

USGS Analysis Ready Data (ARD)

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Outline

- USGS and CEOS Analysis Ready Data for Land (CARD4L) Efforts
- USGS Landsat Collection 1 (C1) scene verses U.S. Analysis Ready Data (ARD) tiled products
- Key USGS U.S. ARD product motivations and operational and science needs
- USGS Landsat Collection 2 (C2) data products
- Future USGS ARD scoping and development
- More information on USGS ARD

USGS and CEOS Analysis Ready Data for Land (CARD4L) Efforts

- Current USGS ARD efforts include provision of a tiled continental-based Landsat Collection 1 data product known as ‘Landsat (C1) U.S. ARD’ (Dwyer et al. 2018)
- The Landsat C1 tiled U.S. ARD product is generated from Landsat C1 Level-1 and Level-2 scene-based data products
- USGS participation in CARD4L efforts include cross-checking current Landsat C1 Level-1 and Level-2 globally distributed, scene-based products against international agreed upon compliance standards

Dwyer, J.L., Roy, D.P., Sauer, B., Jenkerson, C.B., Zhang, H., and Lyburner, L., 2018, Analysis ready data—Enabling analysis of the Landsat archive: Remote Sensing, v. 10, no. 9, art. no. 1363. doi.org/10.3390/rs10091363

USGS Landsat Collection 1 (C1) scene verses U.S. ARD tiled products

- Landsat C1 Level-1 (standard) and Level-2 (on-demand) globally distributed, scene-based products have a Universal Transverse Mercator (UTM) projection
- Landsat C1 U.S. ARD (standard) utilizes a Web-Enabled Landsat Data (WELD) tiling scheme for Level-1 and Level-2 data production using a Albers Equal Area (AEA) projection

Key USGS U.S. ARD product motivations and operational and science needs

- Landsat C1 U.S. ARD evolution, development, and operations was/is driven by the need to:
 - (1) support USGS mission goals and science at the national scale such as the Land Change Mapping, Analysis, and Projection (LCMAP) project;
 - (2) support Landsat science and applications time series analysis and study;
 - (3) leverage and advance Landsat remote sensing at regional to sub-continent scales
- Landsat C1 U.S. ARD tiles enable time series analysis at pixel scales, eases the burden of large scale systematic data processing, and a mechanism to interrogate, understand, and analyze 48+ years of Earth Observation measurement continuity

USGS Landsat Collection 2 (C2) data products

C2 standard scene-based data products include:

- Real-Time (RT) Digital Numbers (DNs) for Landsat 7 and Landsat 8
- Level-1 TP corrected (Tier 1) DN for Landsat 1-9
- Level-1 GT and Level-1 GS corrected (Tier 2) DN for Landsat 1-9
- Level-2 Surface Reflectance (SR) for Landsat 4-9
- Level-2 Surface Temperature (ST) for Landsat 4-9

Note: Product package includes product metadata, Level-1 per-pixel quality assurance (QA), per-pixel solar and view angle image arrays, Level-2 SR per-pixel aerosol QA, and Level-2 ST per-pixel intermediate QA bands

USGS Landsat Collection 2 (C2) data products

C2 standard U.S. ARD data products include:

- Level-1 Top-of-Atmosphere (TOA) reflectance for Landsat 4-9
- Level-1 TOA Brightness Temperature (BT) for Landsat 4-9
- Level-2 Surface Reflectance (SR) for Landsat 4-9
- Level-2 Surface Temperature (ST) for Landsat 4-9

Note: Product package includes product metadata, Level-1 per-pixel quality assurance (QA), per-pixel solar and view angle image arrays, Level-2 SR per-pixel aerosol QA, and Level-2 ST per-pixel intermediate QA bands

Future USGS ARD scoping and development

- USGS is in the final phase of reprocessing the consolidated Landsat global archive into a Landsat C2 data product inventory:
 - Public release of Landsat C2 scene-based data products is scheduled for Spring / Summer 2020
 - Public release of Landsat C2 U.S. ARD data product is scheduled for Fall 2020
- Over the past 2 years, the USGS has been scoping and working with the Landsat Science Team on defining and establishing a roadmap to potentially scale current U.S. ARD processing to the globe

More information on USGS ARD

- Data Format Control Book (DFCB)
 - <https://www.usgs.gov/media/files/landsat-analysis-ready-data-ard-data-format-control-book-dfcb>
- Product Guides
 - <https://www.usgs.gov/land-resources/nli/landsat/landsat-science-products>
- Web page
 - <https://www.usgs.gov/land-resources/nli/landsat/us-landsat-analysis-ready-data>