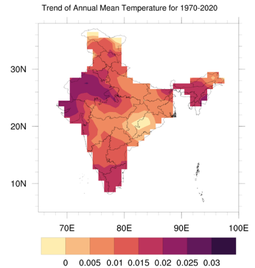
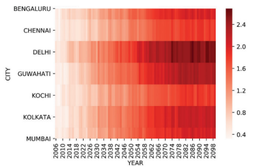
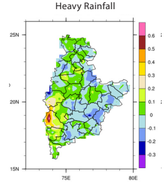
SUCCESSFUL FINDINGS:



Rising mean temperatures over India during the last 50 years.



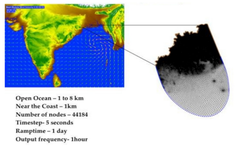
Projected mean temperatures over major Indian cities under RCP4.5 scenario depicting rise of around 2 degrees by 2100

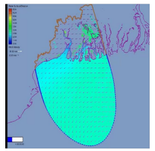


Observed spatial variation in extreme rainfall trends over Western Plateau and Hills Region

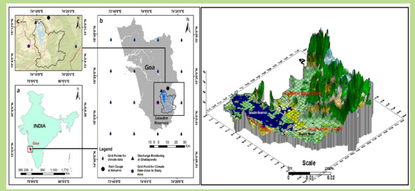
(Funder: Tower research)

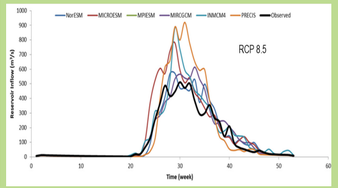
Storm Surge Modeling





ADCIRC hydrodynamic model setup used to predict storm surge in the Bay of Bengal under warming climate

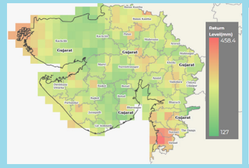




Projections from various climate models as an input to hydrological model to predict future inflows into a Salaulim reservoir in Goa, India

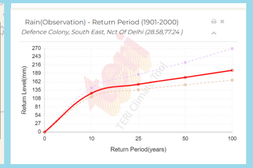
(Funder:Norwegian Embassy)

TERI Climate Tool Outputs



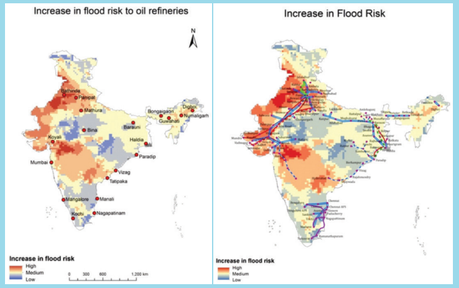
50-years return level frequency of Rainfall for Gujarat state.

(Funder: Norwegian Embassy)



Rain: Return Period(1901-2000) Delhi

Oil and Gas Refineries: Flood Risk Map



Mapping the flood risks around oil and gas refineries at the pan-India level

(Funder: FIPI/MoPNG)

TO KNOW MORE, CONTACT US:

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Infrastructure:

- Centre for Climate Modeling's expertise may be assessed from the infrastructure capacity and the projects that are undergoing and have been undertaken in the past few years.
- The climate modeling infrastructure consists of High Performance Computing (HPC) facility with total peak performance of 12 TerraFLOPS.
- It has 308 cores of new generation Intel Xeon processors with in total 1408 GB RAM. The HPC setup has over 250 TB of storage.
- This division includes separate data storage file servers for restoring climate modelling outputs. Many projects in India have used climate modeling simulations to assess climate change impacts and coastal vulnerability in the eastern sectors, North Indian region, high altitude, and coastal regions.

CLIMATE MODELING ACTIVITIES AT TERI

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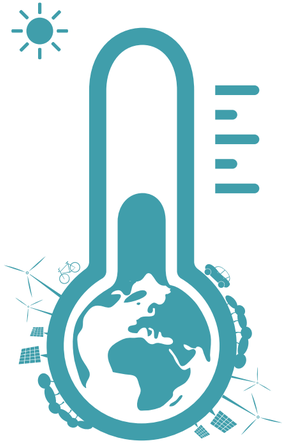
Creating Innovative Solutions for a Sustainable Future

Introduction

The Center for Climate Modeling focuses on addressing knowledge gaps in climate change science and developing a better understanding of climate variability at various spatial and temporal scales in order to effectively link climate science to policy research. With its unique integrated focus. In this context, TERI's Center for Climate Modeling aims to improve its climate modelling skills in order to better understand regional and subnational changes.

The information generated would be used to assess impact, vulnerability, and adaptation. The group's activities range from the use of cutting-edge global and regional climate models such as CCSM 3.0[1], CESM 1.0[2], GFS[3] and Met Office Unified Model (GCMs) and PRECIS[4], WRF[5], NorESM[6] and COAWST[7] (regional coupled) (GCMs), to linking these regional climate projections to various Impact Assessment Models, such as finite element based Advanced Circulation (ADCIRC) (for storm surge and coastal circulation), Soil and Water Assessment Tool (SWAT) (for water resources), Decision Support System Technology for Agrotechnology Transfer (DSSAT) (for agriculture), Integrated Biosphere Simulator model (IBIS) (for forestry), Dynamic Integrated Vulnerability Assessment model (DIVA) (for coastal zones) and MIKE (urban & riverine flooding).

1 CCSM- Community Climate System Model by National Centre for Atmospheric Research (NCAR)
2 CESM- Community Earth System Model by National Centre for Atmospheric Research (NCAR)
3 GFS- Global Forecast System
4 PRECIS- Providing Regional Climate for Impact Studies by UK Met Office
5 WRF- Weather Research and Forecasting by NCAR
6 NorESM- Norway Earth System Model
7 COAWST- Coupled-Ocean-Atmosphere-Wave-Sediment Transport Modelling System



Research

- Relation between Sea-Ice loss and Indian Summer Monsoon.
- Improving the understanding of climate processes and its linkages at regional scales, especially under the growing extreme climate events.
- Development of Flood Early Warning System for studying the potential impact of flooding and identification of flood prone areas in north eastern India.
- Better understanding of impacts of climate change on river flows using hydrological model
- Assessment of Physical risk due to extreme weather events, sea level rise and cyclones

Policy Linkages

- State Action plans on climate change
- State/ district level climate vulnerability plans
- Industry level risk assessment plans
- City level flood management plans
- Near real time flood forecasting for cities
- Climate Tool for decision makers
- Providing scientific projections on future dependable flows in rivers to assist planners in better management of water resources at state or district level
- Training: research schools and workshops for stakeholders and policy makers

Services

- Climate projections at regional scale under AR5/6 scenarios.
- Climate Risk assessment specific to various sectors like agriculture, infrastructure, water resources, fisheries, health and disaster management.
- Cyclone detection and Hazard Risk Mapping
- Sea level rise and its impact upon coastal inundation
- Multi-hazard risk mapping and Integrated Impact Assessment
- Outreach and Training

Skills and Expertise:

- Global Climate Model Analysis: The Climate Modeling team at TERI aims to build capacity in Climate System Models and Earth System Models with the goal of assessing and addressing existing uncertainties by providing bias corrected data for better results and more reliable projections.
- Quantitative impact assessment of severe climate change or Extreme Events: The team assessed precipitation and temperature extremes over India through various indices. This projected extreme events over the spatial and temporal scales.
- High Resolution regional climate projections for different scenarios: To simulate the climate at local scales TERI in collaboration with UK Met Office has developed in house capacity to project climate change scenarios over Indian region at high spatial resolution.
- Multi-hazard risk mapping: The validated high resolution climate modeling inputs are further tailored to feed into Impact Assessment Models. This produces risk and vulnerability assessment maps.
- Hydro-dynamical Modeling and Storm Surge modeling: TERI's climate modeling group has ported regional climate model outputs to a two-dimensional depth averaged hydro-dynamical model (ADCIRC) which provides the maximum probable surge height due to high intensity storms in future with respect to baseline.

Major activities:

- Global and regional simulations of past, present and future climate using the climate system models and regional dynamical downscaling tools.
- Scenario generation and understanding the spatial-temporal scales of climate variability using the models.
- Understanding the climate variability and monsoon dynamics depicted in the models and qualitative estimation of bias or uncertainty produced by the models.
- Tailoring of climate model outputs in order to link them with the region or location specific Impact Assessment Models.
- Extreme climate event analysis and determination of climate extremes to assist better decision making.
- Examining reservoir sustainability in the light of climate change
- Tailor-made climate outputs for user specific needs – transport sector, water sector, health sector, coastal infrastructure like Ports etc., Oil & Gas sector and Energy sector.

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