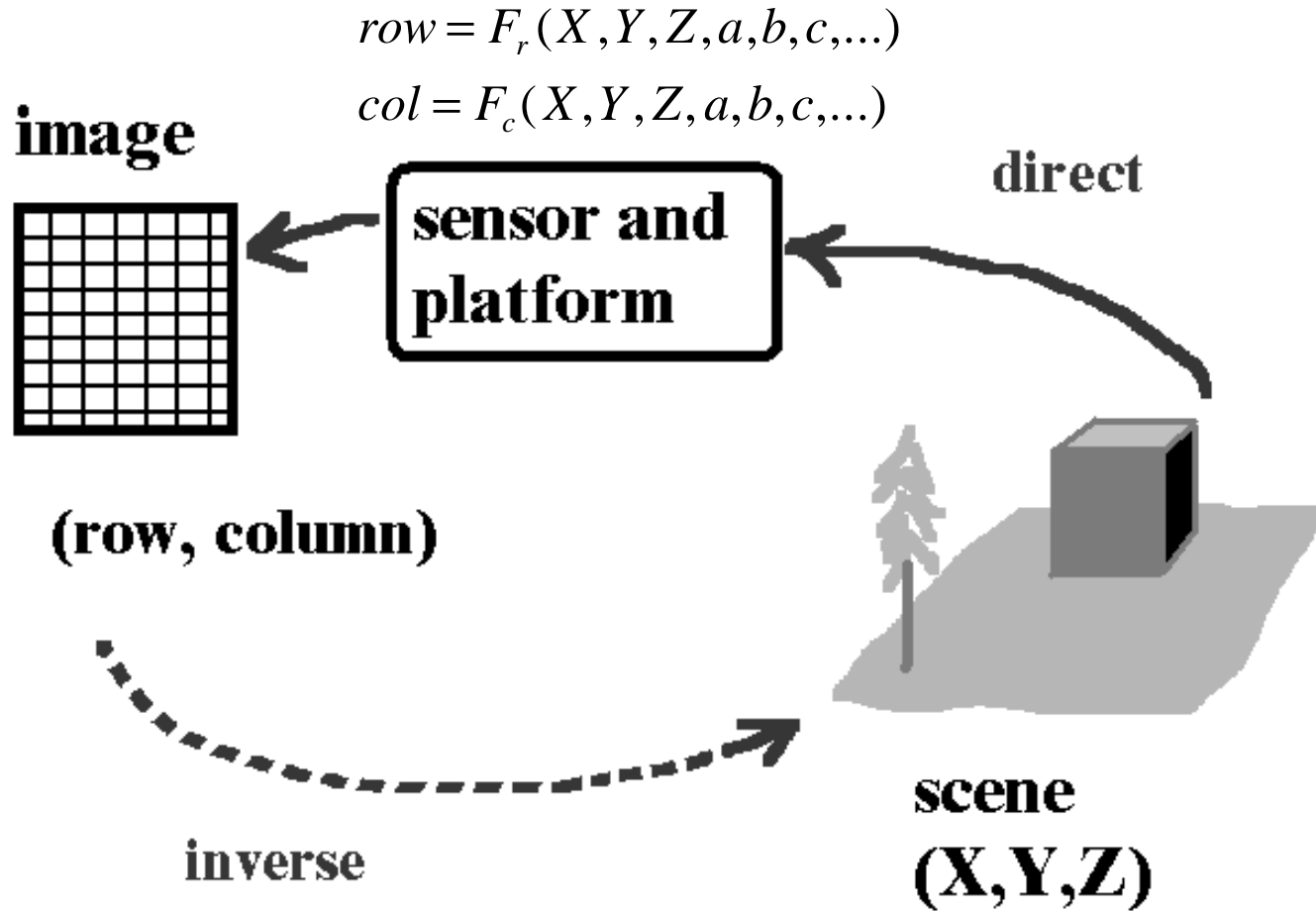


# Photogrammetry



# Components of Photogrammetry

- Sensors
- Imagery / Data
- Platform / Trajectory
- Processing techniques
- Applications / Consumers

# Sensors 1



Still frame camera



Aerial frame film camera



Motion imagery / video camera



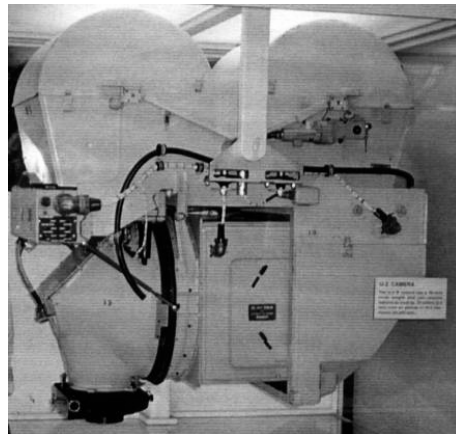
Aerial frame cluster (digital)



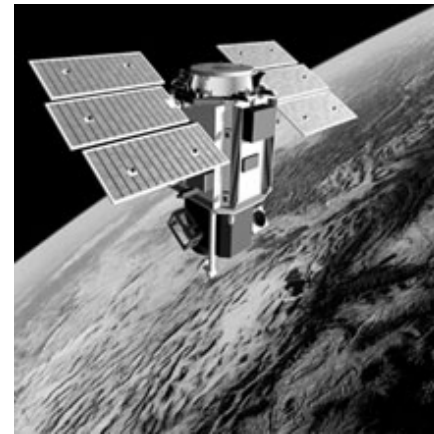
Aerial linear array, digital pushbroom



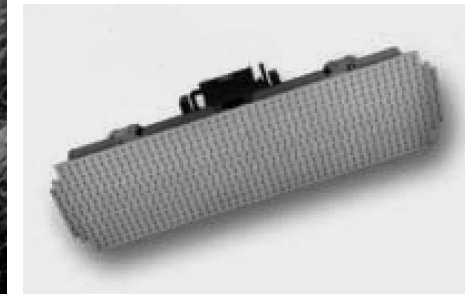
LIDAR scanning range and intensity imager



Aerial panoramic film camera, Hycon-B



Spaceborne linear array, pushbroom, quickbird

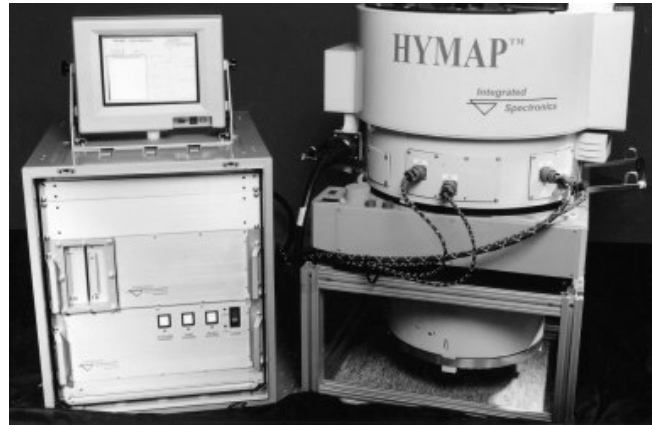


Synthetic aperture radar (SAR) antenna (active system, X)

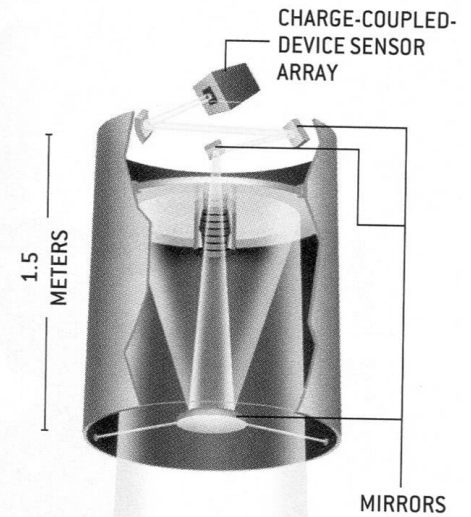
# Sensors 2



Thermal infrared camera



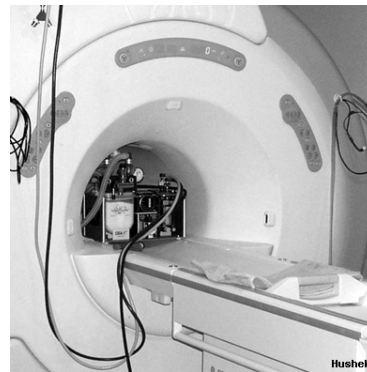
Hyperspectral whiskbroom scanner



IKONOS or Quickbird telescope / camera



Ultrasound transducer

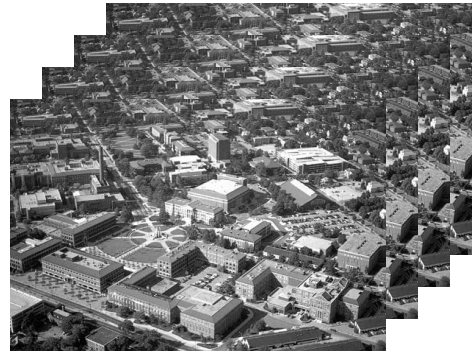


MRI scanner



Conventional aerial photograph 23x23 cm

# Images 1



Video frames



Panoramic image of NYC



Airborne pushbroom, raw and corrected

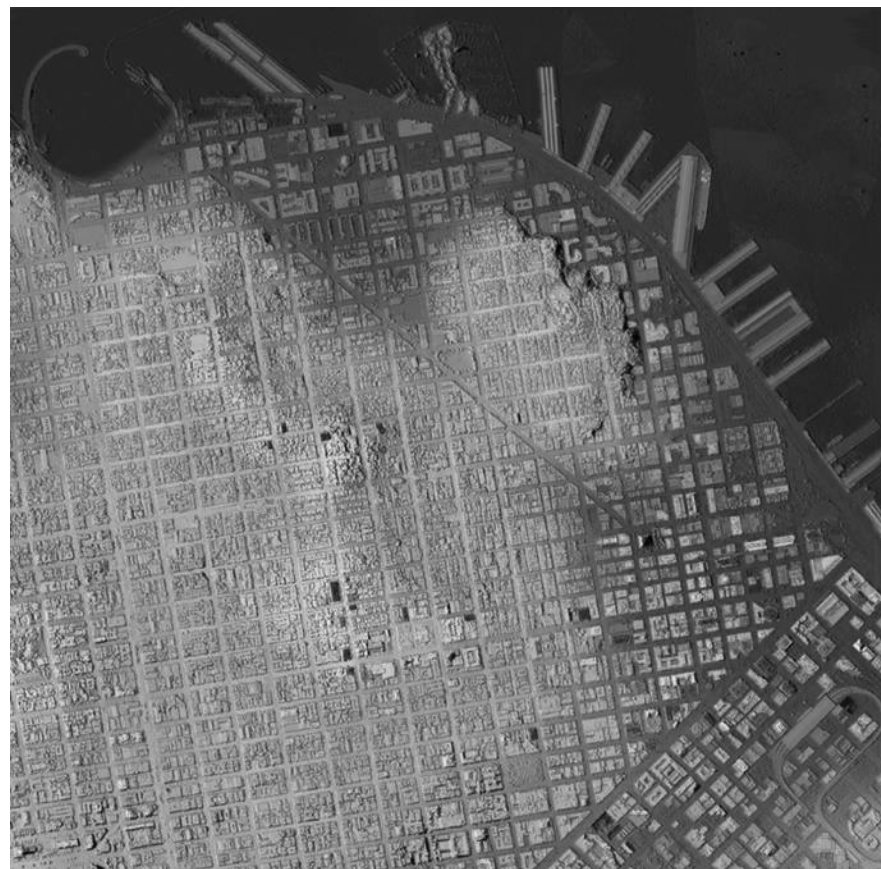


Quickbird 61cm image

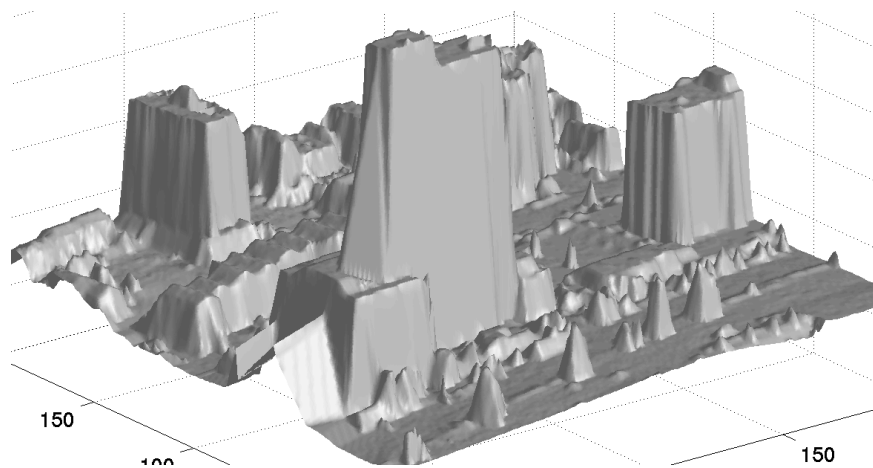
Hymap hyperspectral



## Images 2



LIDAR range image



LIDAR oblique view

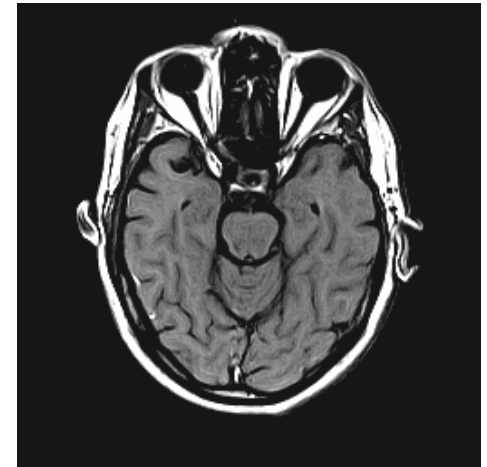
# Images 3



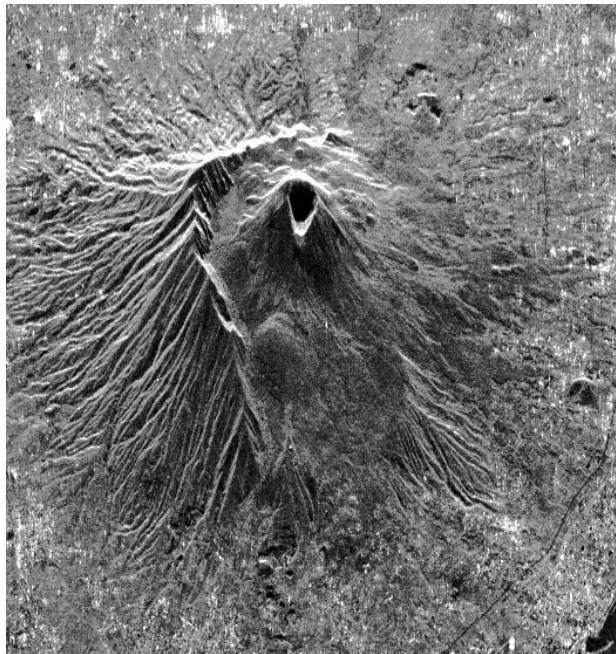
Balloon photo, Boston ca. 1859



Russian KVR-1000 Film



MRI

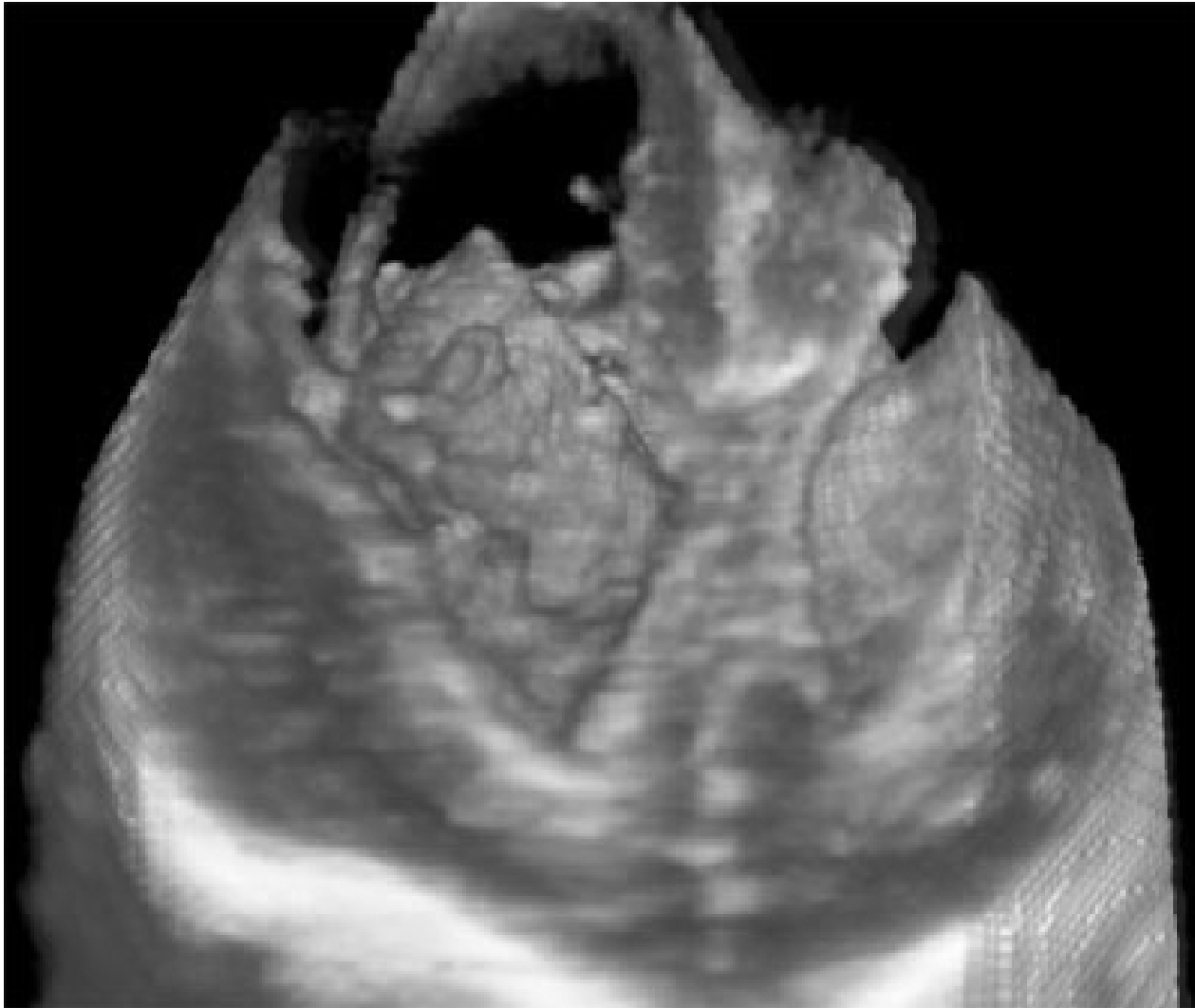


Synthetic aperture radar, SAR

Thermal image, color coded



# Anaglyph Stereo Computed Imagery from Two Ultrasound Sensors (heart valave ?)



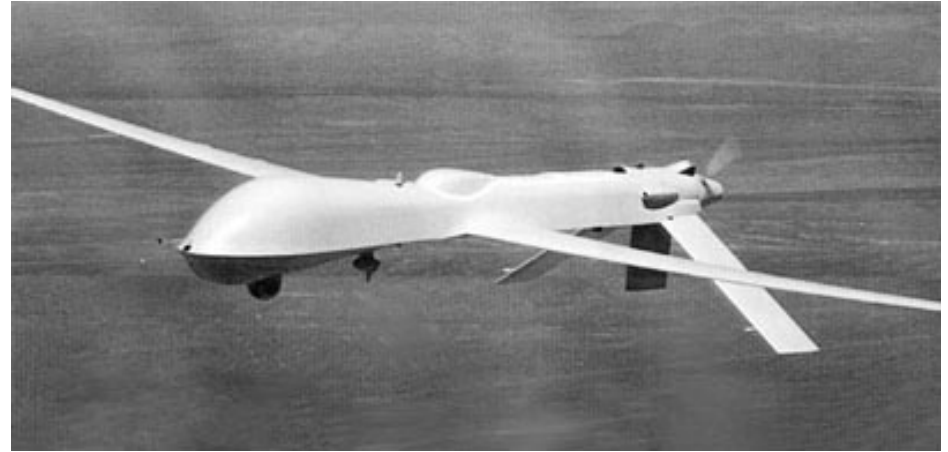


# Platforms

Cessna



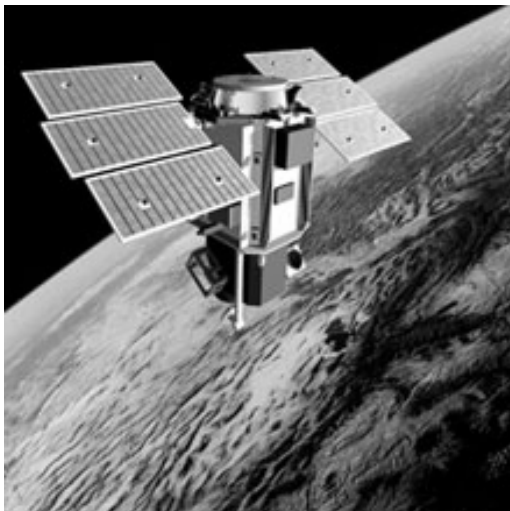
Predator UAV



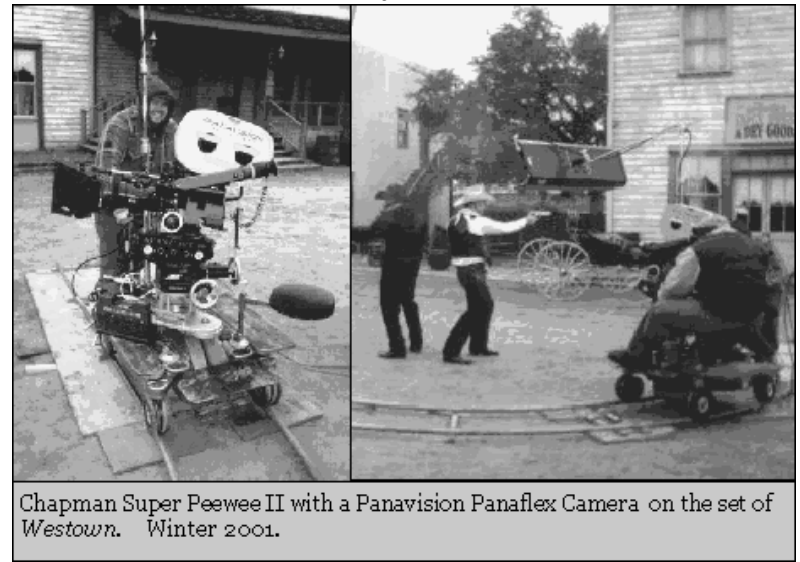
Tripod



Satellite low earth orbit



Track & dolly for camera move



# Processing

- Point measurement
- Resection, block adjustment
- Rectification, registration
- Terrain and feature extraction
- Segmentation
- Multispectral / hyperspectral classification
- Manual, automated, semi-automated
- Analog, digital
- Optical flow analysis
- Change detection
- Automated target recognition
- Stereo viewing, interpretation and 3D data capture
- Visualization, image based rendering
- Image restoration, enhancement, super-resolution
- Data fusion
- Mosaics
- Matching and correspondence
- Compression
- Data hiding, digital watermarking

# Applications

- Topographic mapping, cartography, large scale, small scale
- Land development, roadway design, earthwork computation
- Data for GIS, transportation, urban features, land use
- Reconnaissance, surveillance
- Targeting
- Creation of 3D CAD models
- Image based rendering, virtual scene generation, replacement of actual camera operation
- Visualization, simulation
- Close-range: industrial, architectural, medical
- Resource management, forests, agriculture, wildlife, urbanization, environmental assessment
- Mineral, petroleum exploration