High Latitude Proving Ground Plans for 2014-2015

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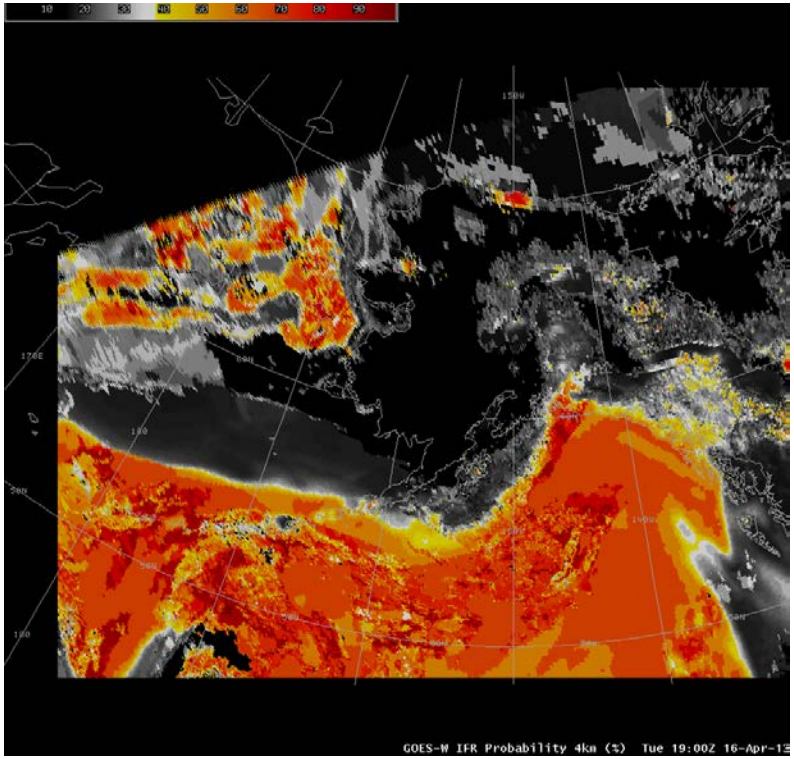
Outline

- Capacity building
- Implementing and evaluating new satellite products developed by partners
- Local product development
- Modeling with imagery
- Training and other support for our NOAA end users

Capacity building

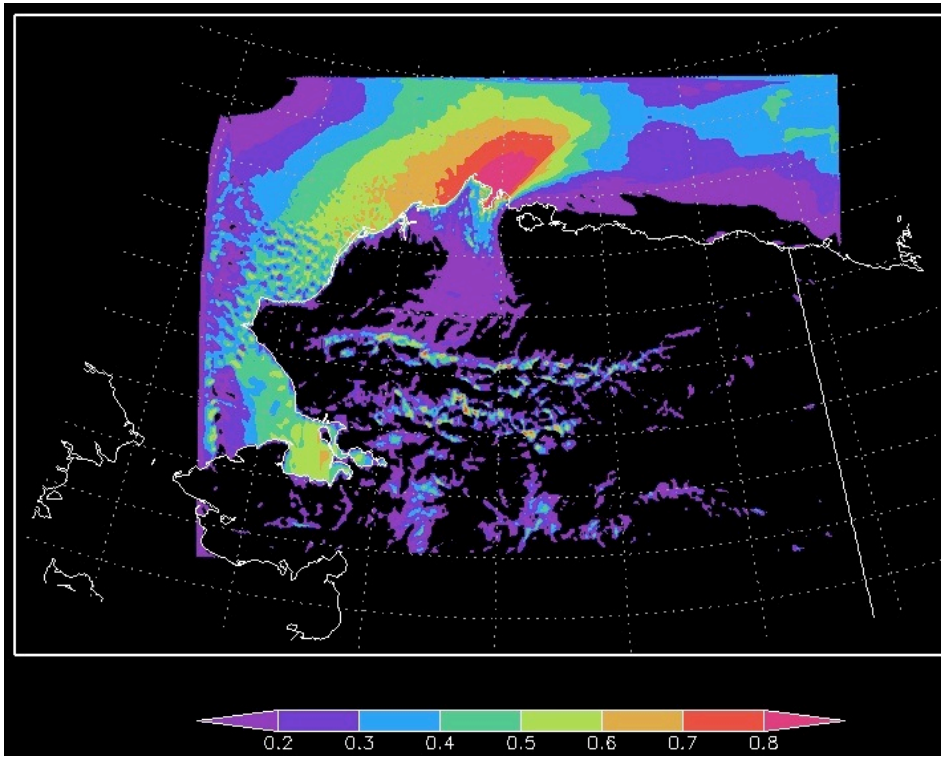
Implementing and evaluating new satellite products developed by partners

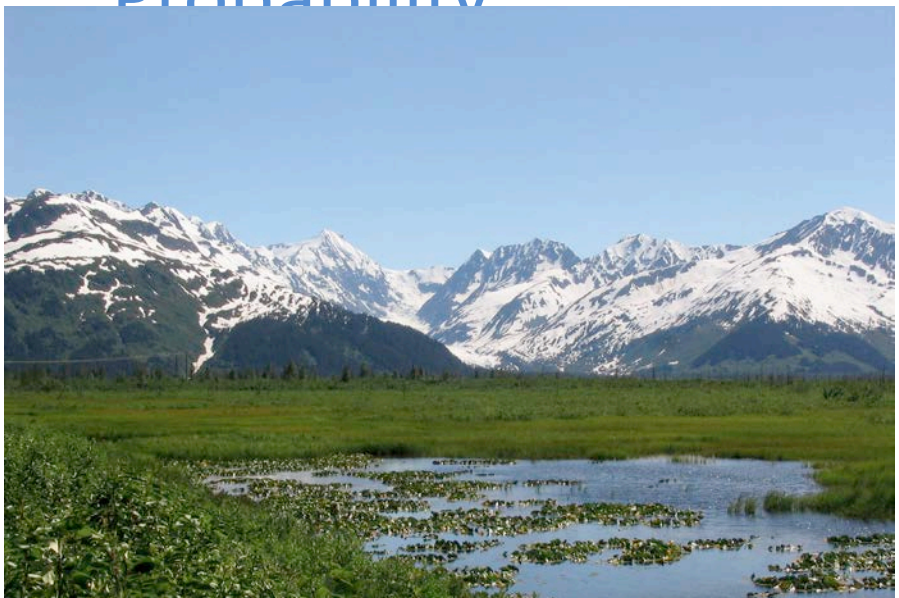


- Volcanic Ash, Low Cloud and Fog developed at UWisc
- GMU/CCNY River flood and Ice
- SPoRT RGB Microphysics
- CrIS and AIRS sounder products
- Evolving Day/Night Band products

Local product development

- Cold Air Aloft
- SEAK Lapse Rate/Snow storage
- Blowing Snow Probability





Modeling and Cal/Val with Imagery

- Flooding Initiative
  - Ground Truth with airborne imagery
- Cryosphere Initiative
  - Snow Cover Sub-Initiative

Photo: Chas Jones

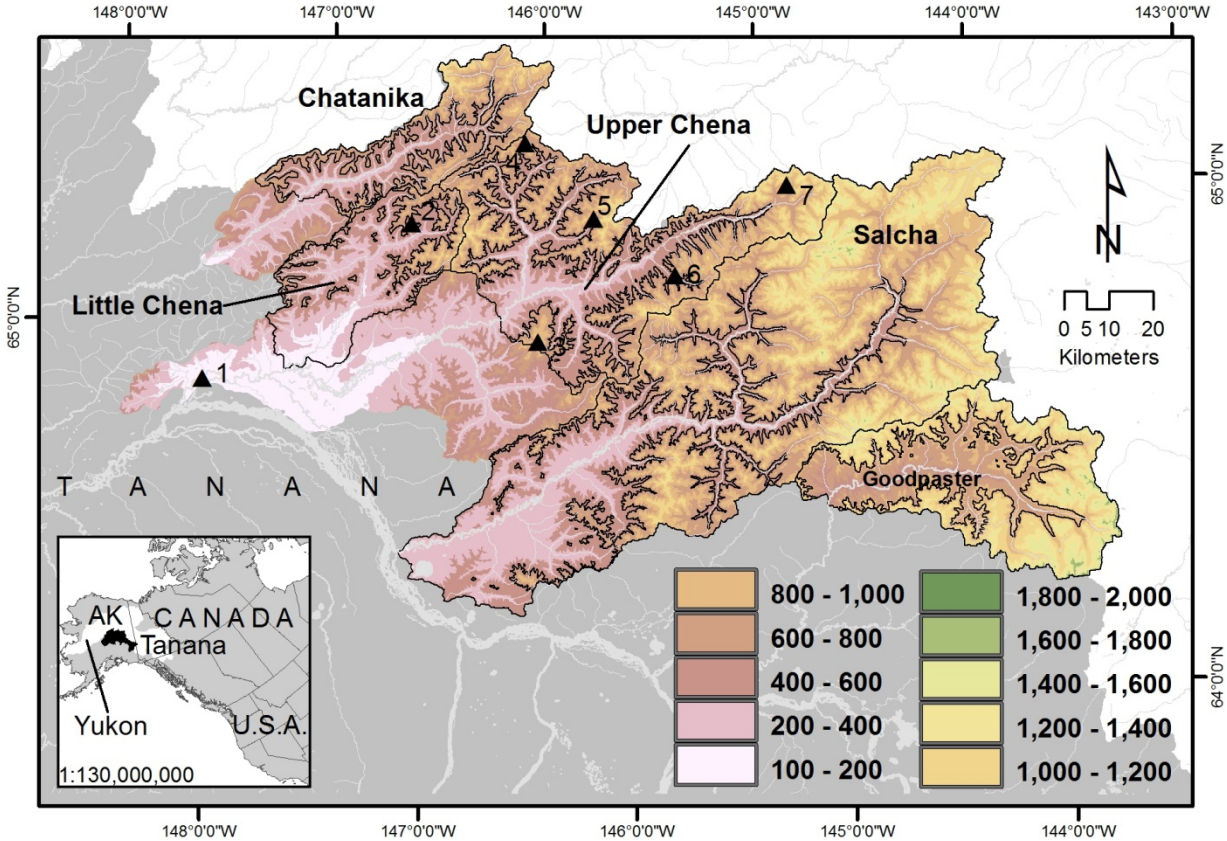
MODIS estimates of fractional snow cover extent in Interior Alaska

Katrina Bennett, Jessica Cherry,
Scott Lindsay (APRFC)

Introduction

- Information on snow cover fractional extent (SCE) is vital in regions with few gaged stations and broad, variable geographic extents such as AK
- Using these data to inform hydrologic models may improve the physical nature of models
- Study applies MOD10A1 data in the NWS RFC's CHPS-FEWS model framework using the Sacramento rainfall runoff model, coupled with SNOW17 to examine the impact of this additional observational data on flow estimation in Interior boreal forest watershed of sub-arctic Alaska

Study Area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Upper Chena
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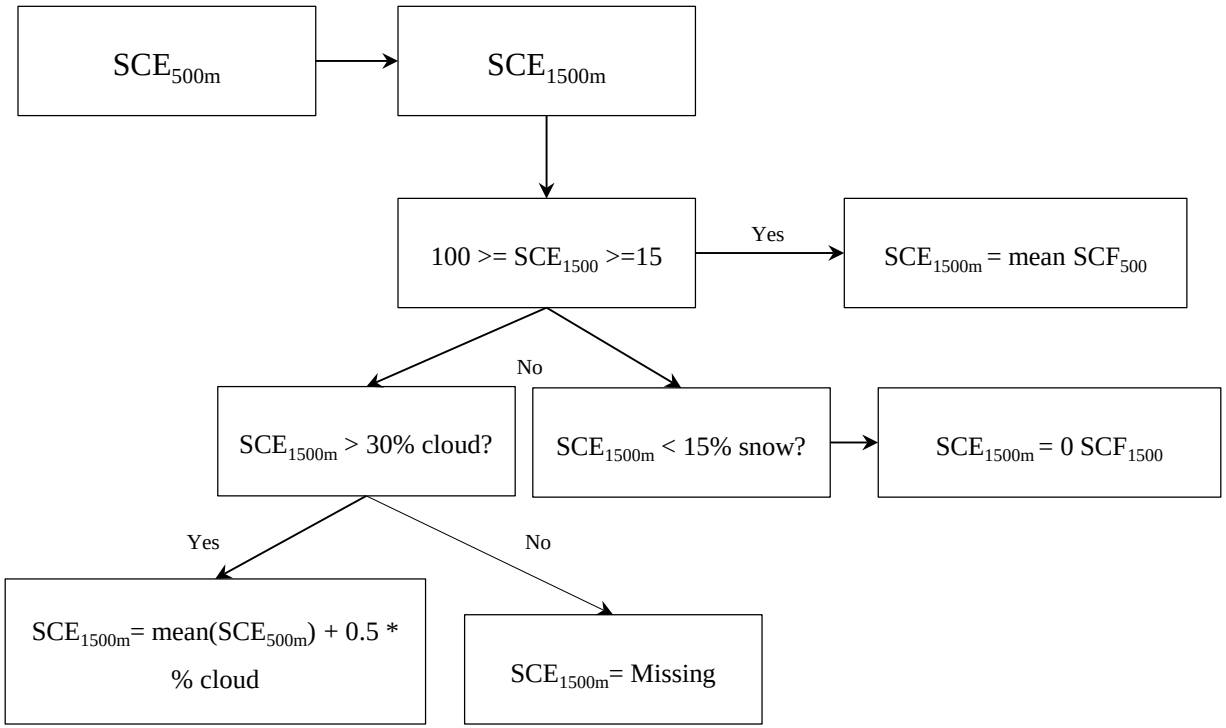
600 - 800
400 - 600
200 - 400
100 - 200
1,800 - 2,000
1,600 - 1,800
1,400 - 1,600
1,200 - 1,400
1,000 - 1,200

Methods

- MOD10A1 grids pre-processed in two ways
  - Raw MOD10A1 grids imported into a modified CHPS FEWS framework
  - Cloud corrected MOD10A1 grids generated and ingested into CHPS
  - Cloud corrected MOD10A1 with rule-based versions are also considered
- Results are discussed for parameterization at different basin units, including north/south facing slopes
- SCE are compared with SNOTEL stations in the basin
- Hydrologic output is examined

Cloud Corrected MOD10A1

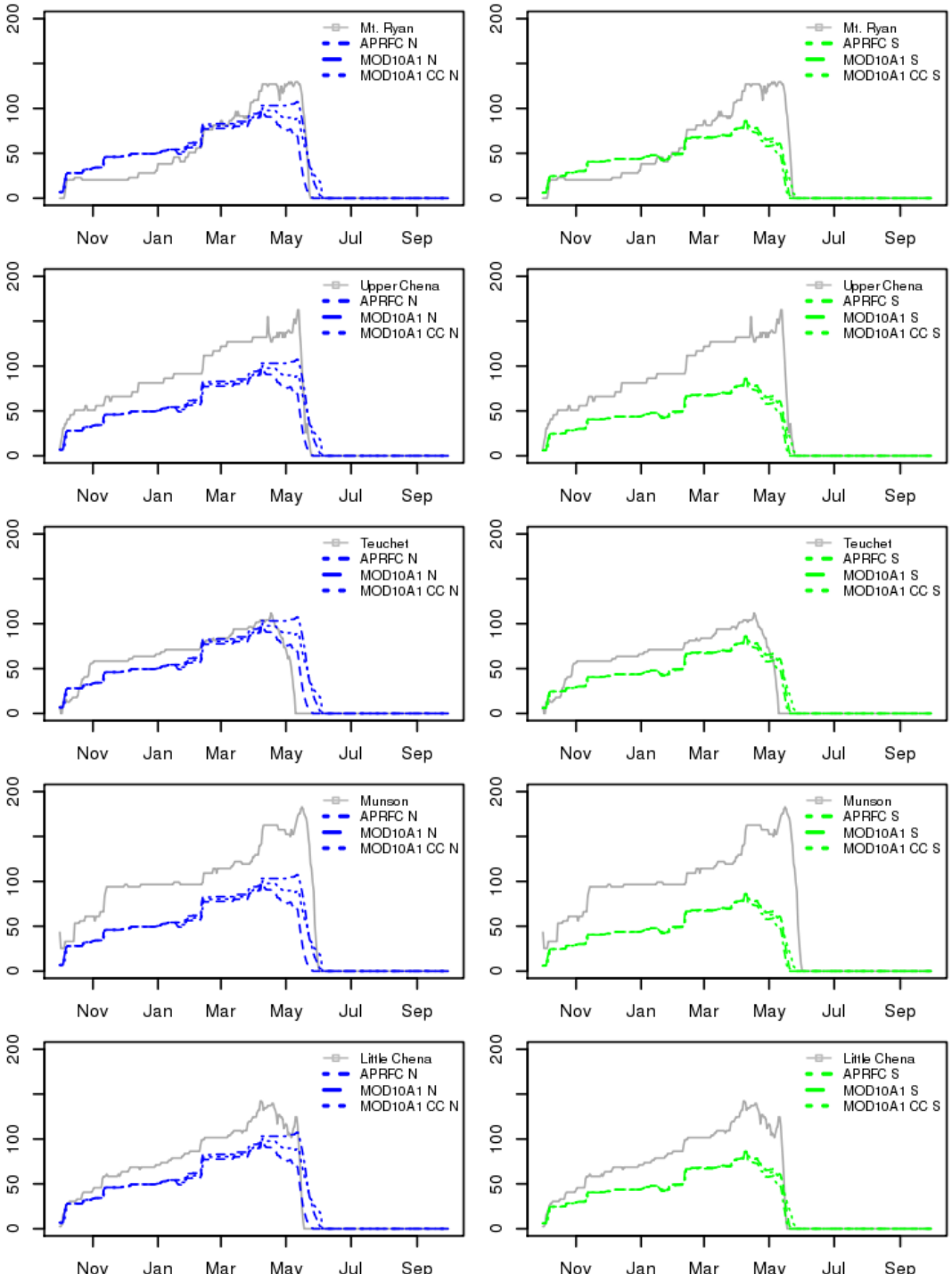


Parameterization

- Simple approach to model calibration using SNOW17 models parameters only
- Parameters that control the air temperature and impact the snow cover depletion to speed or retain melt during the snow ablation season were focused on
- MODIS runs need an upward adjustment of these values because the areal depletion curve is no longer controlling the melt rate; thus SCE present on northern, upper elevation slopes in the late spring must have higher melt rates applied to melt the snow with the correct timing

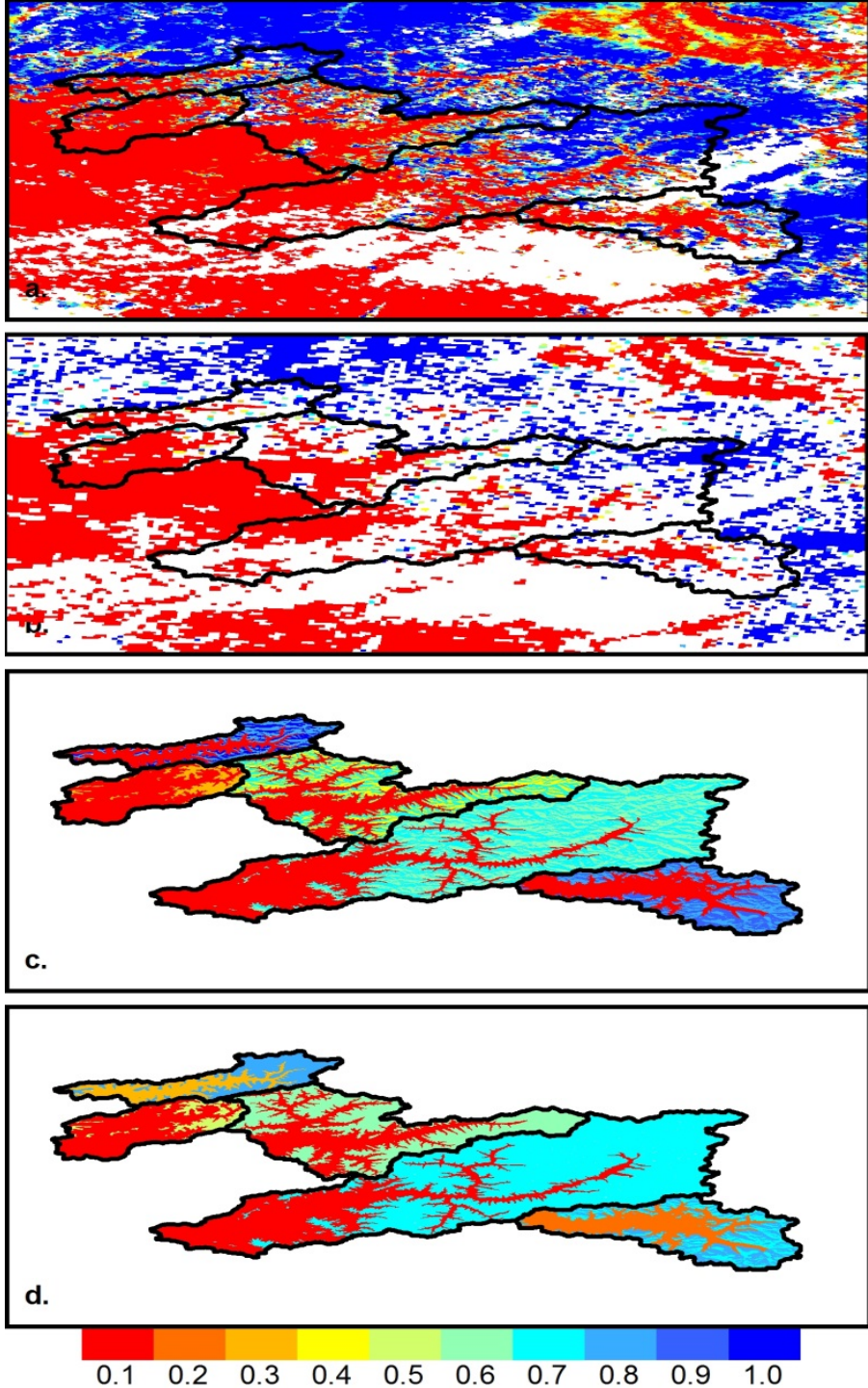
SNOTEL Comparison

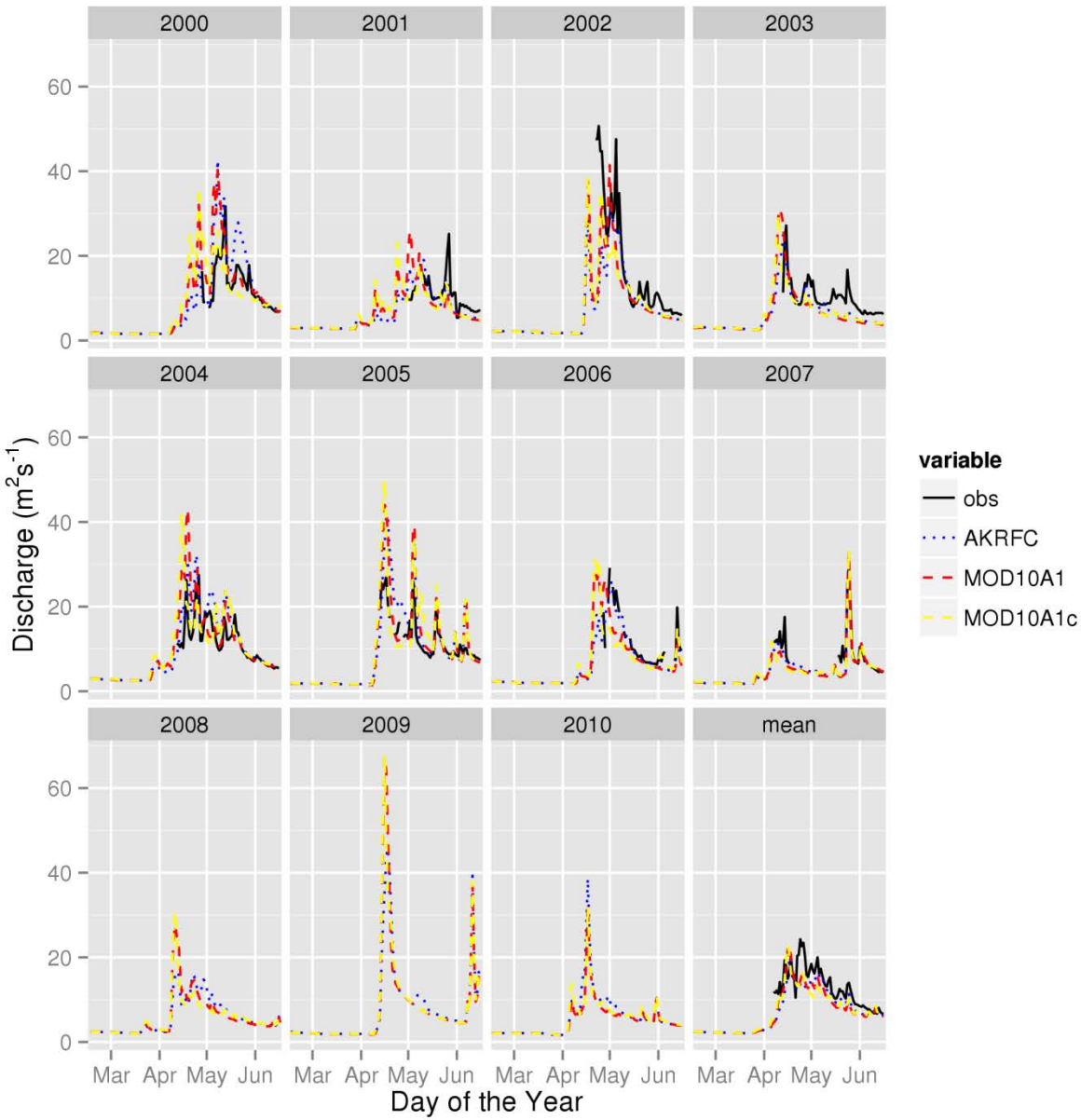
- Five SNOTEL sites from across the region
- North response from the Upper Chena Basin blue, south green
- Timing best matched at upper elevation sites (Mt. Ryan, Upper Chena) by MODIS runs although model (broad region) vs SNOTEL site specific estimate a challenge.



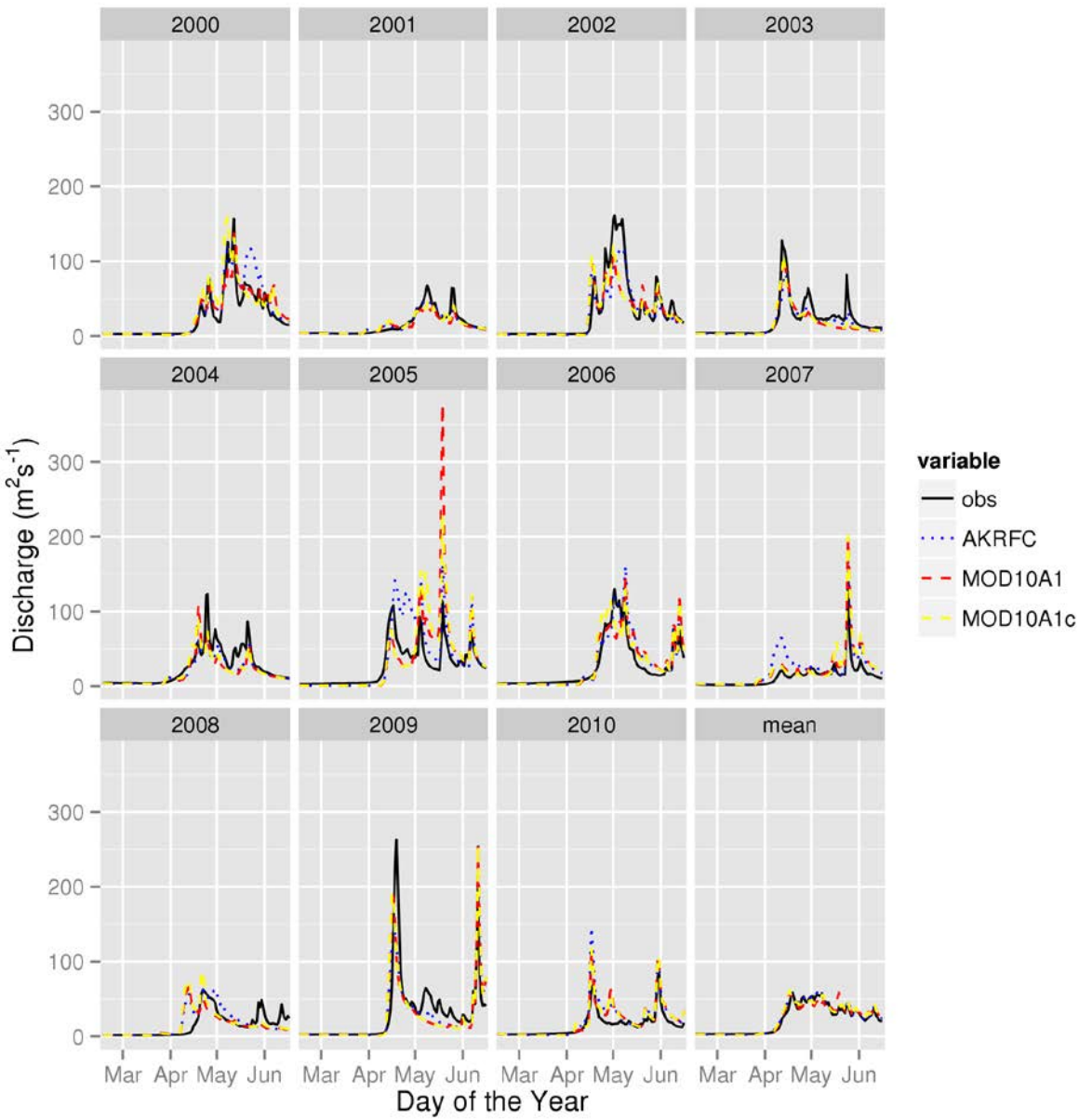
AESC CHPS

- Areal extent of snow cover in CHPS SNOW17 for a) MOD10A1 uncorrected grids , b) corrected grids, c) model lumped uncorrected, d) model lumped corrected.

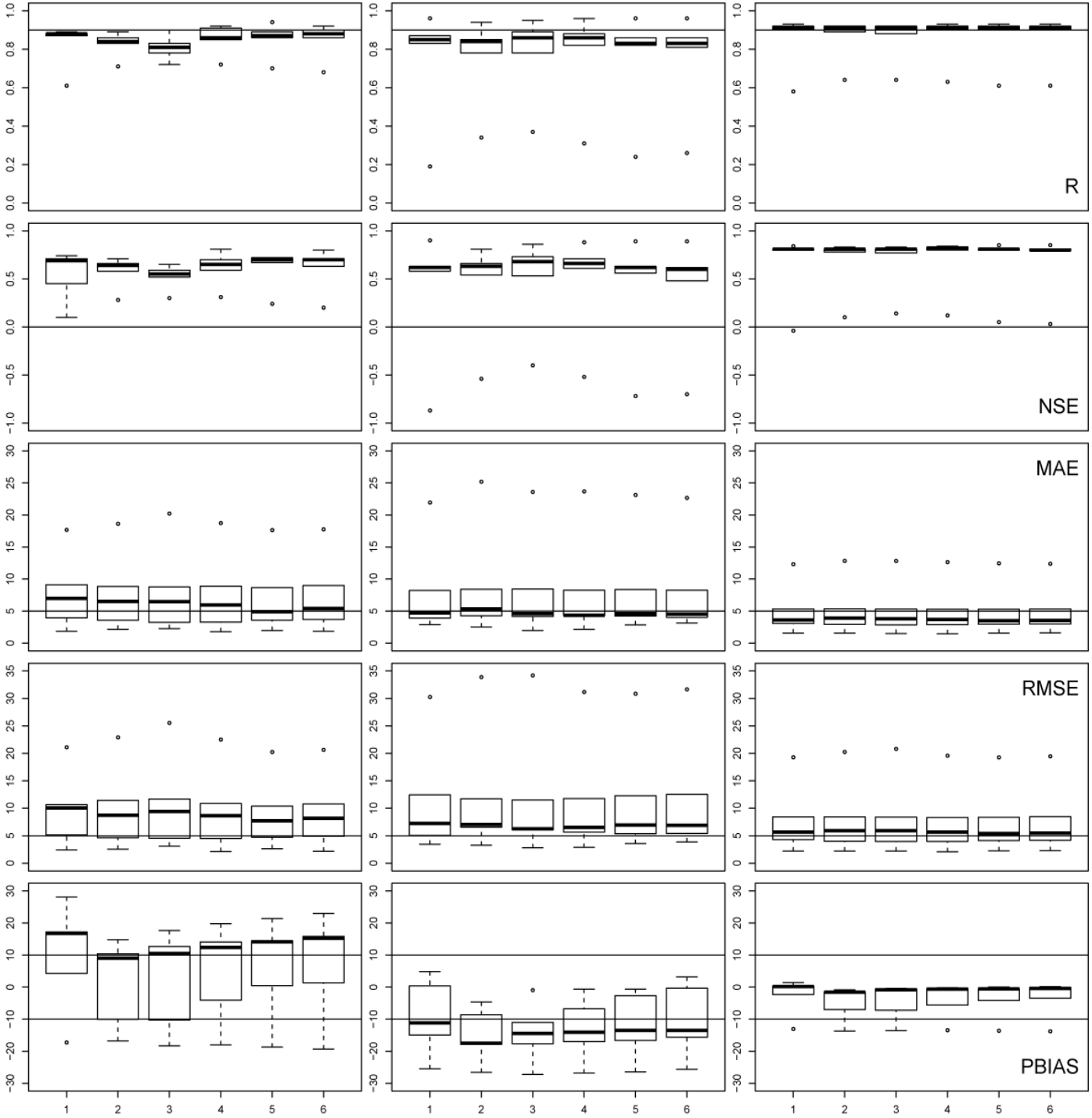




Chatanika River



Upper Chena River


R
NSE
MAE
RMSE
PBIAS

MODSCAG Investigation

- A tree correction factor is required (Raleigh et al. 2013) to adjust SCE according to the gap fractional percentage of the ground that is captured by the sensor
- Tree fraction in AK is not widely available and has errors which inflate the results in the boreal forest, in particular
- When used, the tree fractional data turns MODSCAG into a binary product product (either 100% SCE or 0%)
- Research into the improvement of

  a) tree fractional estimates for boreal forested regions

  b) correcting MODSCAG using different techniques is needed before this product can be used to estimate SCE in these watersheds

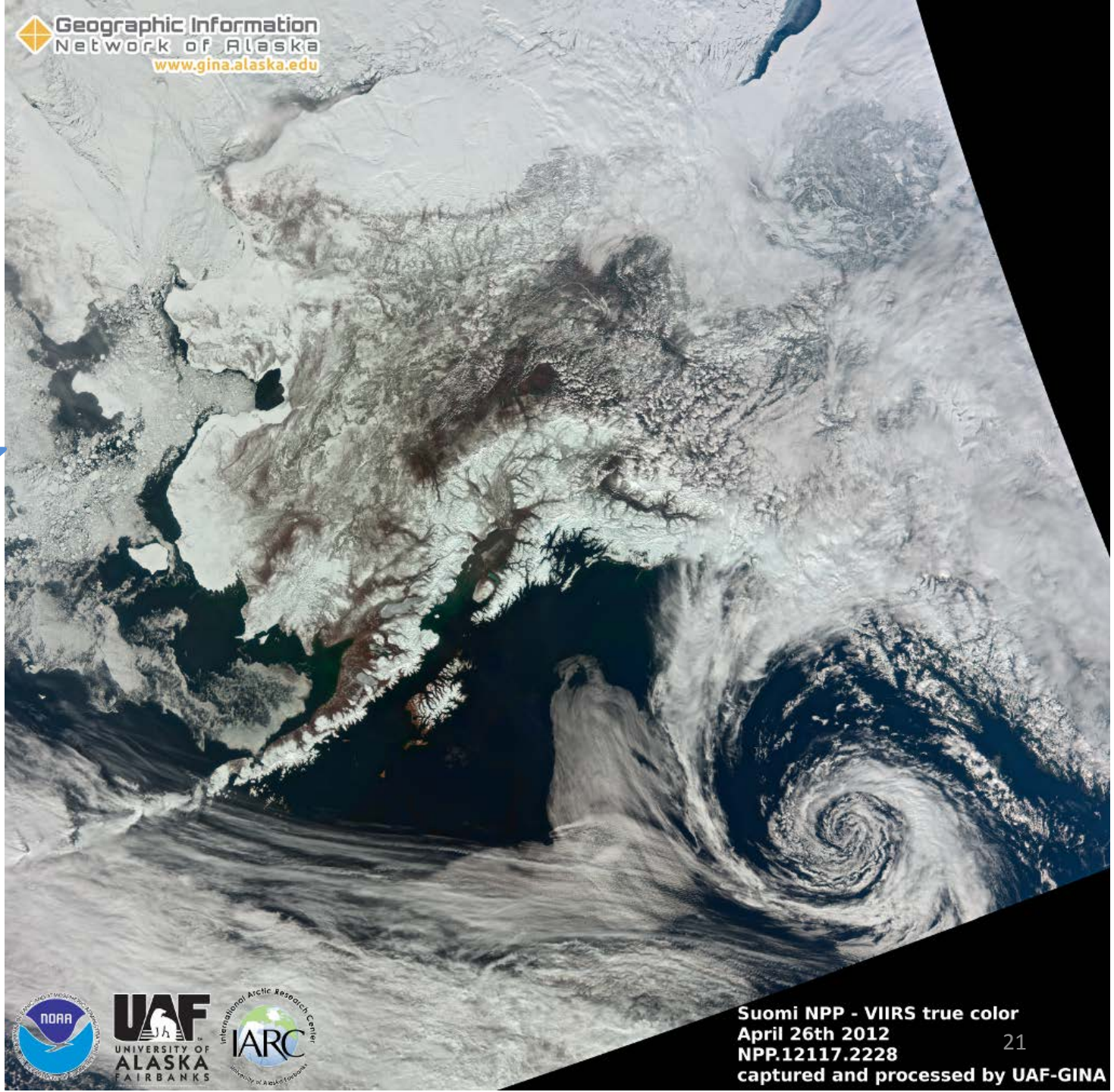
Snow Cover Sub-Initiative

- Will partner with STAR and NOHRSC to evaluate VIIRS binary and fractional snow cover products
- Will work with other partners to identify datasets for correcting state of the art spectral mixing algorithms with improved inputs for vegetation and albedo, etc.
- Leverage UAF database of *in situ* snow obs and airborne data collections to evaluate a hindcast experiment
- Identify steps to operationalizing

Training and End User Support

- Want to deliver the best available info for a 'Weather Ready Nation'
- Want to engage AK Region, the WFOs, Aviation Weather Unit, and the APRFC
- Building on a base of collaboration and communication

Thank You!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