

INVITED SPEAKERS

Peter Bauer
ECMWF

Jana de Wiljes
University of Potsdam, Germany

Alban Farchi
CEREA, Ecole des Ponts
and EDF R&D, France

Erik Van Vleek
University of Kansas, USA

Xuguang Wang
University of Oklahoma, USA

Milija Zupanski
Cooperative Institute for
Research in the Atmosphere, USA

LOCAL ORGANISING COMMITTEE

Alberto Carrassi
University of Bologna, Italy

Pier Paolo Alberoni
ARPAE, Italy

Carlo Cacciamani
Italia Meteo

Chiara Marsigli
ARPAE, Italy



9th International Symposium on Data Assimilation

www.eventi.unibo.it/isda2023

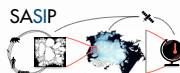
Partners



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA
DEPARTMENT OF PHYSICS AND ASTRONOMY
"AUGUSTO RIGHI"



Sponsors



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MONDAY 16

08.30 | Registration + Opening

METHODS & APPLICATIONS I

Chair: Alberto Carrassi

09.30 | M. Zupanski

INVITED SPEAKER

Addressing Nonlinearity in Data Assimilation

10.05 | L. Berre

Formulation and use of 3D-hybrid and 4D-hybrid ensemble covariances in the Météo-France global data assimilation system

10.25 | N. Bousserez

A Hybrid Ensemble-Variational Approach for Greenhouse Gas Source Inversions in the Integrated Forecasting System (IFS)

10.45 – Coffee break

METHODS & APPLICATIONS II

Chair: Peter Jan Van Leeuwen

11.30 | G. Evensen

Learnings from petroleum reservoir history matching

11.50 | T. Necker

Empirical optimal vertical localization derived from large ensembles

12.10 | B. Raczka

Improving Forecasts of Land Surface Carbon Cycling using the Data Assimilation Research Testbed (DART)

12.30 | Y. Chen

Multivariate state and parameter estimation with data assimilation on sea-ice models using a Maxwell-Elasto-Brittle rheology

12.50 – Lunch

METHODS & APPLICATIONS III

Chair: Chiara Marsigli

14.00 | M. Weissmann

The impact of Aolus satellite wind lidar observation in the global NWP system of DWD

14.20 | A. Storto

Towards coupled air-sea data assimilation in a regional model

14.40 | J. Dumont Le Brazidec

Towards the inversion of plumes from power plants and industrial sites in satellite CO2 images using deep neural networks

15.00 | L. Rovai

Testing a WRF-based modelling chain for operational forecasting under different data assimilation inputs

15.20 – Coffee Break

METHODS & APPLICATIONS IV

Chair: Martin Weissmann

16.00 | F. Counillon

Estimation of Ocean Biogeochemical Parameters in an Earth System Model Using ensemble data assimilation methods

16.20 | F. Vossepoel

On Gaussianity and nonlinearity in state- and parameter estimation in earthquake cycle models

16.40 | S. Federico

Lightning data assimilation: impact on precipitation and lightning forecast

17.00 | J.W. Acevedo Valencia

Assimilation of Camera Cloud Motion Vectors (CAM-CMV) into a Regional NWP system

17.20 | J-F. Caron

Farewell hybrid covariances: Moving to fully ensemble-derived background-error covariances for NWP at Environment and Climate Change Canada

17.40 | Closing talk session

Ice Breaker until 19.45

TUESDAY 17

8:30 | Poster display

DATA ASSIMILATION FOR CONVECTION, HIGH-RESOLUTION MODELS AND STORMS I

Chair: Tijana Janjic

09.00 | X. Wang

INVITED SPEAKER

Recent Development of Multiscale Data Assimilation for Numerical Weather Prediction

09.35 | G. Craig

The Weak Temperature Gradient approximation as a balance principle for convective-scale data assimilation

09.55 | D. Meng

Synergistic assimilation of cloud and dynamical information based on cloud-dependent background field error covariance

10.15 | C. Merker

Benefit and challenges in assimilating near-surface temperature and humidity observations in complex terrain

10.35 – Coffee Break

DATA ASSIMILATION FOR CONVECTION, HIGH-RESOLUTION MODELS AND STORMS II

Chair: Massimo Bonavita

11.20 | T. Janjic

Ensemble Kalman Filter based Data Assimilation for Tropical Waves in the MJO Skeleton Model

11.40 | J. Taylor

Improving short range prediction of convective weather systems using a 1000-member ensemble Kalman filter with 30-second update

12.00 | M. Verlaan

A bias-kalman-filter for operational storm-surge forecasting

12.20 | S. Wang

A Local Data Assimilation Method (Local Data Assimilation v1.0) and its Application in a Simulated Typhoon Case

12.40 | A. Demortier

Added value of assimilating ground observations from personal weather stations in a convective-scale numerical weather prediction system

13.00 – Lunch

DATA ASSIMILATION FOR CONVECTION, HIGH-RESOLUTION MODELS AND STORMS III

Chair: Francois Counillon

14.00 | T. Miyoshi

PREVENIR: Japan-Argentina Cooperation Project for Heavy Rain and Urban Flood Disaster Prevention

14.20 | K. Khosravi
Assimilation of 3D radar information at convective scales at Deutscher Wetterdienst (DWD)

14.40 | M. Martet
New possibilities with AROME 3d-Envar: assimilation of MTG/LI Flash Extend Accumulation (FEA) and direct assimilation of ground-based radar reflectivity

15.00 | T. Diefenbach
Measures of imbalance in convective-scale data assimilation

15.20 – Coffee Break

DATA ASSIMILATION FOR CONVECTION, HIGH-RESOLUTION MODELS AND STORMS IV
Chair: Thomas Gastaldo

16.00 | L. Kugler
Comparing the assimilation of visible and infrared satellite observations to radar reflectivity for convective-scale numerical weather prediction

16.20 | M. Reinhardt
Intelligent Camera Cloud Operators for Convective Scale Numerical Weather Prediction

16.40 | M. Minamide
Predictability of moist convection through ensemble convective-scale all-sky satellite data assimilation

17.00 | L. Berre
A 3D-EnVar scheme for the operational convective scale NWP system Arome-France

17.20 | Closing talk session

Poster Session until 19.45

WEDNESDAY 18

DATA ASSIMILATION & MACHINE LEARNING I
Chair: Geir Evensen

09.00 | A. Farchi
INVITED SPEAKER
Model error correction with data assimilation and machine learning - from theory to the ECMWF forecasting system

09.35 | R. Arcucci
Data Learning 2.0: integrating Data Assimilation with Machine Learning to deal with limitations in models and data

09.55 | B. Melinc
Emulating 3D-Var Data Assimilation using Variational Autoencoder

10.15 | M. Chrust
Hybrid Data Assimilation - Machine Learning for Model Error Estimation and Correction: application to the ECMWF IFS model

10.35 – Coffee Break

DATA ASSIMILATION & MACHINE LEARNING II
Chair: Takemasa Miyoshi

11.20 | M. Bonavita
Hybrid NWP-Machine Learning or End-to-End Learning?

11.40 | H.F. de Campos Velho
Data Assimilation and Predictability by Machine Learning Approach

12.00 | J. Liang
Developing observation operator based on machine learning model for satellite data assimilation

12.20 | M.-Y. Chan
Mitigating sampling errors in ensemble data assimilation with Probit-space Ensemble Size Expansion (PESE)

13.00 – Lunch

NOVEL MATHEMATICAL IDEAS IN DATA ASSIMILATION I
Chair: Yumeng Chen

14.00 | J. de Wiljes
INVITED SPEAKER
Advances in high dimensional nonlinear filtering - intermediate updates and novel localisation strategies

14.35 | M. Bocquet
Bridging traditional data assimilation and optimal transport

14.55 | S. Ehouarn
A kernel extension of the Ensemble Transform Kalman Filter

15.15 | N. Panda
Using Koopman and Perron Frobenius Operators For Non-Linear Data Assimilation

15.35 – Coffee Break

METHODS & APPLICATIONS V
Chair: Martin Veerlan

16.15 | S. Dance
A new computational approach for spatially correlated observation error statistics in data assimilation

16.35 | A. Fowler
The importance of anchor observations in data assimilation

16.55 | S. Crezee
Towards an operational assimilation of RAMAN lidar temperature and mixing ratio profiles with COSMO/KENDA-1

17.15 | Closing

20.00 | Social Dinner

THURSDAY 19

8:30 | Poster display

NOVEL MATHEMATICAL IDEAS IN DATA ASSIMILATION II
Chair: Marc Bocquet

09.00 | E. Van Vleck
INVITED SPEAKER
Adaptive Meshing for Ensemble Based Data Assimilation

09.35 | I. Pasmans
Tailoring data assimilation to discontinuous Galerkin models

09.55 | S. Fletcher
Nongaussian based Kalman Filters

10.15 | D.S. Carriò Carriò
A New Localization Method for Non-Gaussian Variations of the EnKF: “The Ensemble Squeeze Localization”

10.35 – Coffee Break

NOVEL MATHEMATICAL IDEAS IN DATA ASSIMILATION III
Chair: Sarah Dance

11.20 | P. Van Leeuwen
Continuous nonlinear data assimilation

11.40 | F. Pinheiro

Data assimilation for a two-layer quasi-geostrophic model using an Ensemble Synchronization Particle Filter

12.00 | E. Carlson

Continuous Data Assimilation: A Nonlinear Algorithm & Connection to Physics

12.20 | F. Beiser

Rank Histogram Estimators for Multi-level Data Assimilation

12.40 | V. Martinez

Parameter estimation for nonlinear PDEs

13.00 – Lunch

NOVEL MATHEMATICAL IDEAS IN DATA ASSIMILATION IV

Chair: Ivo Pasmans

14.00 | R. Todling

Is there a relationship between cornered-hat methods and a residual approach to estimate system uncertainty?

14.20 | Q. Tang

An ensemble based data assimilation framework for an integrated hydrological model: development and examples

14.40 | T. Enomoto

Assimilation of nonlinear observations using the maximum likelihood ensemble filter with exact Newton optimization

15.00 | M. Destouches

Improving background error covariance estimation with Multilevel Monte Carlo Methods

15.20 – Coffee Break

NOVEL MATHEMATICAL IDEAS IN DATA ASSIMILATION V

Chair: Alison Fowler

16.00 | E. Holm

Soft Re-Centred Ensemble of Data Assimilations

16.20 | C.-C. Hu

Incorporating non-Gaussian observation errors into variational methods

16.40 | A. Dirkson

A new approach for estimating observation error covariance using ensemble data assimilation

17.00 | Closing talk session

Poster Session until 19.45

FRIDAY 20

DATA ASSIMILATION & MACHINE LEARNING III

Chair: Roland Potthast

09.00 | P. Bauer, invited speaker

Destination Earth, digital twins, data assimilation, deep learning

09.35 | L. Lei

Convolutional Neural Network-based Adaptive Localization for an Ensemble Kalman Filter

09.55 | Y. Ikuta

Generating background error covariances for hydrometeors with conditional generative adversarial networks

10.35 | C. Marsigli

The GLObal-to-Regional ICON Digital Twin for high-impact weather applications

10.35 – Coffee Break

METHODS & APPLICATIONS VI

Chair: Carla Cardinali

11.20 | A. Lorenc

Designing new Data Assimilation software for Operational Global NWP

11.40 | A. Weaver

Scale-dependent background-error covariance modelling, with application to global ocean data assimilation

12.00 | L. Scheck

A neural network-based forward operator for assimilating near-infrared satellite images

12.20 | S. Migliorini

Assimilation of Transformed Retrievals from IASI radiances at the Met Office

12.40 | M. Buzziotti

Data-Driven Tools: From Ideal models to Geophysical systems

13.00 – Lunch

METHODS & APPLICATIONS VII

Chair: Alberto Carrassi

14.00 | G. Conti

Advanced diagnostic tools to assess the observations impact in the analysis and forecast

14.20 | E. Calvella

The Mean-Field Ensemble Kalman Filter: Gaussian and Particle Approximations

14.40 | T. Payne

A Hybrid Differential-Ensemble Linear Forecast Model for 4D-Var

15.00 | Closing