Introduction to SAR and MapReady

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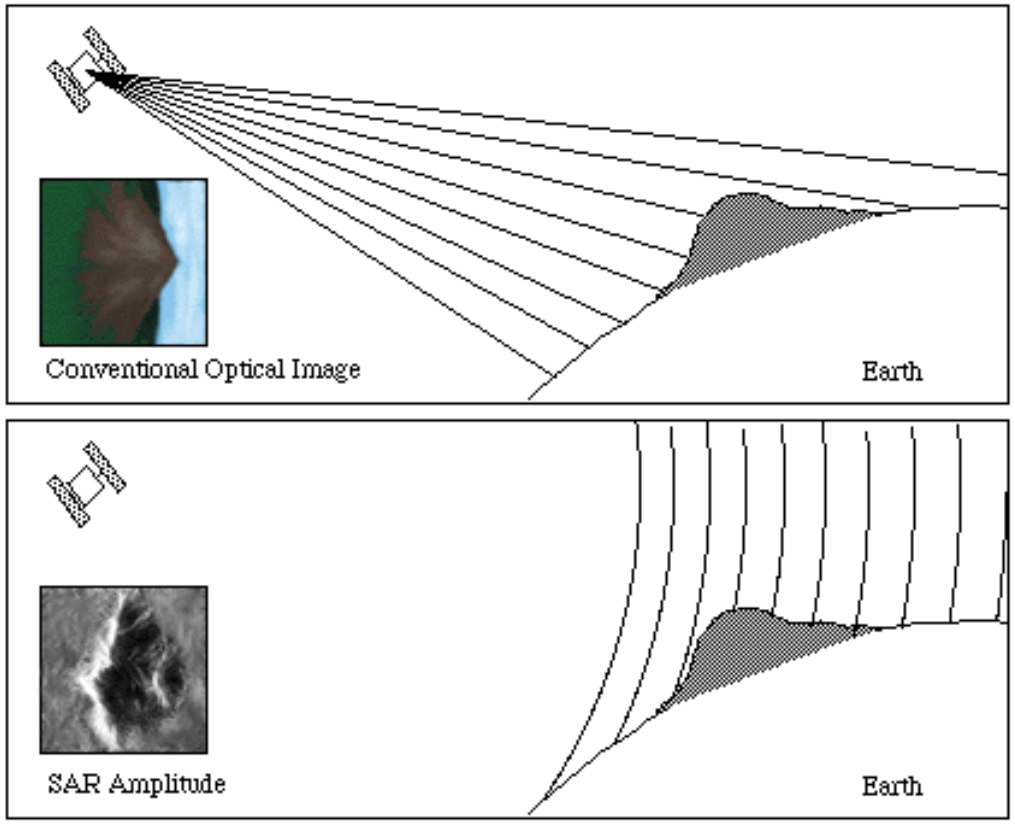
Geometric Distortions

Optical systems which are angle-based. Optics project points on ground to unique pixels in focal plane.

SAR systems are range-based.

- This leads to geometric distortions such as foreshortening, layover, and shadow regions.

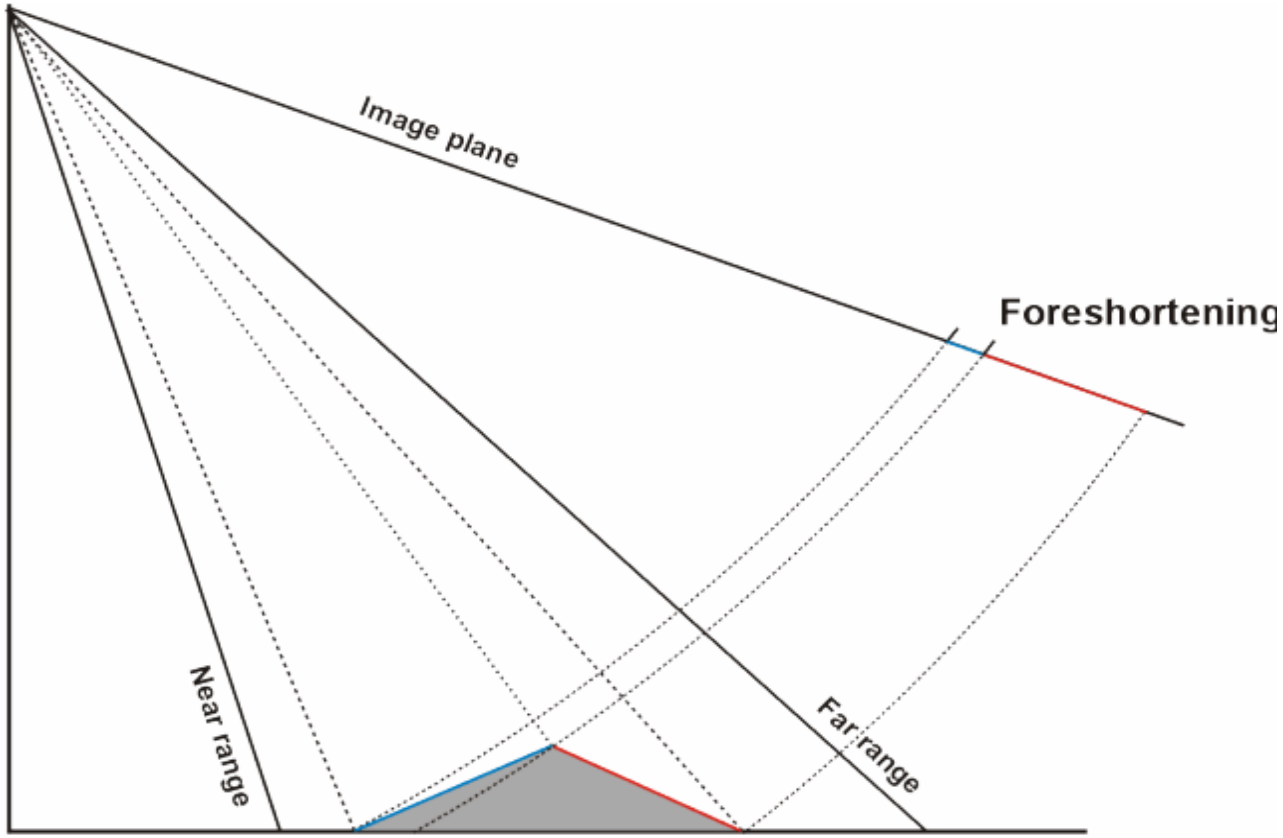


Geometric Distortions

Severe topography emphasizes geometric effects

Geometric Distortions

Severe Topography produces 1) foreshortening, 2) layover, and 3) shadowing



Terrain Correction

Terrain Correction “orthorectifies” SAR data. Data is resampled so that pixels appear in the proper geolocation.

One can overlay SAR data onto remote-sensing data from different sensors and/or geometries.

Terrain Correction

SAR Image
With Layover

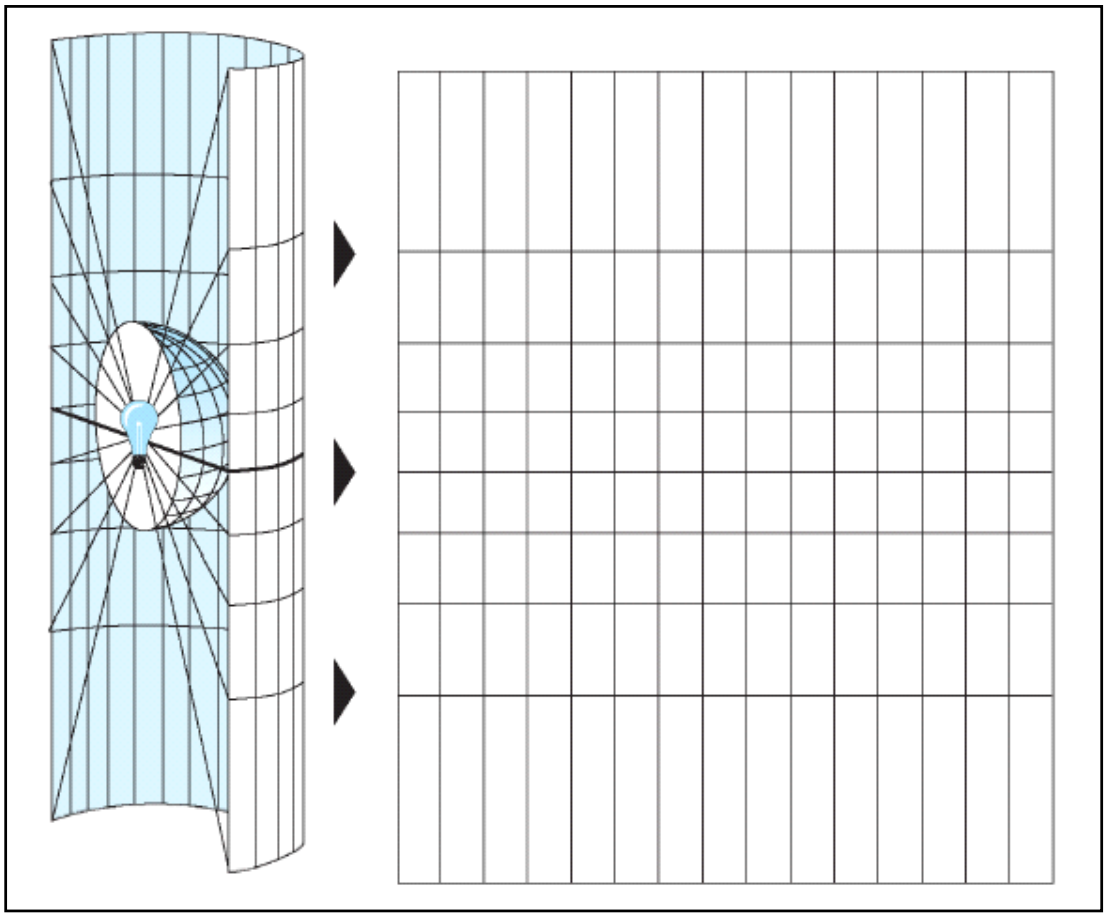
Terrain Corrected Image
Without Layover

Geocoding

ASF Level-1 imagery comes in ground range projection in which each pixel represents the same area.

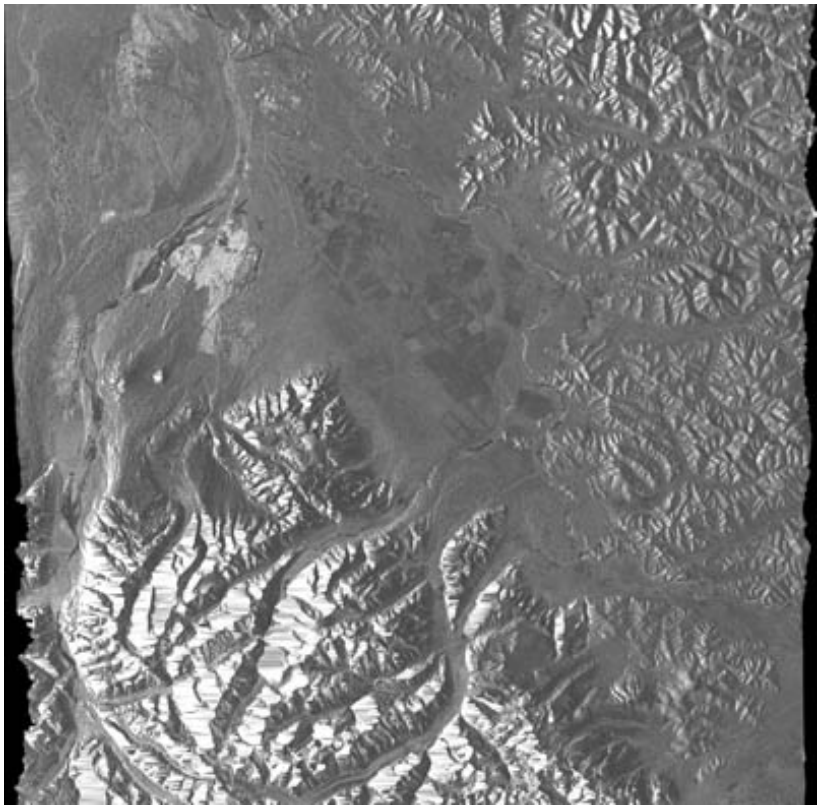
MapReady (See later slides) re-projects the image to one of five commonly used map projections:

- UTM
- Polar Stereographic
- Lambert Azimuthal Equal Area
- Lambert Conformal Conic
- Albers Equal Area

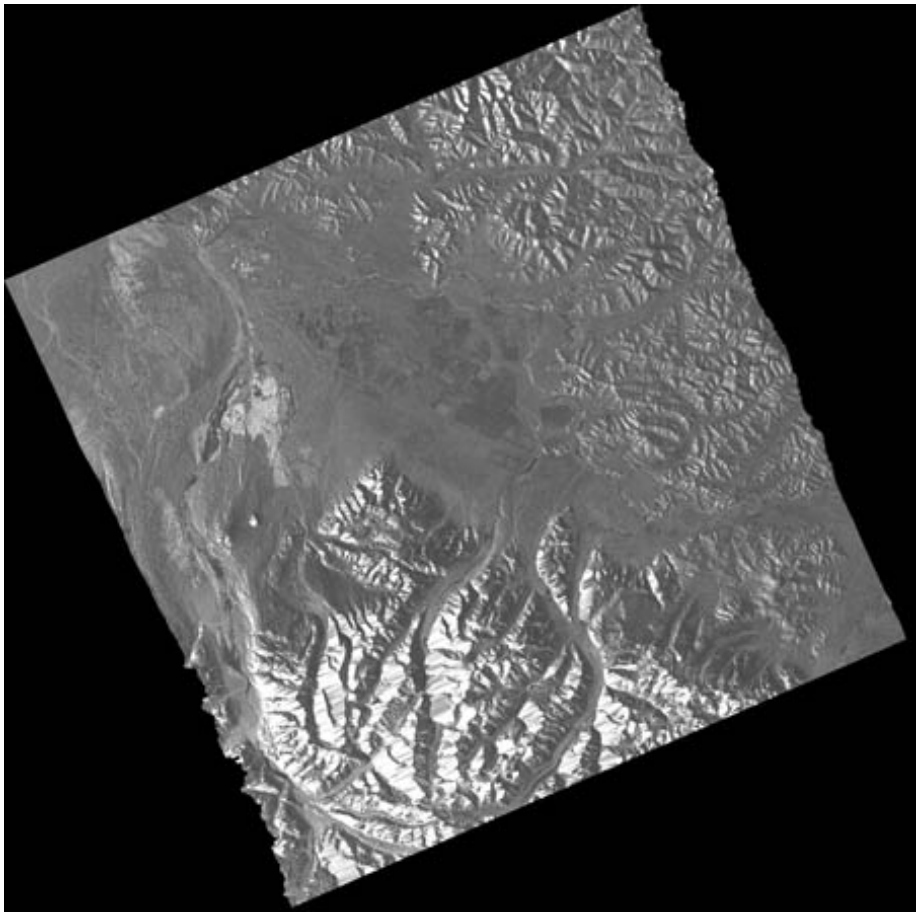


UTM: Universal Transverse Mercator

Geocoding



Terrain corrected image before geocoding



After geocoding

MapReady
Remote Sensing Tool Kit

http://www.asf.alaska.edu/downloads/software_tools#mapready

MapReady converts SAR data to geocoded geoTIFFs, jpegs, or other "common" formats.

- *MapReady* geocodes to standard projections and datums.
- *MapReady* terrain correction removes geometric distortions of SAR.
- *MapReady* is available as source code or binary
- *MapReady* runs using a graphical user interface (GUI) available for Windows and Linux.

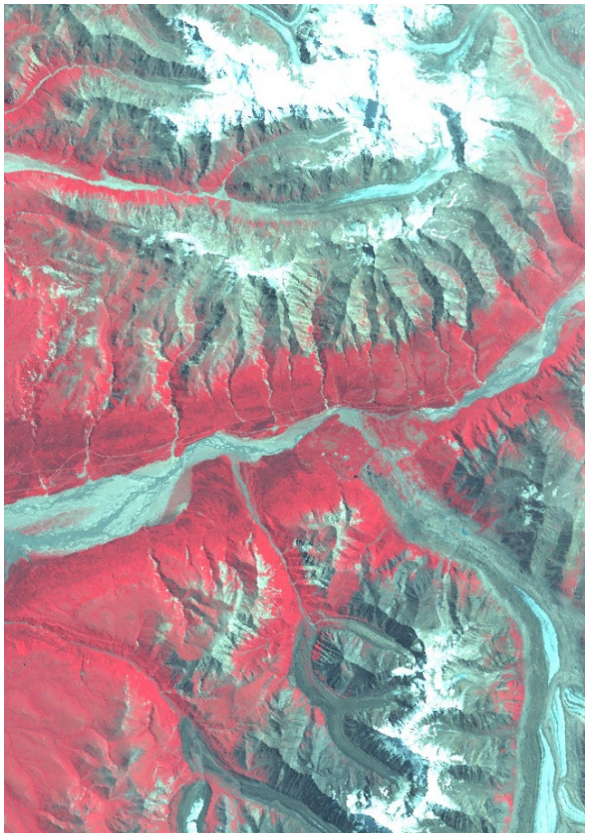
MapReady Motivation

Historically, SAR data has been used by “SAR experts,” familiar with CEOS formats, SAR imagery, and a UNIX working environment.

A new user base exists in GIS, if SAR can be provided as “just another layer,” like USGS maps, GeoEye imagery, Landsat scenes, etc.

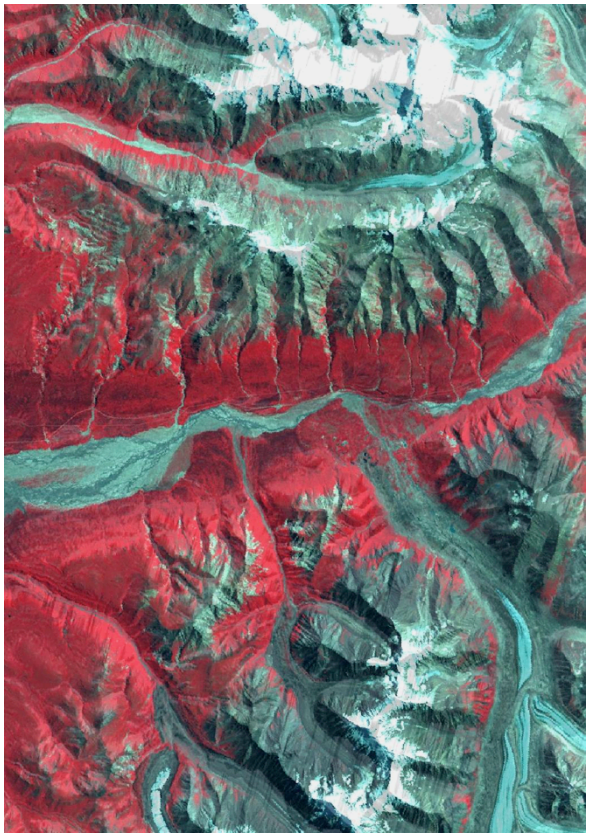
MapReady is easy to install and user friendly, thus paving the way in helping users make their SAR data compatible with other forms of remote-sensing data.

Data Fusion



Landsat

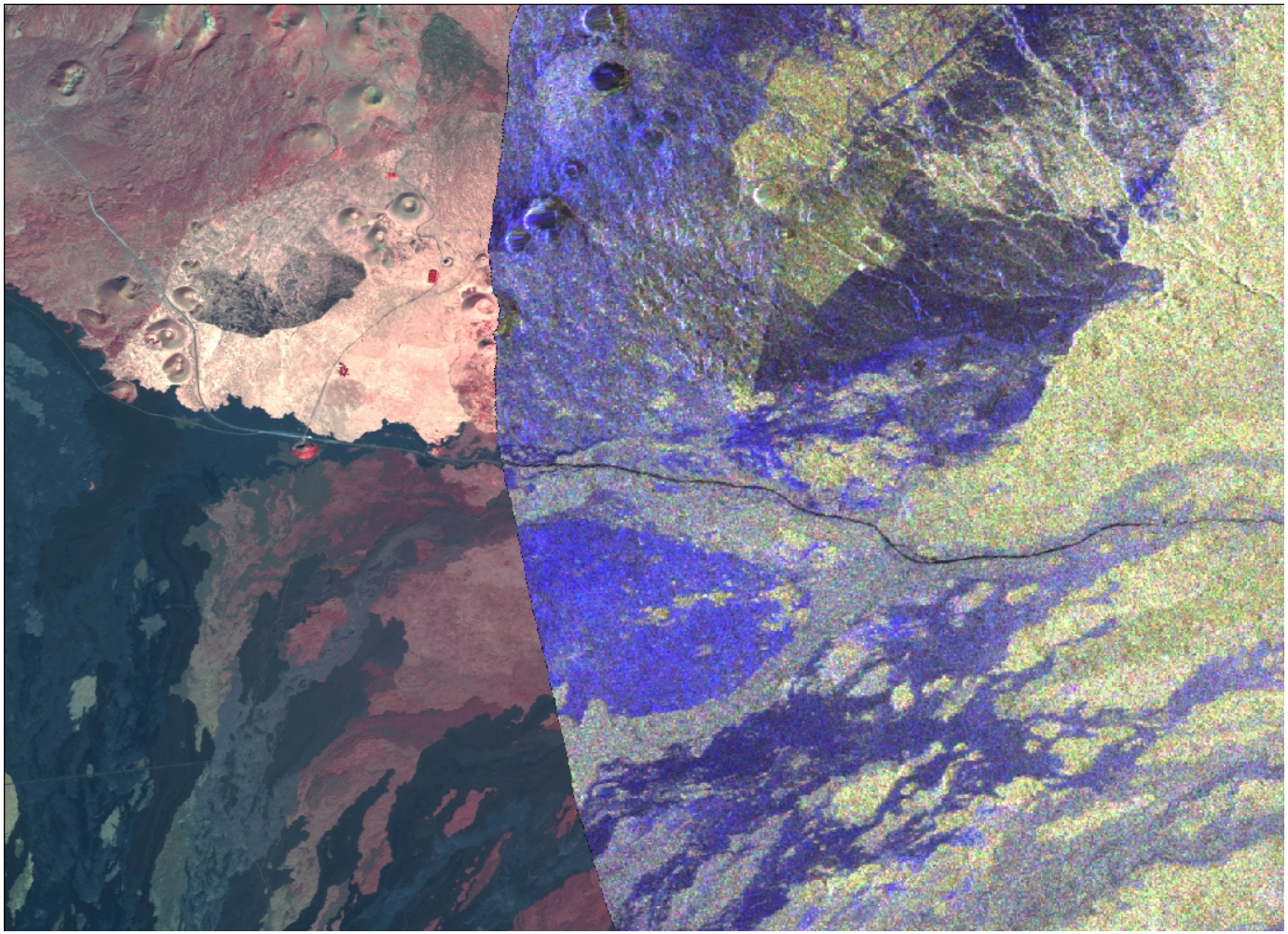
Terrain Corrected SAR



Fused Product

Terrain Correction permits SAR co-registration with other datasets.

GIS Compatibility



Mauna Kea: Pauli Decomposition overlaid onto AVNIR-2 image