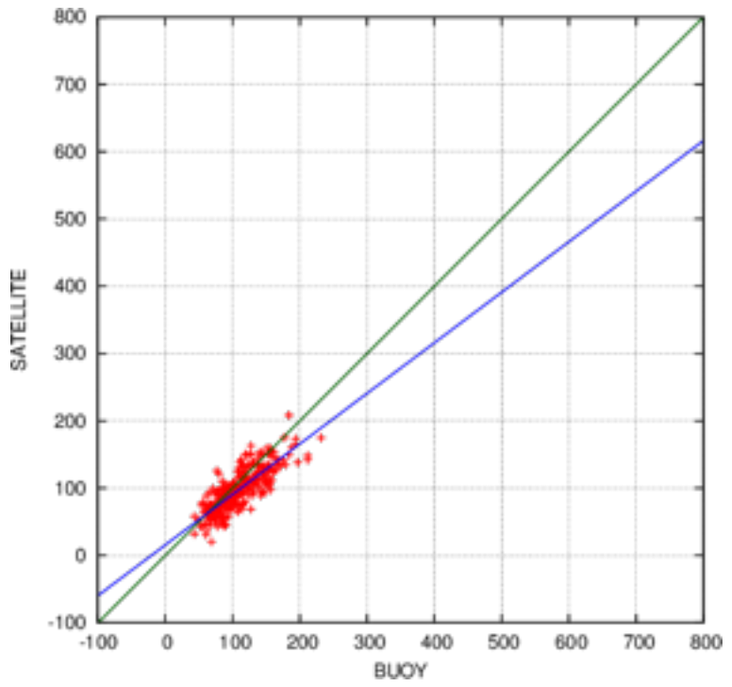
J-OFURO3 Preliminary



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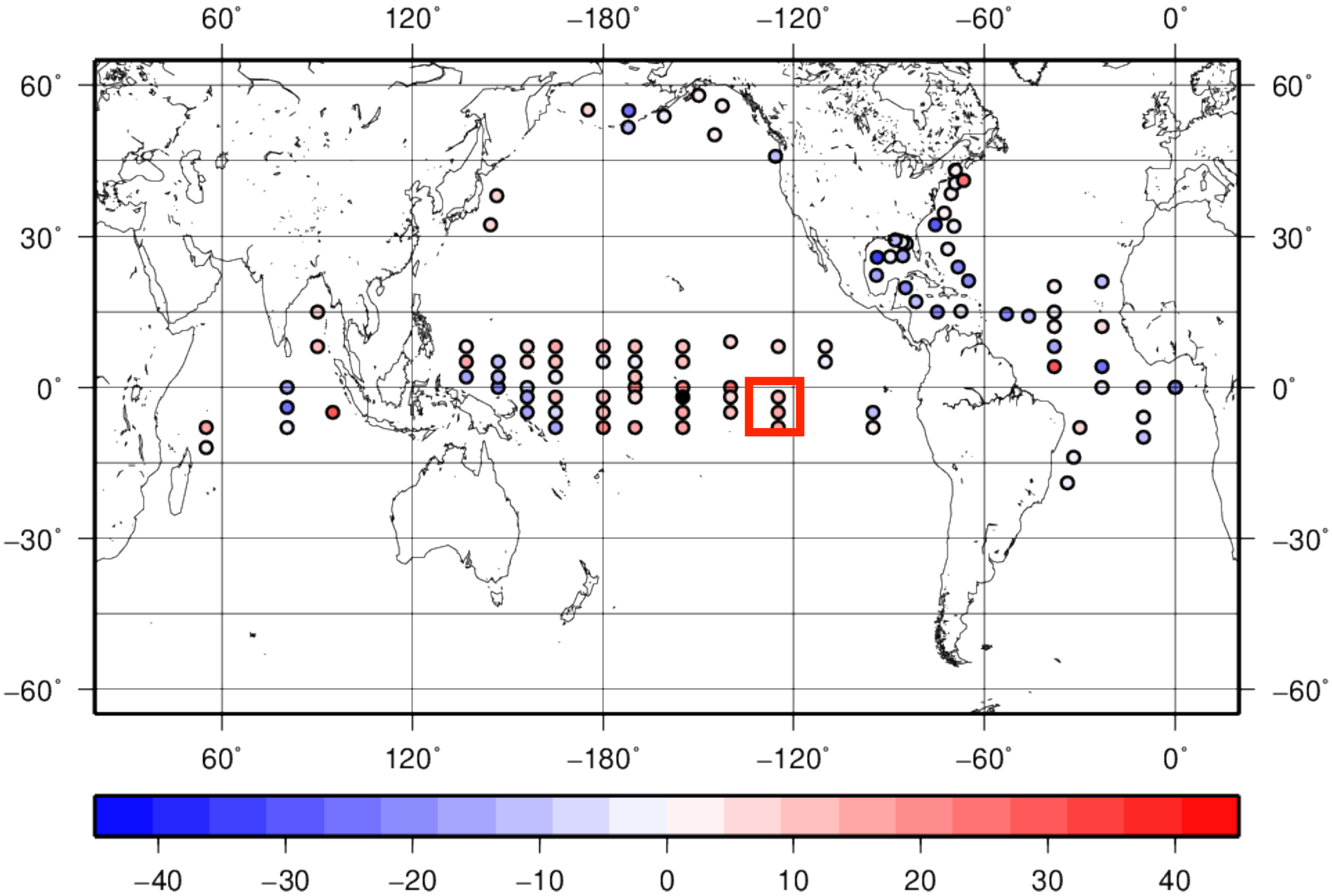
LHF@0n156e

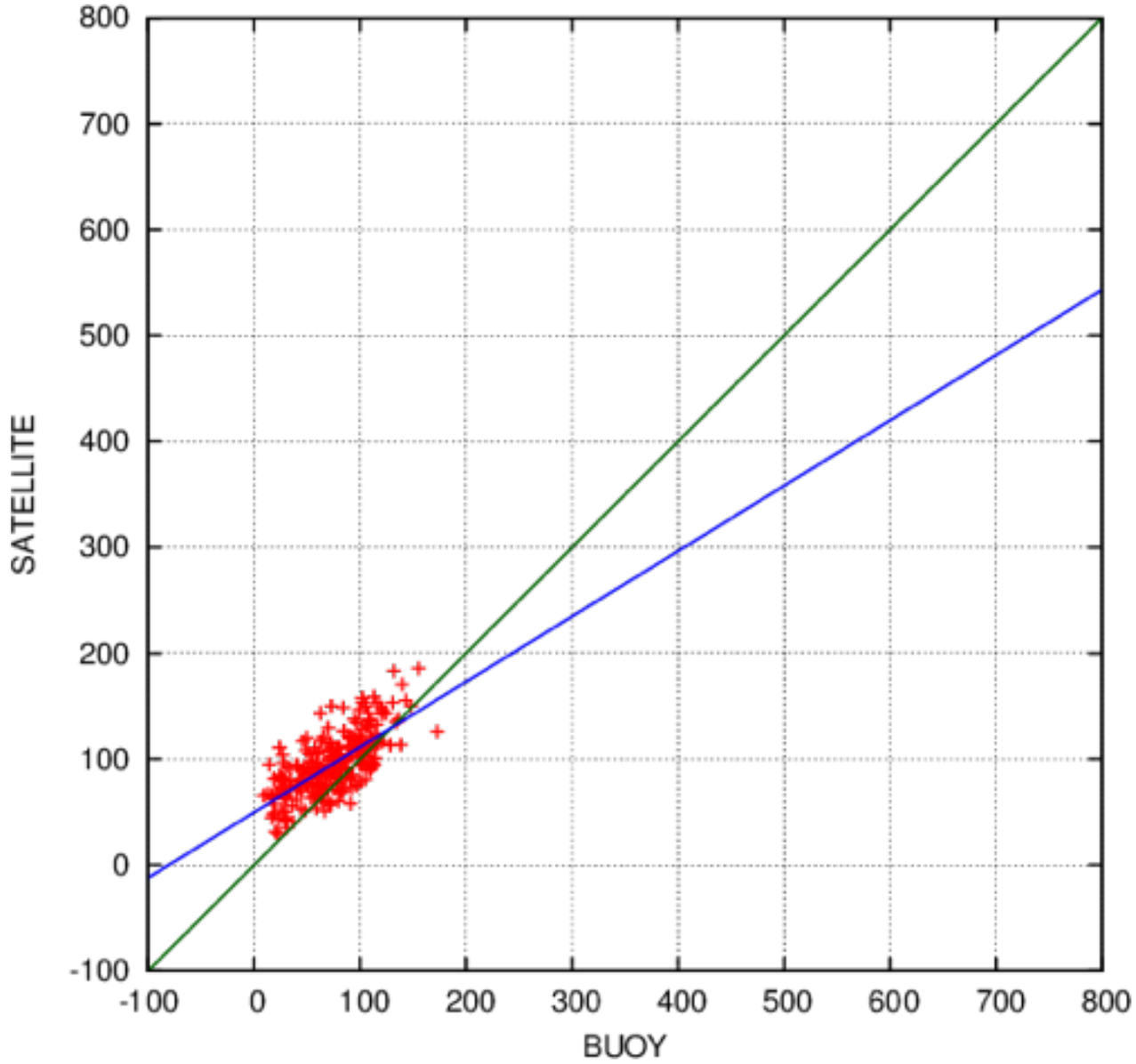
JRA-55 Ver. 0.3

BIAS

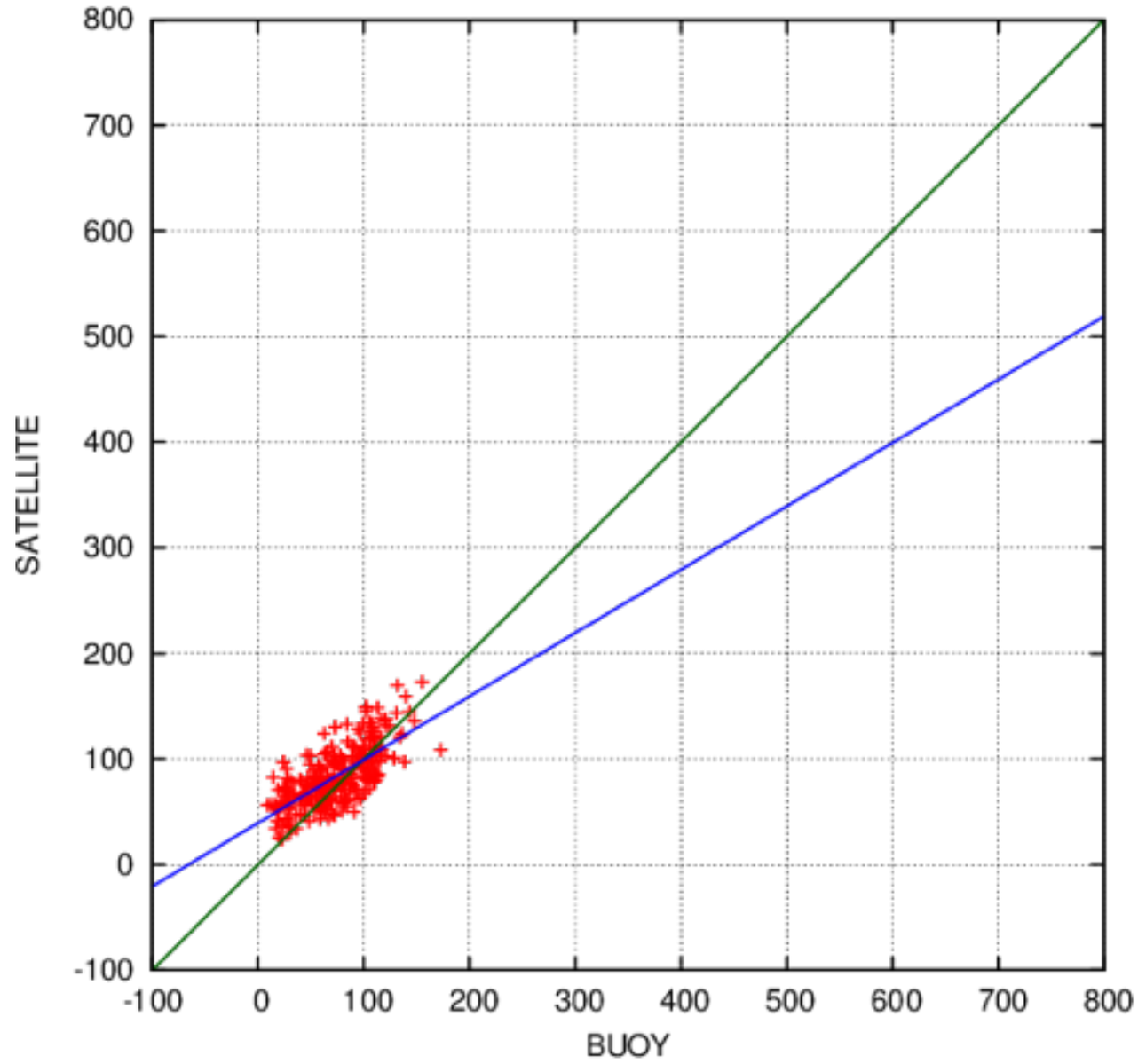
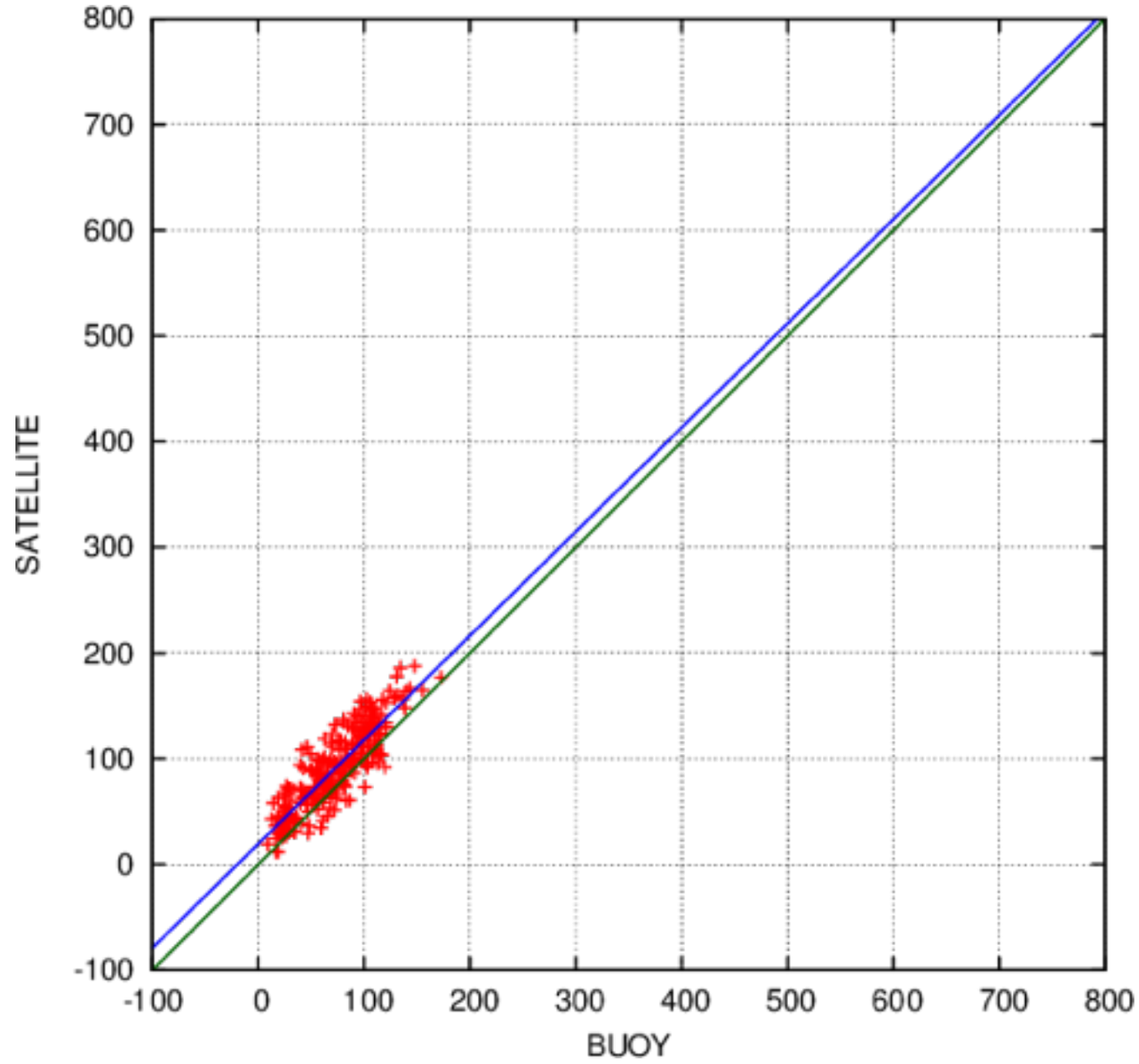
LHF W/m^2



JRA-55 v0.1
LHF@5s125w



JRA-55 v0.3
LHF@5s125w



J-OFURO3
LHF@5s125w