

CRYOSPHERE AND STV: USER AND AGENCY PERSPECTIVES

Elias J. Deeb, Ph.D.
Research Scientist
Cold Regions Research and Engineering Lab (CRREL)
Hanover, New Hampshire

2023 STV Community Meeting

14-15 November 2023

Pasadena, CA



US Army Corps
of Engineers®

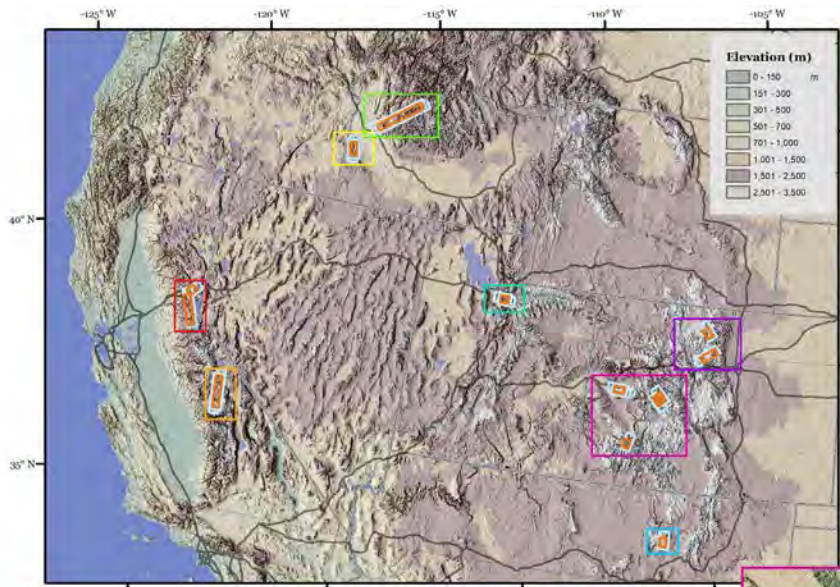


U.S. ARMY®

Innovative solutions for a safer, better world

NASA SnowEx and Future Satellite Missions for Snow

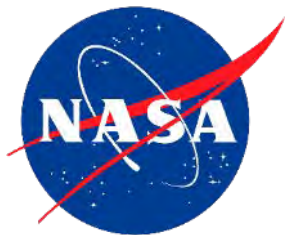
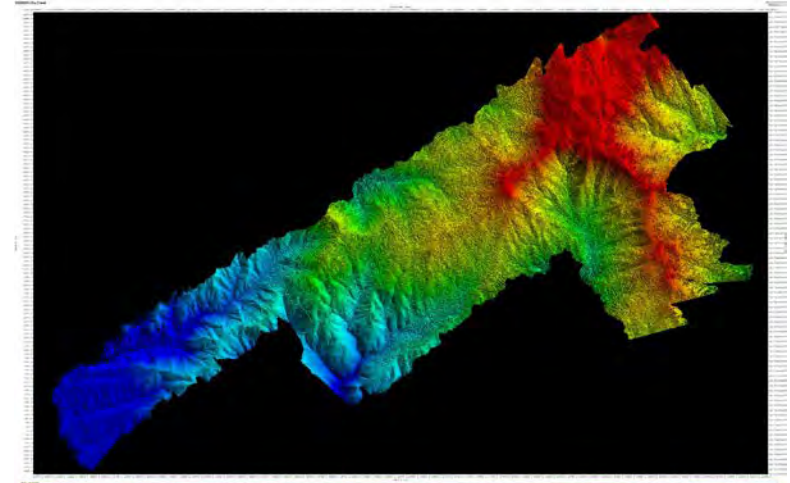
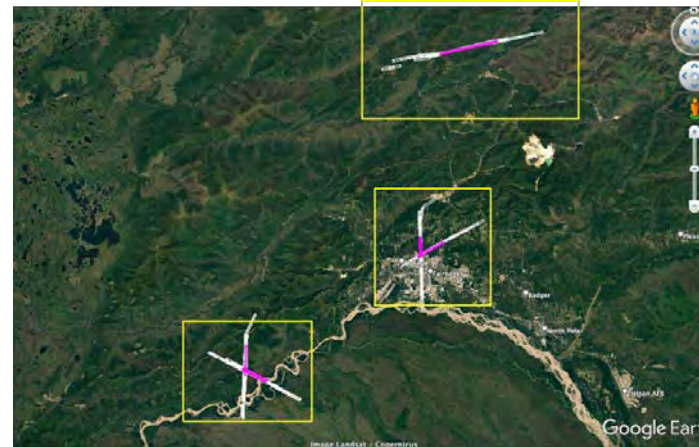
Western US



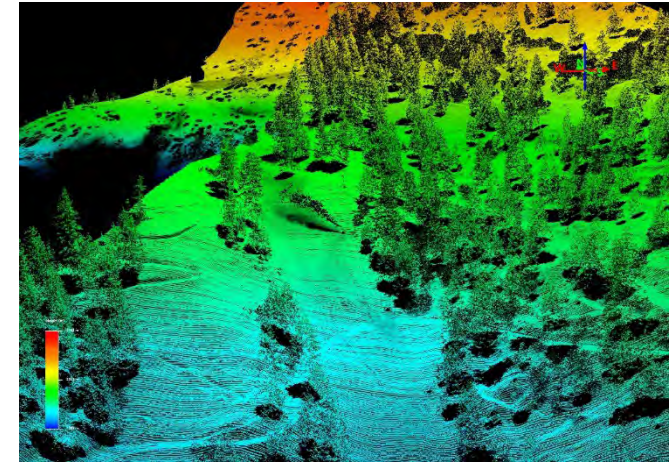
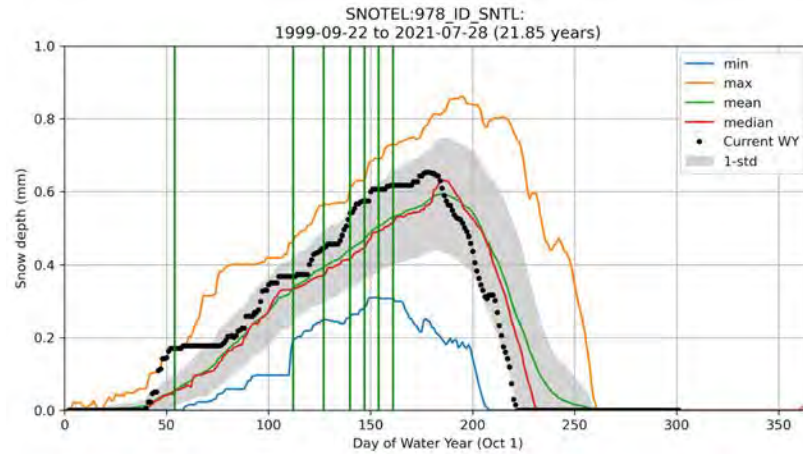
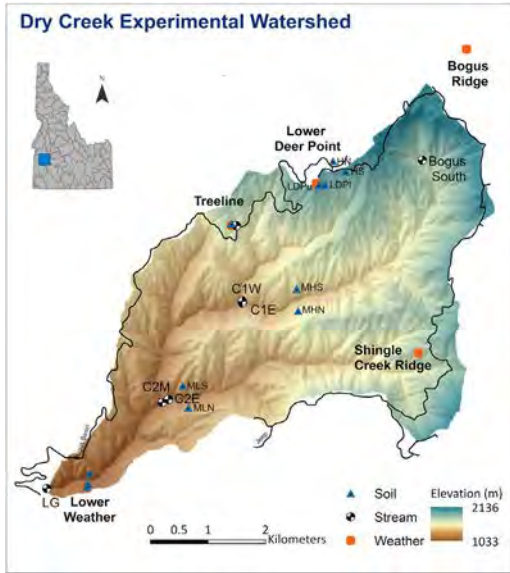
North Slope, AK



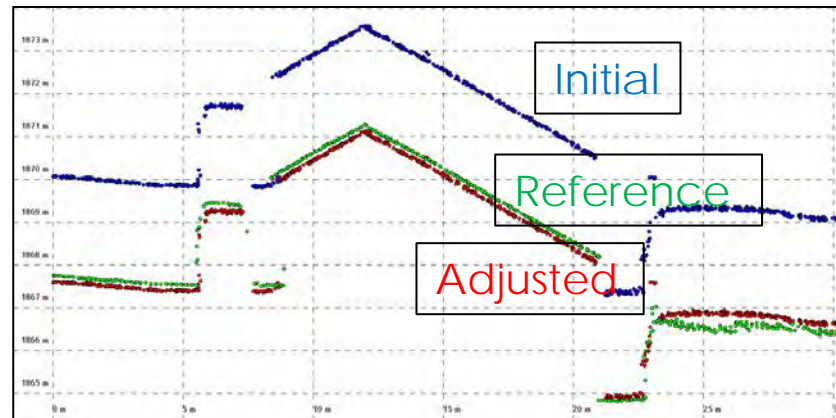
Fairbanks, AK



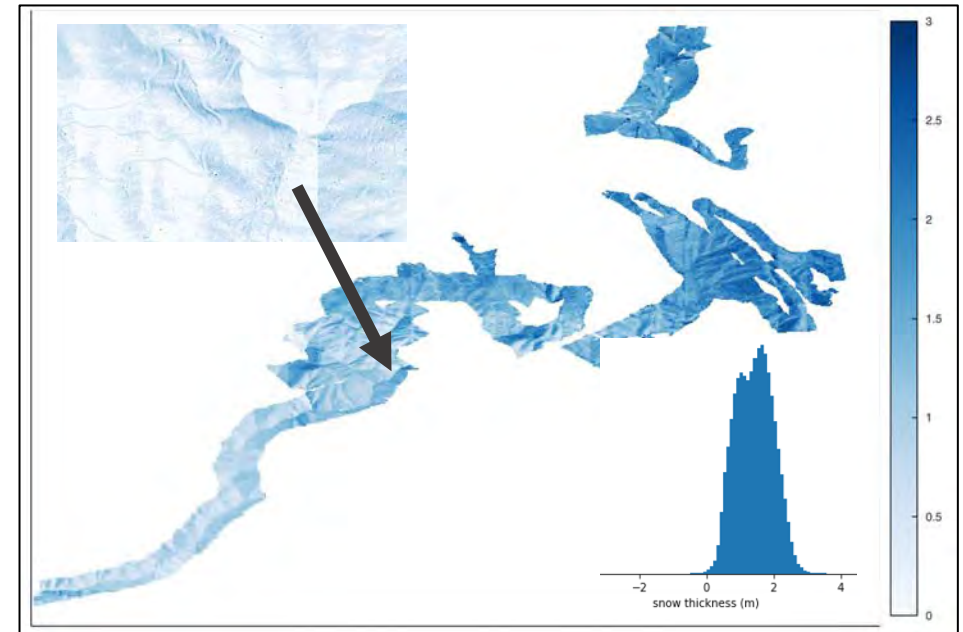
Snow depth time series



03 Mar 21 – 24 Nov 20 Snow Depth Change

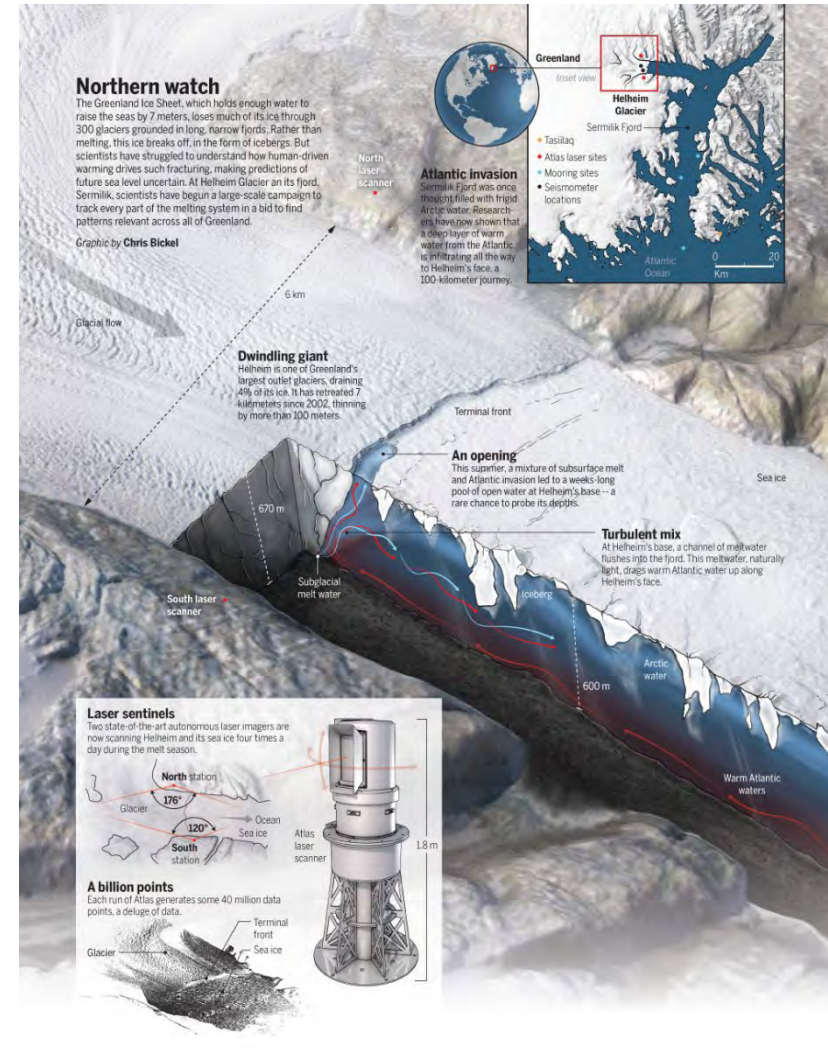


Open-source automated registration

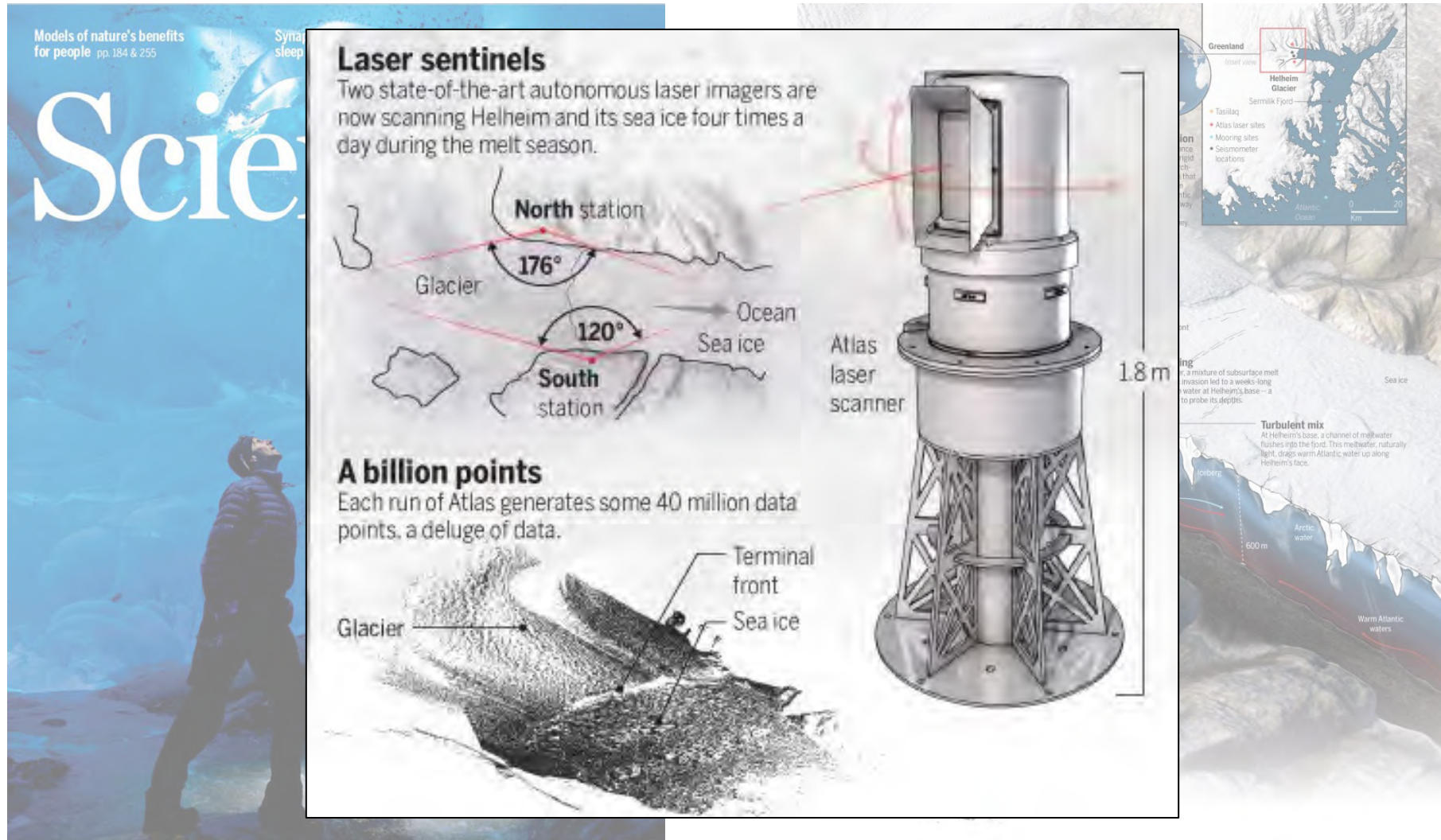


Shad O'Neel (CRREL), 2021-2023

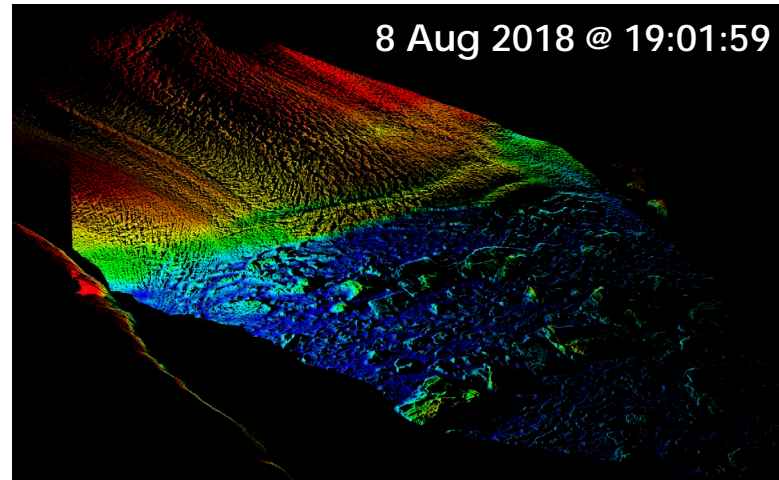
Glacier/ice sheet mass balance and dynamics



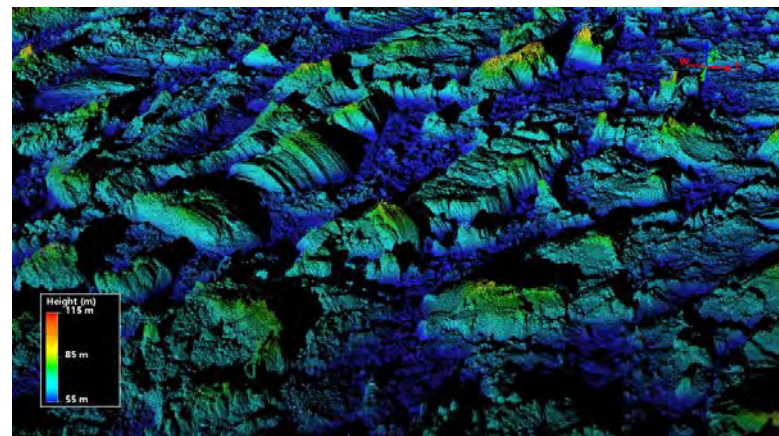
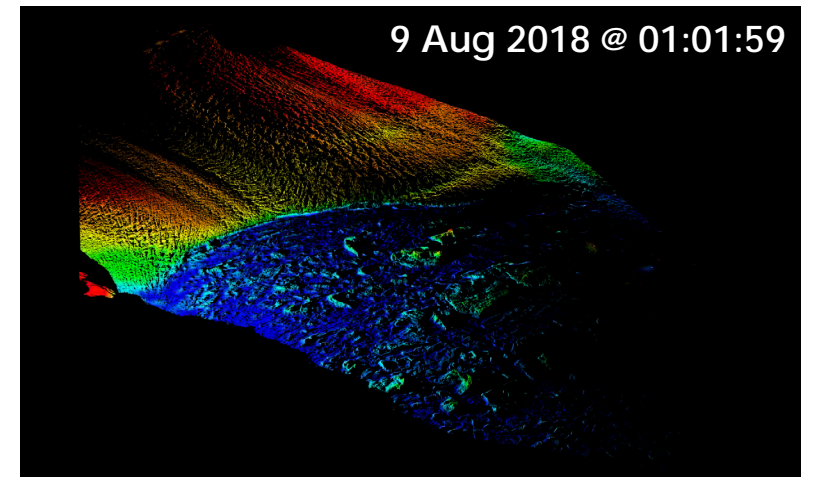
Glacier/ice sheet mass balance and dynamics



Glacier/ice sheet mass balance and dynamics



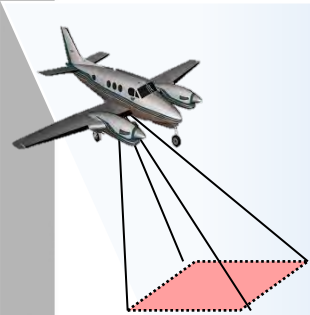
Adam LeWinter (CRREL)



Heising-Simons Foundation
<https://www.hsfoundation.org/>

GRiD – Geospatial Repo and Data Management

<https://grid.nga.mil/>



NGA Authoritative Foundation Data
(DGED, TanDEMx, Terraform, DTED, HRTE, SRTM)

Tactical Collection Programs

- Active Programs:
Buckeye, MACHETE
- Legacy Programs:
ALIRT, HALOE

- **Civil and CONUS Collection Programs**

- USGS, NOAA, DoD Civil Engineering Components, etc

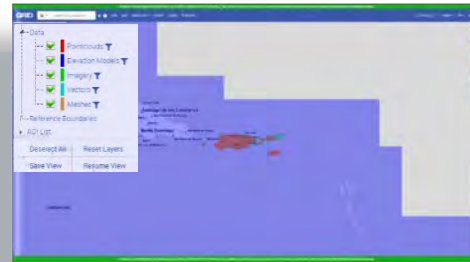


Hard Drives



CD/DVD/
Blu-ray

Elevation Models
3D Pointclouds
Imagery
Features
Meshes



GRiD

Common Projection/Datum
for Storage & Display

API / Web Services



Map of the World (HLZ)
GRiD-QTM Plugin (GQ)
GEOINT Service Proxy (GSP)

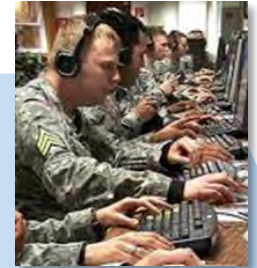
Elevation Models
3D Pointclouds
Imagery
Features
Meshes

Download ▾

Web Download



Hard Drive
(NGA Custom Media)



Analysts/Warfighters



CD/DVD/BluRay
(NGA Custom Media)



Client/Browser
Streaming
(certain pointclouds & meshes)



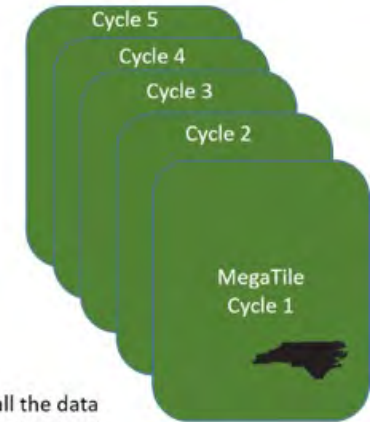
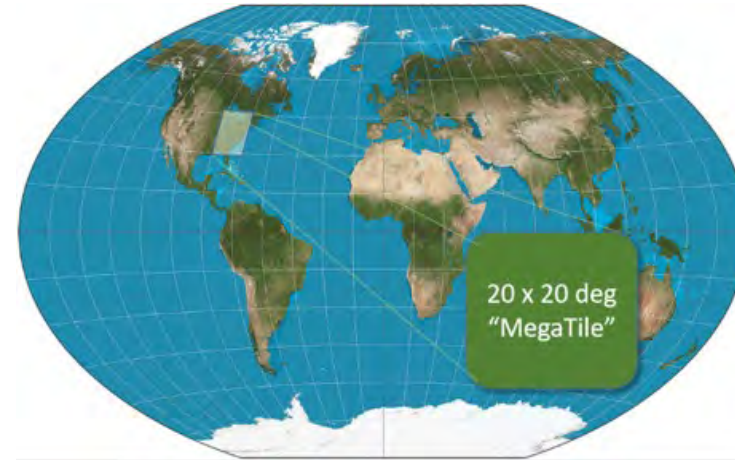
*Focus on bandwidth-constrained users (e.g., data chipping, compression, server-side applications)



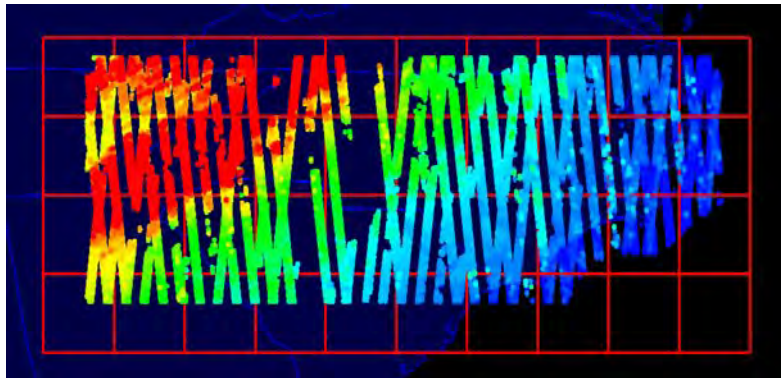
Ex: “Skinny” ICESat-2 Data in NGA GRiD

ICESat-2 “Skinny” formatted files are a custom NGA product where the ICESat-2 data geospatially and temporally organized into “MegaTiles”.

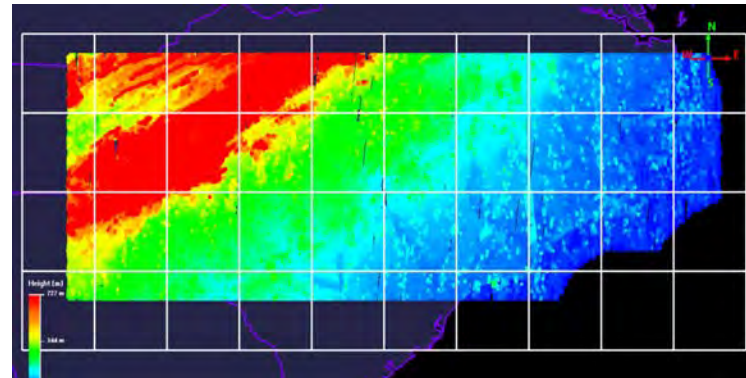
- The data are “skinny” as only the signal photons are included
- Merge attributes from ATL03/ATL08 data product
- Data are stored as LAZ v1.4



“Identify all the data over North Carolina”



Cycle 3 (march 2019 – June 2019)



Cycle 3 – 11 (march 2019 – March 2021)

Neuenschwander et. al, Univ of Texas at Austin

Cryosphere – STV wishlist, needs, desires

- Can STV help bridge gap in our process understanding of the cryosphere based on in-situ observations and applications?
- Spatial/temporal requirements
 - Snow hydrology – at 10s of meters, from a single observation at peak snowpack to several synoptic observations through accumulation and ablation
 - Glaciology – at 100s of meters, less frequent for ice sheets but more frequent for fast-moving glaciers to capture dynamic conditions
 - Damage assessment (NGA) – “high-res” and temporally recent; Gaza or the Ukraine, analyst needs both pre- and post-event data
- “Game changer” – open/transparent/reproducible/automated workflows to process large volumes of data; data scientists, cloud computing, IT resources; move away from single investigator work towards large interdisciplinary efforts that incorporate in-situ, remote sensing, and modeling
- Example: NISAR and ASF collaboration to facilitate data production, dissemination, and community engagement