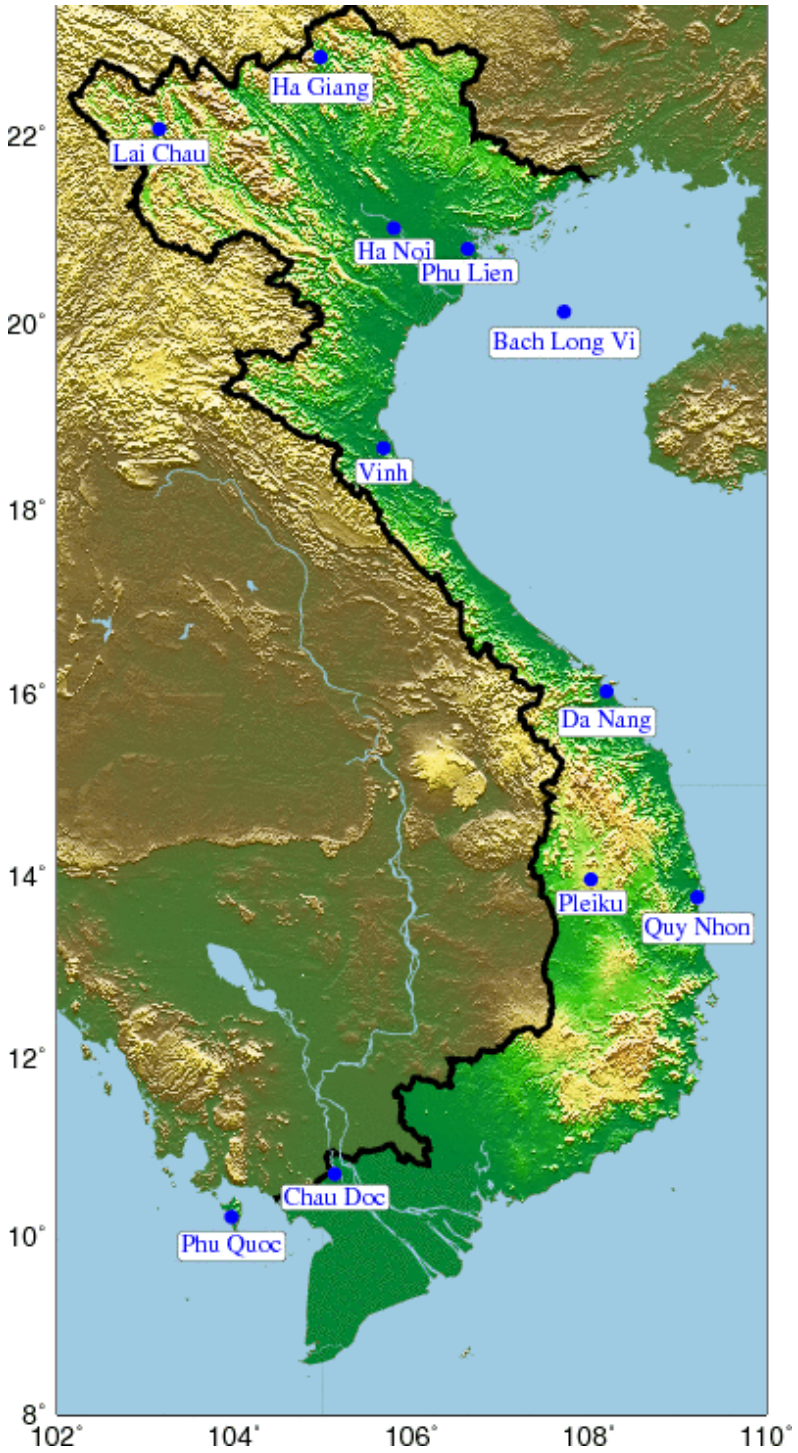
STATISTICAL DOWNSCALING

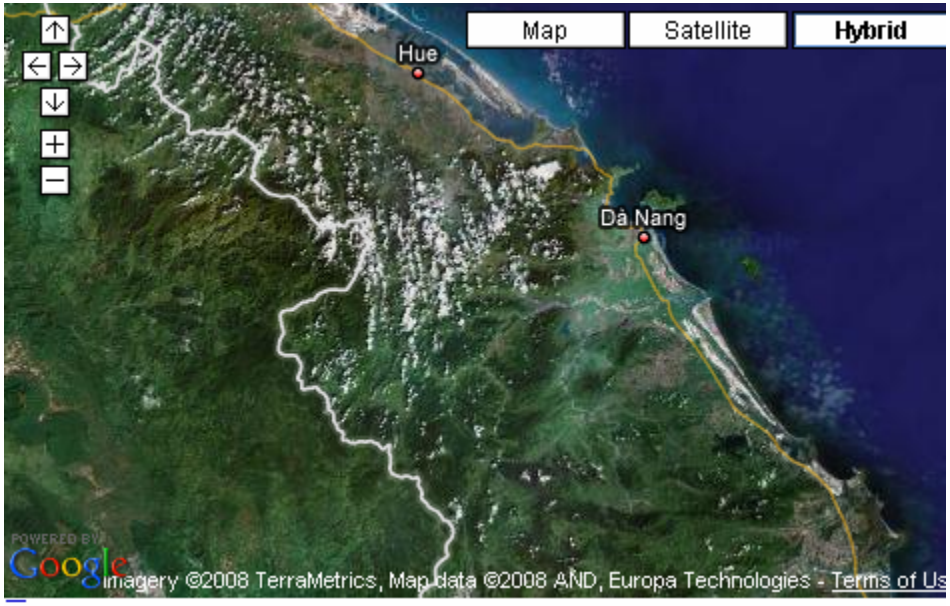
by

SAJI AND KANG SCHEME:

A case study for VIETNAM


Ha Giang
Lai Chau
Ha Noi
Phu Lien
Bach Long Vi
Vinh
Da Nang
Pleiku
Quy Nhon
Chau Doc
Phu Quoc
22°
20°
18°
16°
14°
12°
10°
8°
102°
104°
106°
108°
110°


Map
Satellite
Hybrid
Hà Noi
Hai Phòng
Nam Dinh

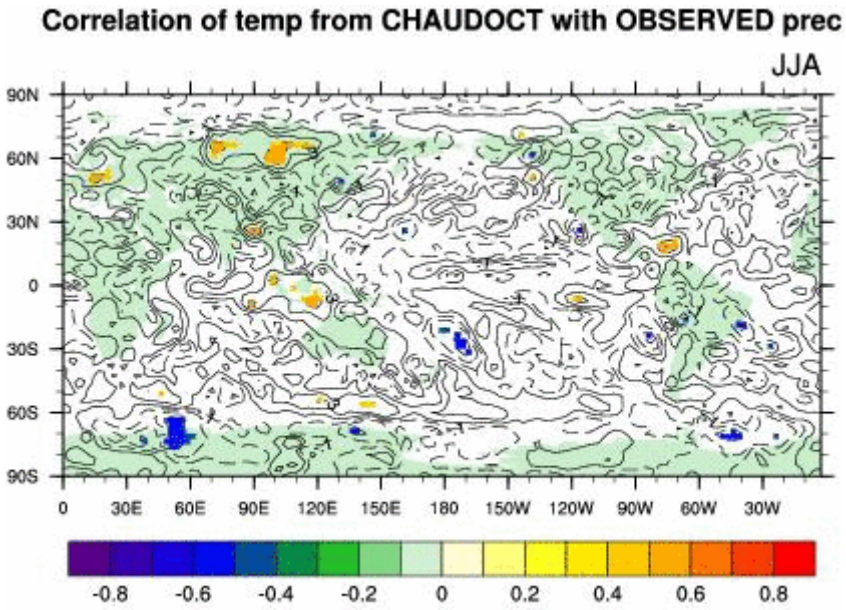

Map
Satellite
Hybrid
Hue
Da Nang
Google
Imagery ©2008 TerraMetrics, Map data ©2008 AND, Europa Technologies - Terms of Us

Part 1. CLICK

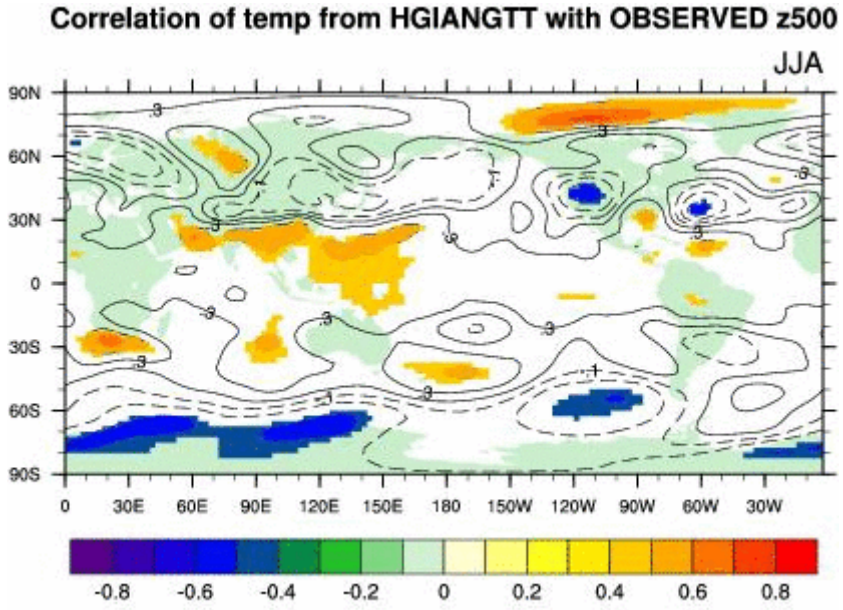
There are 2 kinds of correlations that we can get from maps:

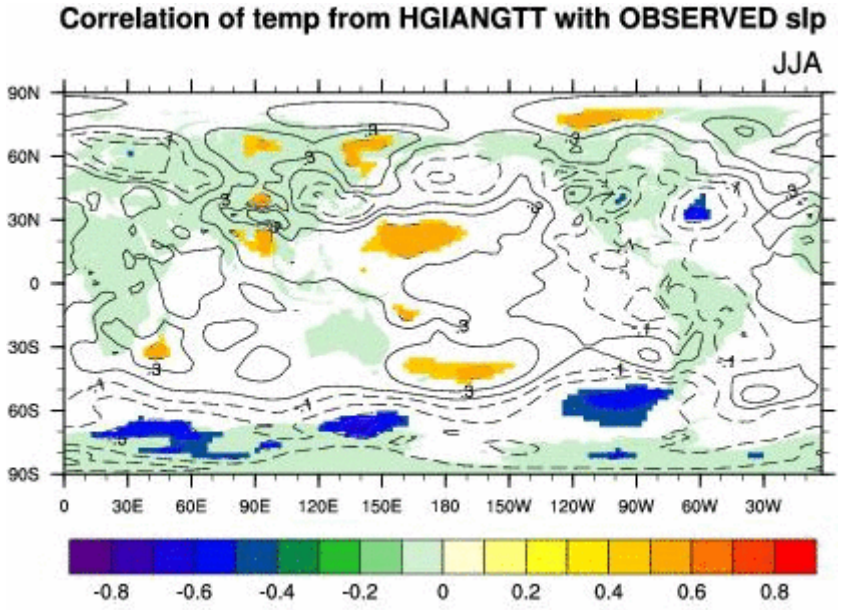
- Show nothing relationship via eye-ball (1).

- Clear pattern with prevail predictor(s) (2).

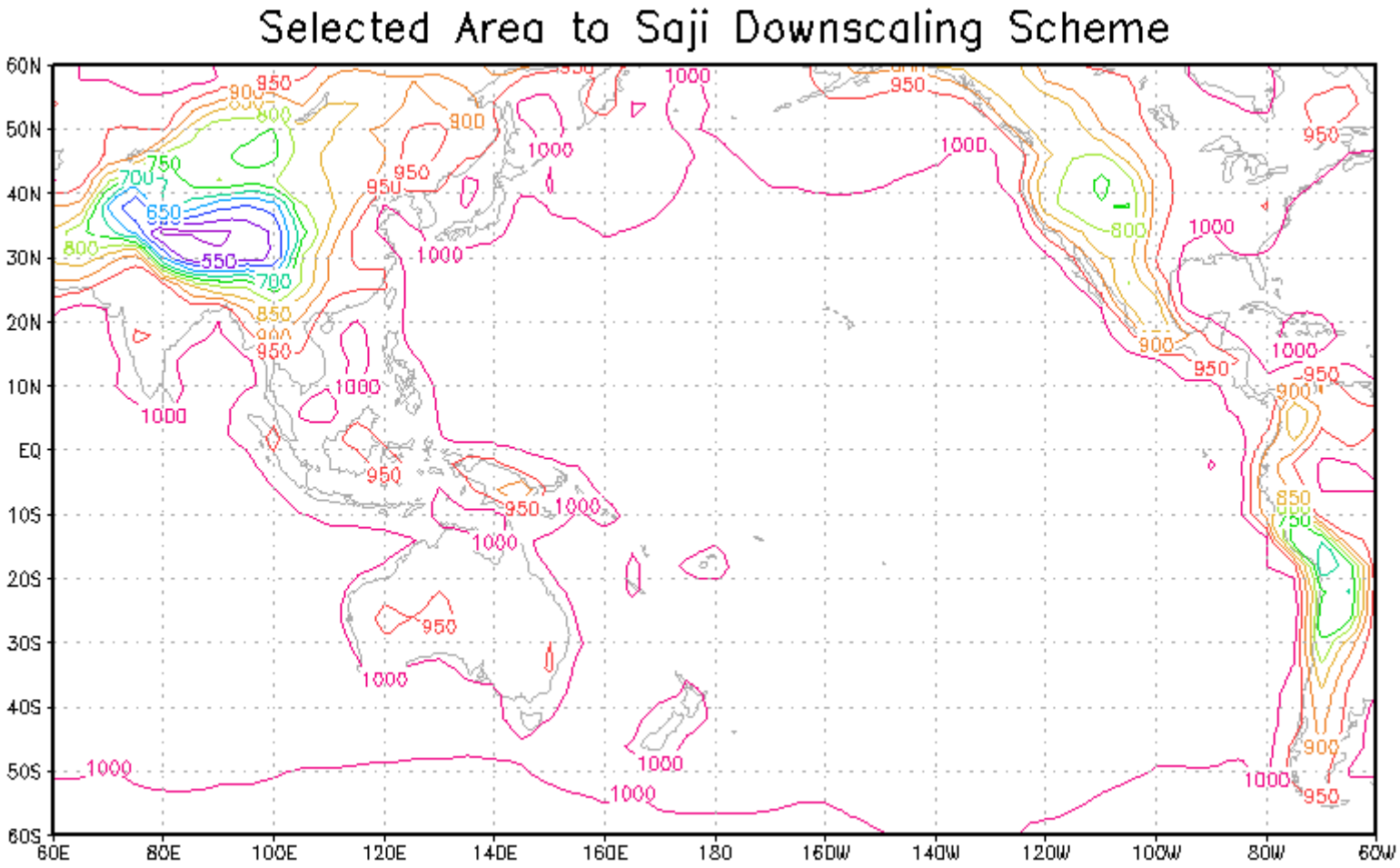

Correlation of temp from CHAUDOCT with OBSERVED prec
JJA
90N
60N
30N
0
30S
60S
90S
0
30E
60E
90E
120E
150E
180
150W
120W
90W
60W
30W
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8

Type 1


Correlation of temp from HGIANGTT with OBSERVED z500
JJA
90N
60N
30N
0
30S
60S
90S
0
30E
60E
90E
120E
150E
180
150W
120W
90W
60W
30W
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8


Correlation of temp from HGIANGTT with OBSERVED slp
JJA
90N
60N
30N
0
30S
60S
90S
0
30E
60E
90E
120E
150E
180
150W
120W
90W
60W
30W
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8

Type 2



Region: 60S - 60N, 60E-60W

Six Models Used: CWB, GCPS, GDAPS_F, NCEP ,JMA, METRI

Predictant: TEMPERATURE
Three success models: CWB, GCPS, GDAPS_F, NCEP

JJA				DJF		
Station Name	Pre1	Pre2	Pre3	Pred 1	Pre2	Pre3
Lai Chau	T850	V850	V200			
Ha Giang	V850	Z500	T850	SLP	T850	
Lang	Z500	V850	T850	Z500	T850	
Phu Lien	Z500	V850	T850	Z500	T850	
Vinh	Z500	V850	T850	SLP	T850	Z500
Da Nang				T850		
Plei Ku	Z500	V850	T850	Z500	V850	T850
Quy Nhon	V850	Z500	V850	T850		
Phu Quoc	Z500	V850	T850	V850	T850	PREC
Chau Doc				T850		
Bach LV	V850	U850		Z500	SLP	U200

Predictant: PRECIPITATION
Three success models: CWB, GCPS, GDAPS_F, NCEP

	JJA			DJF		
Station Name	Pre1	Pre2	Pre3	Pred 1	Pre2	Pre3
Lai Chau	T850					
Ha Giang	Z500	V850	T850			
Lang						
Phu Lien						
Vinh						
Da Nang				V200	PREC	
Plei Ku						
Quy Nhon						
Phu Quoc	V850	T850	U850			
Chau Doc				V850	T850	
Bach LV				SLP		

When focusing on precipitation by re-ordered models used, we can distinguish/split out other predictors for each station.

Predictant: PRECIPITATION

Three success models: GCPS, GDAPS_F, NCEP; region: 60S - 60N, 60E-60W

	JJA				DJF			
Station Name	Pre1	Pre2	Pre3	Pre4	Pred 1	Pre2	Pre3	Pre4
Lai Chau								
Ha Giang	Z500	V850	T850	V200				
Lang								
Phu Lien								
Vinh								
Da Nang								
Plei Ku								
Quy Nhon								
Phu Quoc	Z500	SLP	V850	T850				
Chau Doc	T850							
Bach LV								

Comment 1

- CLICK shows more skill in TEMPERATURE predict. than that of PRECIPITATION; JJA temp > DJF temp.
- In summer, most stations show good relationship with global circulation, Z500. →One reference var. for ENSO prediction.
- "Sensitivity" on selected models or **lack of** some **variable**s in model data, hindcast. This becomes a difficult issue.
- There are some stations could not find any prevail predictor (summary table below)

	JJA	DJF
PREC.	Lang(48820),48855,48870	PLien(48826),48820,48845,48917,48870
TEMP.	ChauDoc(48909),48855	LaiChau(48800)

Part 2. Kang scheme

Six models: CWB, GCPS, GDAPS_F,JMA, MGO and NCEP

Height predictors: PREC,Z500,SLP,T850,T2M,U850,V850,U200,V200

2.1. Lead Predictor(s):

- Aver. Corr. Coef. of RAW MME with the first predictor

Stn. ID(Name)	JJA		DJF	
	RAIN	TEMP	RAIN	TEMP
48839(BLV)	0.29	0.03	0.2	0.47
48909(ChDoc)	0.33	0.37	0.25	0.4
48855(DNang)	0.21	0.42	0.25	0.41
48805(HGiang)	0.35	0.52	0.5	0.41
48820(Lang)	0.28	0.66	0.22	0.52
48800(LChau)	0.23	0.57	0.23	0.41
48917(PQuoc)	0.23	0.02	0.37	0.52
48866(PleiKu)	0.29	0.73	0.25	0.5
48826(PhLien)	0.33	0.57	0.22	0.43
48870(QNhon)	0.23	0.45	0.31	0.39
48845(Vinh)	0.05	0.54	0.13	0.48

- Aver. Corr. Coef. Of each model in RAW MME in Vietnam.

	JJA		DJF	
	RAIN	TEMP	RAIN	TEMP
CWB	0.42	0.49	0.34	0.43
GCPS	0.34	0.46	0.22	0.55
GDAPS_F	0.41	0.42	0.24	0.44
JMA	0.35	0.45	0.28	0.55
MGO	0	0.47	0.32	0.39
NCEP	0.31	0.37	0.18	0.33

Comment 2

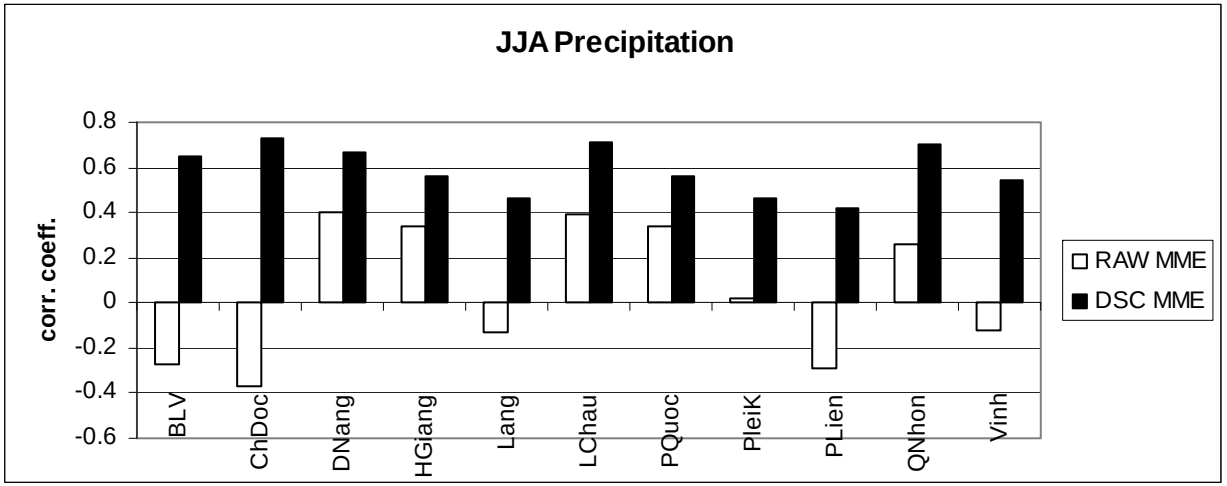
- ✓ Predictability of RAW MME in Temp. is much higher than that of Prec.

→ requirement to focus on Prec.

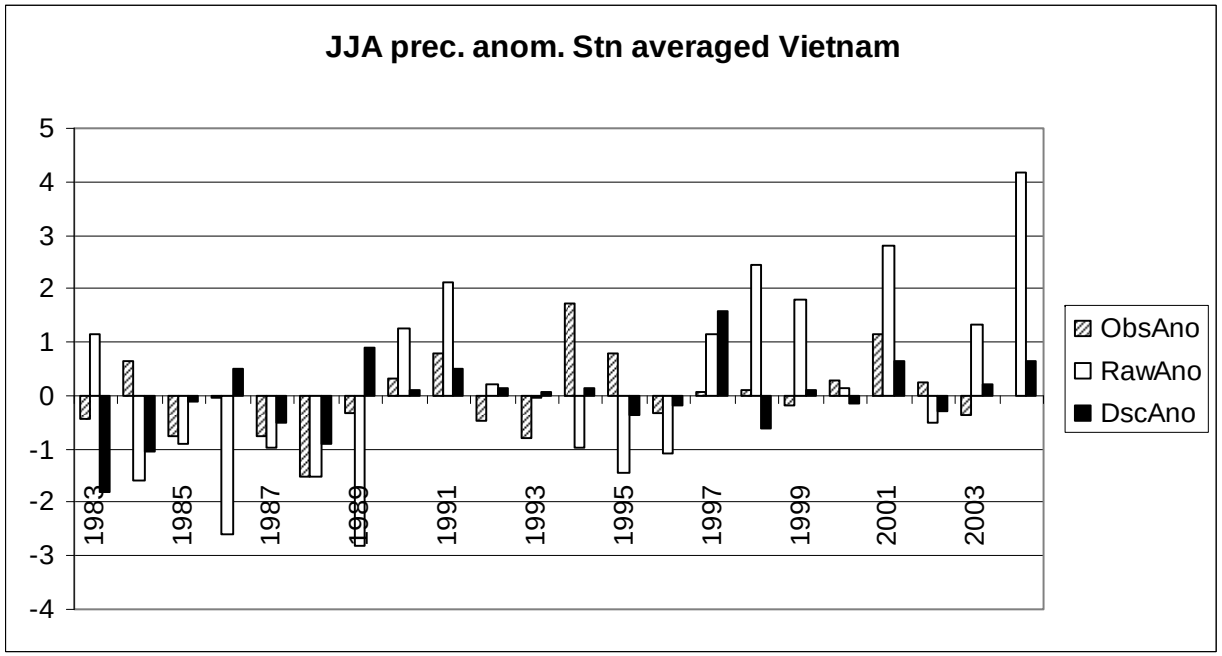
- ✓ “Skill” or “Weighted” of models for “operational purpose” are listed via order:

CWB,{GDAPS,GCPS},{NCEP,JMA},MGO

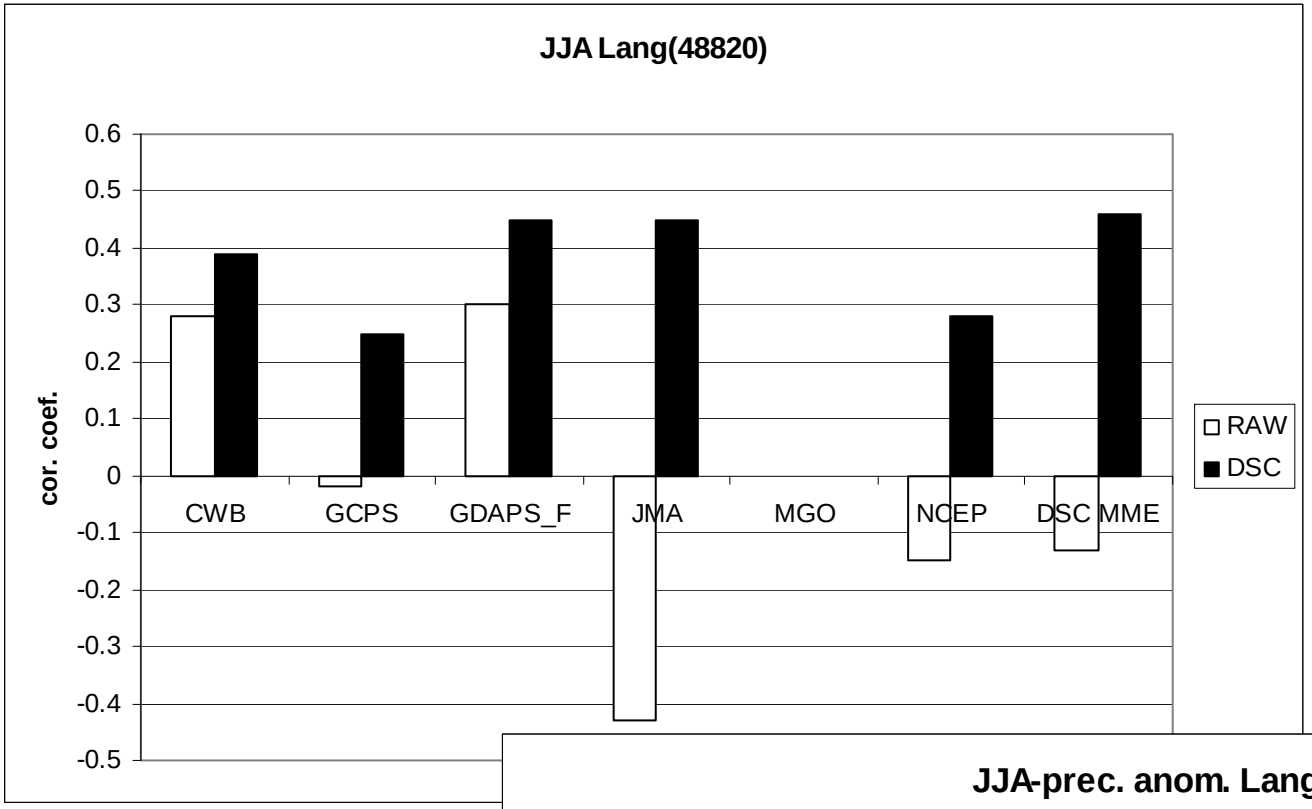
2.2 Comparison between RAW and DSC.



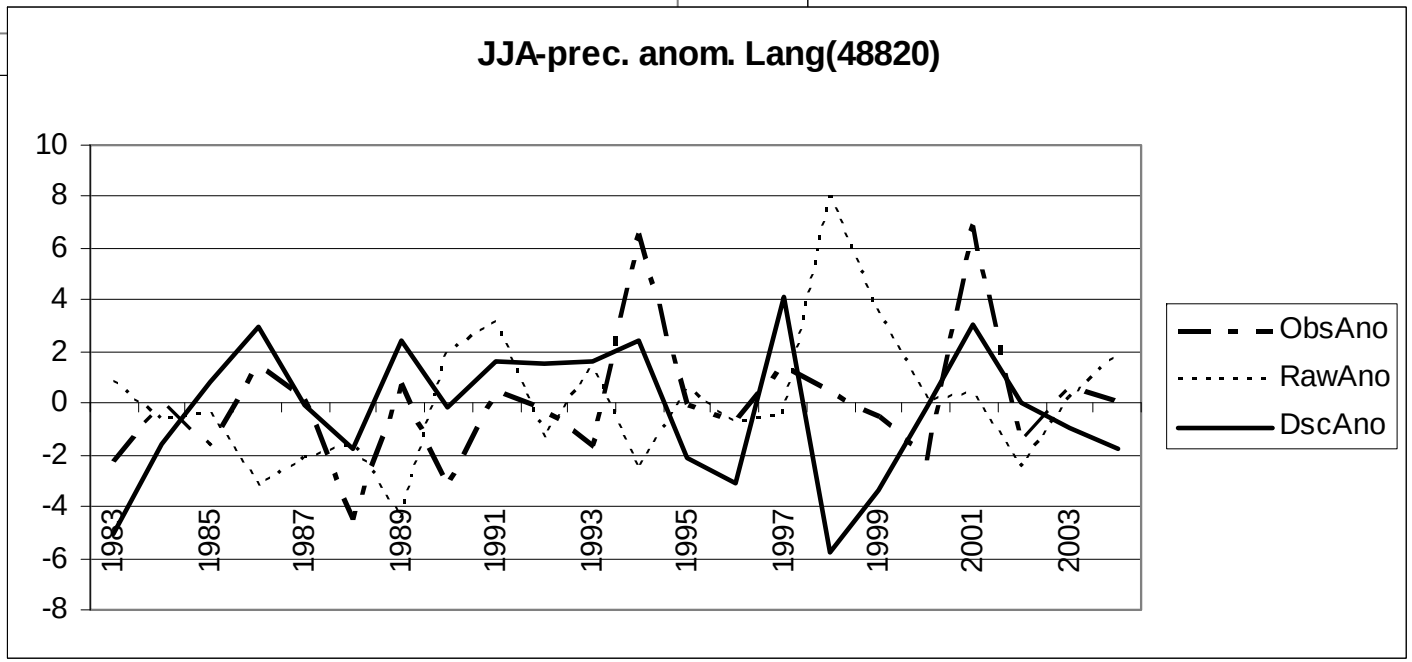
JJA PREC



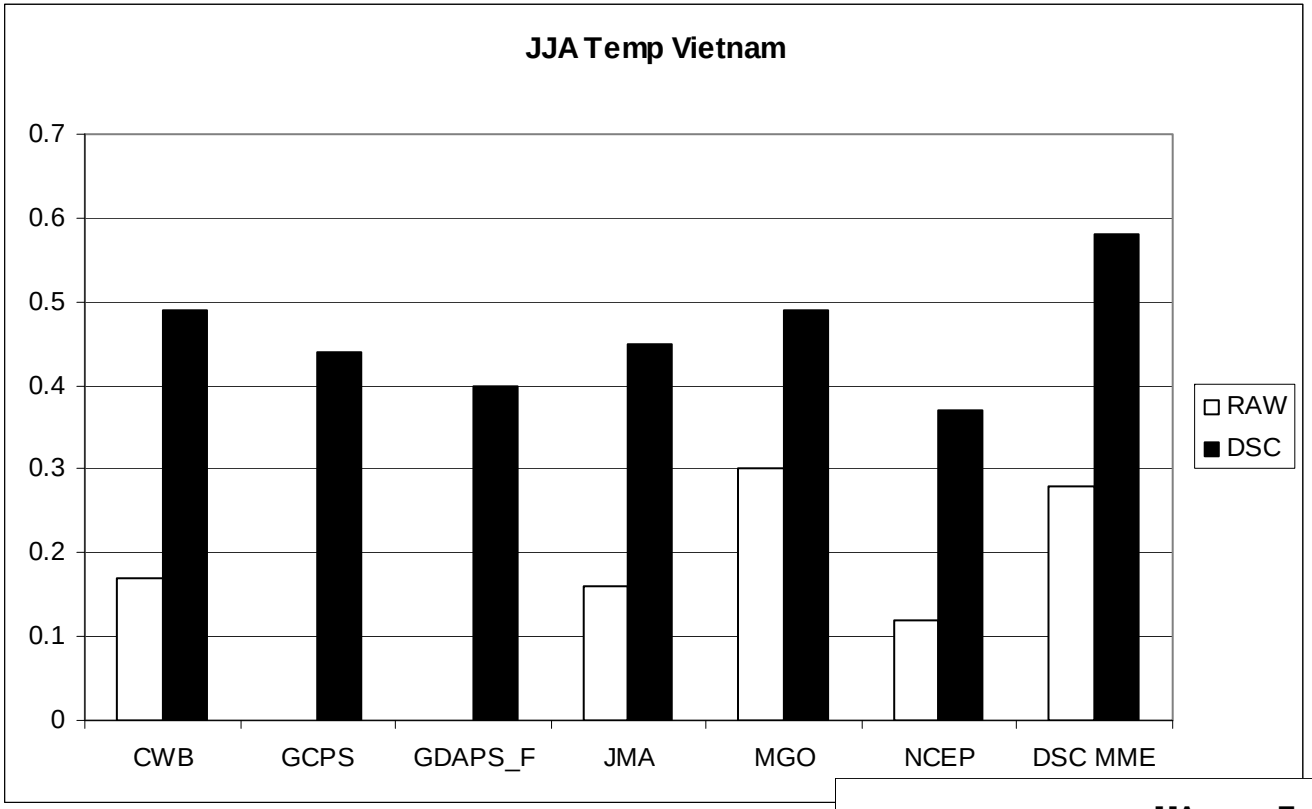
JJA	DJF
PREC	TMP

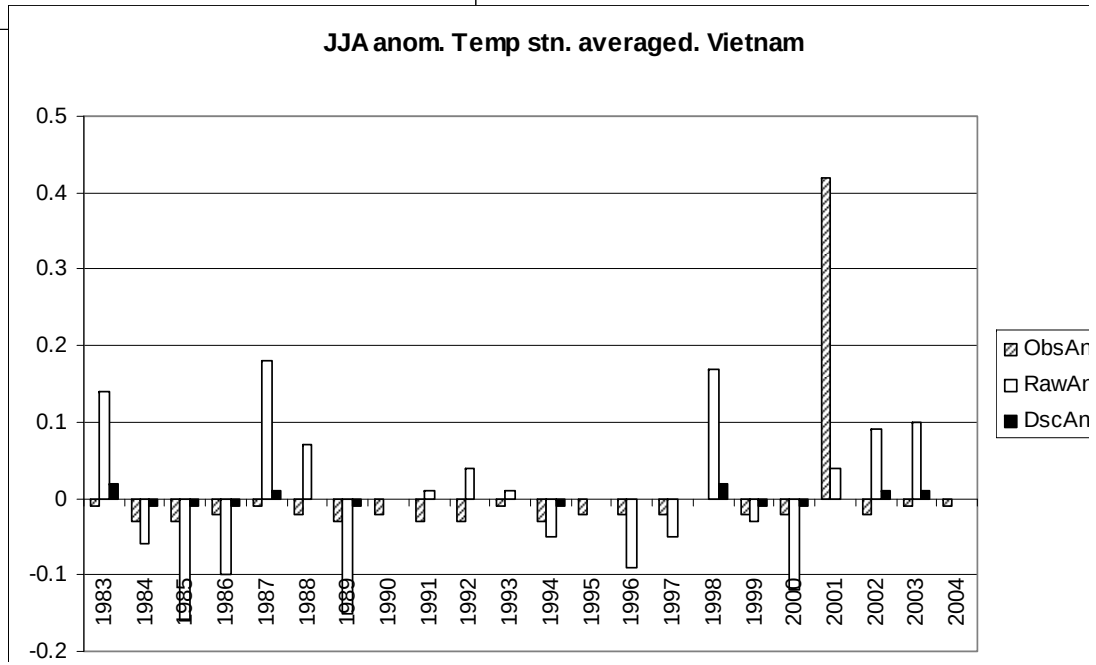


JJA PREC
Case study

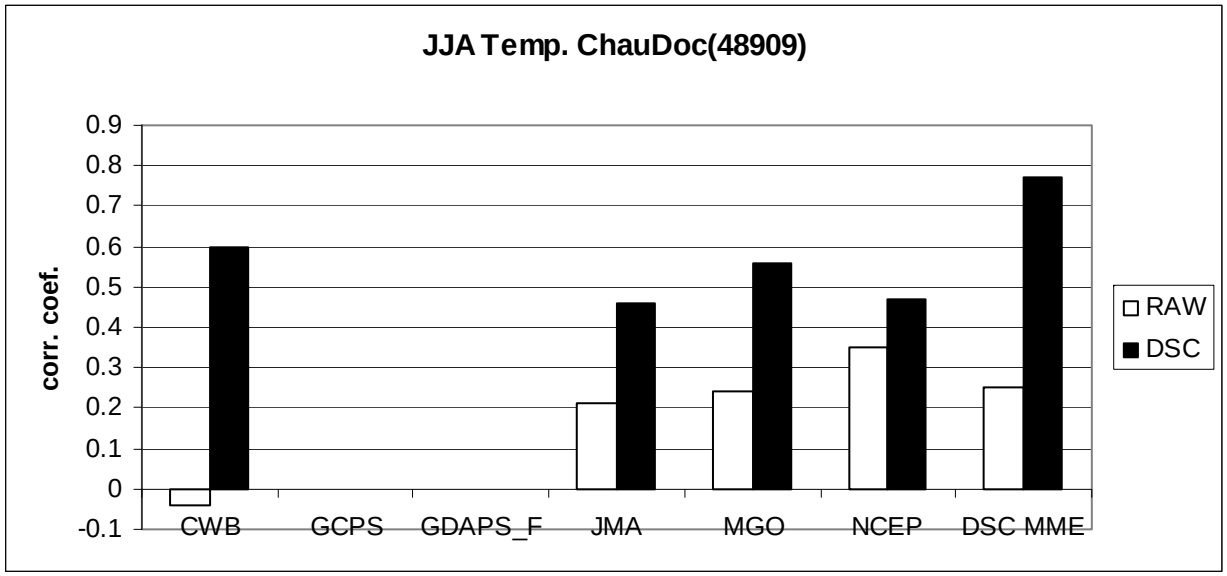


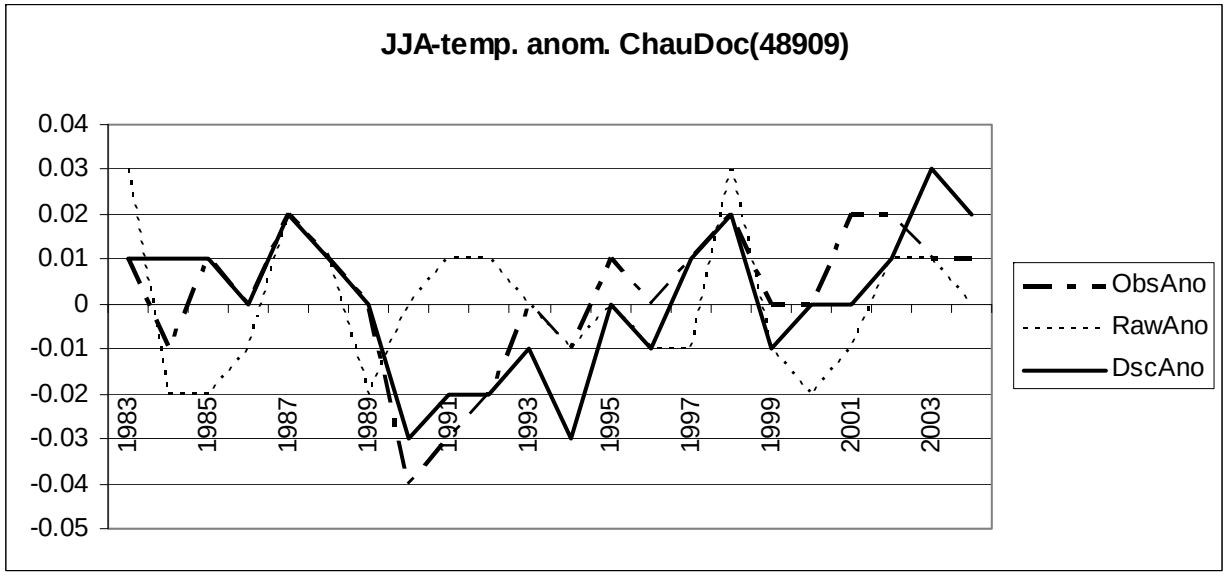
JJA TEMP


JJA Temp Vietnam
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
CWB
GCPS
GDAPS_F
JMA
MGO
NCEP
DSC MME
RAW
DSC

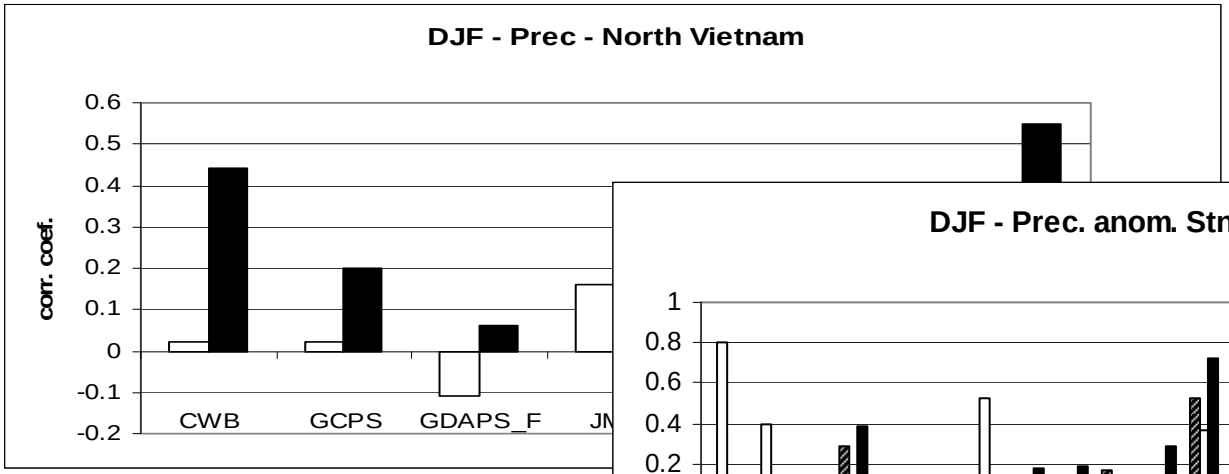

JJA anom. Temp stn. averaged. Vietnam
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
ObsAn
RawAn
DscAn

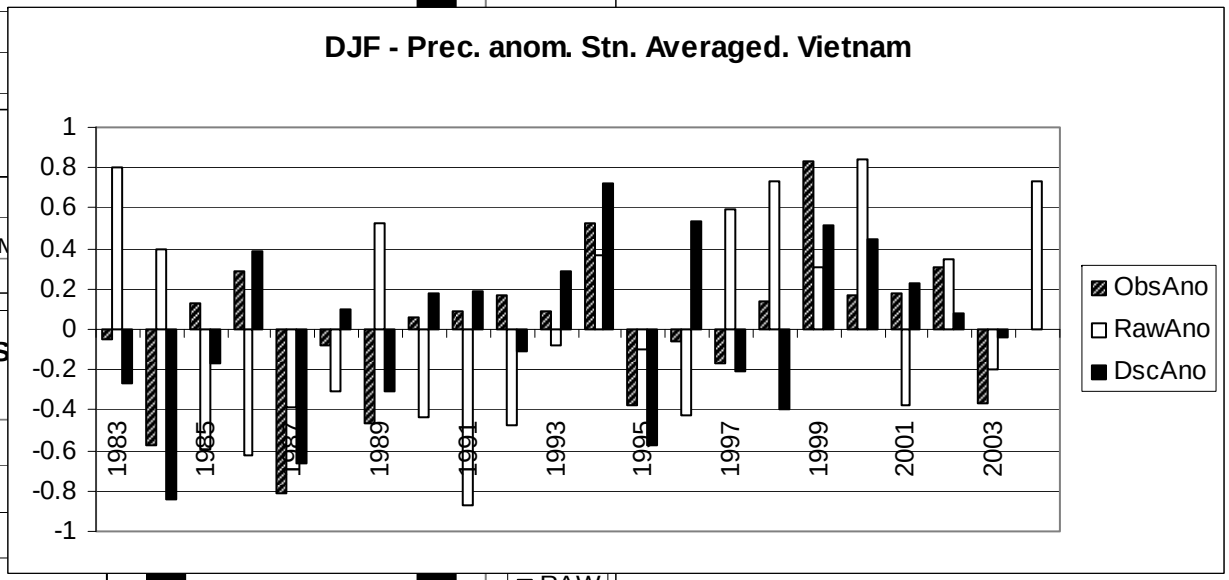
JJA TEMP
Case study

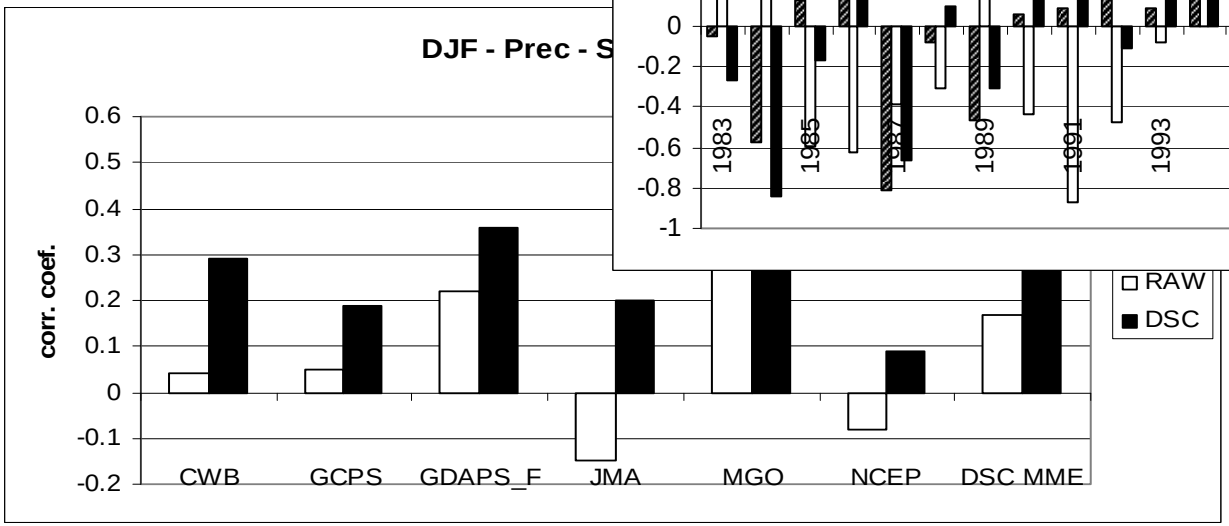


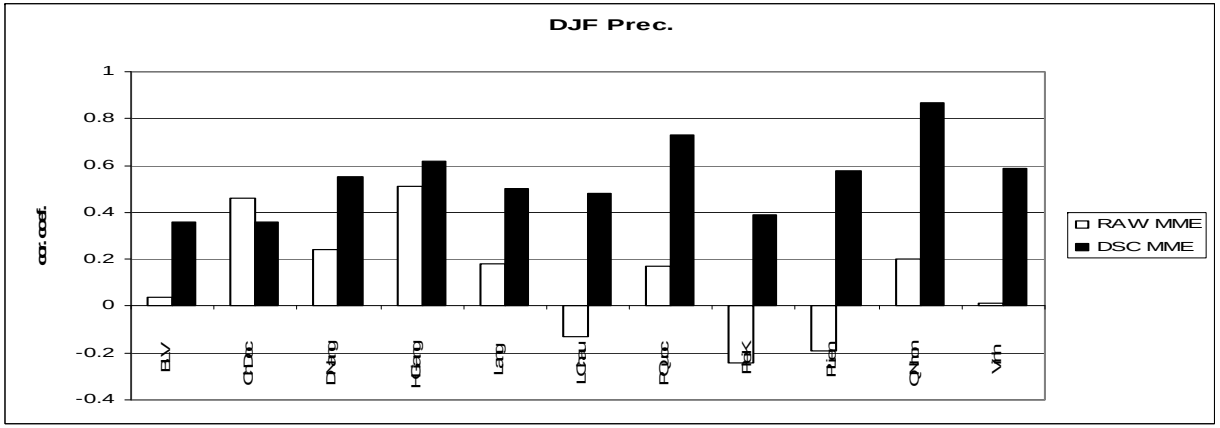


DJF PREC

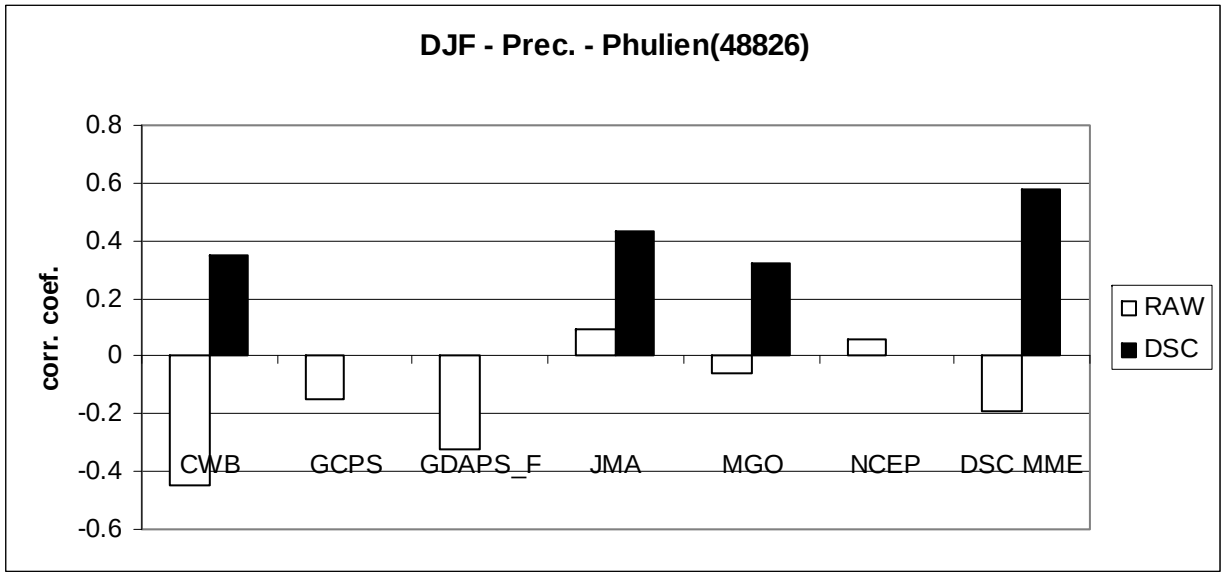

DJF - Prec - North Vietnam
corr. coef.
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
CWB
GCPS
GDAPS_F

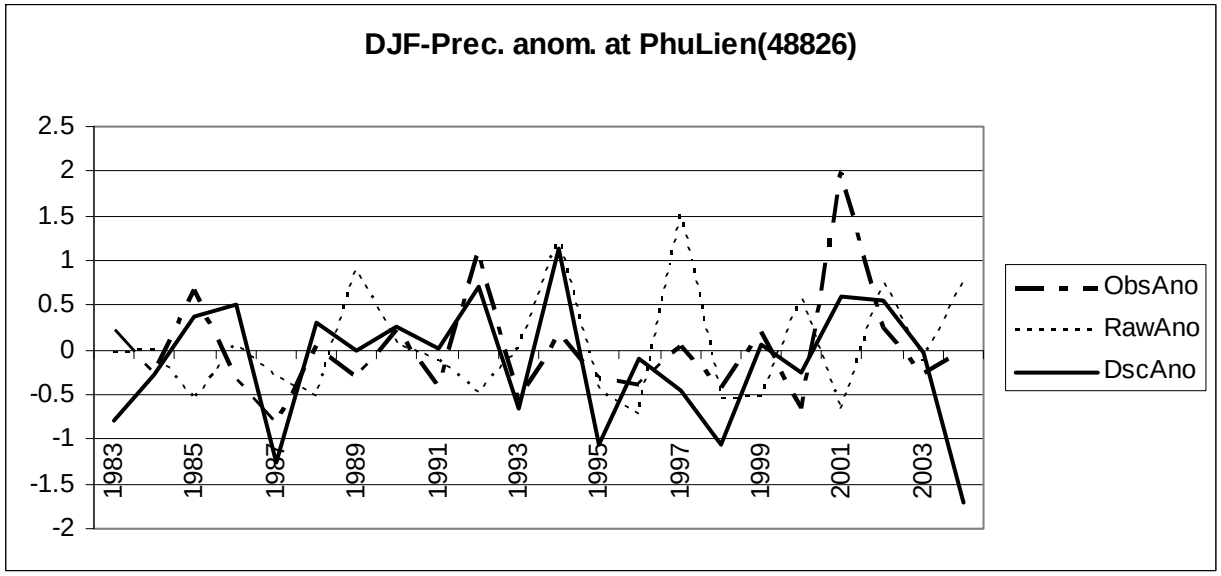

DJF - Prec. anom. Stn. Averaged. Vietnam
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
1983
1985
1989
1991
1993
1995
1997
1999
2001
2003
ObsAno
RawAno
DscAno


DJF - Prec - S
corr. coef.
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
CWB
GCPS
GDAPS_F
JMA
MGO
NCEP
DSC MME
RAW
DSC

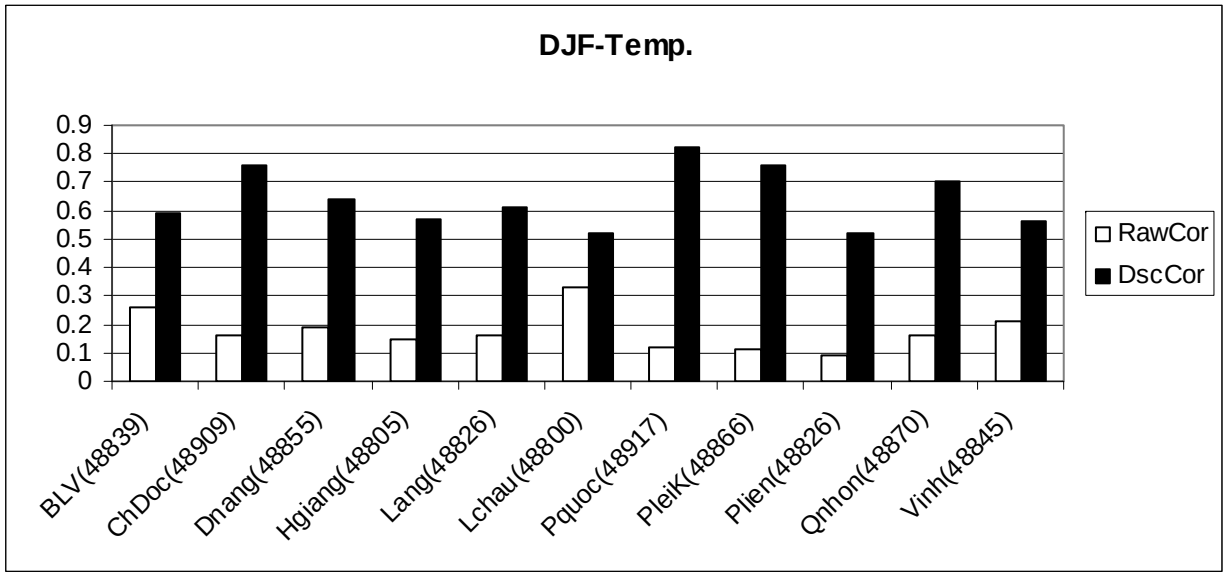

DJF Prec.
corr. coef.
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
RAW MME
DSC MME

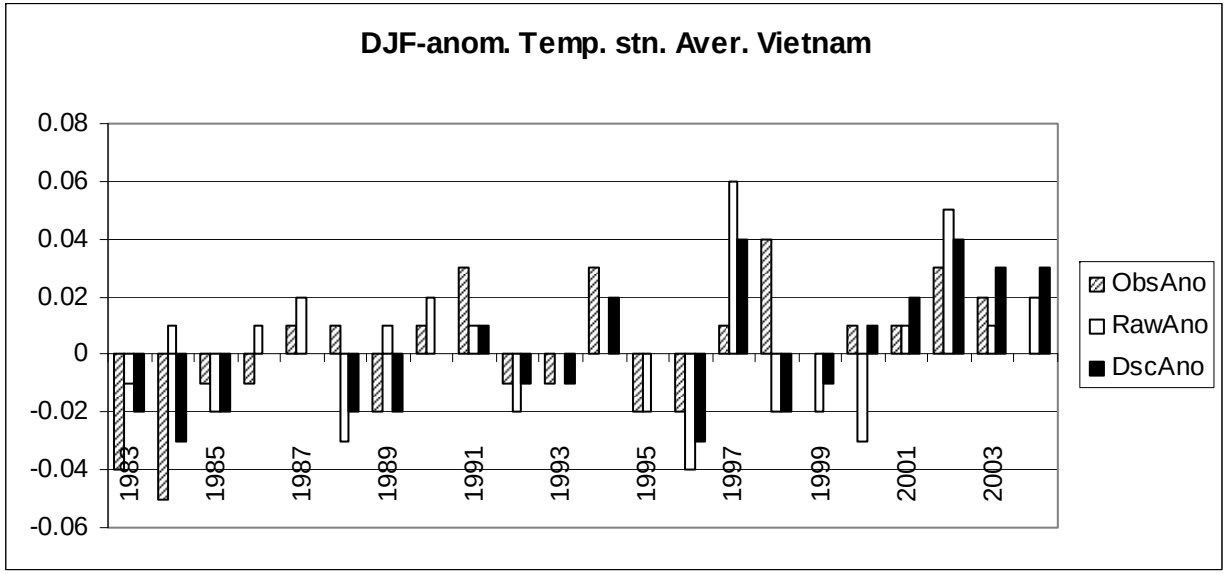
DJF PREC
Case study





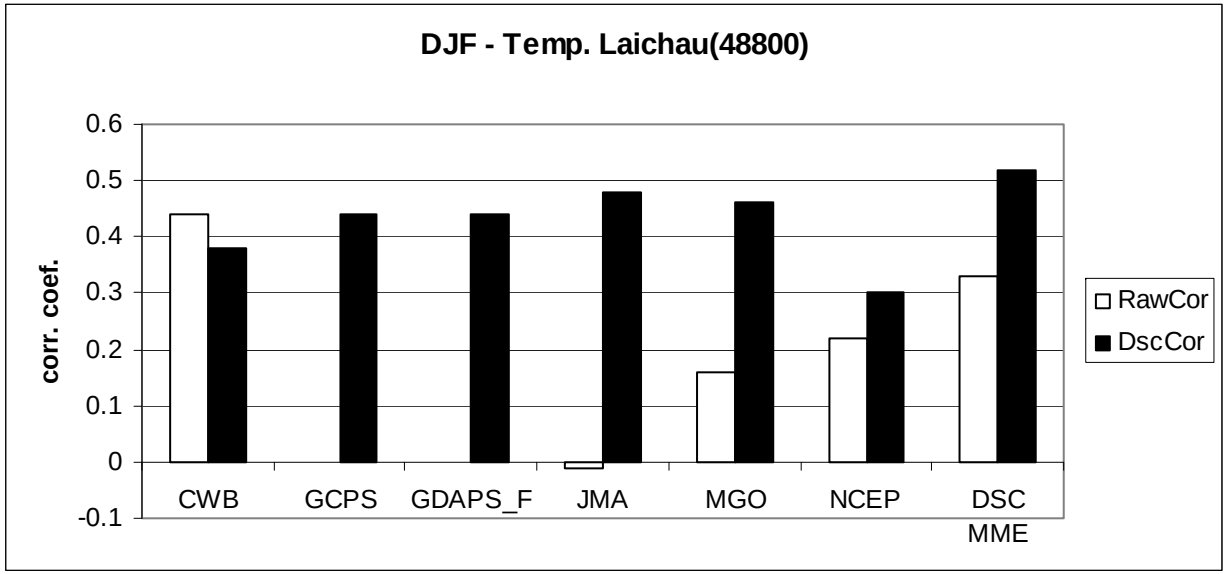
DJF TEMP.

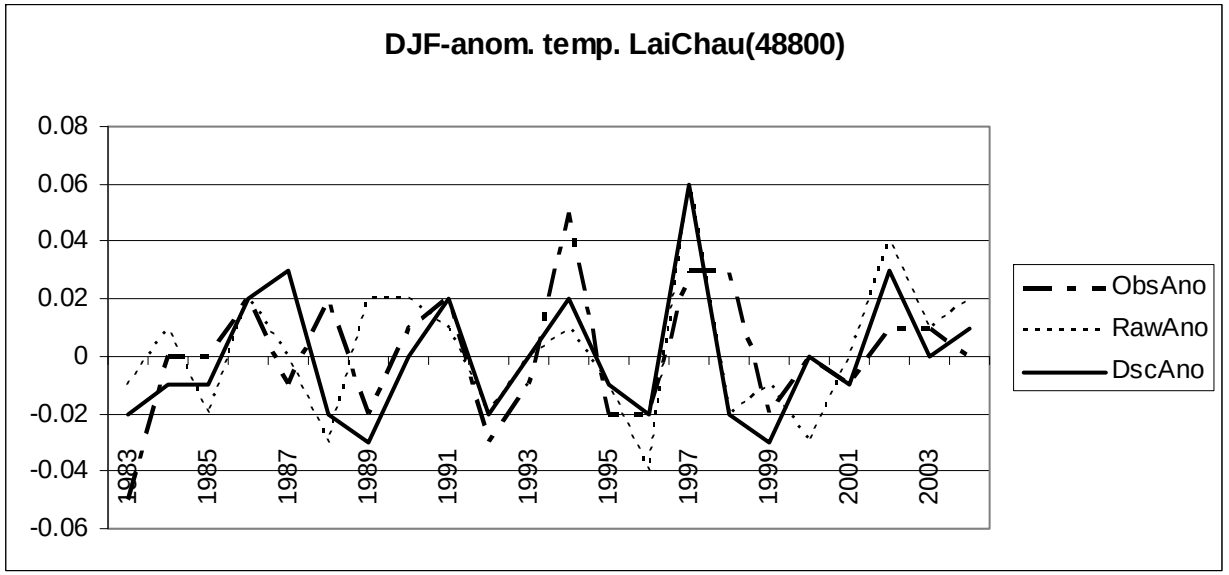

DJF-Temp.
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
BLV(48839)
ChDoc(48909)
Dnang(48855)
Hgiang(48805)
Lang(48826)
Lchau(48800)
Pquoc(48917)
PleiK(48866)
Plien(48826)
Qnhon(48870)
Vinh(48845)
RawCor
DscCor


DJF-anom. Temp. stn. Aver. Vietnam
0.08
0.06
0.04
0.02
0
-0.02
-0.04
-0.06
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
ObsAno
RawAno
DscAno

DJF TEMP.

Case study





Conclusions

- Need further study in theses schemes, increasing number stations(as much as possible in Vietnam obs. Network)
- For the operational purpose, work with both schemes in some next seasons in order to assessments, stability…
- Further explanation by understanding local climate regime at station scale.

- CLICK can be used to ENSO impact studies.
- Kang scheme shows skill for precipitation prediction.

- MUST KEEP TO WORK WITH APCC FOR THIS DOWNSCALING ISSUE!

THANK YOU