FAU

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The FAU-SIAM student chapter invites you to a talk by

Geir Evensen, Ph.D.

Chief Scientist at the Norwegian Research Center

An international initiative of predicting the SARS-COV-2 pandemic using ensemble data assimilation

Thursday October 29, 2020

11:00am EST

Open to all and live on Zoom with the passcode Fall2020

Abstract

This work demonstrates the efficiency of using iterative ensemble smoothers to estimate the parameters of an SEIR model. We have extended a standard SEIR model with age-classes and compartments of sick, hospitalized, and dead. The data conditioned on are the daily numbers of accumulated deaths and the number of hospitalized. Also, it is possible to condition the model on the number of cases obtained from testing. We start from a wide prior distribution for the model parameters; then, the ensemble conditioning leads to a posterior ensemble of estimated parameters yielding model predictions in close agreement with the observations. The updated ensemble of model simulations has predictive capabilities and include uncertainty estimates. In particular, we estimate the effective reproductive number as a function of time, and we can assess the impact of different intervention measures. By starting from the updated set of model parameters, we can make accurate short-term predictions of the epidemic development, assuming knowledge of the future effective reproductive number. Also, the model system allows for the computation of long-term scenarios of the epidemic under different assumptions. We have applied the model system on data sets from several regions around the world. These countries and states all have vastly different developments of the epidemic, and we could accurately model the SARS-CoV-2 outbreak in all of them. We realize that more complex models, e.g., with regional compartments, may be desirable, and we suggest that the approach used here should be applicable also for these models.

About the speaker

Dr. Evensen is an applied mathematician with a Ph.D. from the University of Bergen with more than 30 years of experience in research and development related to data assimilation in ocean and weather forecasting and petroleum technology. He developed the Ensemble Kalman Filter/Smoother and introduced it for ocean forecasting. He implemented ensemble methods for history matching of reservoir models that are used operationally today. He also implemented Fast-Model-Update, an ensemble-based reservoir modeling workflow that is now in operational use in Equinor. He has more than 70 publications and one book to his name. His prolific career includes; 14 years at the Nansen Center in Bergen, 14 years at Equinor, and 4 years at NORCE.

Please contact us for more information about our student chapter!
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