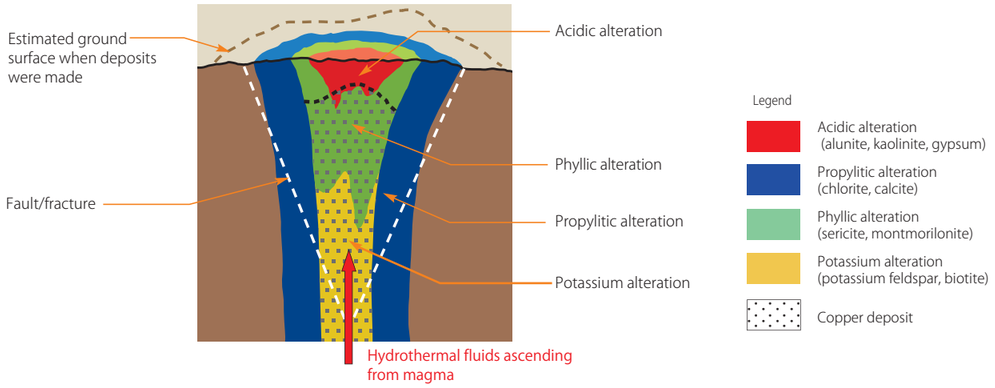
Application to Metallic Ore Exploration

Mineral Exploration using Satellite Data

ASTER SWIR images can be used for extraction of alteration zones associated with mineralization. Target areas for ore exploration are derived from the distribution of alteration zones and mineral deposit models.
Porphyry copper deposits are formed as the result of hydrothermal alteration of minerals due to volcanic activities millions of years ago. The model shown in this page describes its ore genesis.
An area that has a series of alteration zones is likely to have mineral deposits. Remote-sensing technology is used to locate such target areas.

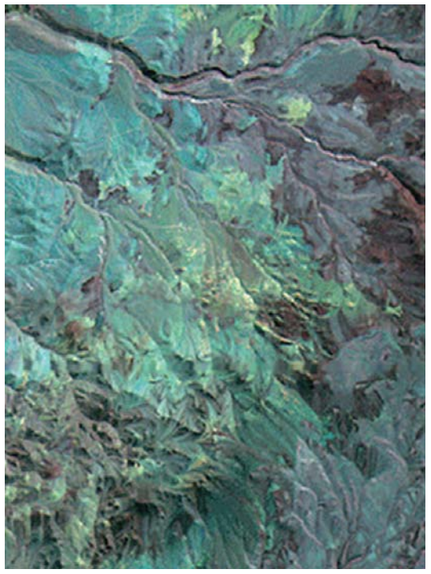


Porphyry copper deposit model

Example of porphyry copper deposit exploration

ASTER VNIR/SWIR composite image

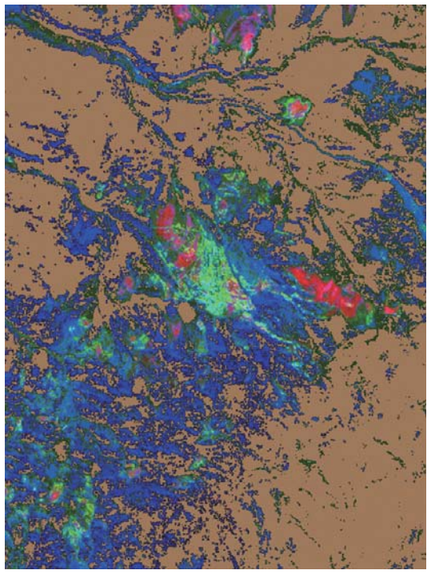
ASTER data is used to assess the existence of alteration rocks such as Kaolinite and Montmorilonite.



Exploradora mine in northern Chile

ASTER SWIR data for Alteration Mapping

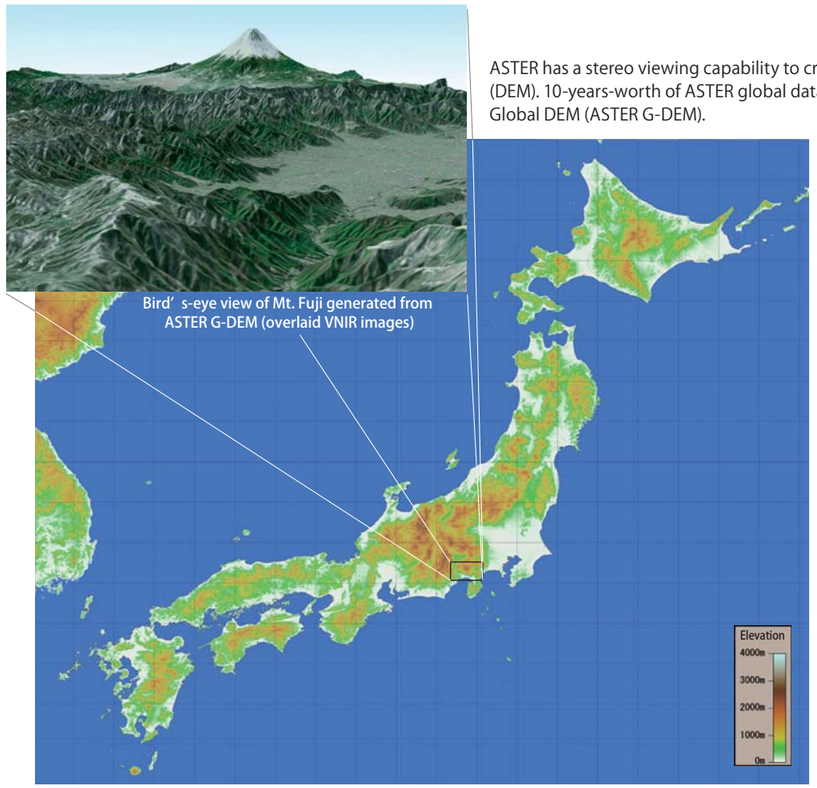
Spectral analysis of ASTER SWIR data can delineate specific mineral alteration zones in its deposit model and identify a region with high copper potential. Such analysis provides valuable information for porphyry copper deposit exploration.



Acidic alteration
Propylitic alteration
Phyllic alteration

Development of Global Datasets

ASTER Global Digital Elevation Model (ASTER G-DEM)



Color elevation slice map of Japan created from ASTER G-DEM

ASTER has a stereo viewing capability to create a digital elevation model (DEM). 10-years-worth of ASTER global data was used to develop ASTER Global DEM (ASTER G-DEM).

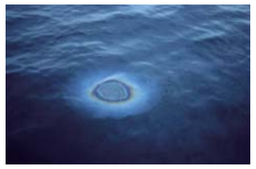
The spatial resolution of ASTER G-DEM is 30 m. Compared to the DEM generated from a single ASTER scene, the vertical resolution of ASTER G-DEM is greatly enhanced by stacking elevation data obtained from multiple stereoscopic observations. ASTER G-DEM seamlessly covers the land areas and an area of interest of any size can be cropped out of it.
ASTER G-DEM supports three-dimensional (3D) visualization of geological information such as a bird's-eye view. In addition to generation of powerful visual maps for resource exploration, ASTER G-DEM can be applied to a wide range of applications including environmental monitoring, disaster prevention, and even entertainment. ASTER G-DEM will be contributed to the Global Earth Observation System of Systems (GEOSS) and used by its member countries around the world.

* Global Earth Observation System of Systems (GEOSS): An international collaborative earth observation system.

Global Oil Slick Database

ERSDAC is developing a database of oil slicks in offshore sedimentary basins for oil exploration.

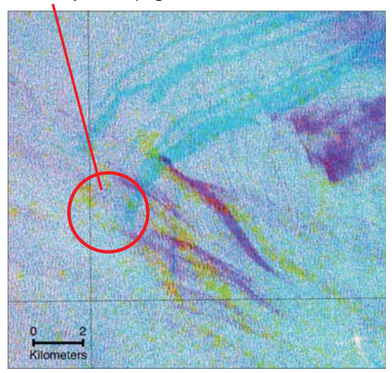
Oil seeps from the ocean floor and floats to the surface (the photo on the left), is carried by wind and waves, and forms an oil slick (oil film) as the photo on the right shows. Oil slicks appear as darker than the water surrounding it in the PALSAR image, because oil slicks make the sea surface smoother and reduce the backscatter of microwave signals transmitted by PALSAR.
ERSDAC is developing a system to display a world map of oil slicks that are thought to have seeped from the ocean floor, which have been detected in the PALSAR data.



Oil shortly after floating to the surface

Oil slick spreading and drifting on sea water

The likely oil seepage location



Mexico Gulf, off the coast of Luisiana , U.S.

Color composite of multi-temporal PALSAR images
Yellow: 2006/6/25, Red: 2006/6/13, Blue: 2006/5/20

The location of where bands of oil slicks appear to originate is the target area of submarine oil seepage.