Landsat Collection 1 vs. Collection 2 Summary

Updated: April 2021

Legend
Collection 2 Improvement / Enhancement

	Collection 1		Collection 2		
	Level-1 Landsat 1-8	**Level-2 (U.S. ARD)** Landsat 4-8	**Level-1** Landsat 1-9	**Level-2** Landsat 4-9	**Level-2 (U.S. ARD)** Landsat 4-9
Supporting Software					
Processing Software	Landsat Product Generation System (LPGS) R13.x	L2PGS BRIDGE R0.8.x	Landsat Product Generation System (LPGS) R15.x		
Geometry					
Coverage	Global	U.S.	Global	Global *	U.S.
Geometric Registration Base	Global Land Survey (GLS) 2000		Landsat 8 OLI Harmonized w/ Sentinel-2 Global Reference Image (GRI)		
Digital Elevation Model	GLS DEM (SRTM / NED / CDED / DTED / NPI / GIMP / RAMP)**		GLSDEM / NASADEM / Alaska NED / CDEM / SNF / NPI / GIMP / ArcticDEM / RAMP **		
Map Projection	Universal Transverse Mercator / Polar Stereographic	Albers ***	Universal Transverse Mercator / Polar Stereographic		Albers ***
Resampling	Cubic Convolution		Cubic Convolution		
Pixel Size (Reflective) (MSS / TM, ETM+, OLI)	60m / 30m		60m / 30m		
Pixel Size (Thermal) (TM / ETM+ / TIRS)	30m / 30m / 30m		30m / 30m / 30m		
Datum	WGS84		WGS84		
Precision Correction Methodology	Baseline		Improved usage of Ground Control Points (GCPs) to produce more Level-1 Terrain Precision (L1TP) Products		
Radiometry					
Per-Pixel Solar Angle Corrections	None (based on scene center)	Full Per-Pixel Correction Applied	None (based on scene center)	Full Per-Pixel Correction Applied	
Solar / Sensor Viewing Angle Information	Angle Coefficient File	None (Per-Pixel Correction Already Applied)	Angle Coefficient File + Band 4 Solar / Sensor Angle Bands	None (Per-Pixel Correction Already Applied)	
TIRS Stray Light Correction (L8 Only)	Yes		Yes		
TIRS Post-Stray Light Correction Adjustment (L8 Only)	None		Post-Stray Light Residual Bias Applied	Post-Stray Light Residual Bias Applied	
Atmospheric Correction / Level-2 Processing					
Surface Reflectance Algorithm Version	N/A	LEDAPS v3.2.1 (TM / ETM+) LaSRC v1.3.0 (OLI / TIRS)	N/A	LEDAPS v3.4.0 (TM / ETM+) LaSRC v1.5.0 (OLI / TIRS)	
Surface Temperature Algorithm Version	N/A	Landsat Single-Channel Surface Temperature v1.3.0	N/A	Landsat Single-Channel Surface Temperature v1.3.0	
Surface Reflectance Fill Value	N/A	-9999	N/A	0	
Surface Temperature Fill Value	N/A	-9999	N/A	0	
Data Type / Scaling Factor (Surface Reflectance)	N/A	Signed 16-bit integer 0.0001 (no offset)	N/A	Unsigned 16-bit integer 0.0000275 + -0.2	
Data Type / Scaling Factor (Surface Temperature)	N/A	Signed 16-bit integer 0.1 (no offset)	N/A	Unsigned 16-bit integer 0.00341802 + 149.0	
L7 ETM+ Surface Temperature Band	N/A	Band 6L Only	N/A	Bands 6L and 6H Combined (6H if unsaturated, 6L otherwise)	
Pressure Source	N/A	NCEP Grid (TM / ETM+) / Internally Calculated (OLI / TIRS)	N/A	NCEP Grid (TM / ETM+) / Internally Calculated (OLI / TIRS)	

	Collection 1		Collection 2		
	Level-1 Landsat 1-8	**Level-2 (U.S. ARD)** Landsat 4-8	**Level-1** Landsat 1-9	**Level-2** Landsat 4-9	**Level-2 (U.S. ARD)** Landsat 4-9
Atmospheric Correction / Level-2 Processing (Cont.)					
Water Vapor Source	N/A	NCEP Grid (TM / ETM+) / MODIS CMA (OLI / TIRS)	N/A	NCEP Grid (TM / ETM+) / MODIS CMA (OLI / TIRS)	
Air Temperature Source	N/A	NCEP Grid (TM / ETM+) / MODIS CMA (OLI / TIRS)	N/A	NCEP Grid (TM / ETM+) / MODIS CMA (OLI / TIRS)	
Aerosol Source	N/A	Internally Calculated (TM / ETM+) / MODIS CMA (OLI / TIRS)	N/A	Internally Calculated (TM / ETM+) / MODIS CMA (OLI / TIRS)	
Ozone Source	N/A	OMI / TOMS (TM / ETM+) / MODIS CMG (OLI / TIRS)	N/A	OMI / TOMS (TM / ETM+) / MODIS CMG (OLI / TIRS)	
Atmospheric Elevation Model	N/A	Global Climate Model DEM	N/A	Global Climate Model DEM	
Atmospheric Reanalysis Source (Surface Temperature)	N/A	North American Regional Reanalysis (NARR)	N/A	GEOS-5 FP-IT (new data) / MERRA-2 (archive data)	
Emissivity Source	N/A	ASTER GED	N/A	ASTER GED	
Surface Temperature Retrieval Method	N/A	Single-Channel (Landsat 4-8)	N/A	Single-Channel (Landsat 4-9)	
General Metadata					
Format	ODL	XML	ODL + XML + SpatioTemporal Asset Catalog (STAC)		
Landsat Metadata Standards Compliance	Fully Compliant	Limited	Improved Level-1 / Level-2 Consistency, Fully Compliant	Limited	
IC Shutter Intrusion Detection	None	None	In Metadata		
Pixel-Level Metadata					
Cloud Masking	Cloud, Cloud Confidence, Cloud Shadow Confidence, Cirrus Confidence (L8 only)		Cloud, Cloud Confidence, Cloud Shadow, Cloud Shadow Confidence, Dilated Cloud, Cirrus (L8 /L9 only), Cirrus Confidence (L8 /L9 only)		
Land Characterization Bits	Snow / Ice Confidence		Snow, Snow / Ice Confidence, Water		
Radiometric Saturation	High-Level (Number of Impacted Bands Only)		Per-Band Saturation Bits		
Terrain Occlusion	Yes (L8 only)		Yes (L8 / L9 only)		
Product Format / Packaging					
Processing Level	L1TP / L1GT / L1GS	L2SP	L1TP / L1GT / L1GS	L2SP / L2SR ^	L2SP / L2SR ^
Format	GeoTIFF		Cloud-Optimized GeoTIFF (COG)		
Data Availability	WRS-2 Scene-Based	U.S. ARD Tile-Based	WRS-2 Scene-Based		U.S. ARD Tile-Based ^^
Band Subsetting	All Bands Included in Product		User-Selectable Bands		
Data Access / Visualization Tools	EarthExplorer Glovis LandsatLook Viewer Machine-to-Machine (M2M) Bulk Download		EarthExplorer Machine-to-Machine (M2M) Bulk Download Direct Access via AWS S3 #		

  * Global Level-2 products are only produced where solar angle constraints are met and atmospheric auxiliary data are available

  ** GLSDEM = Global Land Survey Digital Elevation Model, NASADEM = NASA Shuttle Radar Topography Mission

      Alaska NED = Alaska National Elevation Dataset, CDEM = Canadian Digital Elevation Model

      SNF = Sweden, Norway, and Finland National Elevation Data, NPI = Norwegian Polar Institute Elevation Data

      GIMP = Greenland Ice Mapping Project Digital Elevation Model, ArcticDEM = WorldView-derived Arctic Digital Elevation Model

      RAMP = Radarsat Antarctic Mapping Project Digital Elevation Model

  *** Raw Landsat data are calibrated and reprojected directly into the U.S. ARD Albers projection, which means the U.S. ARD are not resampled twice.

  ^ Surface Reflectance-only (L2SR) products are generated for a small number of island scenes where gaps exist in emissivity dataset coverage (ASTER GED).

  ^^ The Alaska tile grid has been expanded for Collection 2, to include the Aleutian Islands.

  # All Collection 2 products remain available for users at no cost, however, users wanting expedited/large volume egress directly from the commercial cloud vendor may use the Requester

Source: https://www.usgs.gov/core-science-systems/nli/landsat/landsat-collections