What Happens in Norman

Toney Cooper

GeoEye

History

- Operations began in April of 1992

- First commercial ground station that supported *LandSat 4, 5, & 6*

- Continue to provide operational support for Resourcesat-1, Ikonos, and IRS-1D

- Added IRS Production capabilities in 1997

Overview

- Process Flow of Norman Operations
  - Data Acquisition
  - Data Capture
  - Data Processing
  - Orthorectification of Resourcesat Imagery
  - Final QC
  - Product Delivery
- Q&A

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Data Acquisition

- The Norman Facility includes
  - Datron 11 meter parabolic dual S-band/ X-band Antenna

  - Steerable ViaSat (Scientific Atlanta) Antenna

  - Grounded lightning rods

  - Configured for redundancy and multi-mission supports.

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Data Acquisition

- Customer specifies path, row, quad, and date for collection

- Inside CONUS:

  – Scenes down linked and captured in real-time to Norman Operations facility.

  – Norman Operations supports 2-3 Resourcesat acquisitions per day during growing season.

Fairbanks

Norman

IRS-P6 Receiving Stations

Norman, Oklahoma: **GeoEye**

Fairbanks, Alaska: Geoeye

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Data Acquisition

- Outside CONUS:

  - Real-time collection/downlink to IRS-P6 regional affiliate station; or stored on OBSSR and down linked at India.

  - Source image generated at NRSA Processing Center or regional affiliate station

  - Image delivered to Norman via FTP transfer

IRS-P6 Receiving Stations
Hyderabad: **NRSA**
Neustralitz: **Euromap**
Abu Dhabi: **Falcon**
Beijing: **RSGS**

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Data Capturing

- Direct Archival and Quick Look Browse System (DAQLB) handles simultaneous ingest of serial bit streams of data from ResourceSat in real-time

- The system also archives the data on DLT media after appropriate formatting in FRED format.

Satellite dish

FRONT END HARDWARE (FEH)

DLT Drive

DAQLB

Quick Look Browse

RAID

GeoEye
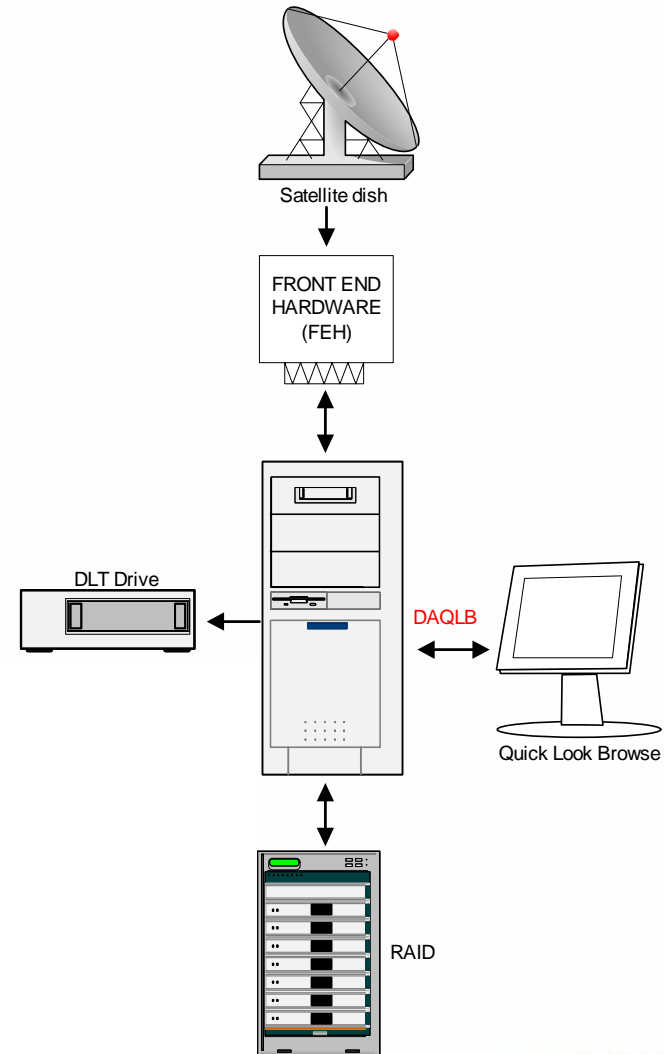
Data Capturing

- The system processes the ancillary information and archives it within a database, that is subsequently used for product generation.

- Additionally, this system also generates thumbnail images that can be used in the data selection process.

Satellite dish

FRONT END
HARDWARE
(FEH)

DLT Drive

DAQLB

Quick Look Browse

RAID
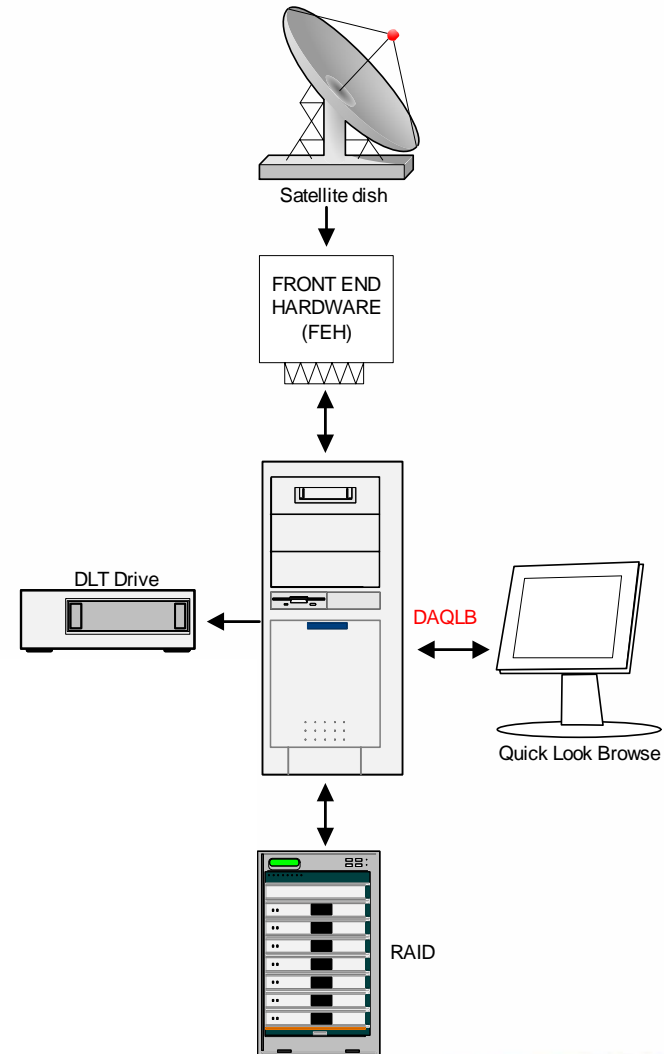
Data Processing

- Data Production Generation System (DPGS) consists of a set of processes and runtime files containing Satellite and Sensor parameters, radiometric look-up tables, configuration files and related information required for processing.

DLT Drive

DPGS

RAID
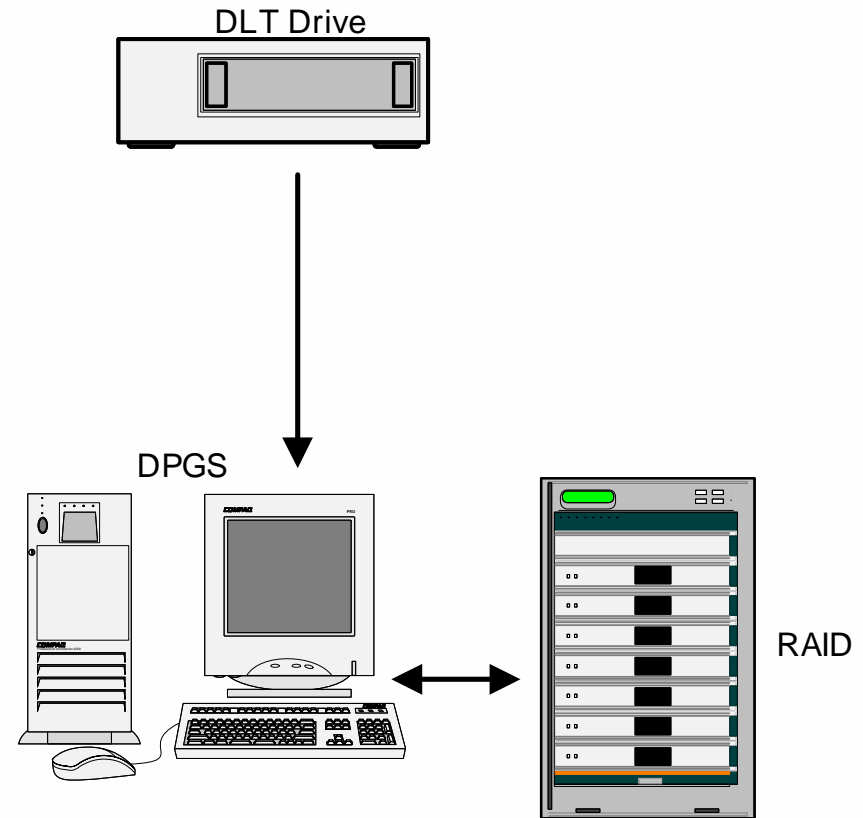
Data Processing

- The system downloads the raw video data corresponding to the user area of interest from the DAQLB system.

- The system then generates the source data by executing a set of processes in pre-defined sequence and precedence.

IRS-P6 DATA RECEPTION

DAQLB

ADIF database

DPGS

Tape drive

PRODUCTS
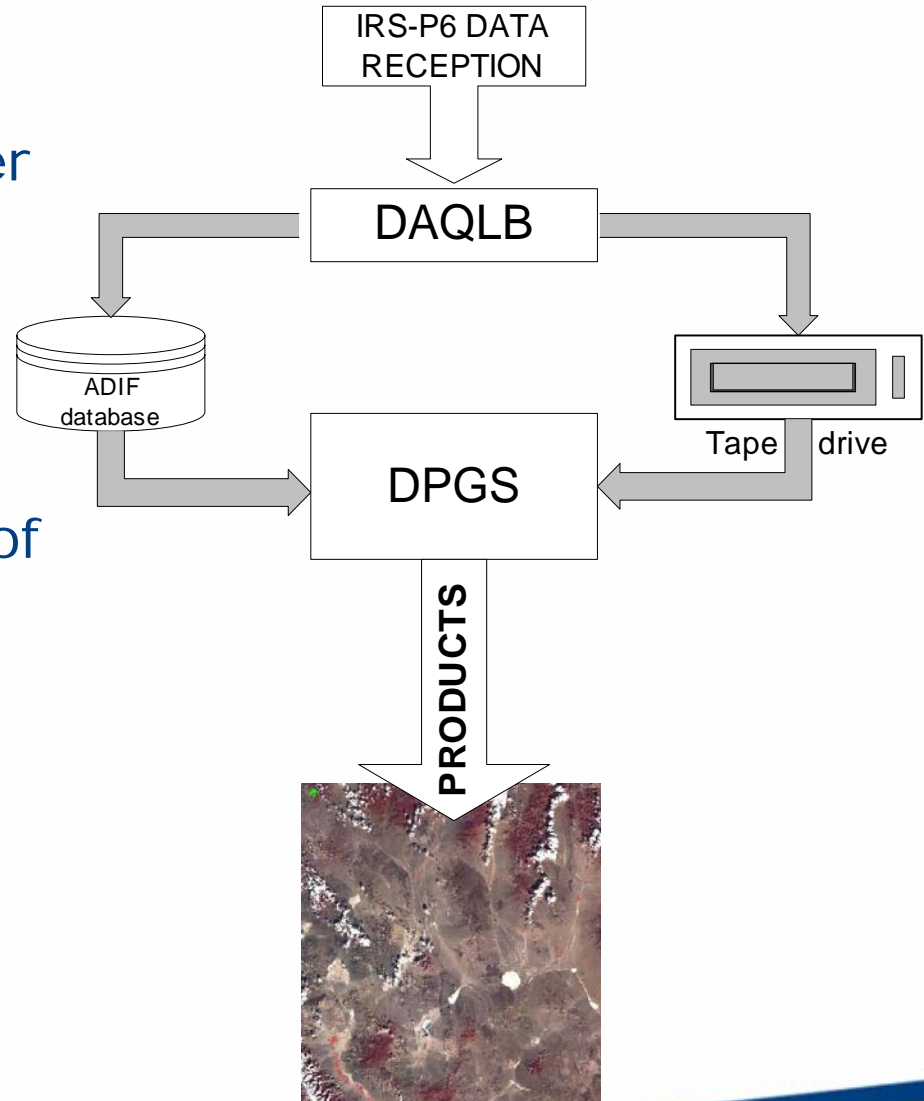
Data Processing

- Quality control (QC) of source image consists of a visual examination of the scene. The operator would identify the following:
    - Cloud Cover
    - Processing/Downlink anomalies
    - Correct path/row/quad/acquisition date

- Customer contacted (email with screen captures) for any questionable scenes. All scenes that pass source image QC are prepared for orthorectification.

Orthorectification

- Most Resourcesat-1 imagery sold to USDA is in the form of orthorectified AWiFS scenes.

- GeoEye has developed a production workflow with custom software to streamline the process of data management, control point measurement, block adjustment and orthorectification


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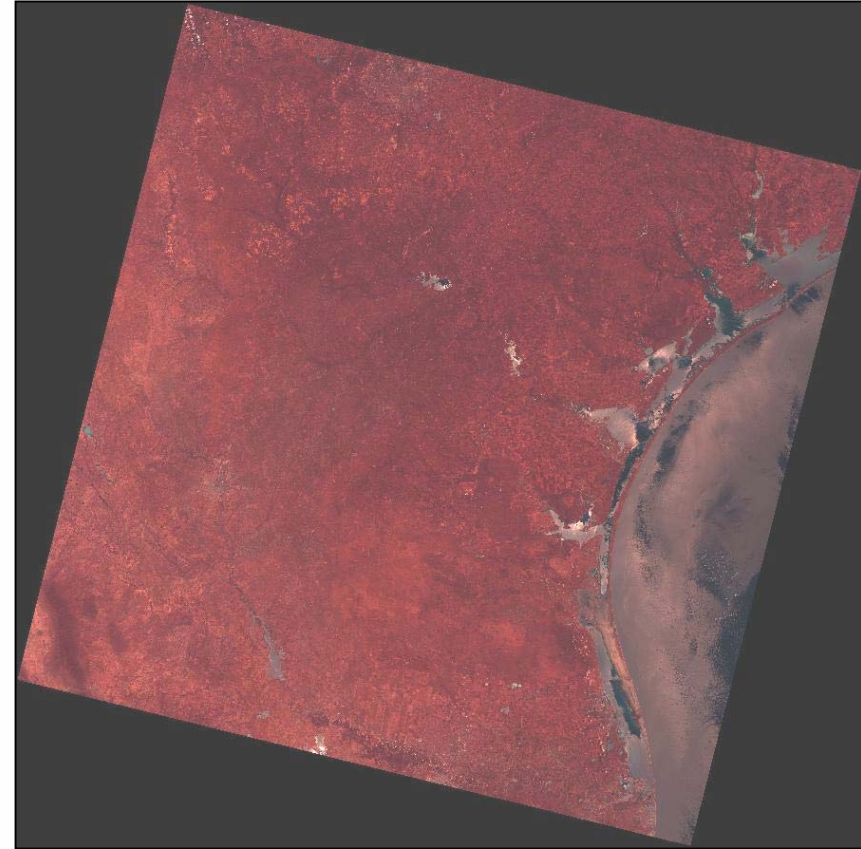
Orthorectification

Major workflow steps:

- Ancillary data compilation
  - Data staging utility compiles reference orthoimagery and the DEM

- Control point measurement
  – Automated image matching software used to collect tie points
  – Configured for AWiFS file naming conventions
  – Matches TIFF + RPC/DEM and reference orthoimage
  – Operator has the option to redefine the spacing of tie point measurements. They also have the option to select min/max number of points to extract.

- Orthorectification
  – Imagery optionally scaled from 10 bits per pixel to 8 bits per pixel
 – Cubic convolution resampling employed

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Final QC

Steps in Quality control process:

- QC operator checks several areas within image for alignment.

- All areas should be within 1 pixel of reference image

- More tie points added and ortho regenerated if tolerance is not met

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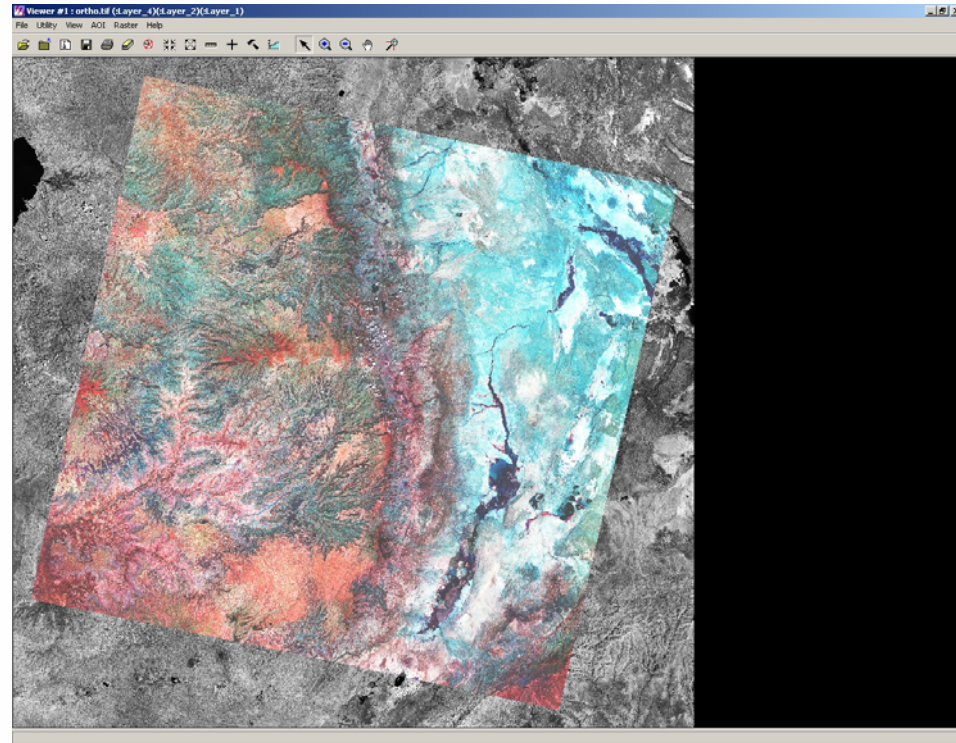
Final QC

- ERDAS IMAGINE 'swipe' tool used to compare ortho with reference orthoimage

- Ortho viewed with different band combinations to ensure that all 4 bands are OK

- 1 pixel alignment with reference is typically achieved with no rework necessary.
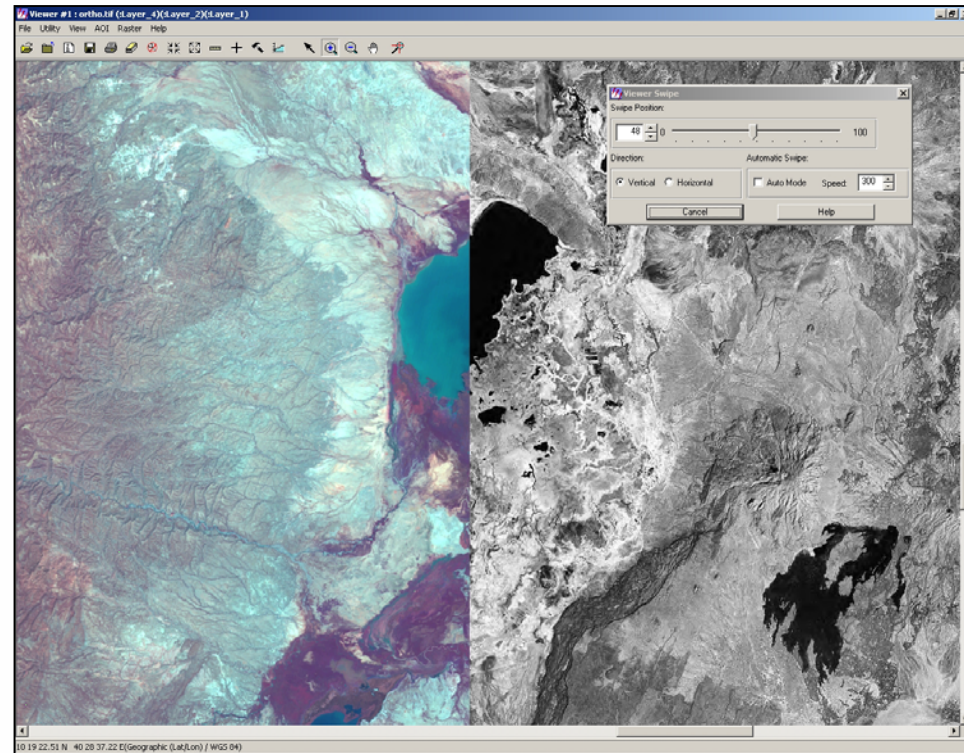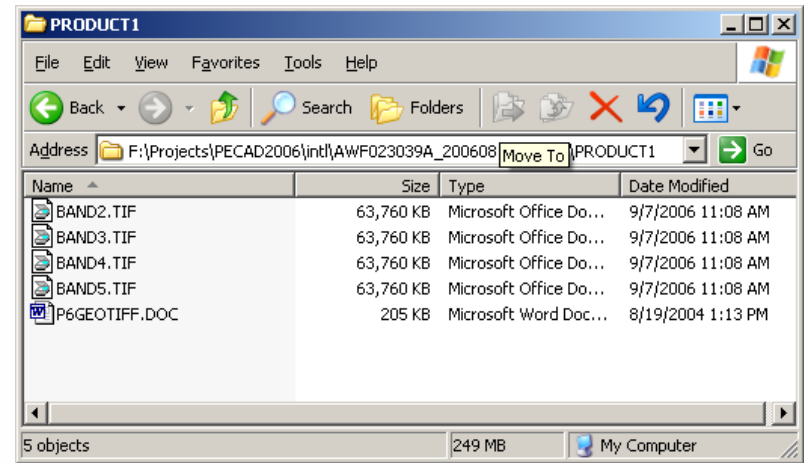
Product Delivery

- 4-band ortho TIFF split into separate bands is generated.
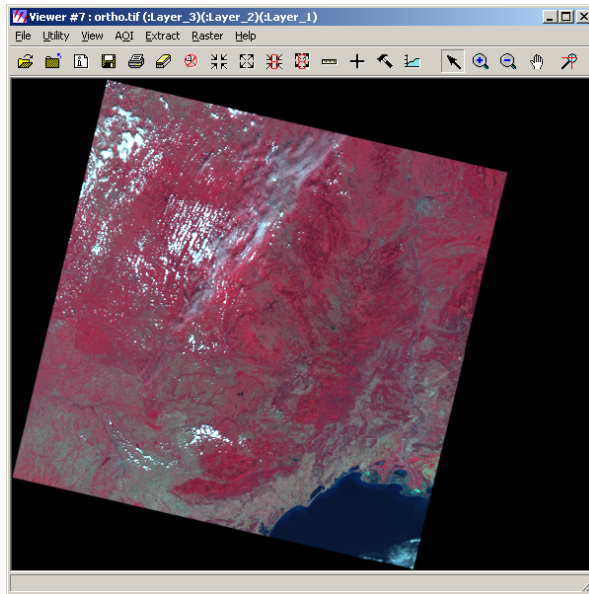
4-band TIFF ortho

Output GeoTIFF ortho product

- Final product is transferred to FTP server, where customer can download.

Summary

- Norman Operations continues to provide reliable data acquisition service of Resourcesat-1

- Custom software used for most data processing steps

- Geoeye's Resourcesat Orthorectification process is interactive, but not labor intensive. Providing numerous operator QC points to ensure the highest product quality.

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