

Special Seminar

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Visiting ATS from the University of Reading

**Improving geophysical system understanding and modelling
by exploring nonlinear data assimilation**

Thursday, March 30, 2017

ATS room 101

Discussion will begin at 3:00 p.m.

Refreshments will be served at 2:30 p.m. in the weather lab

Geophysical systems can be characterised as complex, nonlinear and high dimensional. All of these provide major challenges to understanding and modelling. To explore observations and existing knowledge encoded in numerical models to their full extent one can try to combine both sources of information. A systematic tool for doing this is data assimilation. It can be used to provide a description of the full nonlinear evolution of the system including its uncertainty using all information we have. This can then be analysed for linear and nonlinear relations between processes that determine the behaviour of the system. Specifically, using and extending existing causality theory on information flow, we can unravel cause, effect, and feedbacks. Data assimilation can also be used to infer errors in the model equations. The estimated errors will contain both random and structural components. By extracting the structural components we can infer and quantify missing physics, which can then be used to develop improved parameterisations.

In this presentation I will explore recent advances in nonlinear data assimilation and provide examples of its use on the challenges mentioned above.

Link to colloquium videos and announcement page: <http://www.atmos.colostate.edu/dept/colloquia.php>