LDCM Data Products
Initial Thoughts and Considerations

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LDCM Data Products

Assumptions

- Standard Product
  - L1Gt product generated routinely (fixed recipe)
  - Processing may be constrained by percent cloud cover
  - Geolocation accuracy achieved using definitive ephemeris
  - Relief displacement corrected using best available DEM
  - Web-enabled access for electronic retrieval
- User-specified products
  - Products generated on-demand by user request
  - Need to solicit input from the user community on the levels of processing and service that are required
    - What products does the community need?
    - How are these needs met most effectively?
    - Publish data in compliance with standards and protocols for web services
    - Need to address consistency with legacy Landsat products
  - Includes L1Gt generated from archive according to user-specified parameters
  - Includes standard product delivered on hard media

LDCM Standard Data Products

L0R

- Some low level product must be available, specifics are TBD
- Demand may not be high, but the requirement may be for CalVal, International Cooperator data inter-comparison, researchers, or value-added retailers (VARs) and service providers

L1Gt

- WRS-2 Path/Row
- Surface reflectance preferred, at sensor reflectance at a minimum
- GIS-ready format
- Must be able to provide access to large number of users and high volumes of data

LDCM User-Specified Products

Potential Product Options

- Scene-based L1Gs from archive
  - at-sensor radiances or at-sensor reflectance; surface temperature/emissivity
- Scene-based L1Gt from archive
  - at-sensor radiances, at-sensor reflectance, or surface reflectance; surface temperature/emissivity
- Scene-based cloud reduced composite from standard L1Gt product
  - Comprised of at-sensor radiances, at-sensor reflectance, or surface reflectance; surface temperature/emissivity?
- Scene-based spectral indices from standard L1Gt product
  - options to derive from single-scene at-sensor radiances or reflectance, surface reflectance, surface temperature/emissivity or cloud reduced composite?

LDCM User-Specified Products

Potential Product Options (cont'd)

- Mosaics (contiguous WRS-2 paths/rows)
  - At-sensor radiance
  - At-sensor reflectance
  - Surface reflectance
  - surface temperature/emissivity
  - Cloud-reduced composites
  - Spectral indices
- Area of Interest (AOI)
  - User-defined area of interest (uploaded "shapefiles)
- "Data Cubes"
  - Based on WRS-2 path/row
  - L1Gt with common projection and resampling
- "Change Products"
  - Derived using at-sensor reflectance
  - Geographic extent may be single WRS-2 path/row, mosaic, or area of interest (AOI)
  - Need to define a change metric
    - Robustness and measure of uncertainty

Metadata and Distribution Models

Enabling Data Discovery, Access, and Delivery

- Metadata model
  - Web-enabled search, discovery, and data delivery
  - Scene-based metadata (product and pixel-level)
    - Registration accuracy
    - Uncertainties associated with parameter retrievals
    - Date indices, cloud, shadow, snow, land, water, other QC information as additional data layers
  - Format options
    - File size constraints
    - Usability (GIS-ready)
- Data delivery mechanisms
  - Electronic retrieval and media options
  - Bulk order considerations
  - Web services (e.g. Open Geospatial Consortium standards and service protocols)

Product Types

Acquisitions	Standard	User-specified
Off-nadir acquisition	yes	yes
Nadir acquisition	yes	yes
Product Types (Levels of Processing)		
Level-0R	X	X
Level-1R		
Level-1Gs		X
Level-1Gt	X	X
At-sensor radiances		X
Top of Atmosphere Reflectance		X
Surface Reflectance	X	X
Surface Temperature/Emissivity		X
Spectral Indices		X
Scene-based Mosaics		X
Area of Interest (AOI)		X
Cloud Reduced Composites		X
Time-series (data cube)		X

Product Characteristics

Product Characteristics	Standard	User-specified
Expedited Production	no	yes
Datatype	16-bit	16-bit
Quality Control Layer (TBD), i.e. cloud, shadow, snow, bad data	yes	yes
Map Projection	UTM	UTM, TM, Albers Equal Area, SOM-B, Lambert Conformal Conic, Polar Stereographic, Polyconic, OMA, OMB
Horizontal Datum	WGS84	WGS84, NAD83, NAD27, Other
Resampling Methods	cubic convolution (CC)	cubic convolution (CC) bilnear interpolation (BL) nearest neighbor (NN) modulation transfer function (MTF)
Image Orientation	Map	Map Path (satellite/nominal)
Pixel Size	native (15m, 30m, 60m)	user-specified
Multi-scene	no	yes
Scene-shift	no	yes
Format	Geotiff	Geotiff HDF
Media	FTP	FTP, DVD, Hard drive