2020 EnKF workshop program

Time	Session	Chair
08:30-08:45	Welcome (Xiaodong Luo, NORCE Energy, Norway)	
08:45-09:30	**Machine learning for forecasting and data assimilation** Brian Hunt University of Maryland, USA	Session chair:
09:30-10:00	**Local ensemble transform Kalman filter with cross-validation** Mark Buehner Environment and Climate Change Canada, Canada	
10:00-10:30	**Necessities and scale-dependences of location error corrections for analyzing intense vortices and fronts in high-resolution meteorological data assimilation** Qin Xu[1], Huan-Haun Zhang[2], Li Wei, Kang Nai[2] [1]NOAA, USA; University of Oklahoma, USA; [2]University of Oklahoma, USA	
10:30-10:50	**Break**	
10:50-11:35	**Observation uncertainty in data assimilation** Sarah Dance University of Reading, UK	Session chair:
11:35-12:05	**Development of a novel EnKF data assimilation system with a stretched-grid LMDZ5 atmospheric model** Tarkeshwar Singh National Centre for Medium Range Weather Forecasting, India	
12:05-13:00	**Lunch**	
13:00-13:30	**Better observations, advanced assimilation and improved models** Patrick Laloyaux, Massimo Bonavita, ECMWF	Session chair:
13:30-14:00	**Using a new two-step data assimilation approach for improving surface ocean current predictions** Jesper Sandvig Mariegaard, Jacob Tornfeldt Sørensen, Mai-Britt Kronborg, Arief Rullyanto, Natacha Fery DHI, Denmark	
14:00-14:30	**A supermodel to enhance climate prediction** Francois Counillon[1,2], Noel Keenlyside[1,2], Shuo Wang[1], Alok Gupta[4], Shunya Koseki[1], Marion Devilliers[3], Mao-Lin Shen[1], Gregory Duane[1] [1]NERSC, Norway; [2]University of Bergen, Norway; [3]University of Bordeaux, France; [4]NORCE Climate, Norway	
14:30-14:50	**Break**	
14:50-15:10	**A numerical integration based Kalman filter for moderately nonlinear systems** Sarah A. King[1], Kazufumi Ito[2], Daniel Hodyss[1] [1]U.S. Naval Research Laboratory, USA; [2]North Carolina State University, USA	Session chair:
15:10-15:40	**GPU-accelerated forecasting of drift trajectories using simplified ocean models and particle filters** Håvard Heitlo Holm[1,2], Martin L. Sætra[3,4], André R. Brodtkorb[3,4], Peter Jan van Leeuwen[5,6] [1]SINTEF Digital, Norway; [2]NTNU, Norway; [3]Norwegian Meteorological Institute, Norway; [4]Oslo Metropolitan University, Norway; [5]Colorado State University, USA; [6]University of Reading, UK	
15:40-16:00	**Break**	
16:00-16:30	**Towards the estimation of the forecast error covariance matrix with noisy samples and application to ensemble-based Kalman filters** Serge Gratton[1], Ehouarn Simon[1], David Titley-Peloquin[2] [1]Universitté de Toulouse, France; [2]McGill University, Canada	Session chair:
16:30-17:00	**Multilevel Ensemble Kalman Filtering with local-level Kalman gains** Gaukhar Shaimerdenoval[1], Håkon Hoel[2], Raul Tempone[1] [1]KAUST, Saudi Arabia; [2]RWTH Aachen, Germany	
17:00-18:30	**Poster session**	

| 19:00 | Dinner |

*Invited talks in **blue** color, speakers' names <u>underlined</u>, and titles in **boldface**

08:30-09:15	**Data assimilation in chaotic systems: from dynamically-based to data-driven approaches** Alberto Carrassi[1,2], Marc Bocquet[3], Julien Brajard[4], Colin Grudzien[5], Laurent Bertino[4] [1]University of Reading, UK; [2]Utrecht University, The Netherland; [3]CEREA, France; [4]NERSC, Norway; [5]University of Nevada Reno, USA	Session chair:
09:15-09:35	**Correction of time-dependent boundary conditions through a truncated Larhunen-Loève decomposition within an ensemble Kalman filter. Application to the Gironde estuary 2D forecast numerical model** Vanessya Laborie[1,2] , Nicole Goutal[2], Sophie Ricci[3] [1]Cerema Eau, France; [2]EDF, France; [3]CERFACS, France	
09:35-10:05	**Bayesian inference and uncertainty quantification for source reconstruction of radionuclides release** Joffrey Dumont Le Brazidec[1,2], Marc Bocquet[2], Olivier Saunier[1], Yelva Roustan[2] [1]IRSN, France; [2]CEREA, France	
10:05-10:25	**Break**	
10:25-11:10	**Ensemble based data assimilation via a modified Cholesky decomposition** Elias D. Niño-Ruiz Universidad del Norte, Colombia	Session chair:
11:10-11:40	**An efficient approach for adaptive covariance localization in the ensemble data assimilation** Xiang Xing, Weimin Zhang, Bainian Liu, Xiaoqun Cao, Yi Yu, Tengling Luo National University of Defense Technology, China	
11:40-12:40	**Lunch**	
12:40-13:10	**Identification of critical operational uncertainties in field development planning using stochastic gradients** Remus G. Hanea[1], Eduardo Barros[2], Lars Hustoft[1], Olwijn Leeuwenburgh[2], Rahul Fonseca[2]	Session chair:
13:10-13:40	**Optimization-enhanced EnKF for PDE-constrained Inverse Problems** Aaron Myers, Tan Bui-Thanh The University of Texas at Austin, USA	
13:40-14:10	**Regularization of ensemble Kalman methods for inverse problems** Xinlei Zhang, Carlos Michelén-Ströfer, Heng Xiao Virginia Tech, USA	
14:10-14:30	**Break**	
14:30-15:00	**Revising the reservoir history matching problem** Geir Evensen NORCE Energy, Norway; NERSC, Norway	Session chair:
15:00-15:30	**Recurrent application of pseudo ensemble smoother for calibration of channelized reservoirs using convolutional encoder-decoder** Sungil Kim[1], Kyungbook Lee[1], Jungtek Lim[2], Hoonyoung Jeong[3], Baehyun Min[4] [1]Korea Institute of Geoscience and Mineral Resources, Republic of Korea; [2]SmartMind, Inc., Republic of Korea; [3]Seoul National University, Republic of Korea; [4]Ewha Womans University, Republic of Korea	
15:30-19:30	**Lunch/Time off (activities on your own)**	
19:30	**Dinner**	

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Wednesday 13/05/2020

Time		Session chair
08:30-09:15	**Data assimilation in hydrology and streamflow forecasting** Moha Gharamti UCAR, USA	Session chair:
09:15-09:35	**Considerations on parameter and state estimation with ensemble data assimilation methods – a case study with a nonlinear oscillator** Arundhuti Banerjee, Femke Vossepoel TU Delft, The Netherlands	
09:35-10:05	**IEnKS-MC and 4DEnVar data assimilation comparison for NO2 parameter estimations using satellite measurements** Andres Yarce-Botero[1,2], Santiago Lopez-Restrepo[1,2], O. L. Quintero[2], Elias D. Nino-Ruiz[4], Luis Gabriel Guzman[2], Arjo Segers[4], A. W. Heemink[1], Nicolas Pinel[2] [1]TU Delft, The Netherlands; [2]Universidad EAFIT, Colombia; [3]Universidad del Norte, Colombia; [4]TNO Climate, The Netherlands	
10:05-10:25	**Break/check out**	
10:25-11:10	**Ensemble based reservoir management for the people** Markus F. Dregi Equinor, Norway	Session chair:
11:10-11:40	**Seismic waveform inversion using the iterative ensemble Kalman smoother** Michael Gineste, Jo Eidsvik NTNU, Norway	
11:40-12:10	**A generalisation of the updating step in EnKF** Håkon Tjelmeland, Margrethe K. Loe NTNU, Norway	
12:10-13:10	**Lunch**	
13:10-13:40	**Perfusion estimation using MRI-based measurements and a porous media flow model** R. J. Lorentzen[1], G. Nævdal[1], O. Sævareid[1], E. Hodneland[1], E. Hanson[2], A. Z. Munthe-Kaas[2] [1]NORCE Energy, Norway; [2]University of Bergen, Norway	Session chair:
13:40-14:10	**Two-stage data assimilation to estimate fracture parameters for reservoir simulation based on ensemble Kalman filters** Michael Liem, Patrick Jenny ETH Zurich, Switzerland	
14:10-14:40	**Uncertainty assessment with multiple prior scenarios** Kristian Fossum, Sigurd I Aanonsen, Trond Mannseth NORCE Energy, Norway	
14:40-14:45	**Concluding remarks (Randi Valestrand, NORCE Energy, Norway)**	

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The unbalance components of flow-dependent background errors and its impact on analysis and forecast

Bainian Liu, Shicheng Hou, Tengling Luo, Weiming Zhang
National University of Defense Technology, China

Subspace Ensemble Randomized Maximum Likelihood with local analysis scheme for time-lapse seismic data assimilation

Gilson M Silva Neto[1,2], Geir Evensen[3,4]
[1]Petrobras, Brazil; [2]University of Campinas, Brazil; [3]NORCE Energy, Norway; [4]NERSC, Norway

Exploring ensemble data assimilation methods for induced seismicity in the Groningen gas Field: framework validation with a perfect model setup

Hamed Diab-Montero[1], Marie Bocher[2], Ylona van Dinther[3], Femke Vossepoel[1]
[1]TU Delft, The Netherlands; [2]ETH Zurich, Switzerland; [3]Utrecht University, The Netherlands

Data assimilation in an unstructured 3D mud transport model using the ensemble Kalman filter

Henrik Andersson, Jesper Sandvig Mariegaard, Sina Saremi
DHI, Denmark

Two efficient ideas for the calibration term in the assimilation formula of the standard ensemble smoother

Kyungbook Lee[1], Sungil Kim[1], Jonggeun Choe[2], Hoonyoung Jeong[2]
[1]Korea Institute of Geoscience and Mineral Resources, Republic of Korea; [2]Seoul National University, Republic of Korea

Domain decomposition of Kalman filter by a joint filter localization and model reduction

L. D'Amore, R.Cacciapuoti
University of Naples, Itaty

An ensemble updating procedure for a vector of binary variables

Margrethe K. Loe[1], Håkon Tjelmeland[1], Dario Grana[2]
[1]NTNU, Norway; [2]University of Wyoming, USA

A novel approach to multilevel data assimilation

Mohammad Nezhadali, Tuhin Bhakta, Kristian Fossum, Trond Mannseth
NORCE Energy, Norway

Reservoir history matching for integrated technologies development with hierarchical ensemble Kalman filter algorithm

Mukhina Anastasia G.
National University of Oil and Gas (Gubkin University), Russia

An efficient ensemble Kalman filter implementation via shrinkage covariance matrix estimation: exploiting prior knowledge

Santiago Lopez-Restrepo[1,2], Elias D. Nino-Ruiz[3], Andres Yarce-Botero[1,2], Nicolas Pinel[2], O. L. Quintero[2], Randy Consuegra[1], Arjo Segers[4], A. W. Heemink[1]
[1]TU Delft, The Netherlands; [2]Universidad EAFIT, Colombia; [3]Universidad del Norte, Colombia; [4]TNO Climate, The Netherlands

Background error covariance matrix hybridization for the quasi-geostrophic model

Sébastien Barthélémy[1], François Counillon[1,2]
[1]University of Bergen, Norway; [2]NERSC, Norway

Novel ensemble data assimilation algorithms derived from a class of generalized cost functions

Xiaodong Luo
NORCE Energy, Norway

*Presenters' names underlined