



Centre Spatial de Liège
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Université de Liège, Belgium



GEMITOR

GEoréférencement Multimodal d'Images Tridimensionnelles Optiques et Radar

MULTIMODAL GEOREFERENCING of 3D VHR OPTICAL and X-BAND SAR IMAGERY

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OUTLINES

- Context
- Last studies
- New studies
- Future work



CONTEXT

Two constellations:
PLEAIDES and CosmoSkyMed



ORFEO
Optical and Radar Federated Earth Observation



PhD project: GEMITOR



GEMITOR

- Examine the impact of VHR on existing techniques;
- Develop and implement new algorithms, as required;
- Test InSAR/DInSAR algorithms on simulated X-band VHR Cosmo-SkyMed SAR image;
- Develop multimodal coregistration methods to bring the optical and SAR modalities into the same geographical reference system.



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**Quickbird
panchromatic
image**



**Simulated
CosmoSkyMed
image**

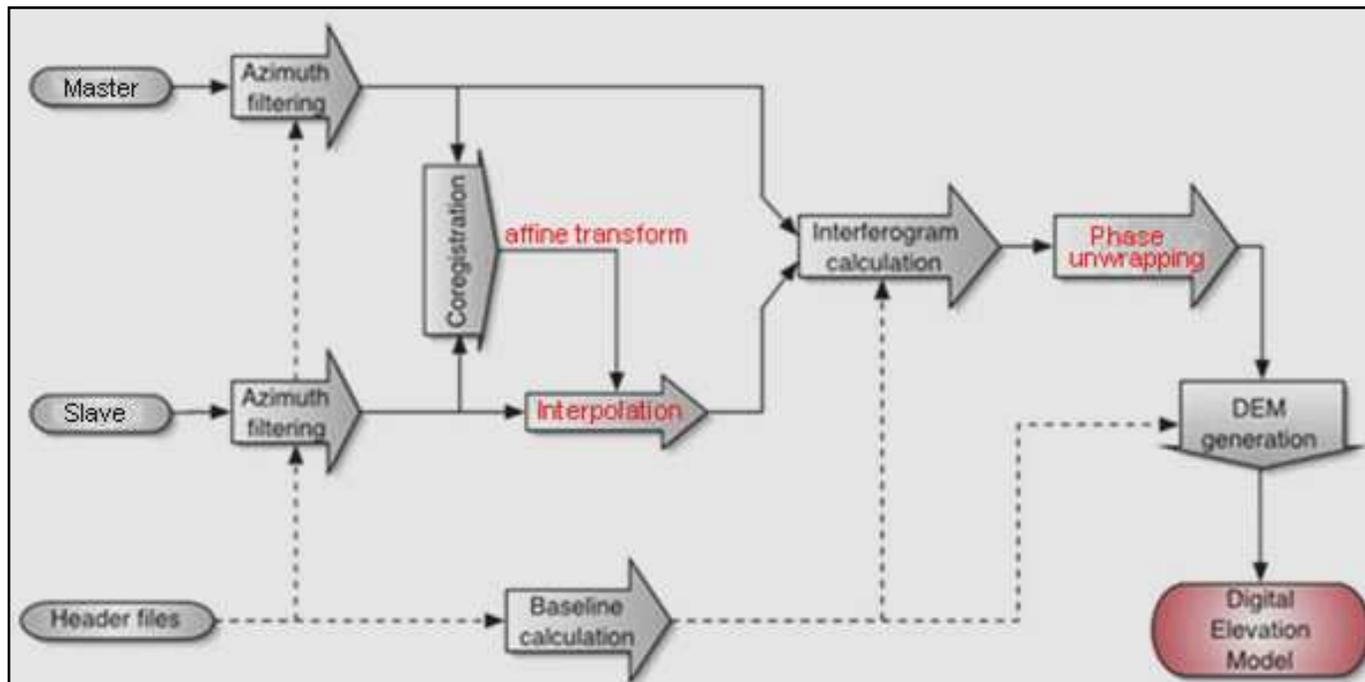


range



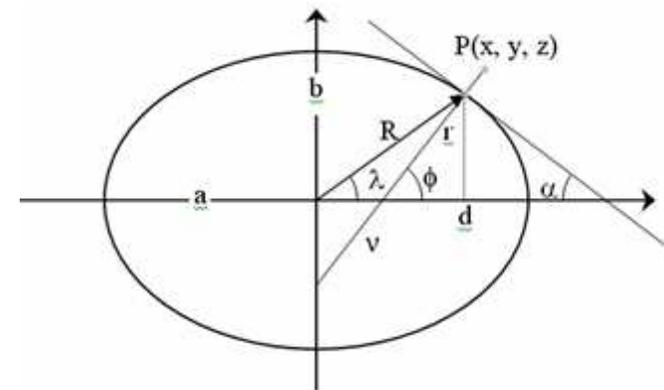
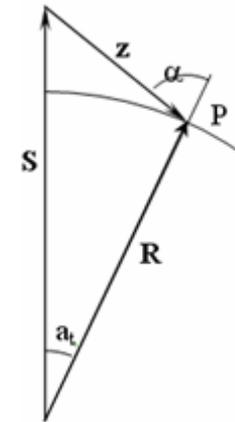
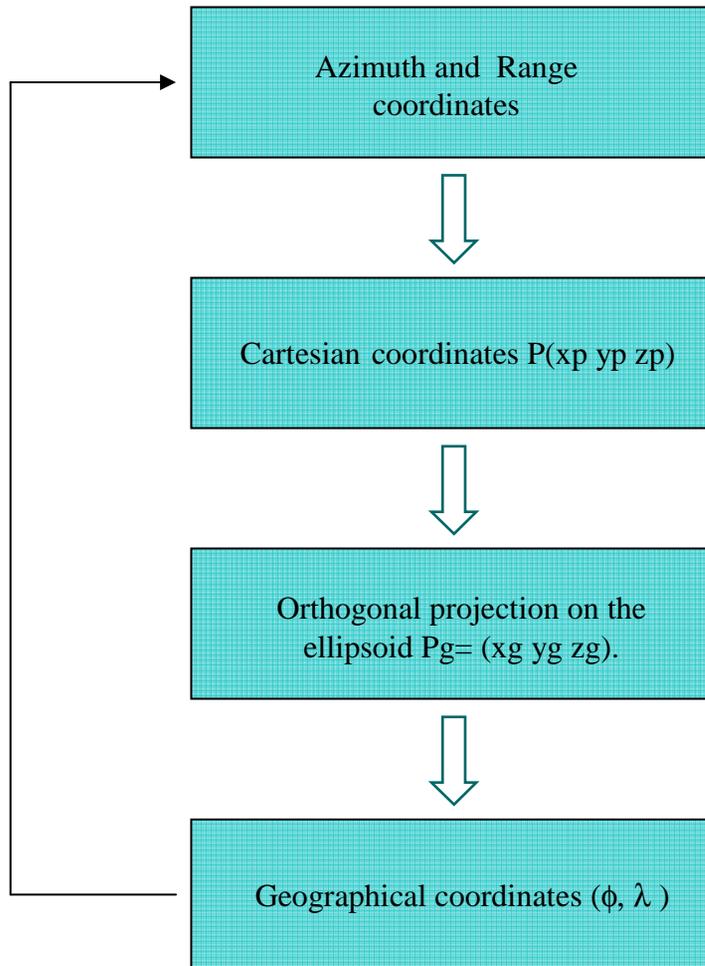
azimuth

InSAR Testing



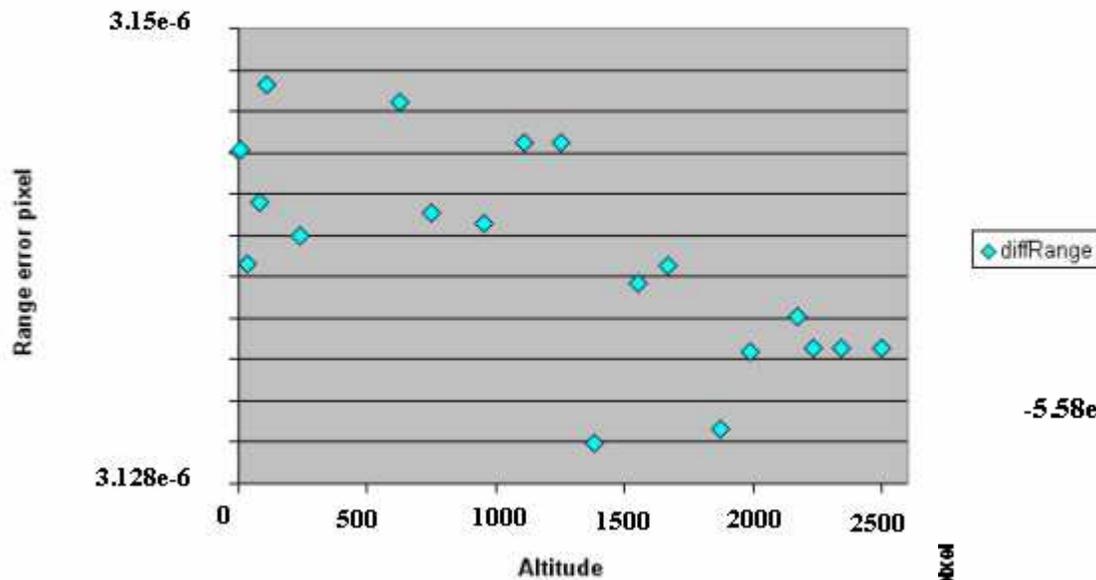
Geocoding Algorithm

The inverse process

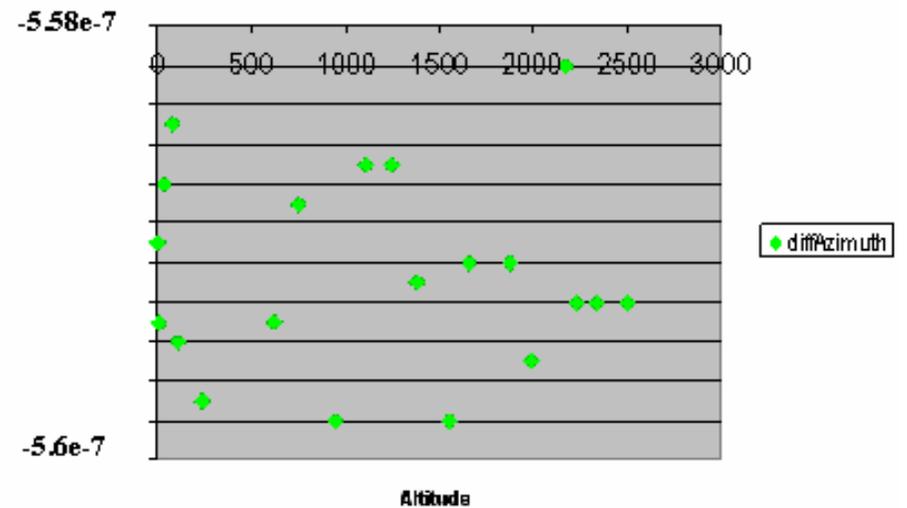


Geographical Accuracy 1

Range estimation v/s altitude differences



Azimuth estimation v/s altitude differences





Geographical Accuracy 2

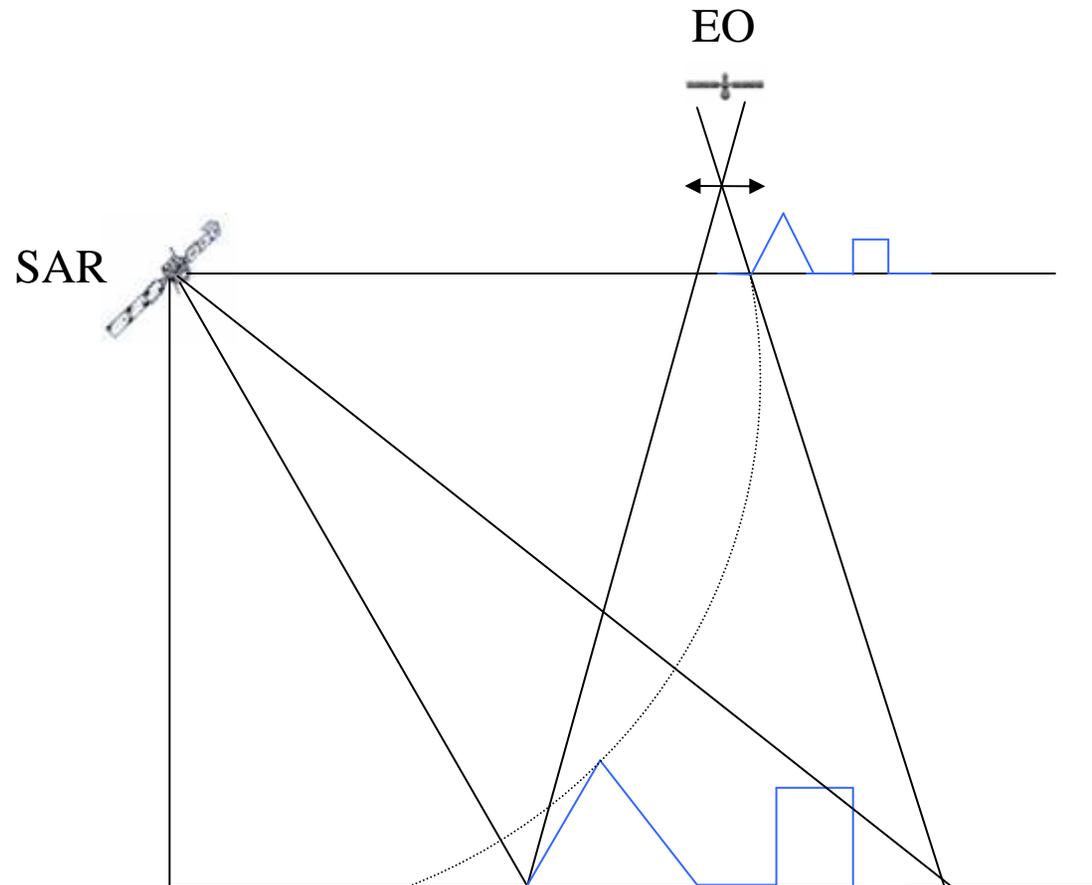
	Doppler centroid frequency	Altitude	Coordinate pixel
Range average	6.6e-08	3.1e-06	5.8e-07
Azimuth average	5.5e-07	5.59e-07	4.4e-07
Range standard deviation	3.5e-06	5 e-09	2 e-06
Azimuth standard deviation	3.5e-08	4.9e-10	1.5e-06



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Registration Problem

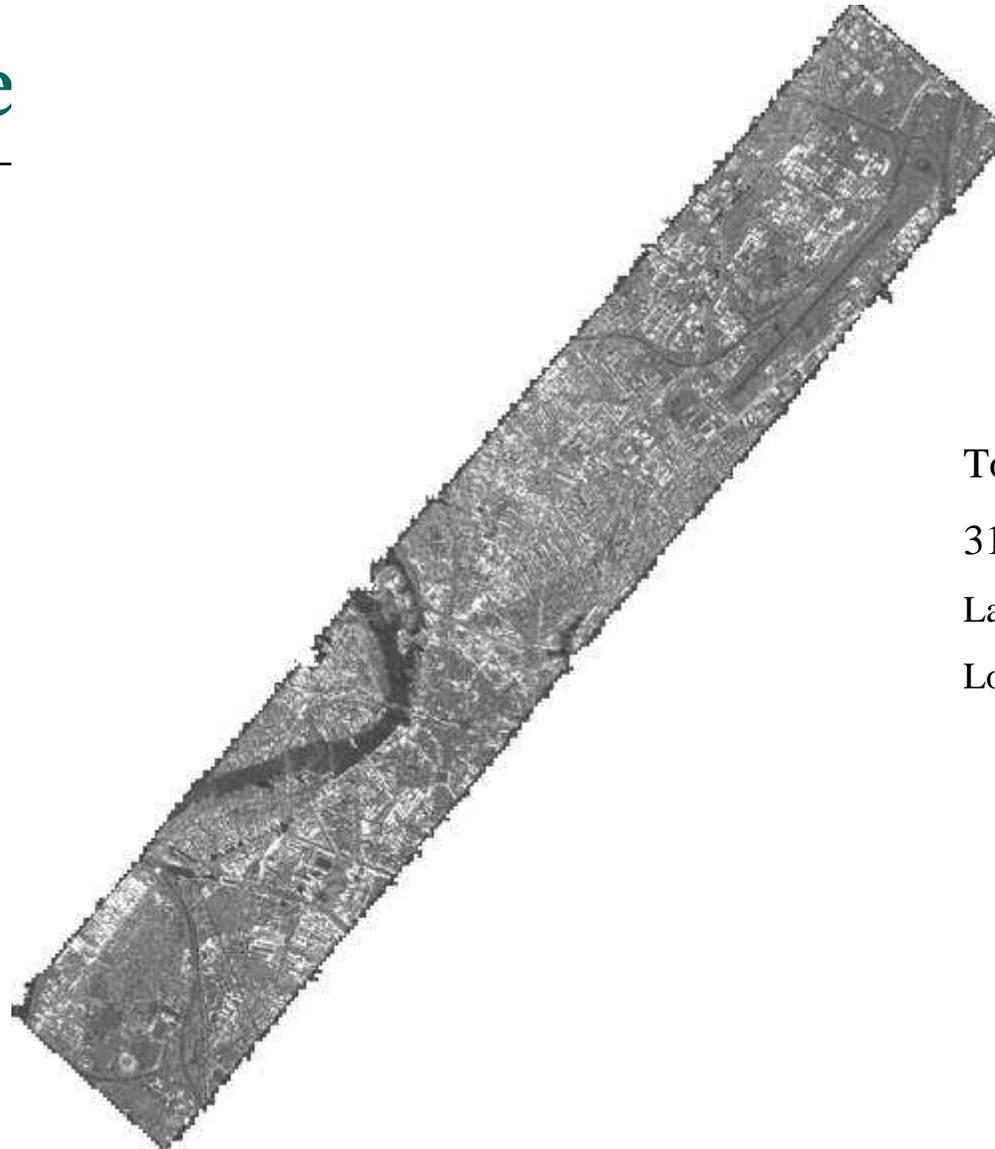




Geore

mage

DEM UTM

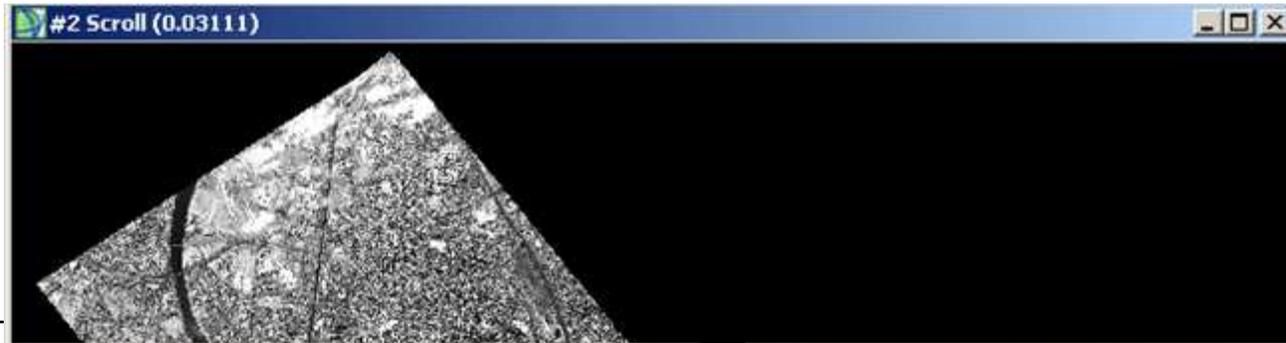


Toulouse UTM

31T

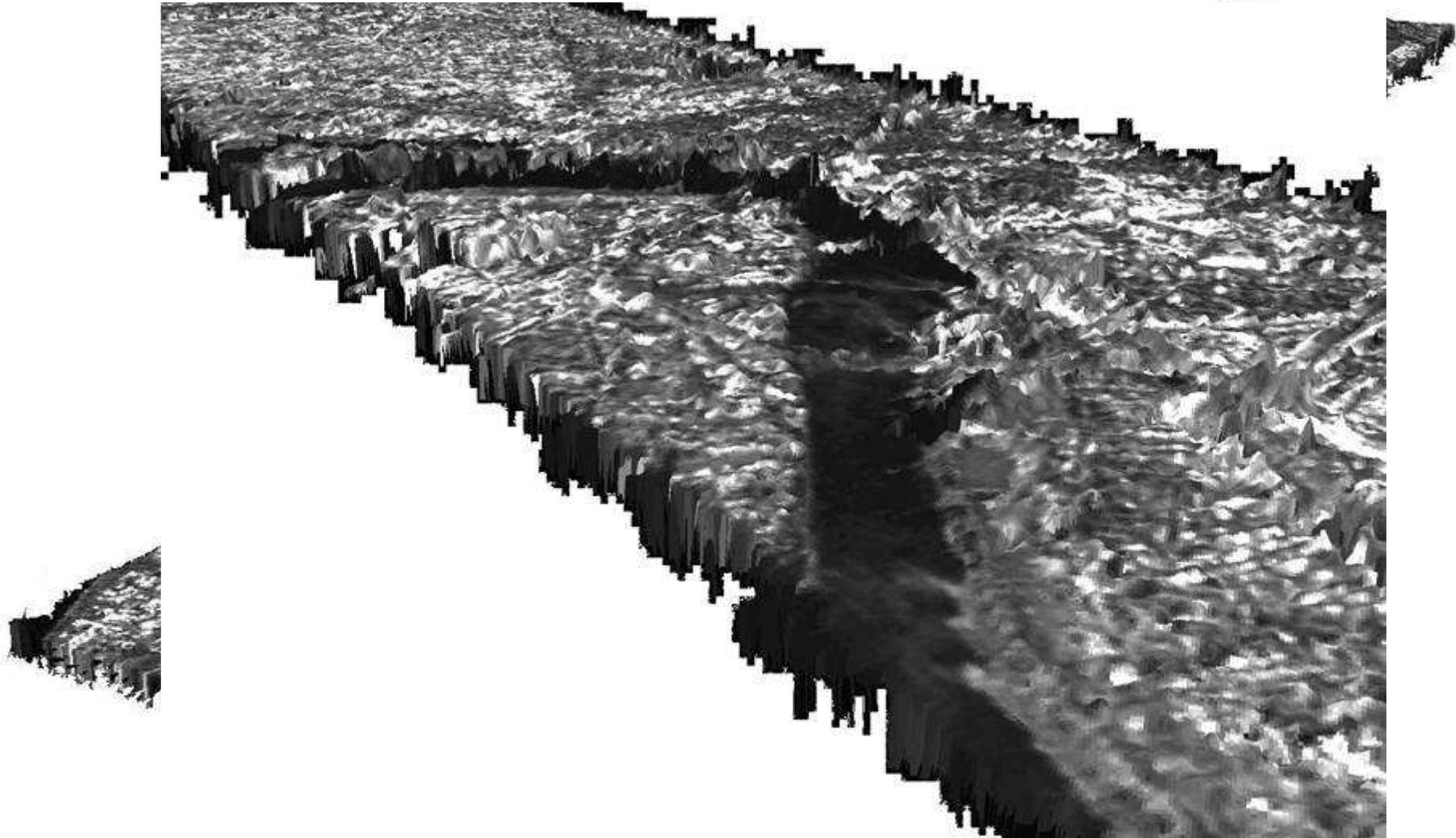
Lat=43.53°

Lon=1.46°





3D VIEWER





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Georeferencing of SAR Image 1

latitude ϕ

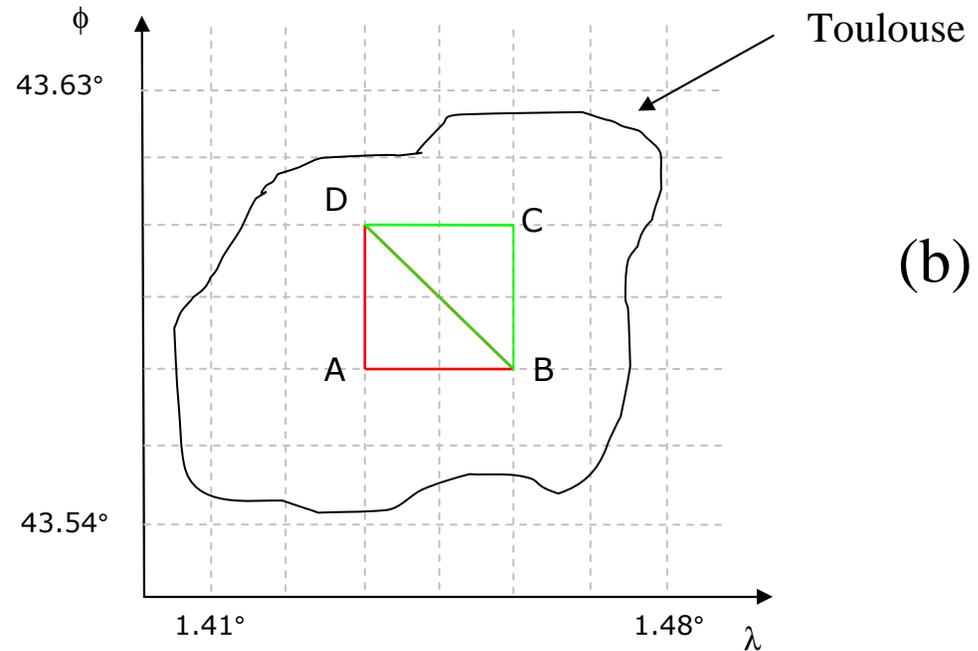
longitude λ

altitude h

intensity I

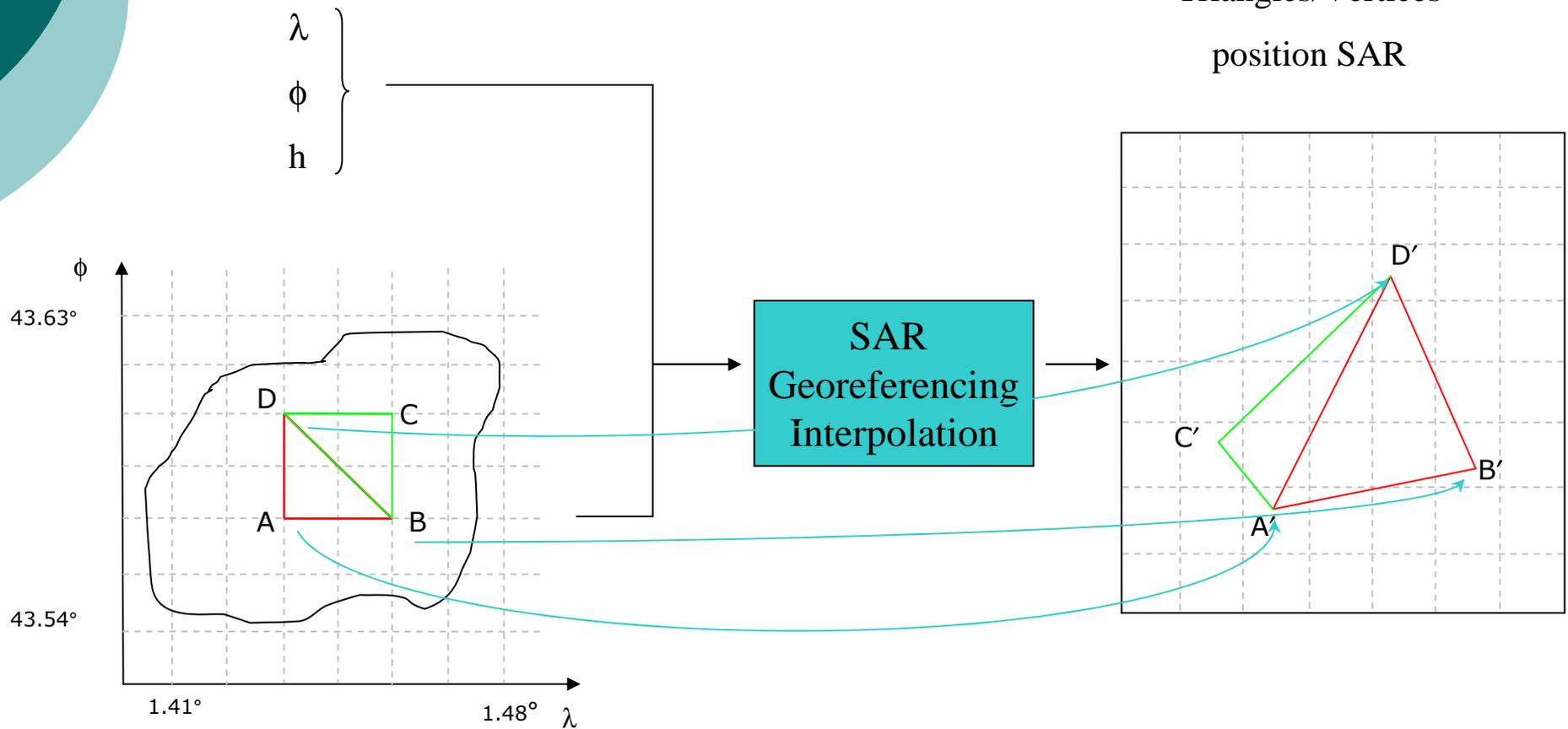
(a)

selected grid



(b)

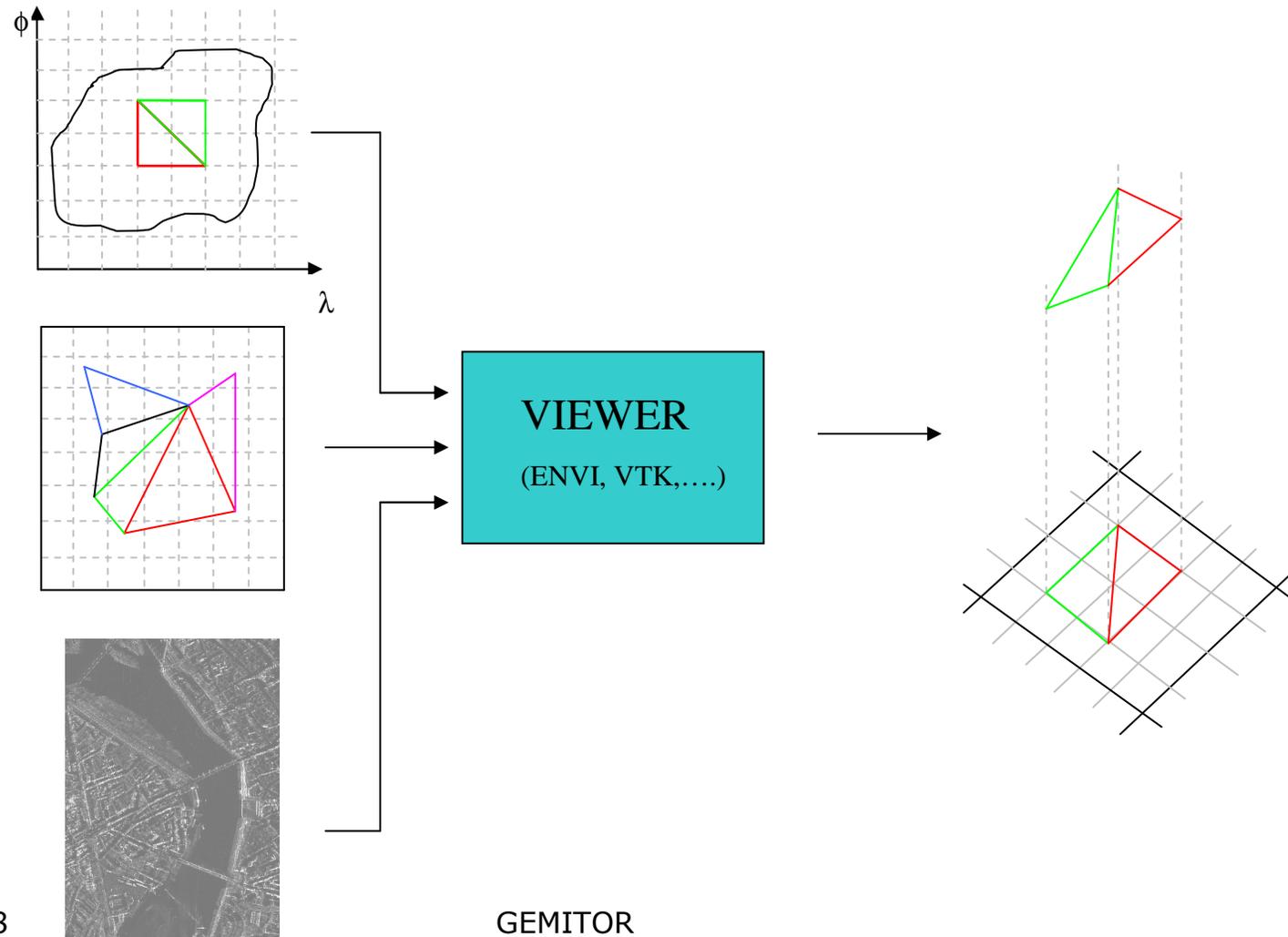
Georeferencing of SAR Image 2



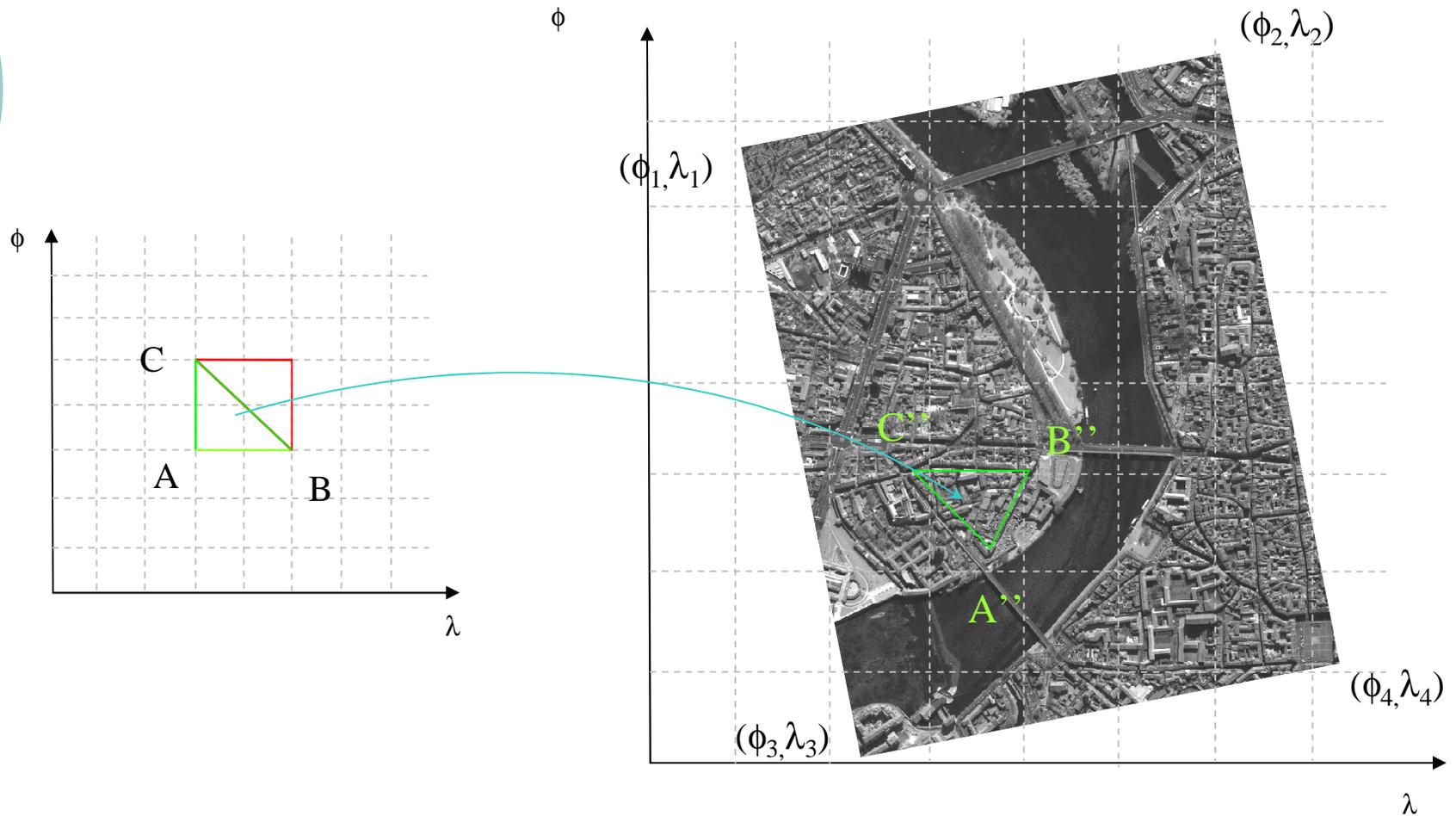
Triangles/Vertices
position SAR

3D VIEWER & NAVIGATION

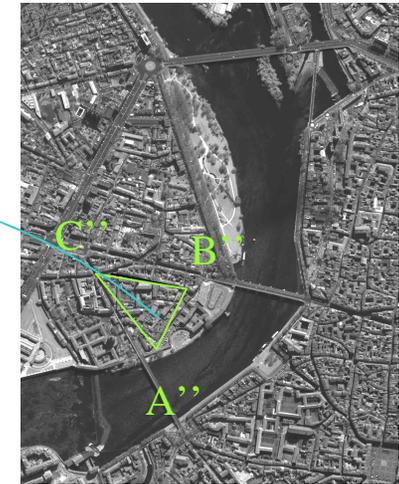
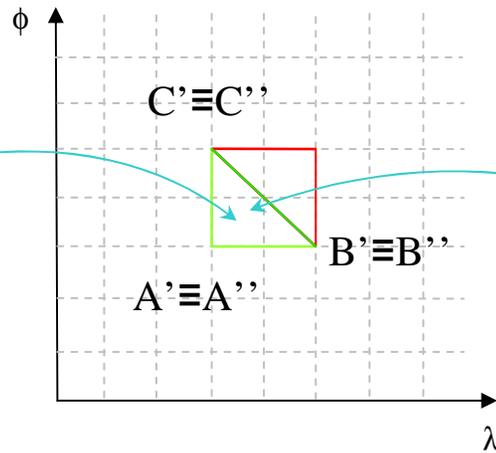
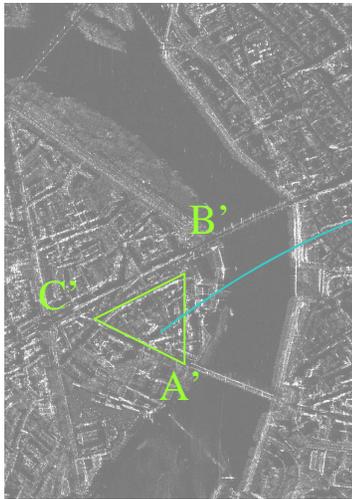
(texture mapping for SAR)



Geographical Grid on EO Image



Registration



Registration



Thank you for your attention!