

Annexure-I

Program: Preparatory Training

09-Sep-2022 Friday		Introduction to Computer Data Analysis	
10:00-11:15	Sagar Gade	LINUX basics and HPC login-putty/moba x-term	Hands on
11:15-11:30	Health Break		
11:30-13:00	Sagar Gade	Continued and Q&A	Hands on
13:00-14:30	Lunch Break		
14:30-16:00	Vinu valsala	NetCDF libraries	Hands on
16:00-16:15	Health Break		
16:15-17:30	Prashanth and Kiran VG	CDO and FERRET	Hands on
10-Sep-2022 Saturday		Introduction to Computer Data Analysis	
10:00-11:15	Mano kranthi Ganadhi	GRADS	Hands on
11:15-11:30	Health Break		
11:30-13:00	Mano kranthi Ganadhi	Continued and Q&A	Hands on
13:00-14:30	Lunch Break		
14:30-16:00	Pratibha	NCL	Hands on
16:00-16:15	Health Break		
16:15-17:30	Pratibha	Continued and Q&A	Hands on

PROGRAM SCHEDULE-NTDA

12-Sep-2022 Monday	DAY-1		
10:00-10:10	Inauguration of Training and Welcome address	Director, IITM	
10:10-10:45	Dr. Vinu Valsala	Introduction to the workshop and the subject of Data Assimilation	Theory
10:45-11:15	Prof. Govindan Kutty	Data Assimilation basics, How DA is defined and how DA formula is derived in this framework for both scalar and multi-dimensional cases.	Theory
11:15-11:30	Health Break		
11:30-13:00	Prof. Govindan Kutty	Continued and Q&A	Theory
13:00-14:30	Lunch Break		
14:30-16:00	Prof. Govindan Kutty	Recognize and understand the meaning of the terms in the equations: e.g., observation operator, error covariance, weight, optimal weight, optimal DA, etc. Assumptions made during derivations Apply those equations for simple problems and interpret the meaning of the equations for the specific simple problem	Theory
16:00-16:15	Health break		
16:15-17:00	Prof. Govindan Kutty	Continued and Q&A	Theory

13-Sep-2022 Tuesday	DAY-2		
10:00-11:15	Dr. Vinu Valsala	Bayesian Theory, Cost Function, Minimization, Incremental Optimization, Observation System Simulation Experiment	Theory
11:15-11:30	Health Break		
11:30-13:00	Dr. Vinu Valsala	Continued and Q&A	Theory
13:00-14:30	Lunch Break		
14:30-16:00	Prof. Govindan	Introduction to WRF system, WRF DA system,	Hands-On

	Kutty	Single-observation assimilation etc.	
16:00-16:15	Health Break		
16:15-17:00	Prof. Govindan Kutty	Continued and Q&A	Hands on

14-Sep-2022 Wednesday	DAY-3		
10:00-11:15	Prof. Govindan Kutty	A brief review of Statistical interpolation, 3DVAR and 4DVAR. A brief review of how each scheme works. Meaning of observation error covariance. Meaning of background error covariance. The difference between a stochastic formula vs. a deterministic EnKF formulation. EnKF problems and treatment, What's filter divergence? Possible causes for filter divergence. What's the sampling error? What's the common treatment of sampling error and how it works: e.g. covariance localization, Possible causes of model errors, Possible ways to represent model errors in EnKF.	Theory
11:15-11:30	Health Break		
11:30-13:00	Prof. Govindan Kutty	Continued and Q&A	Theory
13:00-14:30	Lunch Break		
14:30-16:00	Prof. Govindan Kutty	Introduction to 3DVAR, 4DVAR, Hybrid 3DVAR-ETKF data assimilation system, A test case on tropical cyclone case with and without data assimilation.	Hands on
16:00-16:15	Health Break		
16:15-17:30	Prof. Govindan Kutty	Continued and Q&A	Hands on

15-Sep-2022 Thursday	DAY-4		
10:00-11:15	Dr. Arya Paul	LETKF: Ocean Data Assimilation	Theory
11:15-11:30	Health Break		
11:30-13:00	Dr. Arya Paul	Continued and Q&A	Theory

13:00-14:30	Lunch Break		
14:30-16:00	Dr. Arya Paul	LETKF: Ocean Data Assimilation	Hands on
16:00-16:15	Health Break		
16:15-17:30	Dr. Arya Paul	Continued and Q&A	Hands on

16-Sep-2022 Friday	DAY-5		
10:00-11:15	Dr. Suryakanti Dutta	Special Lecture	Theory
11:15-11:30	Health Break		
11:30-13:00	Dr. Prasad	Special Lecture	Theory
13:00-14:30	Lunch Break		
14:30-16:00	Dr. Anand Kumar Das	IMD Operational Forecast and Data Assimilation	Theory
16:00-16:15	Health break		
16:15-17:30		Visit to HPC	

17-Sep-2022 Saturday	DAY-6		
10:00-11:15	Dr.Rajib Chattopadhyay	Special Lecture	Theory
11:15-11:30	Health Break		
11:30-13:00	Dr.P. Mukhopadhyay	Special Lecture	Theory
13:00-14:30	Lunch Break		
14:30-16:00	Dr.Padma kumari/Dr. Thara	Special Lecture	Theory
16:00-16:15	Health Break		
17-Sep-2022 (SUNDAY) OFF			

19-Sep-2022 Monday	DAY-7		
10:00-11:15	Dr. Indira Rani/Dr. John P George	Observations, observation processing and monitoring: Atmospheric & Ocean Observations, Observation networks Dissemination of observation WMO formats for observation exchange Monitoring of observations at an operational NWP centre	Theory
11:15-11:30	Health Break		
11:30-13:00	Dr. Indira Rani/Dr. John P George	Need for satellite data What do satellite instruments measure? Radiative Transfer Equation: forward and inverse problems Channel selection: channels important for NWP DA	Theory
13:00-14:30	Lunch Break		
14:30-16:00	Dr. India Rani/Dr. John P George	Interpretation of WMO format, Plotting of various conventional observations	Hands-on
16:00-16:15	Health Break		
16:15-17:30	Dr. India Rani/Dr. John P George	Continued and Q&A	Hands on

20-Sep-2022 Tuesday	DAY-8		
10:00-11:15	Dr. Indira Rani/Dr. John P George	Observation operators Background errors Observation errors Bias correction of satellite observations Data selection and QC for NWP applications	Theory
11:15-11:30	Health Break		
11:30-13:00	Dr. Indira Rani/Dr. John P George	GNSS-RO measurements Atmospheric Motion Vectors (AMVs) Sea Surface Scatterometer winds Space-based wind profiler (Aeolus-ADM)	Theory

13:00-14:30	Lunch Break		
14:30-16:00	Dr. India Rani/Dr. John P George	Plotting of various satellite observations and interpreting the differences in the brightness temperature from different channels (Most probably INSAT-3D/3DR sounder/imager and some MW instruments' data)	Hands-on
16:00-16:15	Health Break		
16:15-17:30	Dr. India Rani/Dr. John P George	Continued and Q&A	Hands on

21-Sep-2022 Wednesday	DAY-9		
10:00-11:15	Dr. Indira Rani/Dr. John P George	Introduction to NCMRWF NCUM Deterministic and Ensemble Atmospheric Data Assimilation systems	Theory
11:15-11:30	Health Break		
11:30-13:00	Dr. Indira Rani/Dr. John P George	Continued and Q&A	Theory
13:00-14:30	Lunch Break		
14:30-16:00	Dr. India Rani/Dr. John P George	RT simulation will be continued	Hands-on
16:00-16:15	Health Break		
16:15-17:30	Dr. India Rani/Dr. John P George	Continued and Q&A	Hands on