Products and Applications

Diurnal Drift Corrected for Long-Term Temperature CDR: CISESS Scientists Hui Xu and Bin Zhang have been working on extending the Atmospheric Temperature Climate Data Record from POES Microwave/Infrared Sounders to JPSS/ATMS/CrIS. The temperature trend from 1998 to 2019 is calculated with the merging data of the corrected Aqua, MetOp-A, and NOAA 15/18/19 AMSU-A channel 5 observations. The latest issue that they have corrected is the “diurnal drift.” The diurnal drift effect is caused by satellite orbital drift, which results in changes in local observational time that, if not corrected, may introduce false diurnal climate trends. Orbital differences between morning and afternoon satellites also caused a slight trend difference due to the observational time differences. They developed a new correction method to remove the false climate trend caused by diurnal drift as well as the orbital differences. Prior to the correction (STAR V4.1), the data shows a warming trend generally higher over ocean (0.162 K per decade) than land (0.155 K per decade) areas.

The figure above shows the corrected data (STAR V5.0), in which the warming is more prominent over land (0.191 K per decade) than ocean areas (0.151 K per decade). (POC: Hu Xu, huixu@umd.edu, Funding: JPSS PGRR)
Sea Ice Surface Roughness Product Finalized: CISESS Scientists Sinéad L. Farrell and Kyle Duncan finalized the algorithm and product definition for the Sea Ice Surface Roughness product. It is part of the NOAA/NESDIS/STAR/ Laboratory for Satellite Altimetry (LSA) Polar Ocean Data System (PODS) Arctic airborne sea ice data sets derived from the NASA Operation IceBridge mission.

Sea ice surface roughness is the standard deviation of elevation per unit area and is calculated Airborne Topographic Mapper (ATM) lidar elevation data. Due to the conical scanning geometry of the ATM lidar, across-track sampling is non-uniform. To account for the variation in sample density, ATM elevation data are gridded. Each grid cell has an along-track dimension of 30 m and an across-track dimension that is inversely proportional to the across-track sampling density. Surface roughness is derived per grid cell. Statistics are computed on the distribution of surface roughness for 10 km along-track segments, for each aircraft flight line. The surface roughness data product can be used to improve the characterization of sea ice dynamics in high-resolution sea ice models. It also provides a basis for calibration and validation for sea ice surface roughness measurements derived from other satellite missions such as ASCAT, ICESat-2 and Sentinel-3. Data are accessible at NOAA LSA PODS FTP: ftp://ftp.star.nesdis.noaa.gov/pub/socd/lsc/SeaIceProducts/Airborne/IceBridge/SurfaceRoughness/

(POC: Sinéad Farrell, sinead.farrell@noaa.gov, Funding: Ocean Remote Sensing)
**Publications**

**Diurnal Variation in Cloud Liquid Water Path from Satellites:** There are five cross-track microwave radiometers (AMSU-A & ATMS) onboard polar-orbiting satellites (NOAA-18 & -19, METOP-A & -B and SNPP) that measure cloud Liquid Water Path (LWP) almost 10 times a day. Can we discern LWP diurnal variability from these measurements? Lin Lin and Xiaolei Zou answer this question in the positive in their new article, published July 8th in *Remote Sensing*. After Intercalibration and remapping, they examined average bimonthly diurnal cycles of LWP over the Southeast Pacific Ocean in a stratocumulus region—these results are shown below.

![Graph showing diurnal variation in cloudLiquid Water Path](image)

Their method could be used for other variables measured by multiple cross-track microwave radiometers.

**Lin, Lin;** and Xiaolei Zou, 2020: Diurnal variation in cloud liquid water path derived from five cross-track microwave radiometers onboard polar-orbiting satellites. *Remote Sens.*, 12, 2177, [https://doi.org/10.3390/rs12142177](https://doi.org/10.3390/rs12142177).

*(POC: Lin Lin, lin.lin@noaa.gov, Funding: JSTAR)*