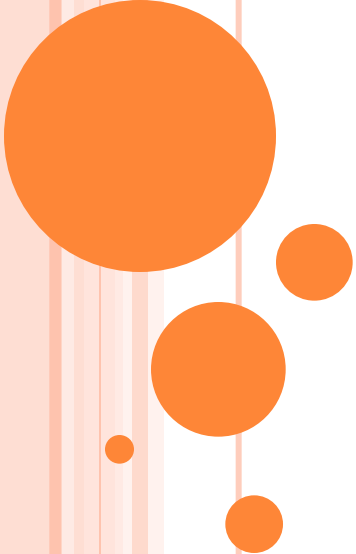




UIB WG-2

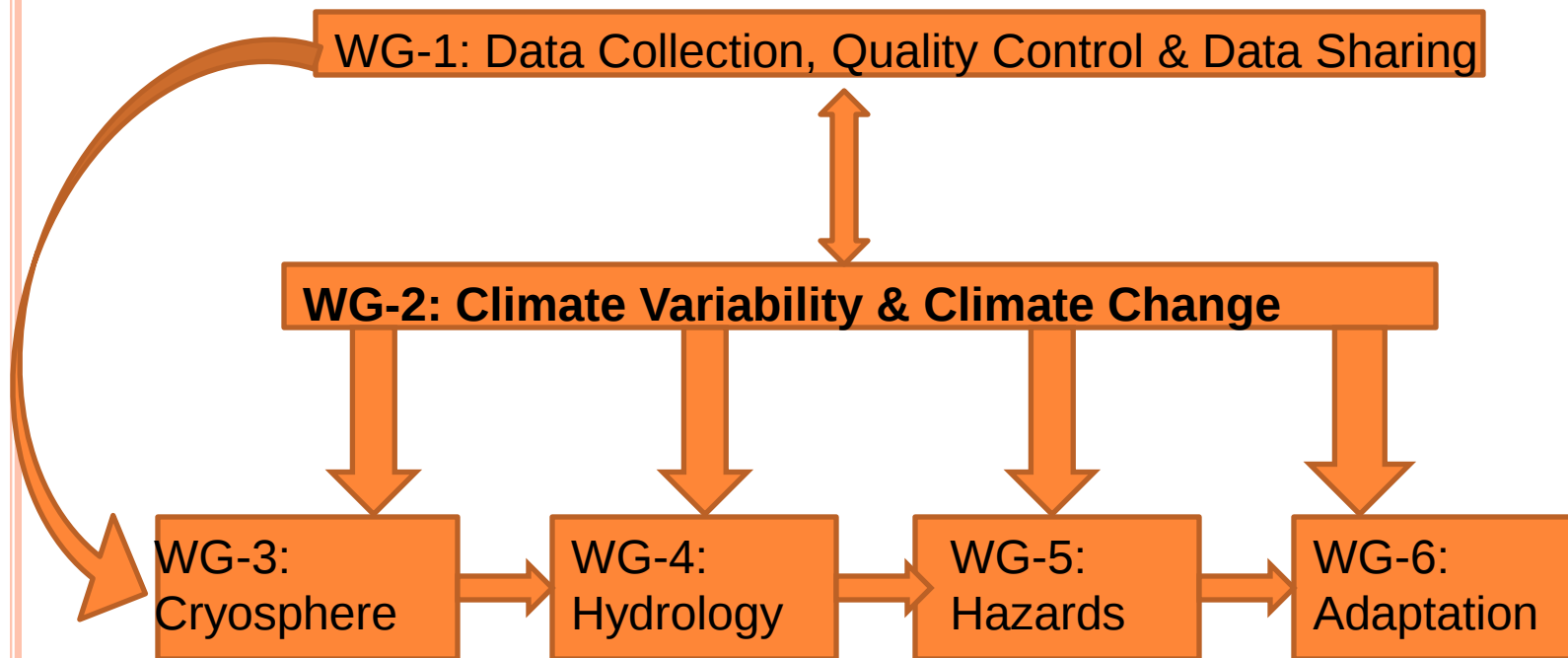
CLIMATE VARIABILITY AND CLIMATE CHANGE

Elisa Vuillermoz & Ghulam Rasul

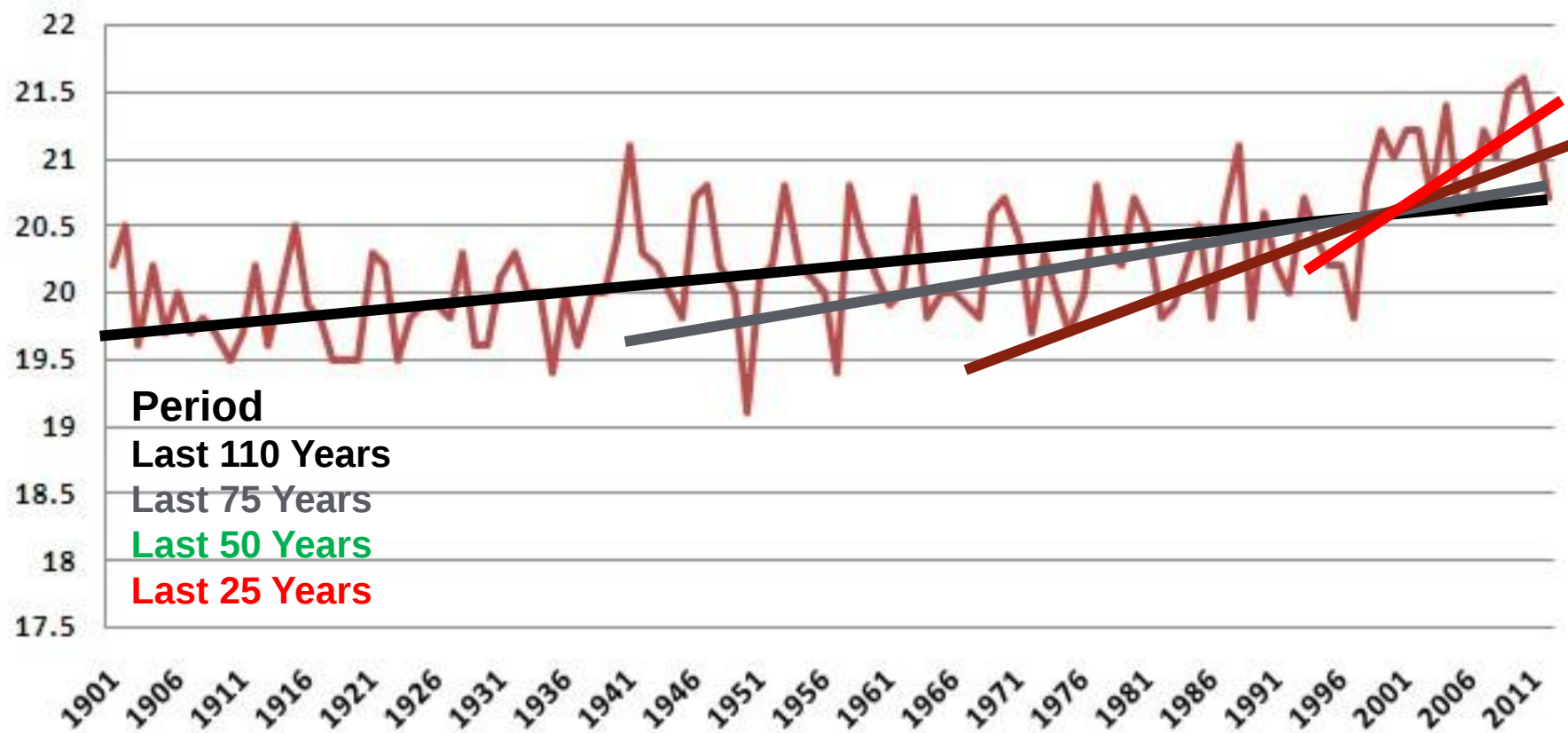
elisa.vuillermoz@evk2cnr.org

rasulpmd@gmail.com

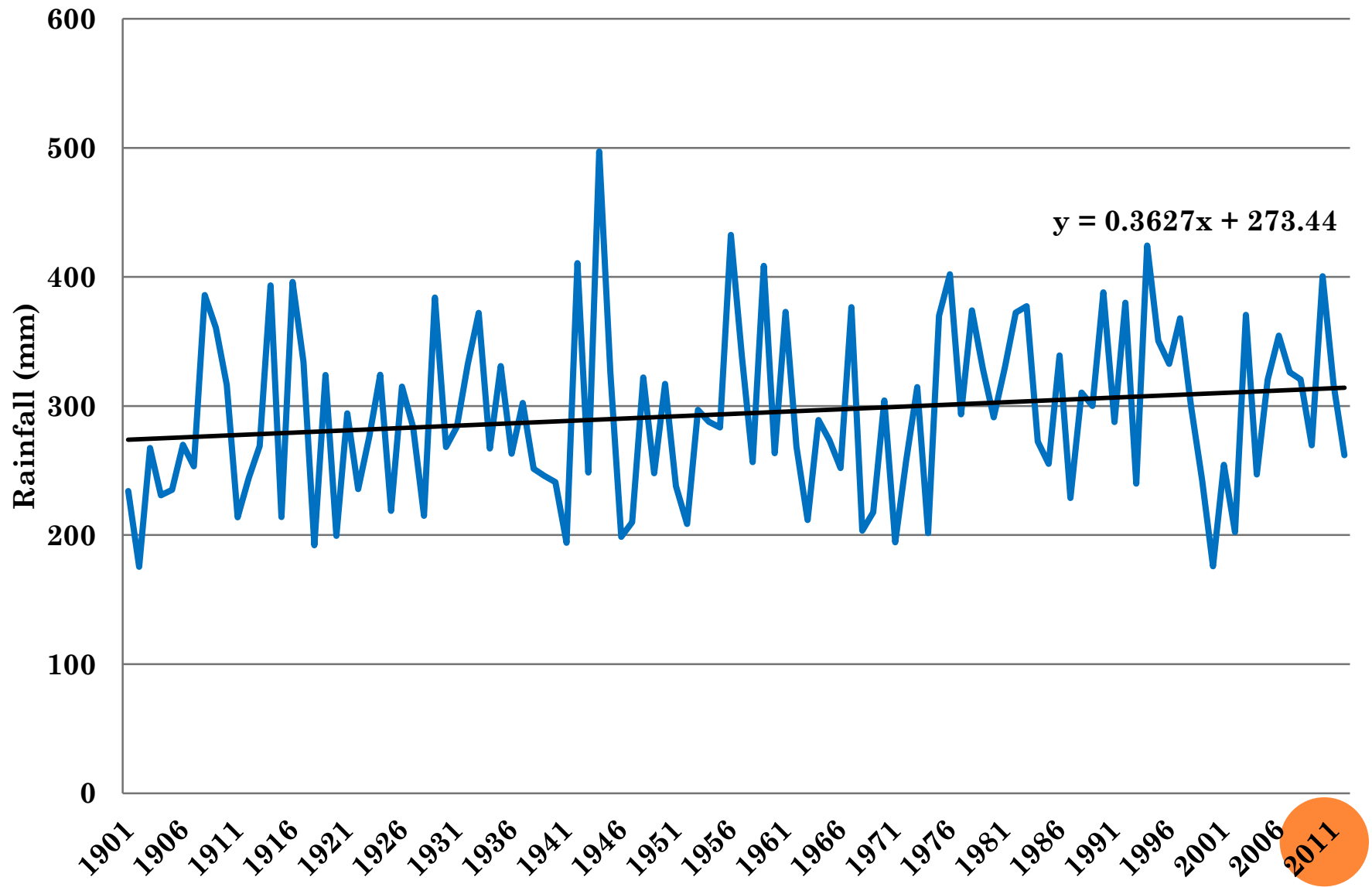
Coordination of Working Groups



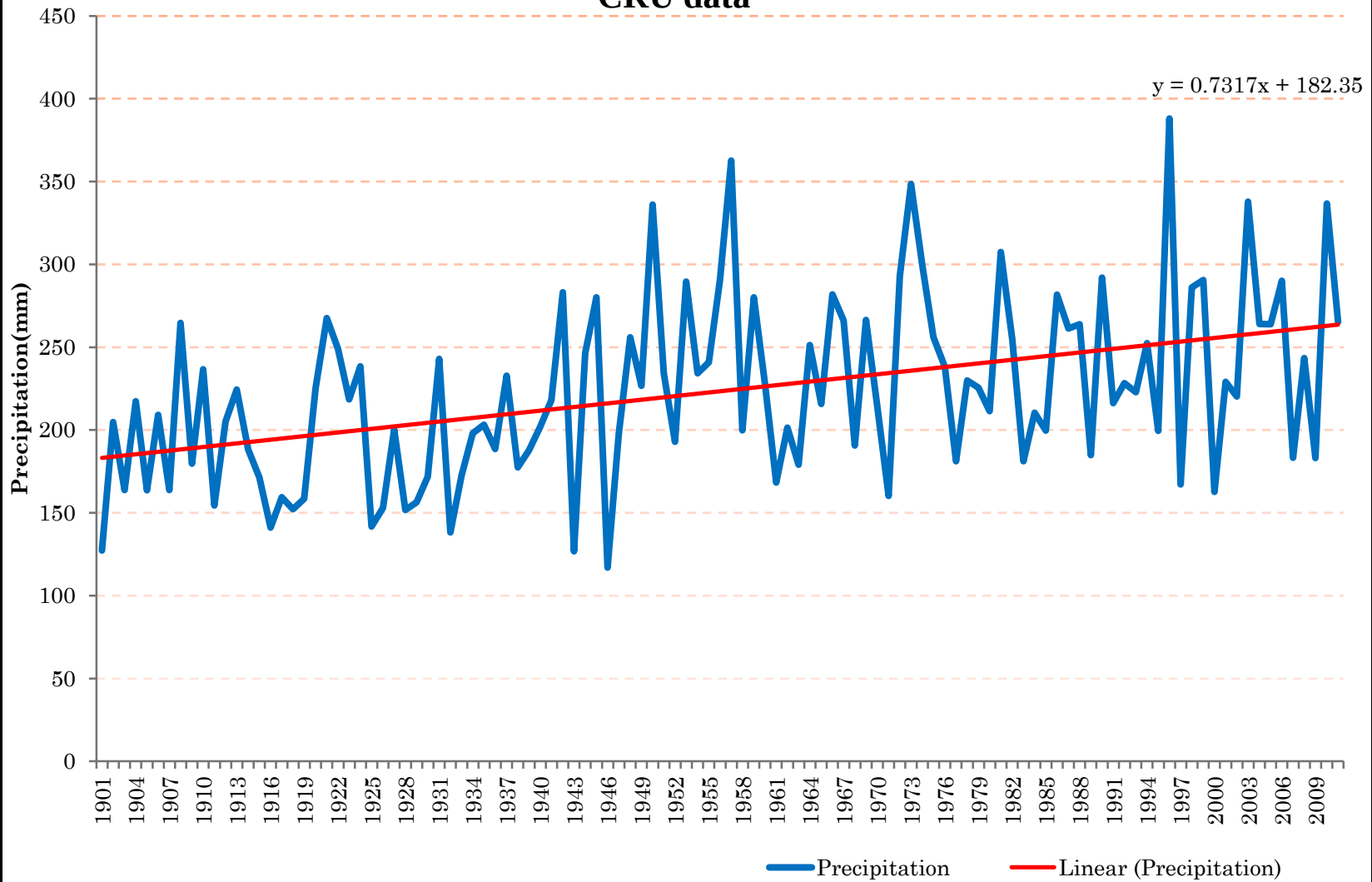
Pakistan Mean Temperature (°C) 1901-2012



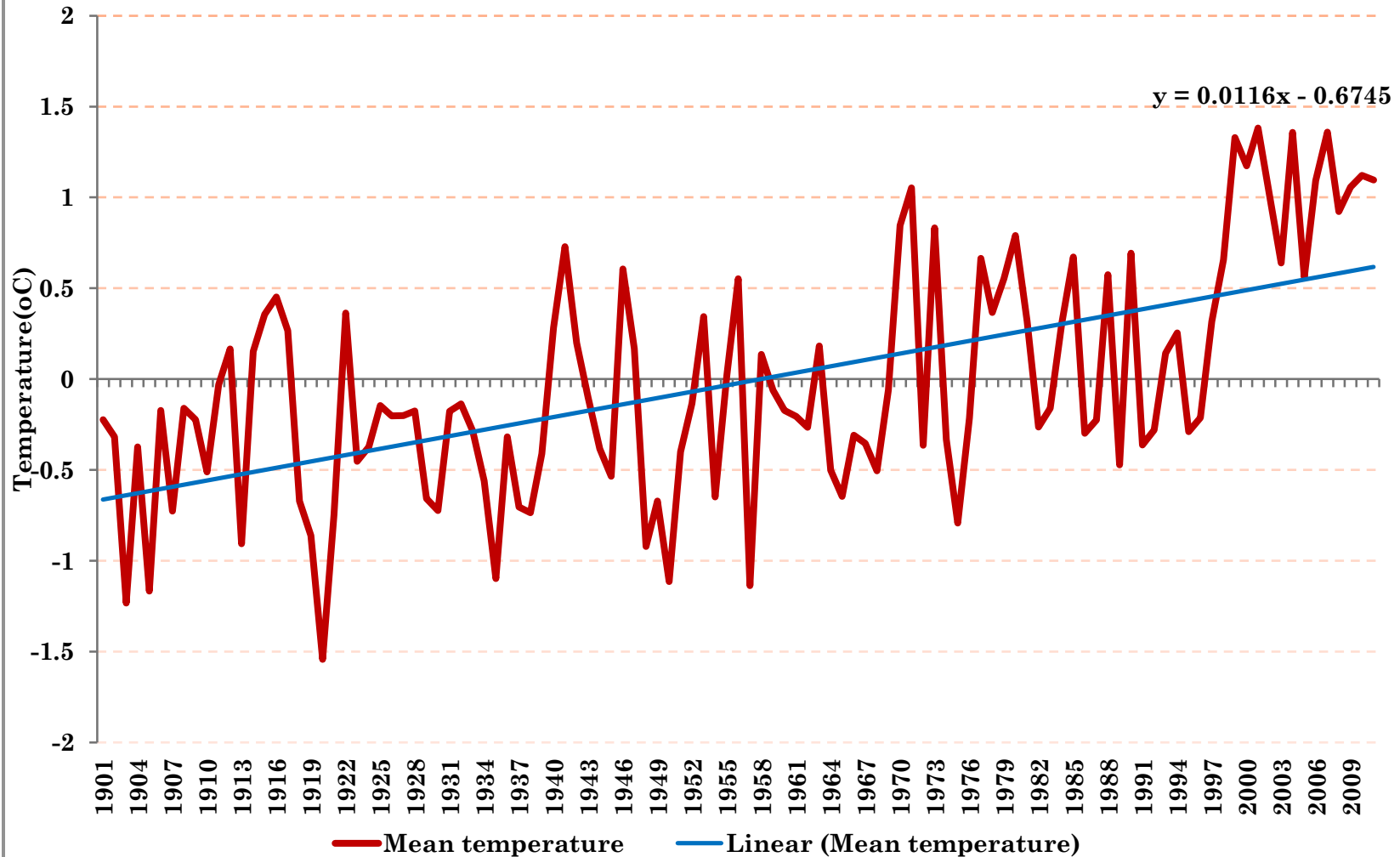
Pakistan Mean Annual Rainfall (mm) 1901-2012



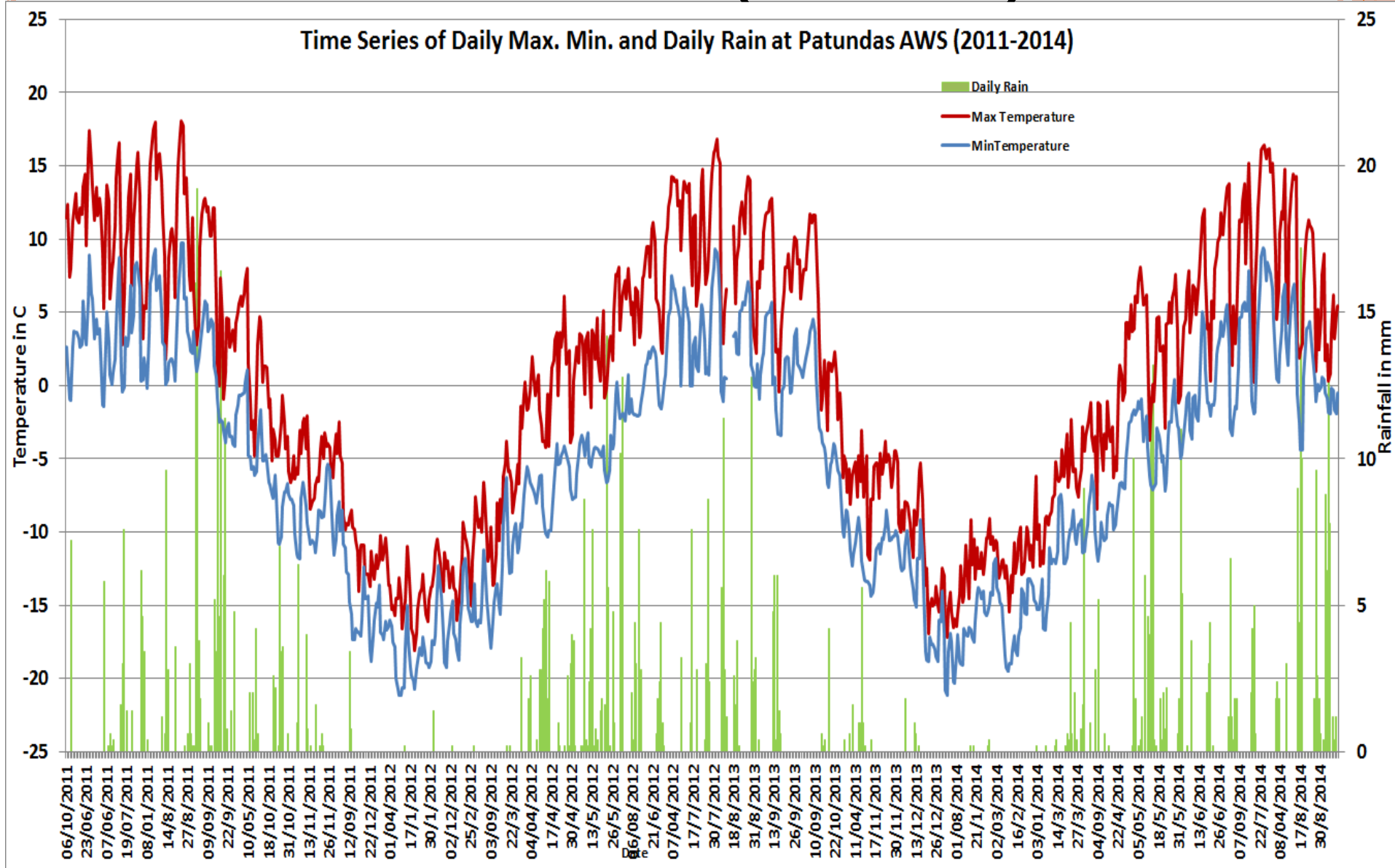
Northern Areas: Annual Mean Precipitation(mm)1901-2012 based on CRU data



Northern Areas: Annual Mean Temperature(°C)1901-2012 based on CRU data



Passu Peak Data (2011-2014)



CMIP5 DOWNSCALING FOR UPPER INDUS BASIN

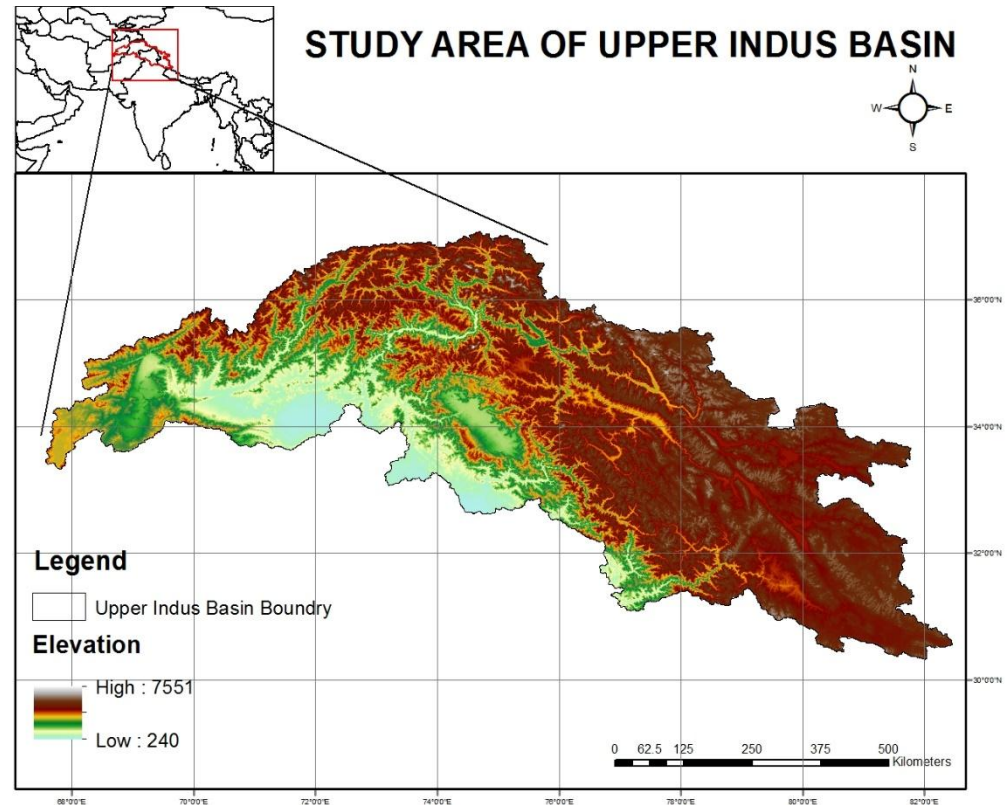
Statistical Downscaling

- Statistical downscaling is a technique employed in various climate-related studies where sub-grid scale processes need essential handling.
- The method named as Linear Interpolation and Bias Correction (LIBC) utilizes station data and high resolution geographic information.
- Future climate is projected after bias correction and downscaling of GCM data based on interpolated station observations.
- The result is high resolution gridded projections of temperature and precipitation parameters.



STUDY AREA

- The study area lies between 30.3N to 37.2N Latitude and 67.5E to 82.5E longitude with an area of 437213.34 sq. km.
- The elevation ranges from 240 m.a.s.l to 7,551 m.a.s.l. within the study area.
- The study area extends over four countries Afghanistan, Pakistan, India and China if we move from west to east.



CMIP5 MODEL SELECTION

- Four GCMs have been selected based on their goodness of fit criteria:
 - They have a good Pearson's Correlation Coefficient (greater than or equal to 0.88) with baseline APHRODITE time-series.
 - Their normalized root mean square error is less than or equal to 0.15
 - Their normalized standard deviations lie within ± 0.4 to that of normalized standard deviation of APHRODITE dataset.

Model	Center	Spatial Resolution	RMSE_T	RMSE_P	SD_T	SD_P	CC_T	CC_P
CCSM4	NCAR	1.25x0.94	0.05	0.15	0.31	0.28	0.99	0.89
CanESM2	CCCMA	2.81x2.81	0.05	0.11	0.31	0.28	0.99	0.94
GFDL-ESM2M	GFDL	2.5x2.011	0.05	0.15	0.31	0.25	0.99	0.86
HadGEM2-ES	MOHC	1.87 x 1.25	0.04	0.11	0.30	0.24	0.99	0.92

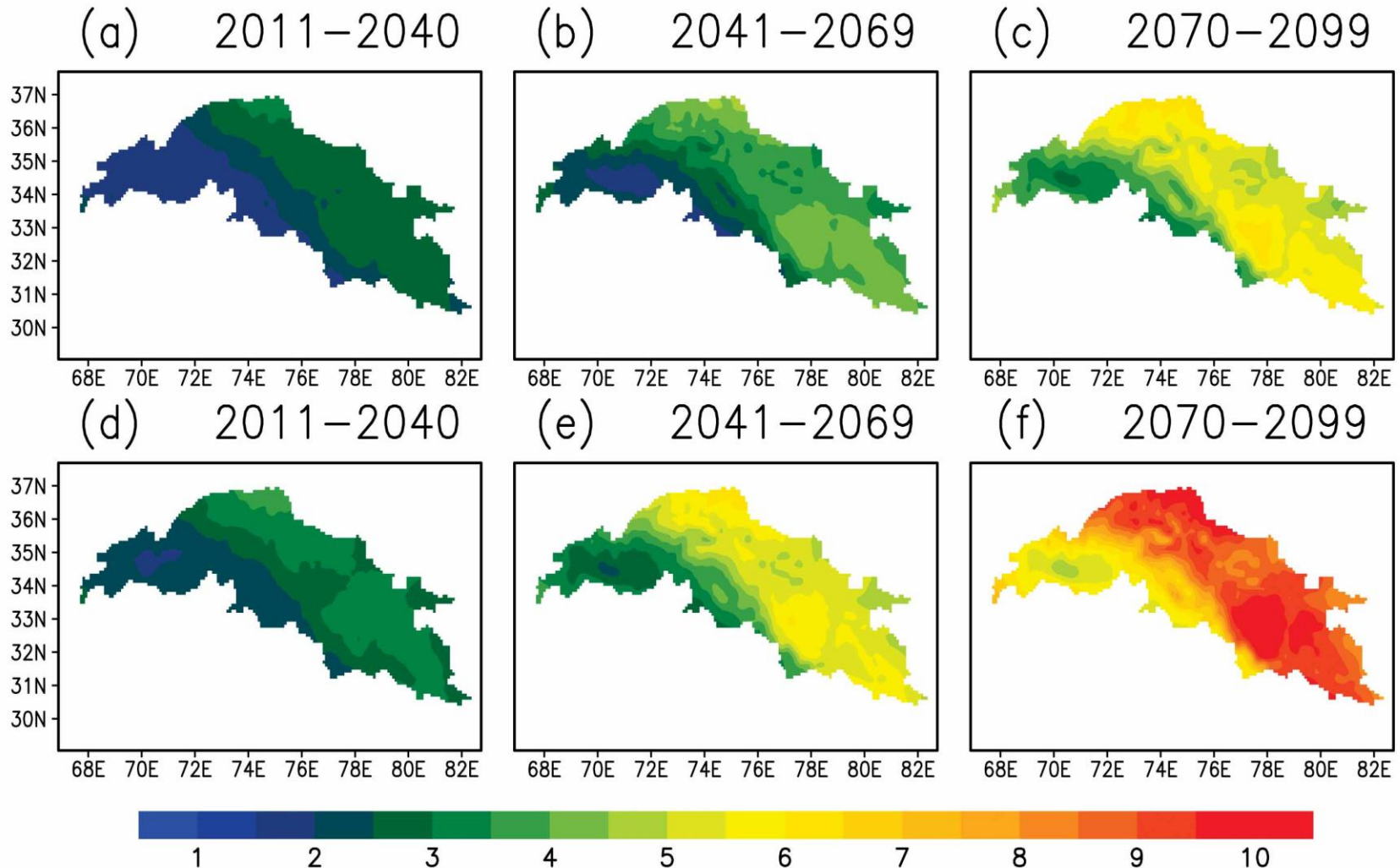


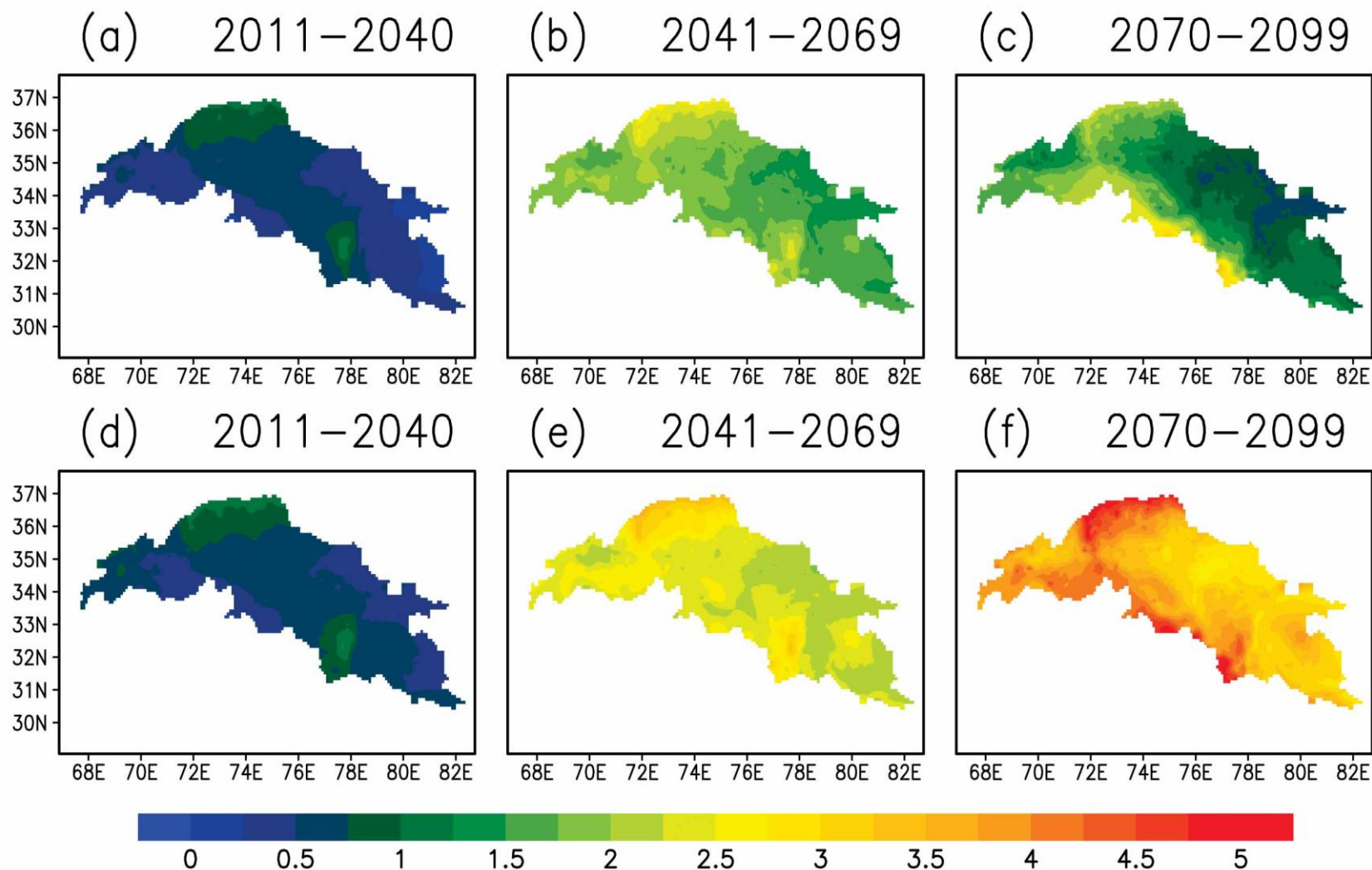
LINEAR INTERPOLATION AND BIAS CORRECTION METHOD (LIBC)

- Time sorting of the observed dataset.
- Domain filtering of the observed dataset.
- Building of Climatology of the respective variable.
- Building of the Climatology of the Standard Deviation of the respective variable.
- Interpolation of the observed dataset to desired horizontal resolution.

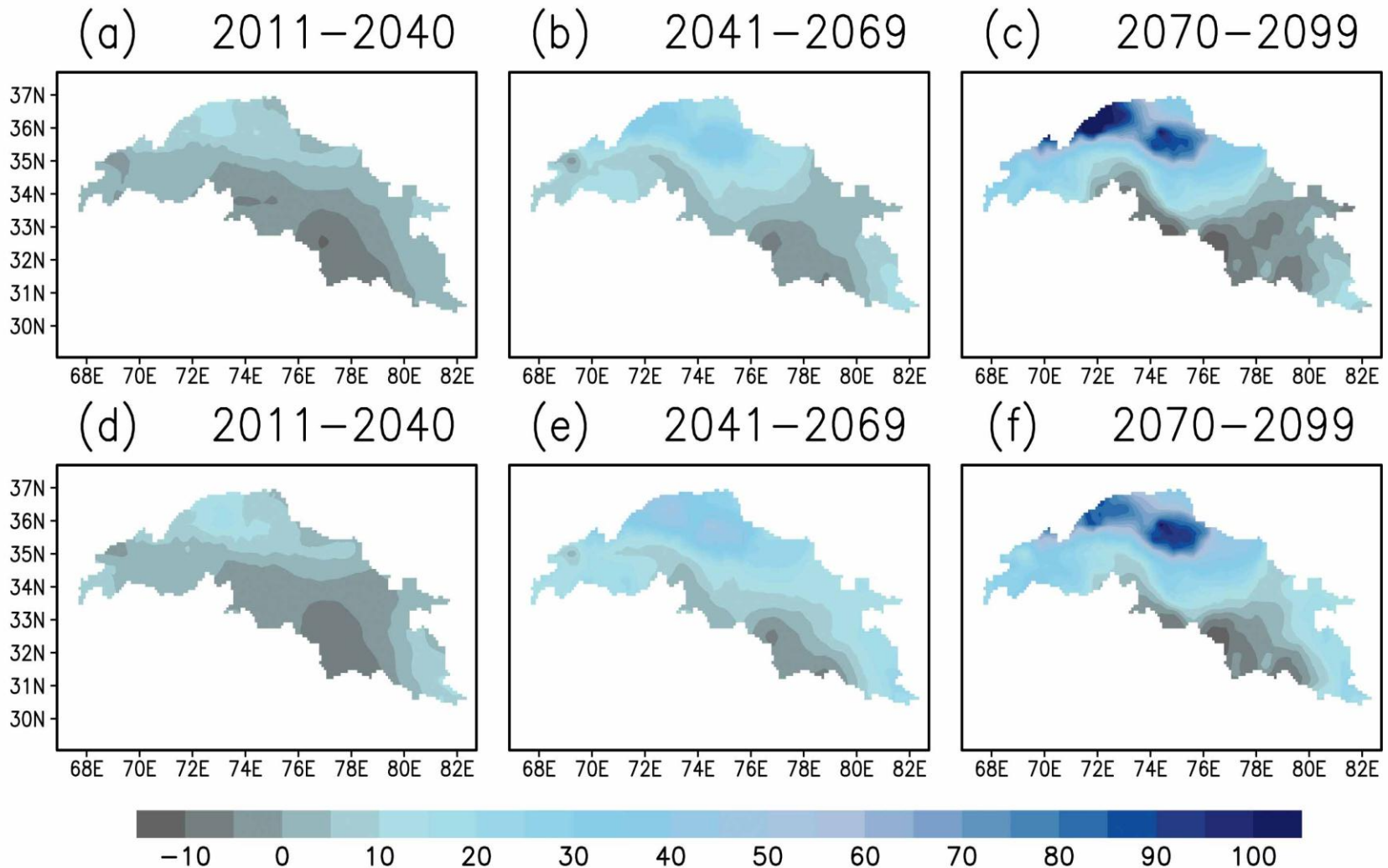


DECADAL CHANGE WINTER MEAN TEMPERATURE (°C) FUTURE – BASELINE (1975-2005)

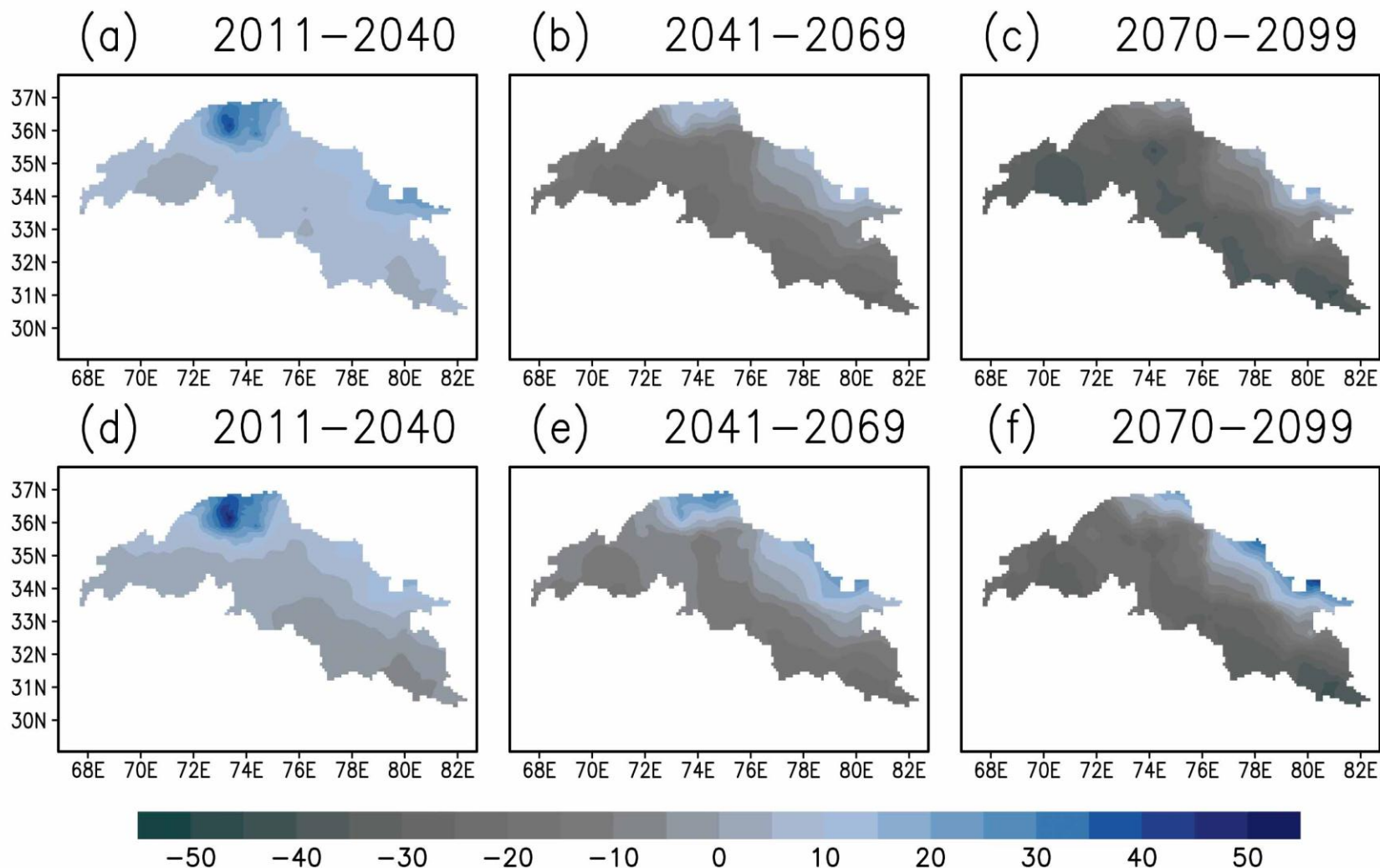




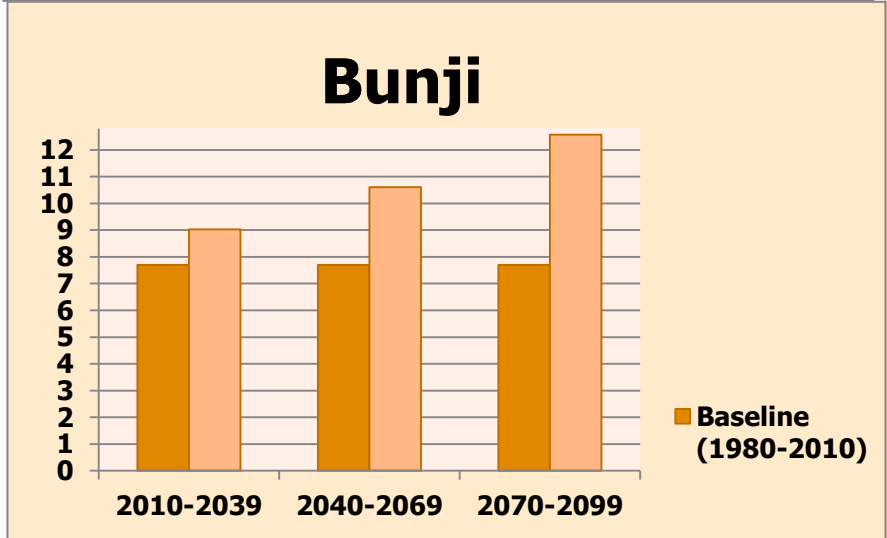
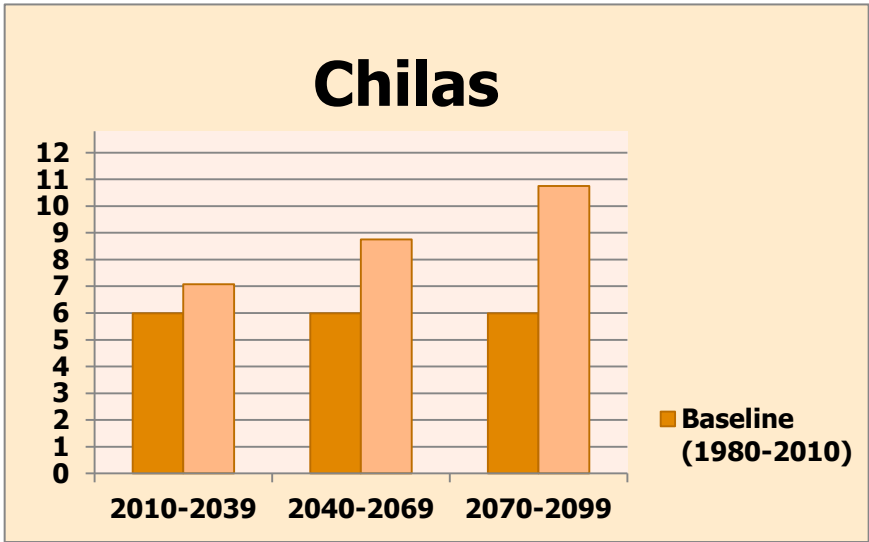
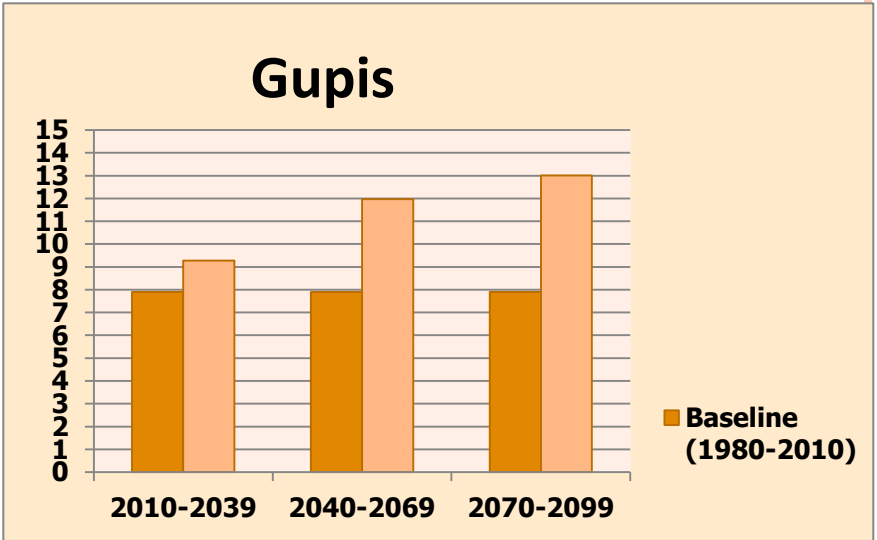
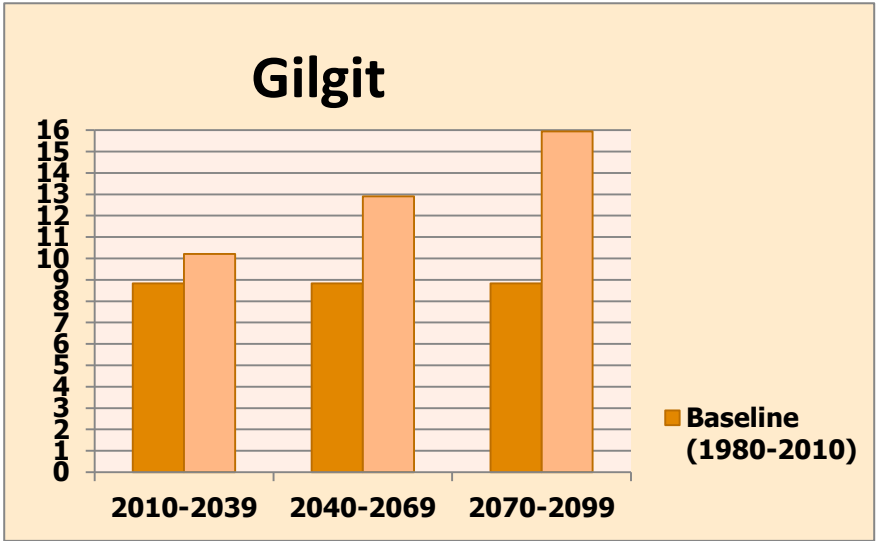
DECADAL CHANGE SUMMER PRECIPITATION(%) FUTURE – BASELINE (1975-2005)



DECADAL CHANGE WINTER PRECIPITATION(%)
FUTURE – BASELINE (1975-2005)

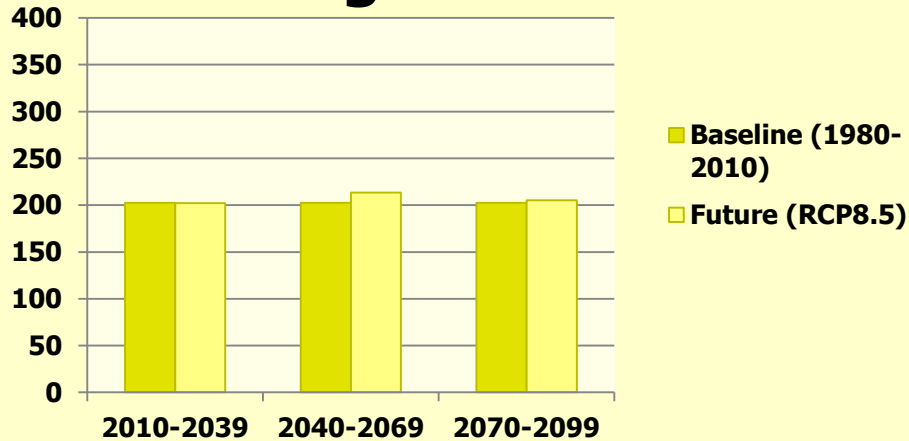


FUTURE MEAN TEMPERATURE (°C) TRENDS UNDER RCP 8.5 SCENARIO

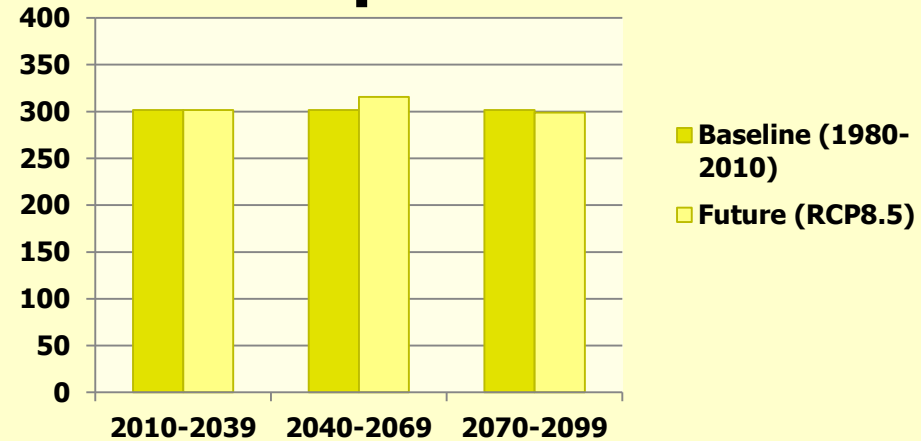


FUTURE PROJECTIONS OF Precipitation

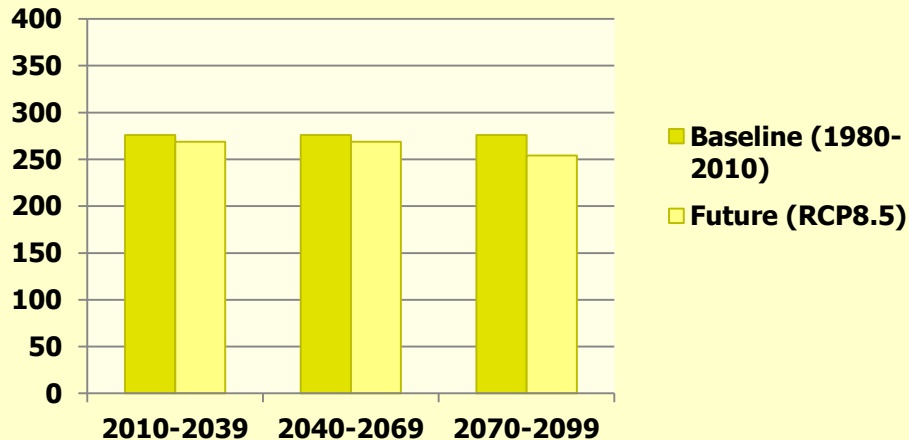
Gilgit



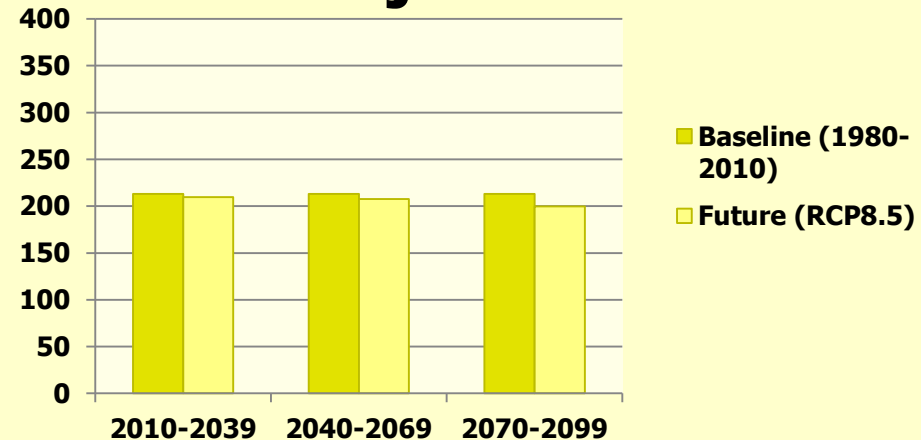
Gupis



Chilas



Bunji



THANKS

