| Time       | Session Title                                                                 | Speaker(s)                                                                 | Institution(s)                                                                 | Chair(s)                                    |
|------------|--------------------------------------------------------------------------------|----------------------------------------------------------------------------|--------------------------------------------------------------------------------|---------------------------------------------|
| 13:00-13:45| Observation uncertainty in data assimilation                                  | Sarah Dance                                                                | University of Reading, UK                                                          | Geir Evensen, NORCE/NERSC                   |
| 13:45-14:15| A methodology to obtain model-error covariances due to the                   | Oliver Pannekoucke1,2,3, R. Ménard4, M. El Aabaribaoune4, M. Plu2            | INPT-ENM, France; CNRM, France; CERFACS, France; Environment and Climate Change Canada, Canada |                                              |
| 14:15-14:45| Parametric Kalman Filter for Earth’s radiation belts dynamics                 | Martin Sabathier1, Vincent Maget1, Olivier Pannekoucke2,3,4                 | ONERA, France; INPT-ENM, France; CNRM, France; CERFACS, France                   |                                              |
| 14:45-15:15| Machine Learning for Model Error in Numerical Weather Prediction             | Patrick Laloyaux1, Thorsten Kurth2, David Hall2, Peter Dueben1, Massimo Bonavita1 | ECMWF; NVIDIA                                                                   | Laurent Bertino, NORCE                      |
| 15:15-15:45| Data Assimilation through constrained Deep Learning                         | Christopher Irrgang, Jan Saynisch-Wagner                                   | Helmholtz Centre Potsdam, German Research Centre for Geosciences (GFZ), Germany |                                              |
| 15:45-16:15| Multilevel ensemble Kalman-Bucy filters                                    | Neil Chada, Ajay Jasra, Fangyuan Yu                                        | KAUST, Saudi Arabia                                                              | Andreas, Stordal, NORCE                    |
| 16:00-16:45| Multilevel and multi-index ensemble Kalman filtering algorithms             | Gaukhar Shaimerdenova1, Håkon Hoel1, Raul Tempone1                         | KAUST; SAUDI ARABIA; RWTH Aachen, Germany                                         |                                              |
| 16:45-17:15| Approximately accounting for multilevel modeling error in multilevel        | Mohammad Nezhadali1,2, Tuhin Bhakta1, Kristian Fossum1, Trond Mannseth1   | KAUST, Saudi Arabia; RWTH Aachen, Germany                                         |                                              |
| 17:15-17:45| Numerical discretization causing error variance loss and the need for       | Richard Ménard1, Sergey Skachko1, Olivier Pannekoucke2,3,4                 | Environment and Climate Change Canada, Canada; INPT-ENM, France; CNRM, France; CERFACS, France | Patrick Raanes, NORCE                      |
| 17:45-18:15| Assimilation of a Coordinated Fleet of Unmanned Aircraft Systems Observations in Complex Terrain Using High-Resolution EnKF | Anders Jensen1, J. Pinto1, S. C. C. Bailey2, R. A. Sobash1, G. de Boer3, A. Houston4, P. Chilson5, T. M. Bell5, Glen Romine1, S. Smith5, D. Lawrence6, C. Dixon6, J. K. Lundquist6, J. Jacob7, J. Elston8, Sean Waugh9, D. Brus10, M. Steiner1 | NCAR, USA; University of Kentucky, USA; CIRES, USA; University of Nebraska-Lincoln, USA; University of Oklahoma, USA; University of Colorado Boulder, USA; Oklahoma State University, USA; Black Swift Technologies, USA; NSSL, USA; Finnish Meteorological Institute, Finland |                                              |
| 18:00-18:45| Machine Learning Techniques to Construct Patched Analog Ensembles for Data Assimilation | Lucia Minah Yang, Ian Grooms | University of Colorado Boulder, USA |                                              |

*Invited talks in blue color, speakers’ names underlined, and titles in boldface*
**Tuesday 08/06/2021**

| Time      | Session Title                                                                 | Session Chair                      |
|-----------|-------------------------------------------------------------------------------|------------------------------------|
| 13:00-13:45 | **Data assimilation in chaotic systems: from dynamically-based to data-driven approaches**<br>Alberto Carrassi¹,², Marc Bocquet³, Julien Brajard⁴, Colin Grudzien⁵, Laurent Bertino⁶, Jonathan Demaeyer⁶, Patrick N. Raanes⁷, Stephane Vannitsem⁸, Ali Aydogdu⁹, Chris Jones⁹, Christian Sampson⁹<br>¹University of Reading, UK; ²Utrecht University, The Netherlands; ³CEREA, France; ⁴NERSC, Norway; ⁵University of Nevada Reno, USA; ⁶RMI, Belgium; ⁷NERSC, Norway; ⁸CMCC, Italy; ⁹University of North Carolina, USA | Session chair: Yuying Chang, NORCE; Xiaodong Luo, NORCE |
| 13:45-14:15 | **State, global and local parameter estimation using local ensemble Kalman filters: applications to online machine learning of chaotic dynamics**<br>Marc Bocquet, Quentin Malartic, Alban Farchi<br>CEREA joint laboratory Ecole des Ponts ParisTech and EdF R&D, France | |
| 14:15-14:45 | **High-resolution Ensemble Kalman filter with a low-resolution model using a machine learning super-resolution approach**<br>Sébastien Barthélémy¹,², Julien Brajard³, Laurent Bertino³<br>¹University of Bergen, Norway; ²Berkneres Center for Climate Reserch, Norway; ³NERSC, Norway | |
| 14:45-15:15 | **DAPPER: Data Assimilation with Python: a Package for Experimental Research**<br>Patrick N. Raanes<br>NORCE, Norway | Session chair: Kristian Fossum, NORCE |
| 15:15-15:45 | **A new framework for elastic ensemble-based data assimilation at large-scale**<br>Sebastian Friedemann, Bruno Raffin<br>INRIA, France | |
| 15:45-16:15 | **Optimal assimilation of SEVIRI Water Vapor Channels With an LETKF**<br>Axel Hutt¹, Roland Potthast²<br>¹INRIA, France; ²DWD, Germany | |
| 16:15-16:45 | **Assimilating surface moisture satellite images into a coupled and spatialized water quality model: strategies and challenges**<br>Emilie Rouzies¹, Claire Lauvernet¹, Arthur Vidard²<br>¹INRAE, France; ²INRIA, France | |
| 16:45-17:15 | **Shape-Oriented Sensitivity Analysis and Data Assimilation for Wildland Fire Applications**<br>Mélanie C. Rochoux¹, A. Collin², A. Costes¹,³, C. Zhang⁴, A. Trouvé⁴, D. Lucor⁵, P. Moireau²<br>¹CERFACS, France; ²INRIA, France; ³CNRM, France; ⁴University of Maryland, USA; ⁵LISN, France | |
| 17:15-17:45 | **A parallel update step of a sampling-free EnKF-type filter**<br>Philippe Bisaioll¹, Ajit Desai¹, Mohammad Khalil², Chris Pettiti³, Dominique Poire⁴, Abhijit Sarkar¹<br>¹Carleton University, Canada; ²Sandia National Laboratories, USA; ³United States Naval Academy, USA; ⁴Royal Military College of Canada, Canada | Session chair: Yue Ying, NERSC |
| 17:45-18:15 | **EnKF-based estimation of CO surface fluxes using simulated observations during summer 2015**<br>Vikram Khade¹,², Saroja Polavarapu¹,², Michael Neish¹, Dylan Jones², Pieter Houtekamer¹, Seung-Jong Baek¹<br>¹Environment and Climate Change Canada, Canada; ²University of Toronto, Canada | |
| 18:15-18:45 | **Assimilation of aerosol optical depth retrievals using ensemble Kalman filter to improve aerosol forecasts**<br>Bo Huang¹,², Mariusz Pagowski¹,², Cory Martin¹, Samuel Trahan¹,², Andrew Tangborn³, Daryl Kleist³, Shobha Kondragunta³, Sergey Frolov¹,²<br>¹University of Colorado Boulder, USA; ²NOAA/ESRL/GSL, USA; ³NOAA/NWS/NCEP, USA; ⁴NOAA/NESDIS/STAR, USA | |

*Invited talks in blue color, speakers’ names underlined, and titles in boldface. Talks not allowed to be recorded in red.*
Multivariate Ensemble Sensitivity Analysis for Understanding the Dynamics of Convective Events
Govindan Kutty, Babitha George
Indian Institute of Space Science and Technology, India

A data assimilation approach for the estimation of mantle viscosities from paleo sea level observations
Reyko Schachtschneider¹, Jan Saynisch-Wagner¹, Volker Klemm¹, Meike Bagge¹, Maik Thomas¹,²
¹Heilmhoitz-Centre Potsdam GFZ, Germany; ²Freie Universität Berlin, Germany

Ocean biogeochemical model parameter uncertainties: Application of ensemble data assimilation to a one-dimensional model
Nabir Mamnun¹, Lars Nerger¹, Christoph Völker¹, Mihalis Vrekoussis²
¹Alfred Wegener Institute, Germany; ²University of Bremen, Germany

A multiscale alignment method for ensemble filtering applied to hurricane and sea ice models
Yue Ying¹, Jeffrey L. Anderson², Laurent Bertino¹
¹NERSC, Norway; ²NCAR, USA

Parameter estimation and Optimal sensor placement for Data Assimilation problems
Louis Sharrock, Nikolas Kantas
Imperial College London, UK

Using the Iterative Ensemble Kalman Smoother for Seismic Waveform Inversion
Michael Gineste, Jo Eidsvik
Norwegian University of Science and Technology (NTNU), Norway

Improving earthquake occurrences estimation using an ensemble Kalman smoother: a synthetic experiment
Hamed Diab-Montero¹, Meng Li², Ylona van Dinther², Femke C. Vossepoel¹
¹Delft University of Technology, the Netherlands; ²Utrecht University, the Netherlands

Assimilation of conventional and satellite observations in a deep convection case during RELAMPAGO using the WRF-GSI-LETKF system
Paola Corrales¹,²,³, Juan Ruiz¹,²,³, Victoria Galligani¹,²,³, Maximiliano Sacco²,⁴, Luiz Sapuccion³, María Eugenia, Dillon³,⁴, Yanina García Skabar³,⁴, Stephen Nesbitt⁵
¹CONICET-UBA-CNRS, Argentina; ²FCEyN. UBA, Argentina; ³CONICET, Argentina; ⁴Servicio Meteorológico Nacional, Argentina; ⁵National Institute for Space Research, Brazil; ⁶University of Illinois, USA

Ensemble based data assimilation via a modified Cholesky decomposition
Elias D. Niño-Ruiz
Universidad del Norte, Colombia

Bayesian data assimilation for patient-specific aorta dissection using bifidelity computational fluid dynamic simulation
Pan Du, Jian-xun Wang
University of Notre Dame, USA

A fast, single-iteration ensemble Kalman smoother for online, sequential data assimilation
Colin Grudzien¹, Marc Bocquet²,³
¹University of Nevada; ²CEREA, France; ³Université Paris-Est, France

Session chair: Laurent Bertino, NERSC
Session chair: Trond Mannseth, NORCE
Session chair: Geir Nævdal, NORCE/UIS; Kjersti Eikrem, NORCE
Session chair: Geir Evensen, NORCE/NERSC

*Invited talks in blue color, speakers’ names underlined, and titles in boldface
| Time       | Title                                                                 | Authors                                                                                   | Institution(s)                                                                                   | Session chair         |
|------------|----------------------------------------------------------------------|------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|------------------------|
| 13:00-13:30| **Ensemble Kalman Inversion: regularization, convergence and localization** | Xin Tong\(^1\), Andrew Stuart\(^2\), Neil Chada\(^3\), Matti Morzfeld\(^4\)       | 1National University of Singapore, Singapore; 2Caltech, USA; 3KAUST, Saudi Arabia; 4UCSD, USA     | Trond Mannseth, NORCE  |
| 13:30-14:00| **Regularization of the ensemble Kalman filter with constrained non-stationary convolutions** | Michael Tsyrulnikov\(^1\), A. Sotskiy, D. Gayfulin \(\)                               | HydroMetCenter of Russia, Russia                                                                  |                        |
| 14:00-14:30| **Novel iterative ensemble smoothers derived from a class of generalized cost functions** | Xiaodong Luo \(\)                                                                       | NERC, Norway                                                                                     |                        |
| 14:30-15:00| **Model probabilities and hierarchical modeling**                      | Kristian Fossum, Sigurd I. Aanonsen, Trond Mannseth \(\)                                 | NORCE, Norway                                                                                   | Geir Evensen, NORCE/NERSC |
| 15:00-15:30| **Derivative-free Bayesian Inversion Using Multiscale Dynamics**       | Grigoris Pavliotis\(^1\), Andrew Stuart\(^2\), Urbain Vaes\(^3\)                        | 1Imperial College London, UK; 2Caltech, USA; 3Inria, France                                      |                        |
| 15:30-16:00| **A p-kernel Stein variational gradient descent algorithm with applications to data assimilation** | Andreas S. Stordal\(^1\), R.J. Moraes\(^2\), P. Nima Raanes\(^1\), G. Evensen\(^1,3\)  | 1NORCE, Norway; 2Petrobras, Brazil; 3NERSC, Norway                                             | Rolf Lorentzen, NORCE  |
| 16:00-16:30| **Comparison of ensemble-based data assimilation techniques for epidemiological forecasting and parameter estimation in an age-based compartmental SEIR model** | Juan Ruiz\(^1,2\), Santiago Rosa\(^3\), Tadeo Cocucci\(^3,4\), Manuel Pulido\(^2,4\) | 1Universidad de Buenos Aires, Argentina; 2UMI-IFAECI/CNRS-CORICET-UBA, Argentina; 3Universidad Nacional del Nordeste, Argentina; 4Universidad Nacional de Córdoba, Argentina |
| 16:30-17:00| **Ensemble-based data assimilation for epidemiological agent based models** | Tadeo J. Cocucci\(^1,4\), Manuel Pulido\(^1,2\), Juan Ruiz\(^2,3\), Santiago Rosa\(^4\) | 1Universidad Nacional del Nordeste, Argentina; 2UMI-IFAECI/CNRS-CORICET-UBA, Argentina; 3Universidad de Buenos Aires, Argentina; 4Universidad Nacional de Córdoba, Argentina |
| 17:00-17:45| **Data assimilation in hydrology and streamflow forecasting**          | Moha Gharamti \(\)                                                                       | UCAR, USA                                                                                       | Andreas Stordal, NORCE |
| 17:45-18:15| **A Multiscale Local Gain Form Ensemble Transform Kalman Filter (MLGETKF)** | Xuqiang Wang\(^1\), Hristo G. Chipilski\(^1\), Craig H. Bishop\(^2\), Elizabeth Satterfield\(^3\), Nancy Baker\(^3\), Jeffrey S. Whitaker\(^4\) | 1University of Oklahoma, USA; 2University of Melbourne, Australia; 3Naval Research Laboratory, USA; 4NOAA, USA |                        |
| 18:15-18:45| **Coupled Thermosphere-Ionosphere Modeling of Global Neutral Densities Using Assimilated COSMIC Radio Occultation Data** | Nicholas Dietrich\(^1\), Tomoko Matsuo\(^1\), Chih-Ting Hsu\(^2\)                       | 1University of Colorado Boulder, USA; 2NCAR, USA                                               |                        |

*Invited talks in blue color, speakers’ names underlined, and titles in boldface*
| Time        | Title                                                                 | Speaker(s)                                      | Location                        | Session chair                |
|------------|----------------------------------------------------------------------|-------------------------------------------------|----------------------------------|------------------------------|
| 13:00-13:45| **Ensemble based reservoir management for the people**                | Markus F. Dregi                                 | Equinor, Norway                  | Andreas Stordal, NORCE       |
| 13:45-14:15| **Digital Integrative Model Development for Reservoir Production**   | Anastasia G. Mukhina                            | Gubkin Russian State University of Oil and Gas, Russia |                              |
| 14:15-14:45| **Selecting Relevant Fractures for Data Assimilation with Ensemble** | Michael Liem¹, Stephan K. Matthai², Patrick Jenny¹ | The University of Melbourne, Australia |                              |
| 14:45-15:15| **A generalisation of the updating step in EnKF**                    | Håkon Tjelmeland, Margrethe K. Loe               | Norwegian University of Science and Technology (NTNU), Norway | Geir Nævdal, NORCE/UiS       |
| 15:15-15:45| **Assessment of correlation-based localization techniques**         | Kristian Fossum                                 | NORCE, Norway                    |                              |
| 15:45-16:15| **Data-driven computational simulation of tumor progression:**      | Jahn Otto Waldeland¹, Geir Nævdal¹,², Steinar Evje¹ | University of Stavanger, Norway; NORCE, Norway | Rolf Lorentzen, NORCE         |
| 16:15-16:45| **Deep learning surrogate-assisted assimilation of image-type data**| Cong Xiao¹, Olwijn Leeuwenburgh²,³, Arnold Heemink², Hai Xiang Lin² | China University of Petroleum, Beijing; Delft University of Technology, the Netherlands; TNO, the Netherlands |                              |
| 16:45-17:15| **Data Assimilation by Ensemble Kalman Filter and Neural Networks** | Haroldo F. de Campos Velho¹, Rosangela C. S. Cintra¹, Steven Cocke² | National Institute for Space Research, Brazil; Florida State University, USA |                              |
| 17:15-17:45| **Regularized ensemble Kalman methods for inverse problems**        | Xinlei Zhang, Carlos Michelén-Ströfer, Heng Xiao | Virginia Tech, USA               | Xiaodong Luo, NORCE          |
| 17:45-18:15| **Nonlinear sparse Bayesian learning using EnKF based state estimator** | Brandon Robinson¹, Philippe Bisaillon¹, Rimple Sandhu¹, Mohammad Khalil², Chris Pettit³, Dominique Poire³, Abhijit Sarkar³ | Carleton University, Canada; Sandia National Laboratories, USA; United States Naval Academy, USA; Royal Military College of Canada, Canada |                              |
| 18:15-18:45| **Unscented Kalman Inversion**                                       | Daniel Z. Huang, Tapio Schneider, Andrew M. Stuart | Caltech, USA                     |                              |

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