

Supervised Classification of RADARSAT-2 Polarimetric Data for Different Land Features

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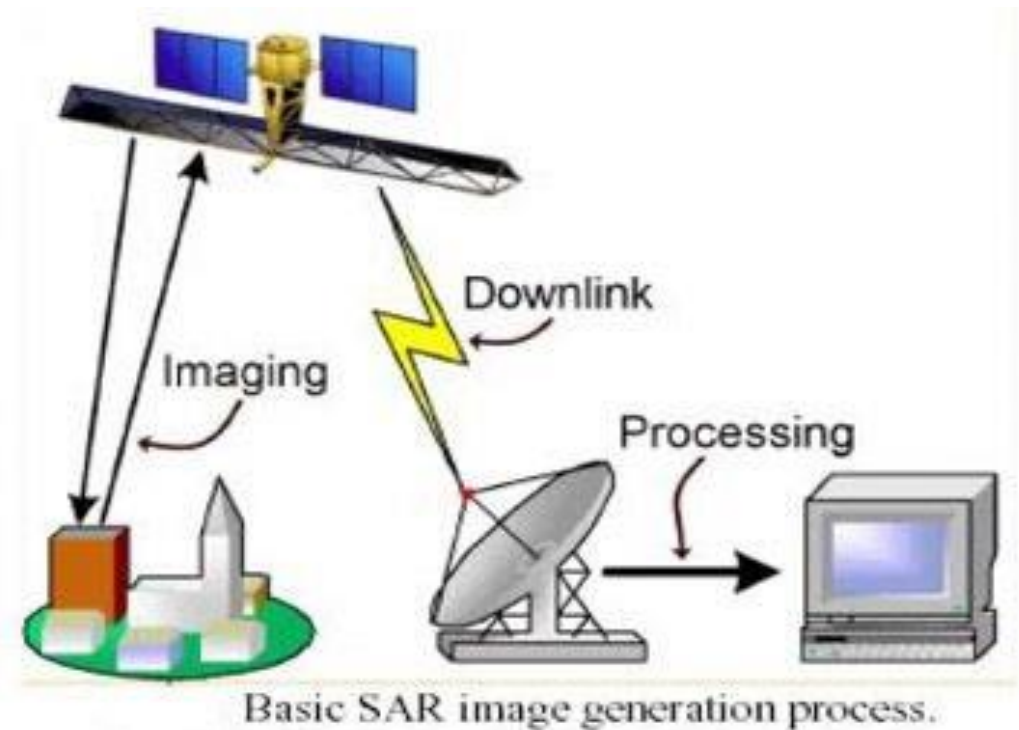
Introduction

- **Synthetic Aperture Radar (SAR)**

Synthetic aperture radar (SAR) bounces a microwave radar signal off the Earth's surface to detect physical properties.

- **Available SAR systems**

ALOS-PALSAR, RADARSAT, TerraSAR-X, TanDEM-X, RISAT, COSMO-Skymed, KOMPSat-5



Advantages and Applications

- **Advantages**

- synthetic aperture radar (SAR) can "see" through darkness, clouds, and rain, detecting changes in habitat, levels of water and moisture, effects of natural or human disturbance, and changes in the Earth's surface after events such as earthquakes etc.

- **Applications**

- Studying Ice and Snow
- Tracking oil spills and ship movements
- Mapping different landforms
- Studying changes in cropland and urban settlements



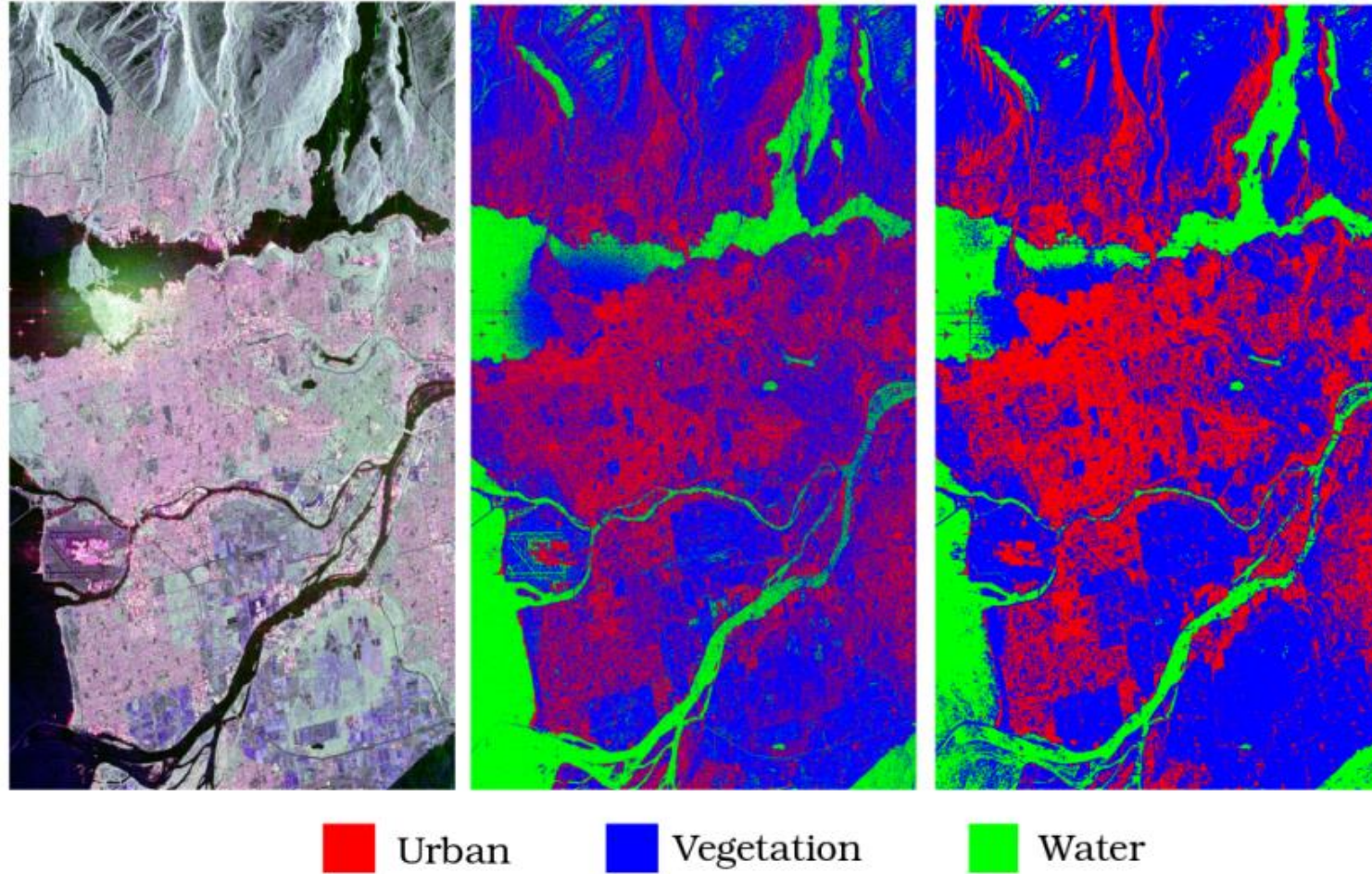
Image credits: optical image (top): DigitalGlobe; SAR image (bottom): MDA

RADARSAT-2

- RADARSAT-2 is an Earth observation satellite. The Satellite has a C-band Synthetic Aperture Radar (SAR) with multiple polarization modes, including a fully polarimetric mode in which HH, HV, VV and VH polarized data are acquired. Its highest resolution is 1 m in Spotlight mode (3 m in Ultra Fine mode). In ScanSAR Wide Beam mode the SAR has a nominal swath width of 500 km and an imaging resolution of 100 m.
- It is filling a wide variety of application, including sea ice mapping and ship routing, iceberg detection, agricultural crop monitoring, marine surveillance for ship and pollution detection, terrestrial defence surveillance and target identification, geological mapping, mine monitoring, land use mapping, wetlands mapping, topographic mapping.



Images after Classification



(a) PauliRGB and classification based on supervised (b) SVM (c) Wishart classifiers

["Supervised Classification of RADARSAT-2 Polarimetric Data for Different Land Features."](#) arXiv preprint [arXiv:1608.00501](#) (2016).

Results

CLASS	Urban	Vegetation	Water
Urban	87.78	0	12.22
Vegetation	0	99.95	0.05
Water	9.41	0.16	90.43

TABLE I
WISHART CONFUSION MATRIX WITH OVERALL CLASSIFICATION
ACCURACY (IN %)

CLASS	Urban	Vegetation	Water
Urban	72.53	0.25	27.22
Vegetation	0	97.70	2.30
Water	10.53	6.17	83.30

TABLE II
SVM CONFUSION MATRIX WITH OVERALL CLASSIFICATION ACCURACY
(IN %)

Conclusion

- Fully Polarimetric data has significant contribution for urban and tropical vegetation cartography.
- Wishart has a good potential for Polarimetric SAR (PolSAR) data classification.