

The Aerospace Cloud Mask Utility: A New Tool for Pixel-level Cloud Mask Annotations for JPSS VIIRS Satellite Data

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Abstract

The Aerospace Cloud Mask (ArCM) utility aids the creation of manually-curated ground-truth cloud masks based on Visible Infrared Imaging Radiometer Suite (VIIRS) moderate-resolution band (M-band) Sensor Data Record (SDR) input. Ground-truth masks produced via ArCM are being used to validate output of the VIIRS Enterprise Cloud Mask (ECM) for particularly challenging scenes. ArCM users are able to define and load M-band RGB composite images and efficiently annotate pixels as cloud or no cloud. Pixels may be annotated via user-defined data filters, via custom-polygon definitions, or at the pixel-by-pixel level. To aid in filter design, users may output band values to the screen through point and click functionality. Users may display geolocated or flat single-band images with custom colormaps to better reveal cloud features. Additionally, parameters of the corresponding ECM may be displayed at the image scale and/or on a pixel-by-pixel basis. Final ground-truth is output in an ASCII format that can be easily leveraged for ECM validation purposes. Utility may be extended to other satellite data sources through a back-end modification, and the potential exists to also leverage output as ground-truth for training machine-learning algorithms. Thus far, the ArCM tool has been used to build ground-truth masks, which represent several million annotated cloudy pixels, for several VIIRS granules.

Introduction

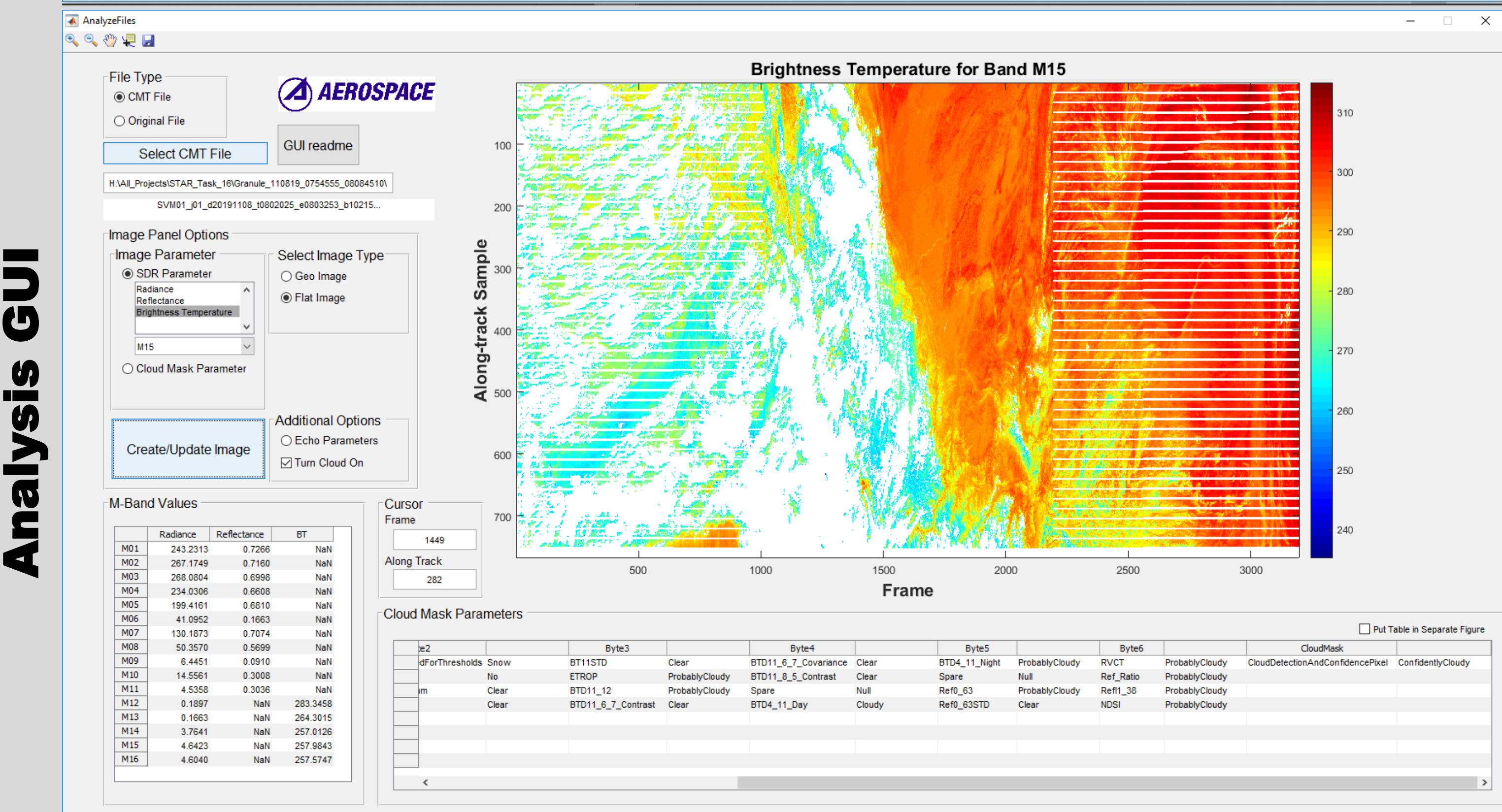
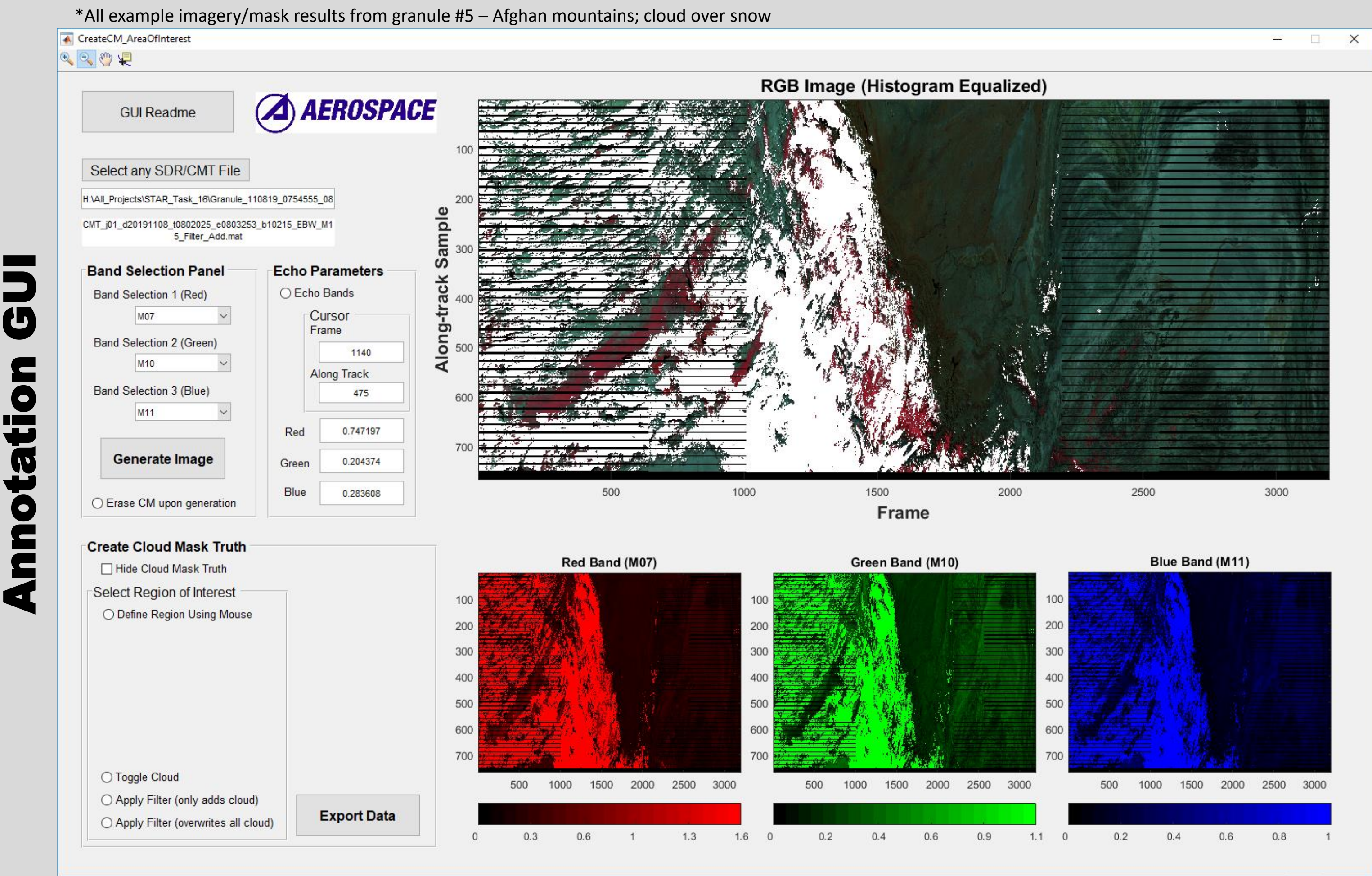
- ArCM facilitates the manual creation of ground-truth cloud masks for VIIRS satellite imagery
 - Offers means to effectively annotate O(100K)+ cloudy pixels/granule
- Created to aid VIIRS ECM validation
- Software Requirements:
 - Free MATLAB Compiler Runtime (R2015b)
 - No MATLAB license required
- Inputs: VIIRS SDR M-band imagery
- Cloud masking functionality:
 - User-defined layered data filters
 - User-defined polygons
 - Pixel-by-pixel annotations
 - Zoomable annotation regions
- Analysis functionality:
 - Single-band/ECM views with ground-truth overlay
 - Pixel-level band summaries with decoded ECM
- Output:
 - ASCII cloud-mask representation
 - Binary representation editable by ArCM

ArCM Annotated Granules (Ongoing)

#	Date	Location	ID	Goal
1	28MAR18	So. U.S. / MX	j01_d20180328_t1913562_e1915207_b01851	Test case on initial data pull. Variety of cloud types.
2	28SEP19	Sahel, Africa	j01_d20190928_t1228365_e1229592_b09636	Small, low-clouds, many “probable” results
3	23OCT19	Afghanistan	j01_d20191023_t0803132_e0804377_b09988	Cloud over snow
4	08NOV19	Afghanistan	j01_d20191108_t0802025_e0803253_b10215	Cloud over snow
5	14JAN20	AK/B.C./Yukon	j01_d20200114_t2044083_e2045328_b11173	Extreme valley cold



ArCM facilitates effective creation of ground-truth cloud masks from VIIRS imagery



Cloud Mask Annotation/Visualization

