CNRM, UMR 3589

SEMINAIRE CNRM

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PUSHING THE LIMITS OF SATELLITE MEASUREMENT PRECISION TO UNDERSTAND THE CHANGING CRYOSPHERE (SNOW)

par David SHEAN (University of Washington, Seattle)

au CEN

Lien visio : https://visio.numerique.gouv.fr/xtm-ezki-krr

Résumé :

Modern constellations of Earth observation satellites (NASA/ESA and commercial) offer exciting opportunities to observe and understand cryosphere change with unprecedented spatiotemporal coverage, resolution, accuracy and precision. However, this ever-growing satellite data firehose requires new scalable processing approaches to extract local, regional, and global results with actionable insights for downstream applications.

Multi-modal data fusion (e.g., integration of optical stereo, laser altimetry, and SAR/InSAR satellite observations) can capture mm- to meter-scale 3D surface change, offering a new understanding of the underlying geophysical processes responsible. Taken together, these observations and improved understanding can inform models needed for future projections of cryosphere change, with implications for the hydrologic cycle and natural hazard mitigation.

I will highlight a selection of scalable, open-source satellite data processing methods developed for high-mountain cryosphere science applications, including 1) regional seasonal snow depth mapping for the Western U.S. with ICESat-2, 2) deep learning models trained on archives of airborne lidar snow depth measurements to predict snow depth from Sentinel1-SAR and Sentinel-2 multispectral images, and 3) a global annual high-resolution snowmelt runoff onset timing dataset for from the entire Sentinel-1 SAR archive, revealing snowmelt timing sensitivity for the past decade.

Finally, I will offer a preview of what we can expect from the recently selected NASA Earth Dynamics Geodetic Explorer (EDGE) 40-beam laser altimeter mission launching in ~2030, and mission concepts for the NASA Surface Topography & Vegetation (STV) targeted observable (mid-2030s).

Pour tout renseignement, contacter Y. Poirier (05 61 07 96 55)
Centre National de Recherches Météorologiques
42, Avenue G. Coriolis - 31057 Toulouse Cedex