SnowEx: a NASA airborne campaign leading to a snow satellite mission

SnowEx update: Sep 15, 2016

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Sponsored by NASA Headquarters/Terrestrial Hydrology Program Manager: Jared Entin
Outline

- **Welcome** – Ed/Gatebe (3 min)
- **Schedule & Logistics** – Ed (3 min)
- **Ground truth/GBRS** – Kelly/Ludo/HP/Chris (15 min)
- **Airborne** – Ed/Gatebe/M.Beckley (10 min)
- **Website** – Gatebe (3 min)
- **Winter Participation** – Dorothy/Kelly (3 min)
- **Q&A** – (10 min)

For more information, see snow.nasa.gov → snowex
SCHEDULE STATUS AND RISKS

Amy Misakonis
SnowEx Major Milestones

• Fall Deployment – 9/25/16 – 10/4/16
  – Ground Truth
  – ASO, GLISTIN-A
• Instruments on Deck @ Aircraft Facility – 12/15/16
• Test Flight – 1/26/17 – 1/30/17
• Winter Deployment
  – Early GT Arrival – 2/1/17
  – Aircraft and GT Campaign – 2/6/17 – 2/24/17
• Final Data Delivery from all Instruments – 6/30/17
# Fall campaign participants

<table>
<thead>
<tr>
<th>Ground field work</th>
<th>LSOS/GBRS</th>
<th>Organizing Team</th>
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<tbody>
<tr>
<td>Kelly Elder</td>
<td>Ludovic Brucker</td>
<td>Amy Misakonis</td>
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<tr>
<td>HP Marshall</td>
<td>Roger De Roo</td>
<td>Ed Kim</td>
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<td>Chris Hiemstra</td>
<td>Mohammad Mousavi</td>
<td>Charles Gatebe</td>
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<td>Travis R. Roth</td>
<td>Eric Small</td>
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<td>William Currier</td>
<td>Jeff Deems</td>
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<td>Nicholas Wright</td>
<td>Peter Gadomski</td>
<td>Airborne</td>
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<tr>
<td>Karl Rittger</td>
<td>Art Gelvin</td>
<td>ASO team</td>
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<tr>
<td>Mark Raleigh</td>
<td>Luke Spaete</td>
<td>GLISTIN-A team</td>
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<tr>
<td>Tarendra Lakhankar</td>
<td>Ann Marie</td>
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<td>Zoe Courville</td>
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<tr>
<td>Ty Brandt</td>
<td><strong>Met Station-Related</strong></td>
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<td>Alex Studd-Sojka</td>
<td>Paul Houser</td>
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<tr>
<td>Clint Boaz</td>
<td>1-2 other persons</td>
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Ground truth/ Ground Based Remote Sensing update

K. Elder/L. Brucker/HP Marshall/C. Hiemstra
Ground Truth Measurements

**Snow Pits**
- Depth
- Density profile
- Temperature profile
- Stratigraphic profile
  - grain type
  - grain size
  - grain photographs
- Snow wetness
- Soil moisture
- Soil state
- Snow surface roughness
- SSA
Ground Truth Measurements

**Snow Depth Transects**
- Manual transects
- Magnaprobe transects

**Other**
- Time lapse photography
- canopy
- snow stakes
Ground Truth Measurements

**Meteorology**
- Wind speed and direction
- Air temperature and relative humidity
- Four component radiation
- Snow depth
- Snow temperature profile
- Skin temperature
- Soil temperature profile
- Soil moisture
- Snowfall – Pluvio and Disdrometer
GM sampling 1
* Terrestrial Lidar Systems (TLS)
  - VZ400, VZ1000, VZ4000, C10

* Survey grade GPS
  - all stakes, some road intersections, building corners, etc.

* Microwave Radiometers
  - 1.4, 19, 37 GHz

* Radar
  - 1 GHz

* Optical
  - Sun photometer (at LSOS and SB/SASP)

* Other techniques
  - Time-lapse cameras
  - Tree accelerometers
  - GPS antennas
  - High speed camera for falling particles

More instruments will be used in February
(e.g. ASD spectroradiometers, mobile radars, scatterometers)
SnowEx aircraft & instrument update

E. Kim / C. Gatebe / M. Beckley
Aircraft & Instruments for Each Deployment

- **Fall 2016:**
  - ASO on its aircraft (King Air)
    - Lidar (1064 nm; 3.5 km/1m @ 3 km alt.)
    - Hyperspectral (350-1050 nm; ±34°)
  - GLISTIN-A on G-III
    - Ka-band InSAR

- **Winter 2017:**
  - NRL P-3
    - SAR (SnowSAR; X and Ku band polarimetric imaging radar, ~5m spatial resolution)
    - Passive microwave (AESMIR; 10, 19 and 37GHz; H and V; 200 m @ 600 m alt.)
    - BRDF (CAR) (multispectral: 340-2300 nm; iFOV: 1°/FOV: 180°)
    - Thermal IR (TBD)
  - ASO on its aircraft
    - Lidar
    - Hyperspectral
  - GLISTIN-A on G-III
    - Ka-band InSAR

- **Summer 2017** (SAR (SnowSAR); aircraft TBD)

Other possible a/c, sensors
- NRL radar plane
- UAVSAR
Airborne Obs box

Notional measurement box for all airborne sensors
Flight box--ASO

Notional flight line box for ASO.
To be refined
Before fall Deployment!

SnowEx team

9/15/2016
Website update

Gatebe

Snow.nasa.gov dedicated site going live Sept 21!
Update on Winter Participation

- Dorothy: only ~half of people contacted have responded
- Deadline tomorrow 9/16/16
- Kelly: critical to get your response; holding up the overall personnel logistics planning of entire winter campaign
- Ed: reason is the only way to accommodate the community participation levels everyone wants is to have participants come in shifts
No Update from HQ this week

Jared Entin
Q & A