IITB-Monash Research Academy

Indian Institute of Technology Bombay | MONASH University

An Indian-Australian research partnership

Project Title:	Effect of global warming on precipitation extremes in India: Adding physics to the analysis	
Project Number	**IMURA0825**	
Monash Main Supervisor (Name, Email Id, Phone)	Prof. Marc Parlange; Email: Marc.Parlange@monash.edu	*Full name, Email*
Monash Co-supervisor(s) (Name, Email Id, Phone)		
Monash Head of Dept/Centre (Name,Email)	Prof. Jeffrey Walker; Email: jeff.walker@monash.edu	*Full name, email*
Monash Department:	Civil Engineering	
Monash ADRT (Name,Email)	Emanuele Viterbo	*Full name, email*
IITB Main Supervisor (Name, Email Id, Phone)	Prof. Basudev Biswal; Email: basudev@iitb.ac.in;	*Full name, Email*
IITB Co-supervisor(s) (Name, Email Id, Phone)	Prof. Subimal Ghosh; Email: subimal@civil.iitb.ac.in	*Full name, Email*
IITB Head of Dept (Name, Email, Phone)	Prof. T. I. Eldho; Email: eldho@civil.iitb.ac.in	*Full name, email*
IITB Department:	Civil Engineering	

Research Clusters:

Research Themes:

Highlight which of the Academy's CLUSTERS this project will address? *(Please nominate JUST **one.** For more information, see www.iitbmonash.org)*		**Highlight which of the Academy's Theme(s) this project will address?** *(Feel free to nominate more than one. For more information, see www.iitbmonash.org)*	
1	*Material Science/Engineering (including Nano, Metallurgy)*	***1***	*Advanced computational engineering, simulation and manufacture*
2	*Energy, Green Chem, Chemistry, Catalysis, Reaction Eng*	2	*Infrastructure Engineering*
3	*Math, CFD, Modelling, Manufacturing*	3	*Clean Energy*
4	*CSE, IT, Optimisation, Data, Sensors, Systems, Signal Processing, Control*	4	***Water***
5	***Earth Sciences and Civil Engineering (Geo, Water, Climate)***	5	*Nanotechnology*
6	*Bio, Stem Cells, Bio Chem, Pharma, Food*	6	*Biotechnology and Stem Cell Research*
7	*Semi-Conductors, Optics, Photonics, Networks, Telecomm, Power Eng*	7	*Humanities and social sciences*
8	*HSS, Design, Management*	8	Design

The research problem

Precipitation (rainfall, snowfall, etc.) occurring over land surfaces support many biotic as well as abiotic activities. Reliable prediction of precipitation is thus crucial for making many policy decisions. However, hydro-climatological processes leading to precipitation are very complex, and thus even robust physics based models often fail to explain precipitation phenomena. In this study, we are interested in learning how global temperate trends have influenced precipitation over land surfaces. Although there is little doubt that the global mean temperature is rising steadily over the past century, our knowledge on its influence on precipitation is quite limited. Most studies in the past have focused on statistical analysis of precipitation trends without studying the underlying causes. This study will focus on acquiring an in-depth understanding on the relationships between hydro-meteorological processes and precipitation trends to improve prediction of future precipitation trends. In particular, this study will focus on predicting extreme precipitation over the India.

Project aims

The main aims of this proposed research are:

- To study hydro-meteorological processes responsible for precipitation extremes.
- To develop a framework for better prediction of precipitation extremes in India.

Expected outcomes

The following outcomes are expected from the proposed research:

- Better scientific understanding of processes responsible for precipitation extremes.
- A model for predicting precipitation extremes in India.

How will the project address the Goals of the above Themes?

The proposed research will address the concerns raised by the IITB-Monash academy (theme 4: Water) by developing modelling tools that can help in management of natural disasters like floods and droughts.

Capabilities and Degrees Required

The proposed research project needs a highly motivated PhD student with strong fundamental knowledge and quantitative skills. Knowledge in statistics is essential. The candidate should have a masters' degree in any subject area related to hydrology/water resources engineering/statistics.

Potential Collaborators

Prof. Edoardo Daly (Monash University) and Prof. Arpita Mondal (IIT Bombay).

Select up to **(4)** keywords from the Academy's approved keyword list **(available at http://www.iitbmonash.org/becoming-a-research-supervisor/)** relating to this project to make it easier for the students to apply.

Water,climate change (Carbon Capture and Sequestration) (9); Modelling and Simulation (37); Computer Simulation (25); Maths (8).