

National Training Workshop on Fundamentals of Data Assimilation

09-21 Sep 2022 at IITM, Pune

Organized By

Development of Skilled Manpower (DESK-ESSC), MoES, IITM

Venue: IITM, Pune (onsite training event)

Resource Persons

				
<p>Dr. Arya Paul, Scientist, INCOIS, Hyderabad</p> <p>Delivering Lectures on: Ocean Data Assimilation, LETKF</p>	<p>Prof. Govindan Kutty, IIST, ISRO, Trivandrum</p> <p>Delivering Lectures on: Variational Data Assimilation and Kalman Filter</p>	<p>Dr. Vinu Valsala, Scientist, IITM, Pune</p> <p>Delivering Lectures on: Optimization theory, Network Design</p>	<p>Dr. Indira Rani, Scientist, NCMRWF, Delhi</p> <p>Delivering Lectures on: Operational Data Assimilation, Satellite Observation and DA.</p>	<p>Dr. John P. George, Scientist, NCMRWF, Delhi</p> <p>Delivering Lectures on: Operational Data Assimilation, Satellite Observation and DA</p>

This workshop is targeted at participants in the later stage of their degree in Atmospheric/Oceanic and allied sciences, PhD scholars, and early career scientists/professors. It is loaded with the right balance of theory and hands-on exercises.

Topics Covered

- Introduction to the Data Assimilation
- Data Assimilation basics, How DA is defined and how DA formula is derived in this framework for both scalar and multi-dimensional cases.
- 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
- Bayesian Theory, Cost Function, Minimization, Incremental Optimization, Observation System Simulation Experiment
- Introduction to WRF system, WRF DA system, Single-observation assimilation etc.
- 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.

- Introduction to 3DVAR, 4DVAR, Hybrid 3DVAR-ETKF data assimilation system, A test case on tropical cyclone case with and without data assimilation.
- Local Ensemble Transform Kalman Filter (LETKF): Ocean Data Assimilation
- IMD Operational Forecast and Data Assimilation
- 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
- Need for satellite data, What do satellite instruments measure?
- Radiative Transfer Equation: forward and inverse problems
- Channel selection: channels important for NWP DA
- Interpretation of WMO format,
- Plotting of various conventional observations
- Observation operators, Background errors, Observation errors, Bias correction of satellite observations, Data selection and QC for NWP applications
- GNSS-RO measurements, Atmospheric Motion Vectors (AMVs), Sea Surface Scatterometer winds
- Space-based wind profiler (Aeolus-ADM)
- Plotting of various satellite observations and interpreting the differences in the brightness temperature from different channels (INSAT-3D/3DR sounder/imager and some MW instruments' data)
- Introduction to NCMRWF NCUM Deterministic and Ensemble Atmospheric Data Assimilation systems.

Application Online: <https://itmjobs.tropmet.res.in/job/workshop-ntda-2022.php>

Participation: By Shortlist based on suitability for the training workshop

Last Date of Application: **25-Aug-2022 05:00 PM**

Contact: desk_training@tropmet.res.in

