DIAS Online Bias Correction & Downscaling Tool

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REEL

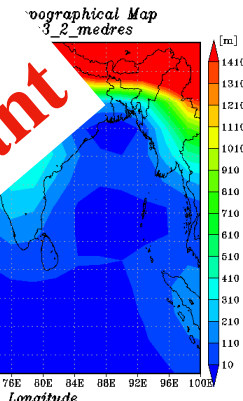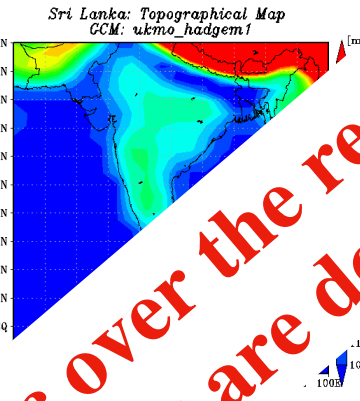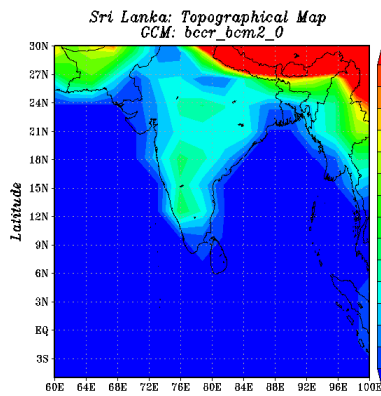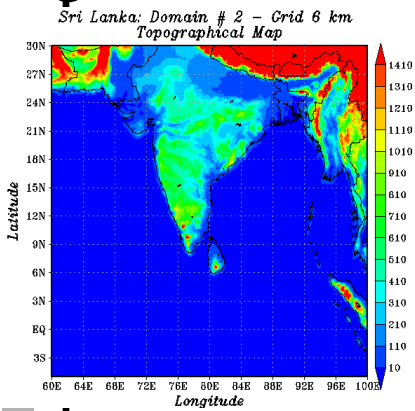# *Topography in GCMs-CMIP3*

Restriction topography, land use, and land-sea distribution.
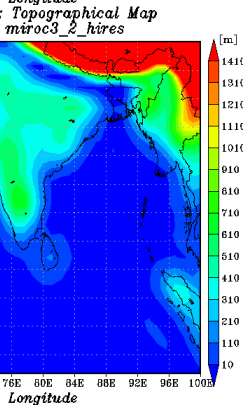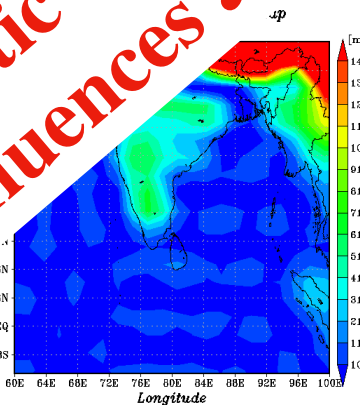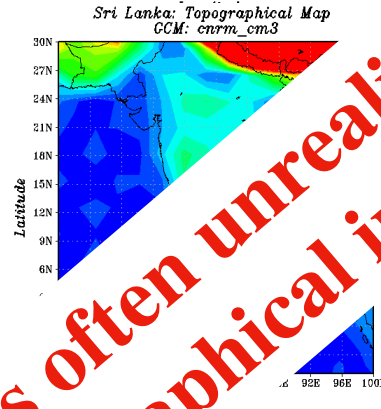
Precipitation is often unrealistic over the regions where the topographical influences are dominant

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Downscaling approaches

- SD → Derivation of transfer function
  - Low-cost, Site dependent
  - GCM biases greatly influence the downscaled information.

- DD → RCMs & higher resolution datasets to simulate finer-scale processes consistent with larger scale   evolution from GCMs.

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Review: Station Based Statistical Bias correction

Rain Type	Threshold	Correction
Extreme	– > 99% of daily precipitation during analysis period **– same frequencies of extreme as insitu station as in GCM** 	***Generalized Pareto Distribution*** –Non every year statistics –Extreme (long or short tailed) fitting ***–Peak over threshold method*** **Fig. 2.** Illustration of threshold model.
No rain day		**Ranking order statistics** – *frequency of no rain day in GCM is same as obs.* – less than no rain day threshold change zero rainfall.
Normal		Gamma Distribution – *monthly CDF of GCM mapping to monthly CDF of station* – inverse of Gamma CDF in each month is corrected rain ***Tanda et al. 2013, JSCE/AJHE***

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Before Bias-Correction	After Bias-correction	Extreme Frequency Analysis

Tunisia

Raw extreme in ranking order (1981-2000)

Corrected extreme in ranking order (1981-2000)

Frequency Analysis (1981-2000)

Philippines

Extreme rainfall before correction

Extreme rainfall after correction

Frequency analysis 1981-2000

Japan

Raw extreme in ranking order

Corrected extreme in ranking order

Frequency Analysis (1981-2000)
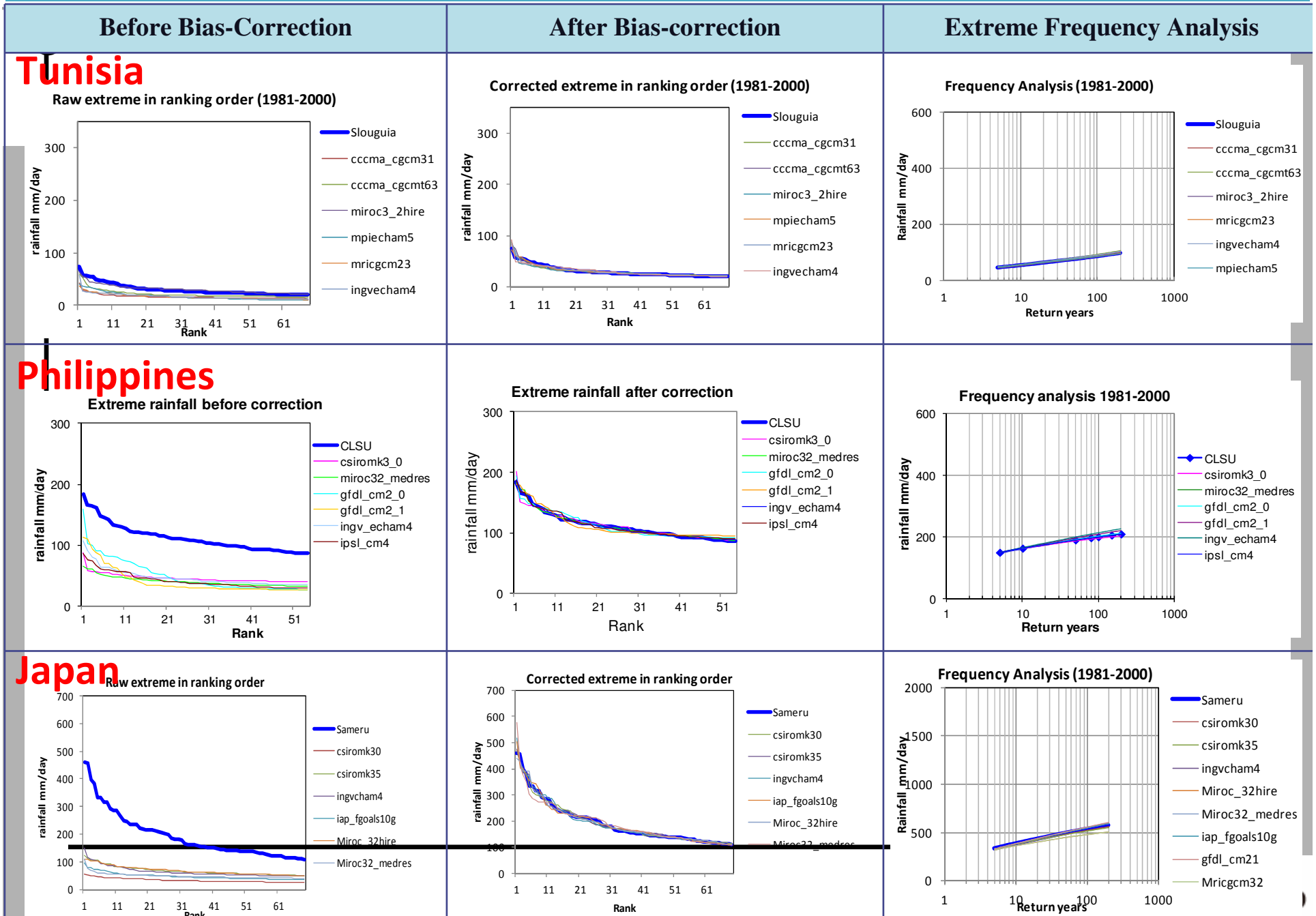
Before Bias-Correction	After Bias-correction	Future Extreme Frequency Analysis

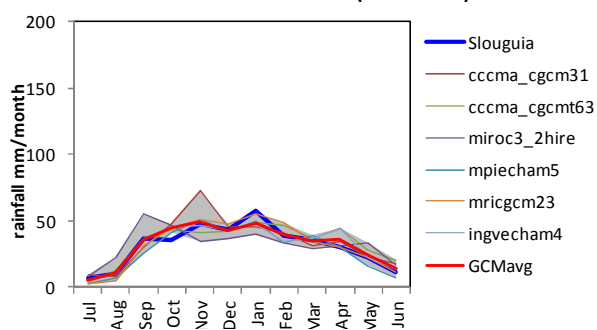## Tunisia

GCM raw seasonal precipitation 1981-2000
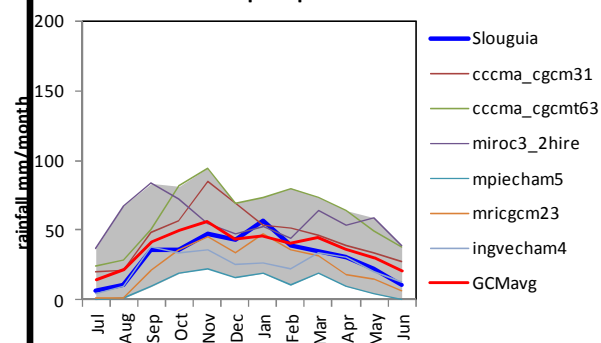
GCM corrected seasanal rainfall (1981-2000)

Frequency Analysis (2045-2065)

Philippines

GCM Raw monthly distribution

Biascorrected monthly distribution

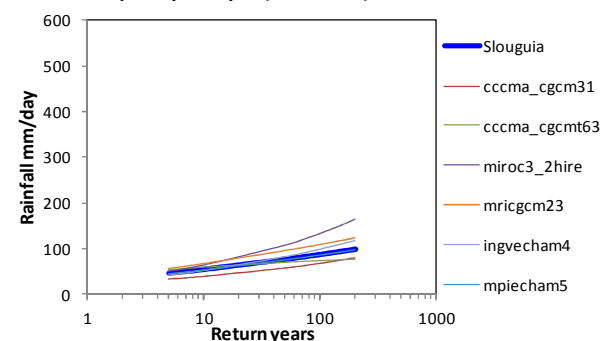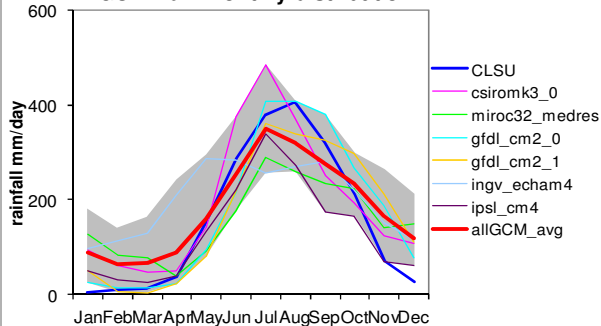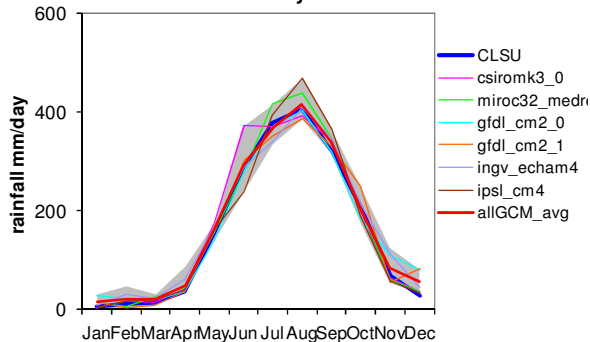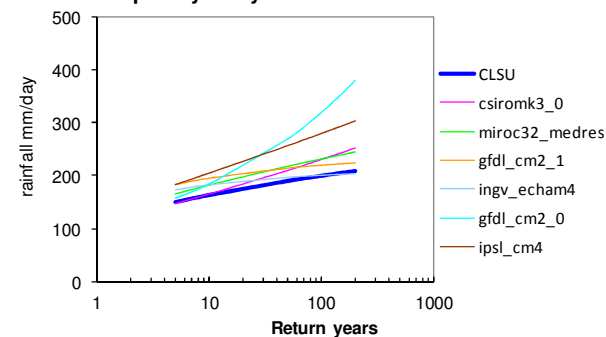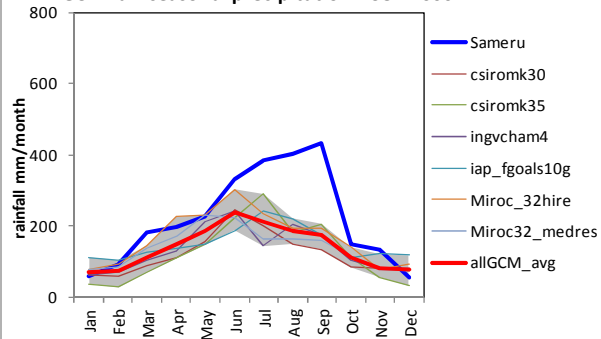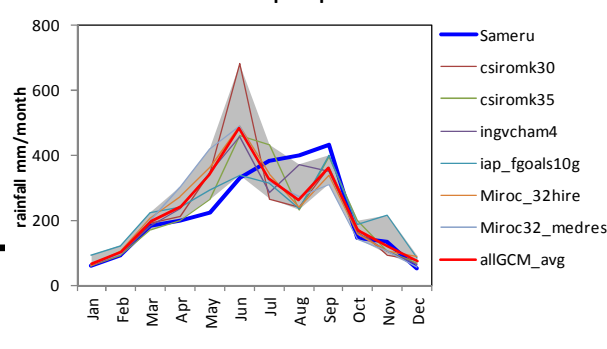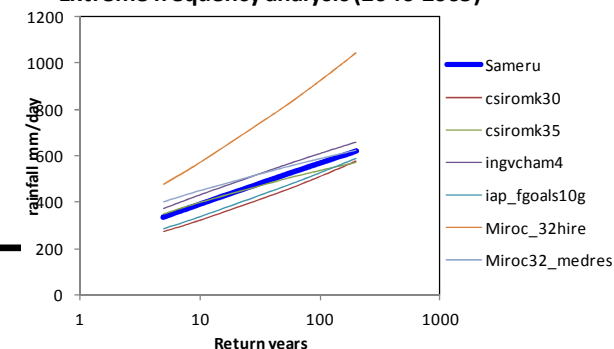Frequency analysis 2046-2065

Japan

GCM raw seasonal precipitation 1981-2000

GCM corrected seasanal precipitation 1981-2000

Extreme frequency analysis (2046-2065)

Input Data: Accuracy and Completeness

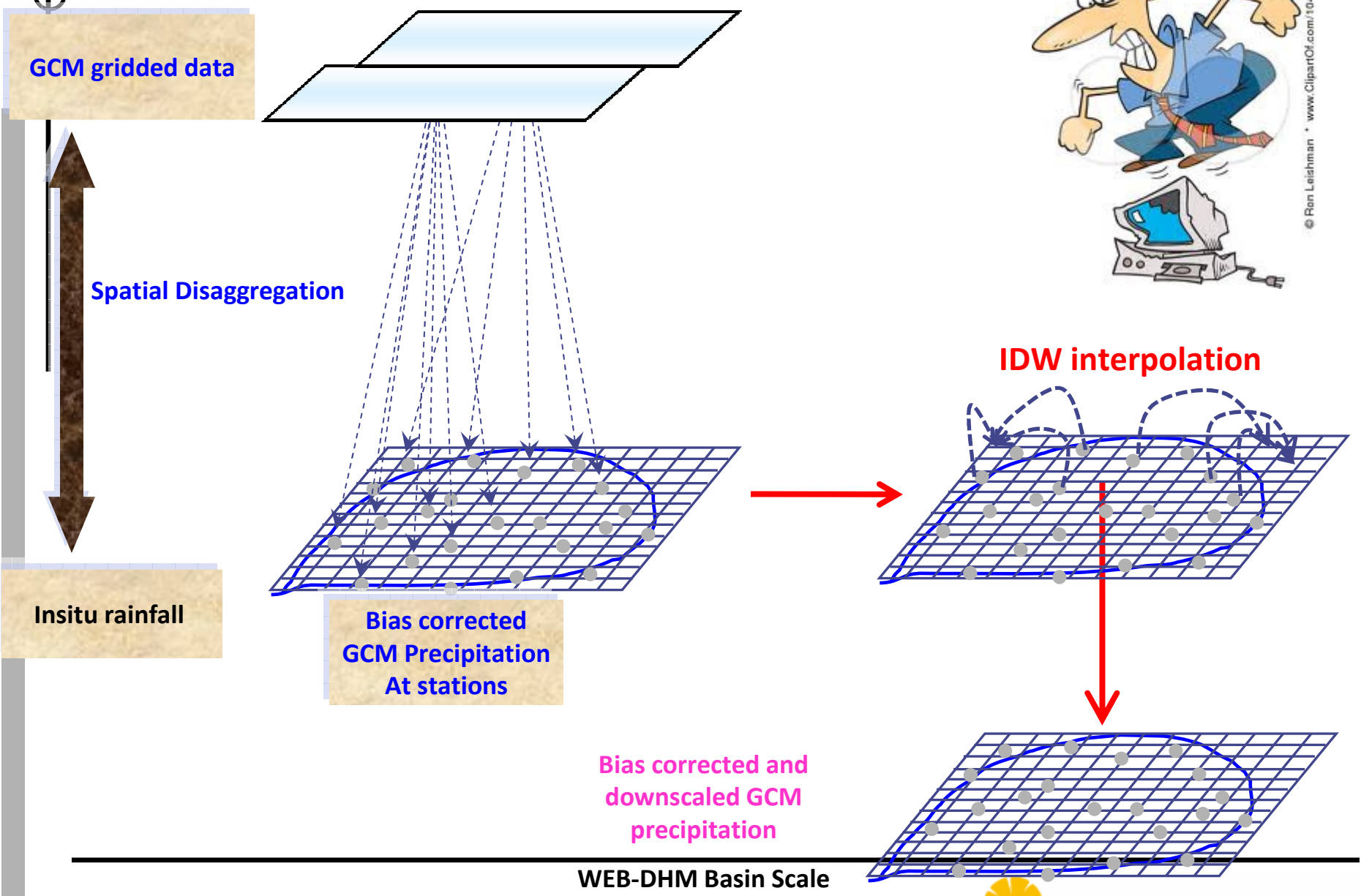## *A famous slogan in computing simulation:*

Garbage In, Garbage Out

Data Availability in AWCI Data Archive

#	Country	CCAA Study Basin Name	Identical with AWCI DP basin?	# of Stations.	Obs.	Period (longest period)	Remarks
1	Bangladesh	Meghna	yes	8	Precipitation	1980 - 2000	
2	Bhutan	Punatsangchhu	yes	14	Precipitation	1985 - 2010	
3	Cambodia	Sangker	yes	5	Precipitation	1981 - 2008	
4	India	Upper Bhima	no	36 17 10	Precipitation Discharge Temperature	1970 - 2006 1973 - 2007 1985 - 2002	
5	Indonesia	Citarum	no	116	Precipitation	1980 - 2009	
6	Japan	Tone	yes	4	Precipitation	1901 - 2000	
7	Korea	Upper Chungju-dam	yes				
8	Lao PDR	Sebangfai	yes				
9	Malaysia	Langat	yes	19	Precipitation	1980 - 2000	
10	Mongolia	Tuul	no	8	Precipitation	1980 - 2000	
11	Myanmar	Shwegyin	yes	3	Precipitation	1980 - 2000	
12	Nepal	Narayani	no	51	Precipitation	1957 - 2010	
13	Pakistan	Hunza	no	2	Precipitation	1999 - 2008	
14	Philippines	Pampanga	yes	3 6	Precipitation AWS	1961 - 2000 1961 - 2011	
15	Sri Lanka	Kalu Ganga	yes	8	Precipitation	1980 - 2010	
16	Thailand	Mae Wang	yes	6	Precipitation	1921 - 2011	
17	Uzbekistan	Chirchik-Okhangaran	yes	11	Precipitation	1979 - 2005	
18	Vietnam	Huong	yes	9	Precipitation	1976 - 2009	

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Bias Correction & Downscaling Scheme

GCM gridded data

Spatial Disaggregation

Insitu rainfall

Bias corrected GCM Precipitation At stations

IDW interpolation

Bias corrected and downscaled GCM precipitation

WEB-DHM Basin Scale

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Engineer--one who makes the life comfortable

Log-In to the DIAS

Log-In to the DIAS

dias.tkl.iis.u-tokyo.ac.jp/model-eval/stable/index.html

Quantitative Evaluation of AOGCM   *** Release 1.2 : New functions added (17/June/2013)

1. Intercomparison : Re-analysis/Observation Data vs. CMIP3 Model Output
   - 1-D Plot (time-series)
   - 2-D Plot
   - Vector Diagram

   - Cross-sectional View
     - Longitude/Latitude-Time , Longitude/Latitude-Height

   - Vertical Profile
     - 1-D Plot , Vector Diagram

2. Comparison of Global Warming Projection between:
   - Climate Models
   - Emission Scenarios

   - Periods of Analysis Time (Multimodel Ensemble Prediction)
     - Daily Data , Monthly Data

3. Tools for CMIP3
   - Bias Correction   (AWCI training program participants only)
     - APHRODITE , In-situ Data

   - Data Download
     - Daily Data , Monthly Data

   - Model Evaluation
     - Monthly Data   (Restricted Access)

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Basin Boundary Information

Country	Basin lon-lat (approx)
Bangladesh-**A**	23-26N, 90-95E
Bhutan-**S**	26-30N, 89-91E
Cambodia-**P**	12-14N, 102-104E
India	N/A
Indonesia-**P**	6-8S, 107-108E
Japan-**S**	36-38N, 138-140E
Malaysia-**A**	2-4N, 101-104E
Mongolia-**S**	46-50N, 102-109E
Myanmar-**A**	17-19N, 96-98E
Nepal-**S**	27-30N, 82-86E
Pakistan-**A**	35-38N, 74-76E
Philippines-**P**	15-17N, 120-122E
Sri Lanka-**A**	6-8N, 79-81E
Thailand-**P**	16-21.5N, 96-101E
Uzbekistan	40-43N, 69-72E
Vietnam-**P**	15-17N, 107-108E

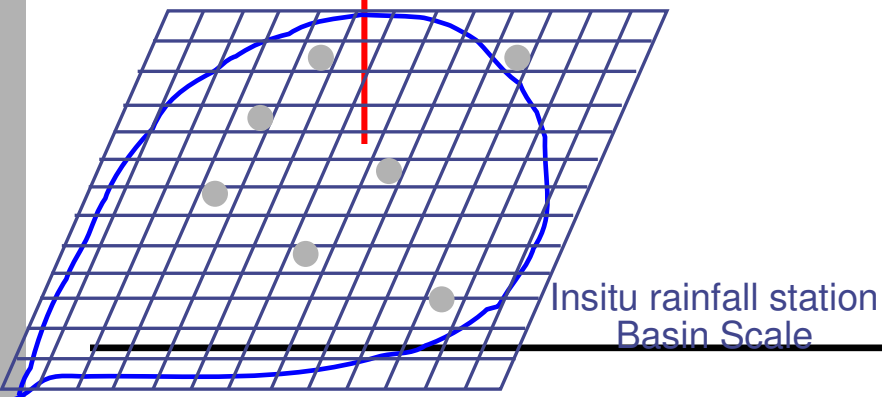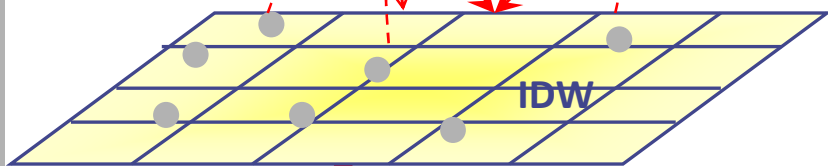THE UNIVERSITY OF TOKYO

GSMAP--Monthly Downscaling Scheme
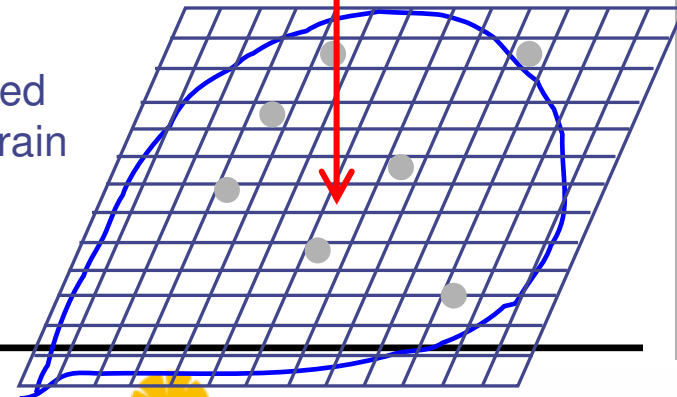
GCM gridded data
1.5 ➔ 5 Degree
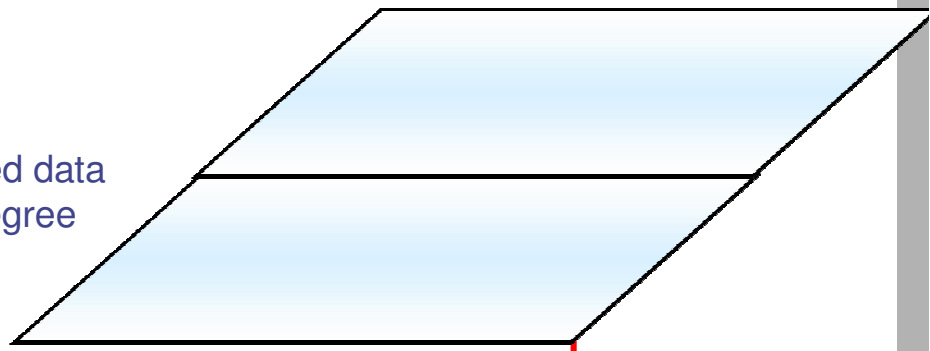
GSMapraw **Vs** Insitu stations based
0.1 Degree gridded GSMap **0.1** Degree

Monthly
correction

GSMaP corrected rainfall based
spatial distributed **weights** Map
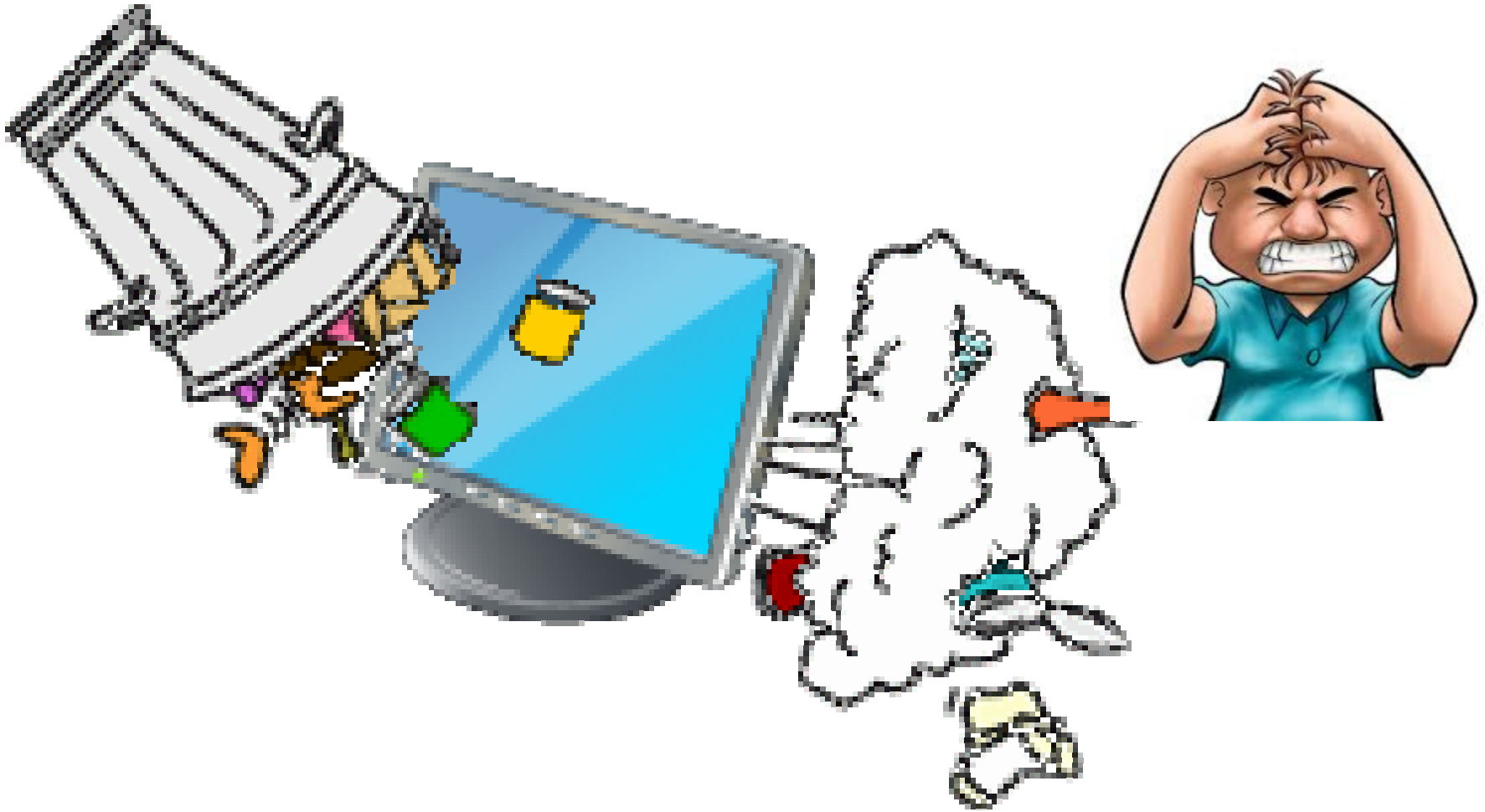
IDW

Bias corrected
Downscaled rain

Insitu rainfall station
Basin Scale

Basin Scale 0.01 Degree

Basin Scale 0.01 Degree

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Input Data: Accuracy and Completeness

Please upload data to get better output

-Thank You-

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