

## SNOWPACK MODELING FOR PRACTITIONERS AND MODELERS

Boulder, Colorado

23-25 June, 2014

### Course concept

Modeling the hydrologic regime in snow-dominated ecosystems requires an understanding of data sources (to drive the model, to update the model, and to evaluate the model's performance); of model architecture (how to set up the model, run the model and make decisions regarding model parameters and model physics); and how to optimally combine data and modeling (data assimilation and model evaluation). The course objective is to learn modeling concepts with hands-on experience, as opposed to being a tutorial on how to run a particular model (i.e. not the same as the CLM school). We will use a modular modeling framework that incorporates components from most snow models in use today. All sections will be hands-on computer laboratory exercises using existing datasets and models. The target audience is people who will benefit from an understanding of snow modeling but who are not already well versed in modeling and data assimilation.

Day 1: Monday, June 23	Day 2: Tuesday, June 24	Day 3: Wednesday, June 25
Intro & Objectives (8:30–9:00am) <b>Lecture 1:</b> Modeling concepts; what is a model, why we model, etc. (9:00 – 10:00am, with questions)	Recap of Day 1, Intro Day 2  <b>Lecture 3:</b> Model Forcing – where do you get them, how good are they, what does it mean? (8:45-10:00 with questions + discussion)	Recap of Day 2, Intro Day 3  <b>Lecture 6:</b> Calibration and Data Assimilation. What is it, why do it, what it involves. (8:45-10:15 with questions + discussion)
10:00 – 10:15 Break	10:00 – 10:15 Break	10:15 – 10:30 Break
<b>Lecture 2:</b> Model Architectures & Parameterizations (10:15 – 11:45am with questions + discussion)	<b>Lecture 4:</b> Model Parameters (10:15-11:00am)  <b>Lecture 5:</b> Model Evaluation, available data, designing metrics, finding errors (11:00-12:00pm)	<b>Lecture 7:</b> Code and Data Management. (10:30-11:00am)  <b>Lecture 8:</b> A Summary of Concepts & Explanation of final exercise (11:00-11:45am)
12:00-1:30pm Lunch	12:00-1:30pm Lunch	11:45-1:00pm Lunch
<b>Computer Session:</b> (1:30-5:30pm) Intro to a model The name-list Compiling (if necessary)	<b>Computer Session:</b> (1:30-5:30pm) Running the model with a number of forcing inputs (e.g. of different quality, or with a	<b>Computer Session:</b> (1:00-4:00pm) Putting it into practice. Given some input data streams, observations and a use

<p>Running the model – select input file/s, plot a simple output. Try 2-3 different parameterizations. (Break as necessary.)</p> <p><b>Dinner with the group.</b></p>	<p>bias). Investigate sensitivity on different variables. Make a plot that shows the difference. (Break as necessary.)</p> <p><b>Dinner on your own.</b></p>	<p>scenario, run the model and evaluate it. Done in larger groups.</p> <p>(4:00-5:30pm) Each group gives a 10min presentation as to what they did and why. 5 slides/plots maximum.</p> <p><b>Dinner/celebration to follow.</b></p>
---	--	--

During class time, students will use computers in the teaching laboratory at NCAR that already have the software installed. However, students are free to use their own computers and software for making plots, e.g. MatLab, R, IDL, IGOR or even Excel. Model data will come out in NetCDF format, but we will have NcView available, as well as other software that can provide a CSV text file of key variables.

Preparatory reading material will be posted on the class website approximately one month before the class begins. Lecture material and class assignments will be posted on the class website after the class takes place.