



CLIMATE CHANGE & DROUGHT MANAGEMENT IN PALESTINE

BY:

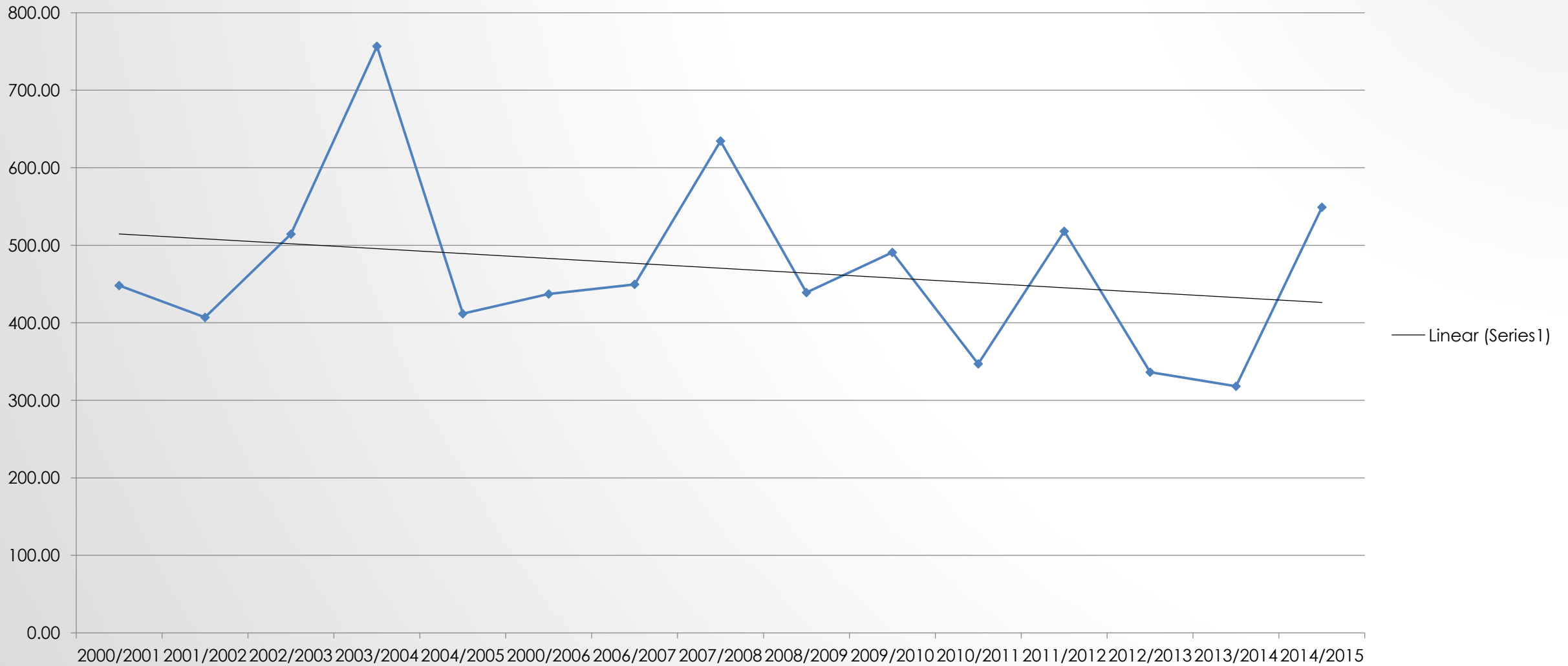
Eng. Deeb Abdelghafour

Workshop on Climate Change Adaptation in the Economic Development Sector
Using Integrated Water Resources Management (IWRM) Tools
Amman, 25-27 May 2016

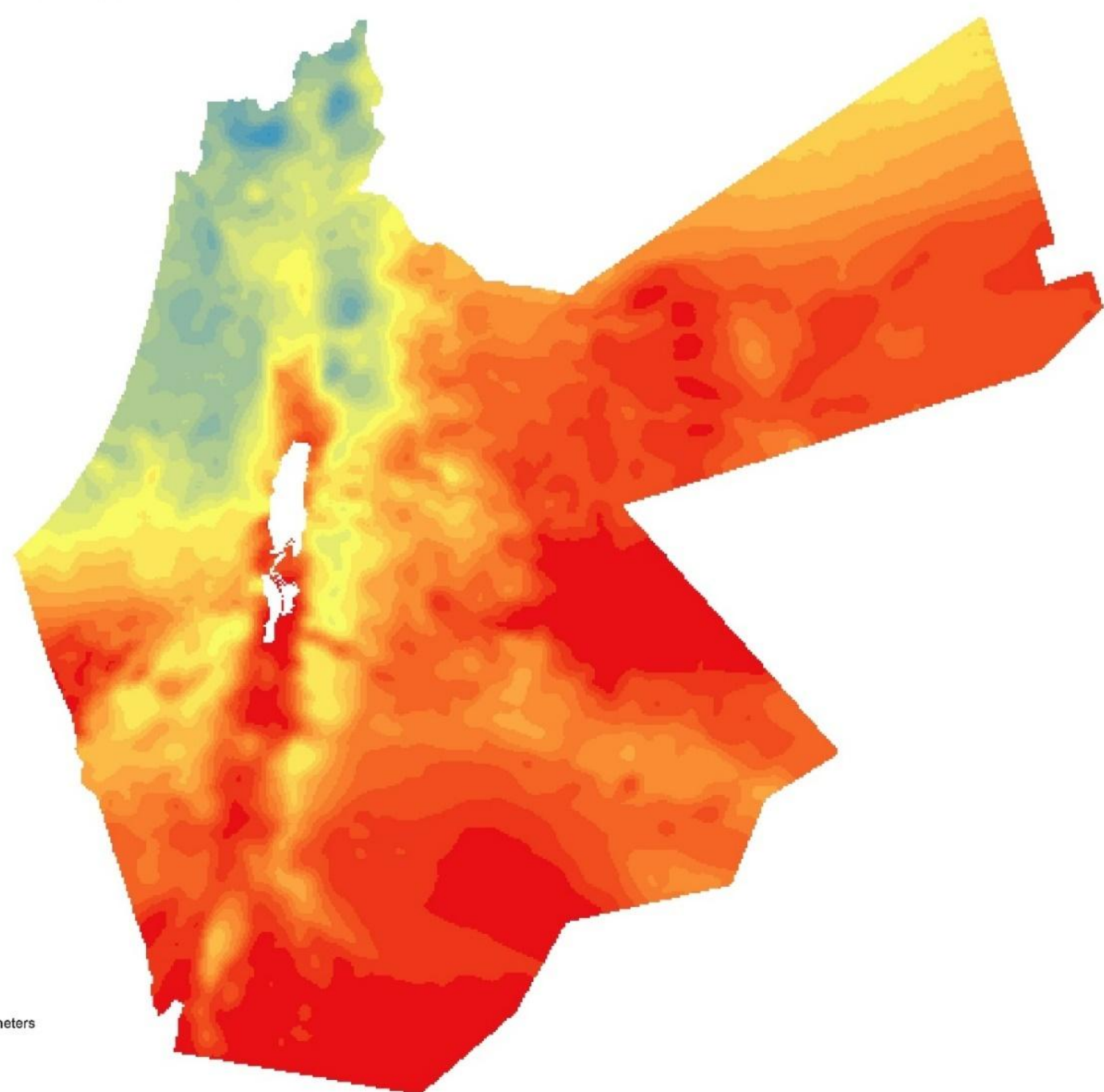
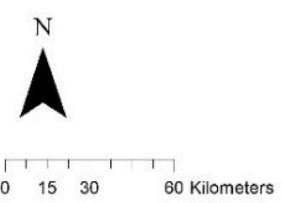
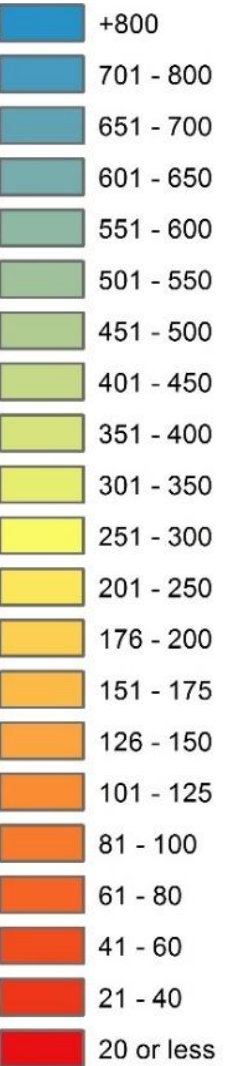
CLIMATE CHANGE/ FACTS FROM PALESTINE

- ❖ Increase in the number of droughts periods
- ❖ Rainfall during 2004-2014 were less than the historical average
- ❖ Frequency of extreme events has increased.
- ❖ Min. and max. summer temperatures have increased.

ANNUAL AVERAGE RAINFALL (2001~2015)



Average annual precipitations (mm), period 1988-2010



ONGOING ACTIVITIES:



1- STRENGTHENING NATIONAL CAPACITIES TO MANAGE WATER SCARCITY AND DROUGHT IN WEST ASIA AND NORTH AFRICA- UNDESA

West Asia

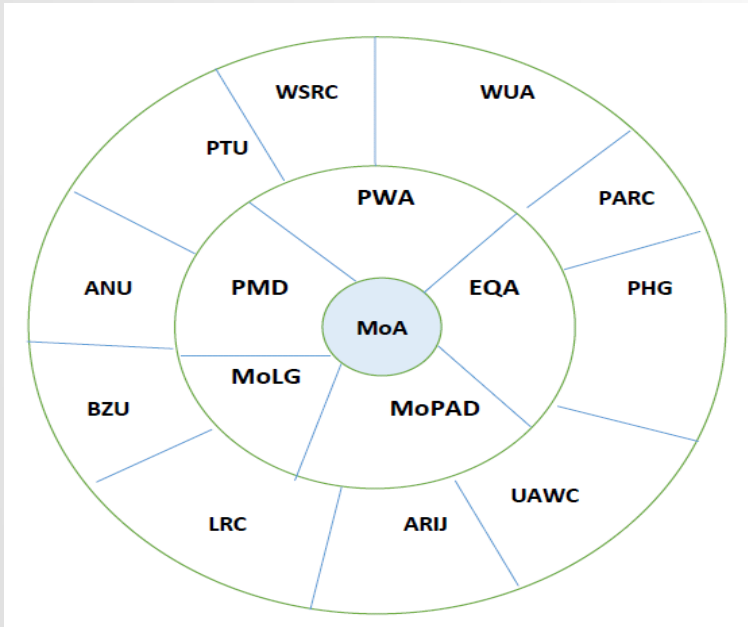
- Yemen
- Jordan
- **State of Palestine**

North Africa

- Tunisia
- Morocco

I. PLANNING FRAMEWORK

1. National Committee:



2. National Capacity Development Training of Trainers (May 2014 - Spain)

3. National Workshop (Jordan - Sept. 2014)

Adoption of MEDROPLAN and University of Nebraska Guidelines

II. METHODOLOGICAL COMPONENT

- Drought Characterization and Monitoring

Type of draught	Draught Indices
Meteorological drought	Standardized Precipitation Index (SPI)
	Effective Drought Index (EDI)
Hydrological drought	Groundwater Resource Index (GRI)
Agricultural drought	Normalized Difference Vegetation Index (NDVI)
	Soil Moisture Anomaly Index (SMAI)
Socioeconomic drought	Water Poverty Index (WPI)

- Impact of Draught on Palestine

ECONOMIC

Decreased production in agriculture

Unemployment caused by production decrease

Pressure on financial institutions (more risks in lending, capitals decrease etc.)

Income reduction for water utilities due to reduced water delivery

Costs in emergency measures to improve resources and decrease demands

Increase in Agricultural inputs due to the spread of diseases

Increase in fodder prices due to the loss in rangeland grazing areas

Increase in water tanking prices

Decrease in sheep and goat prices as farmers have to sell some of the cattails to buy fodders

Increase the prices of the dairy products due to the increase in the inputs prices and low production of the milk

ENVIRONMENTAL

Decrease water supply and quality and quantity of surface water and groundwater
Increase land degradation and desertification
Decline soil fertility
Increase crop pest and diseases
Increase energy demand
Increase risk to crops
Damage to ecosystems and wetlands, biodiversity and diseases (soil erosion, degradation of vegetation cover)
Shortage in drinking water
Increase of salt concentration (in underground layers, irrigated areas)
Damages to wetlands life (flora, fauna)
Damage to air quality (for example dust)

SOCIAL

Affect food security
Damage to public health and safety
Increase in social inequality
Tensions between public administrations and affected groups
Impacts on lifestyle (unemployment, reduced saving capability, malnutrition, difficulty in personal care)
Inequity in drought impacts and mitigation measures distribution

III. OPERATIONAL COMPONENT (NATIONAL PLAN)

- 1. Preparedness & Monitoring Systems for Palestine**
- 2. Establishing Priorities of Water Use**
- 3. Defining the management options in each drought level**

2- DEVELOPMENT OF HIGH-RESOLUTION HYDRO-CLIMATE MODEL FOR FOSTERING COOPERATION ON WATER MANAGEMENT-EXACT PROJECT

LARGE DOMAIN:

By using AFRICA CORDEX-Data extraction with Scale 50Km up to 2070

SMALL DOMAIN: Downscaling data at 5km.

By using **a non-hydrostatic dynamical model** like WRF at very high resolution that explicitly solves convection and other relevant physical processes at this scale.

list of indices that have been computed for the small domain

Climate index	Description	Variable name	Unit
Mean Temperature at 2m	Mean temperature at 2m	T2MEAN	°C
Maximum Temperature at 2m	Maximum temp. at 2m	T2MAX	°C
Minimum Temperature at 2m	Maximum temp. at 2m	T2MIN	°C
Total Precipitation	Total precipitation	RR	mm/day mm/month mm/year
Potential evaporation	Calculated by the Penman parameterization	POTEVP	mm
Mean of daily mean relative humidity at 2m	Mean of daily relative humidity at 2m	RH2	%
6-month Standardized Precipitation Index	SPI6 refers to precipitation in the previous 6-month period	SPI6	/
3-month Standardized Precipitation Index	SPI3 refers to precipitation in the previous 3-month period	SPI3	
Heavy precipitation	Number of heavy precipitation days (> 10mm)	RR10mm	Number of days in the reference period (month or year)

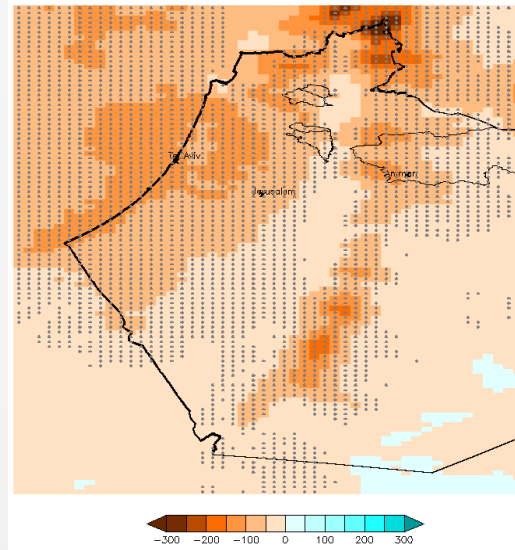
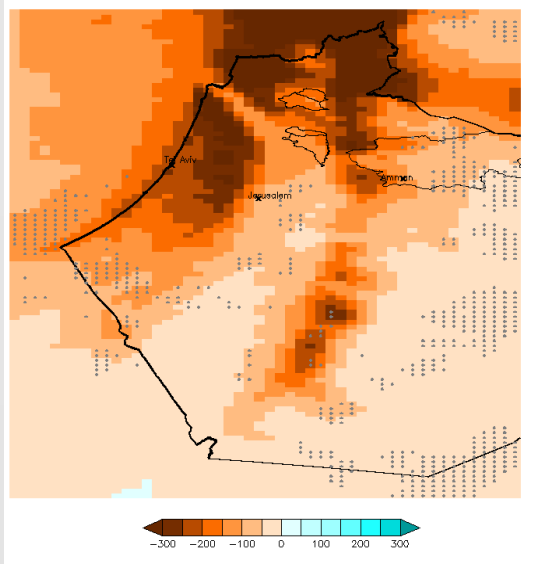
RCP45

RCP85

IPSL

delta=-102mm

delta=-47mm

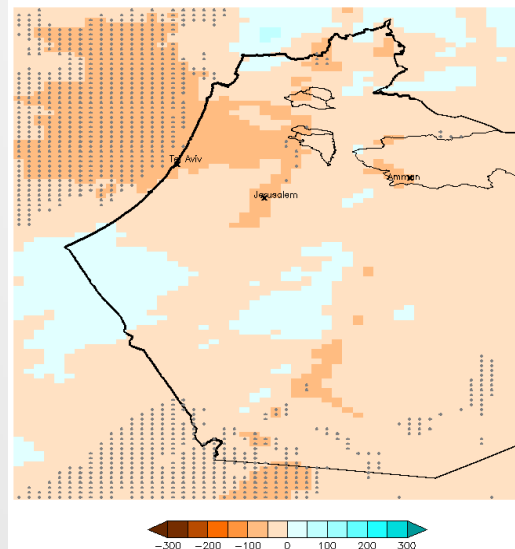
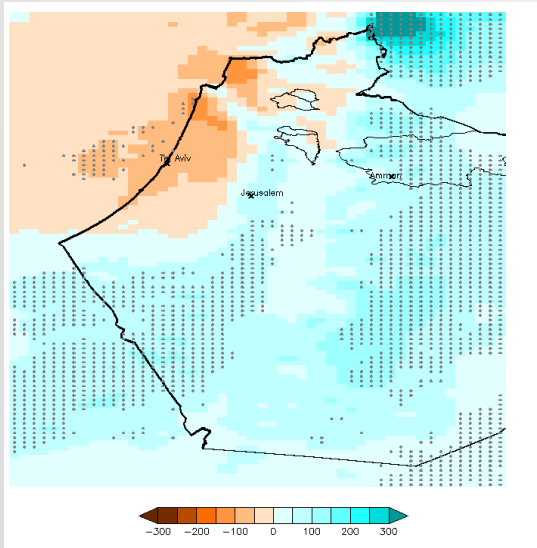


Annual average change in precipitation in the IPSL (top) and in the NOAA (bottom) simulations for RCP4.5 (left) and RCP8.5 (right).

NOAA

delta=+53mm

Delta=-21mm



3- ENHANCING THE CAPACITIES OF THE PA IN THE MAINSTREAMING ENVIRONMENT AND CLIMATE CHANGE PROJECT (BY EQA)

- Preparation of the initial communication Report
 - Greenhouse gas inventory
 - Thematic working group formed and trained and their Capacities were enhanced
 - Vulnerability and adaptation to climate change assessment
- Preparation of the National Adaptation plan for climate change related to different sectors including projects.

WHAT'S NEXT?

- Develop a proposal to install early warning system for Flood.
- Training and capacity building program on Downscaling Models.

THANK YOU