



# IRS-P5 Cartosat-1

## Stereo Pairs and the generation of DEM

Bertrand Saint-Guilhem



# Who we are, how we are linked



- 13 employees
- 100% subsidiary of GAF AG
- data reception, standard processing & image interpretation
- 12 years experience in data distribution.

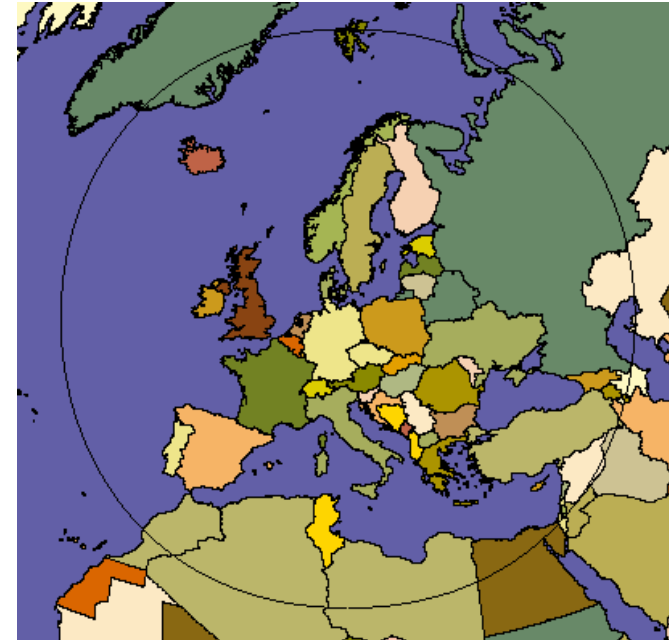


- 140 employees
- more than 20 years experience in remote sensing, software development and project management world wide
- ortho processing, mosaicing, enhancement.



- is GAF's sole shareholder.

# Neustrelitz Ground Station

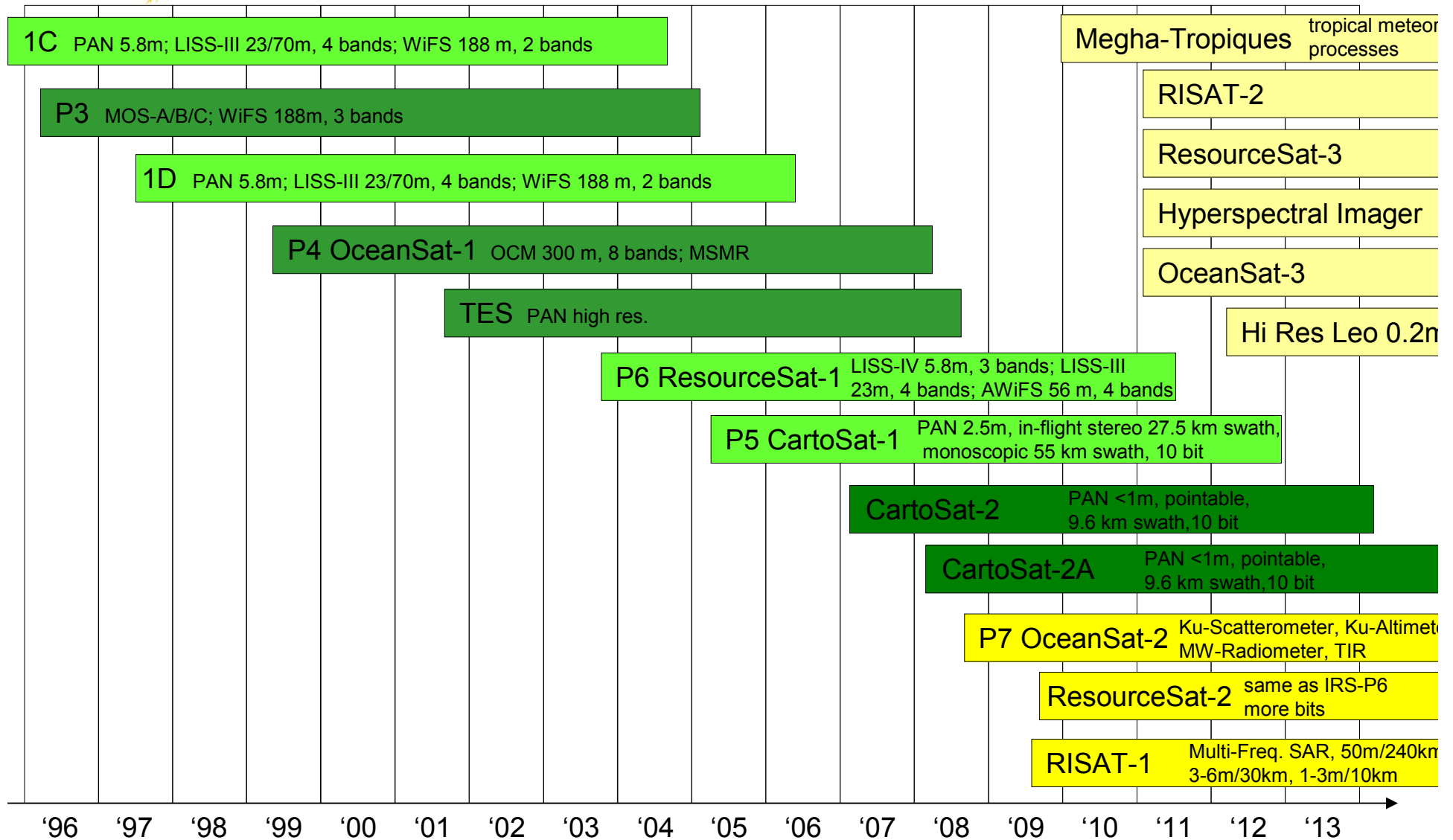


Located at the German Aerospace Center  
(DLR) in Neustrelitz

Operated by Euromap and DLR staff



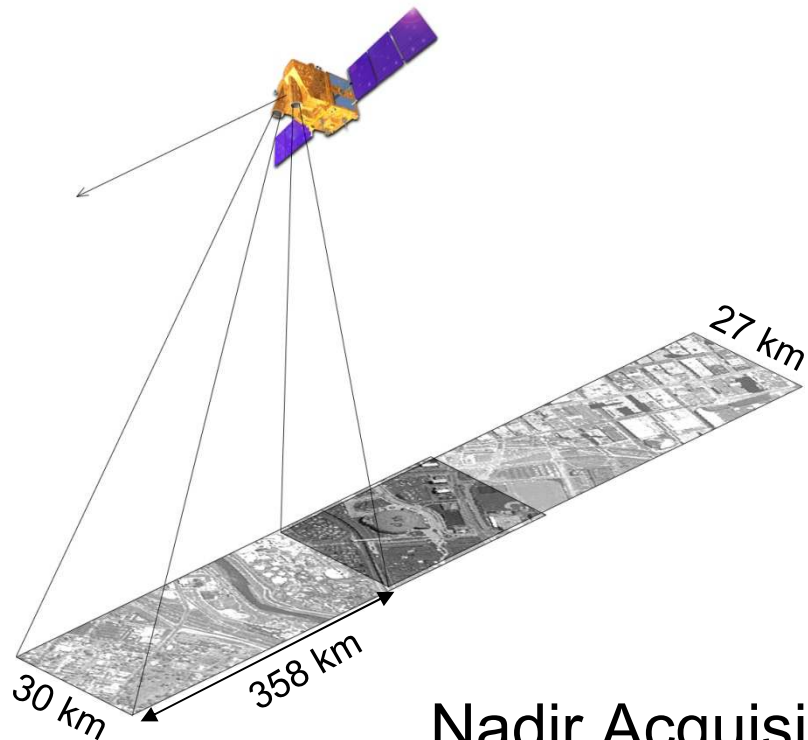
# Indian Earth Observation Program



# Data Acquisition Strategy

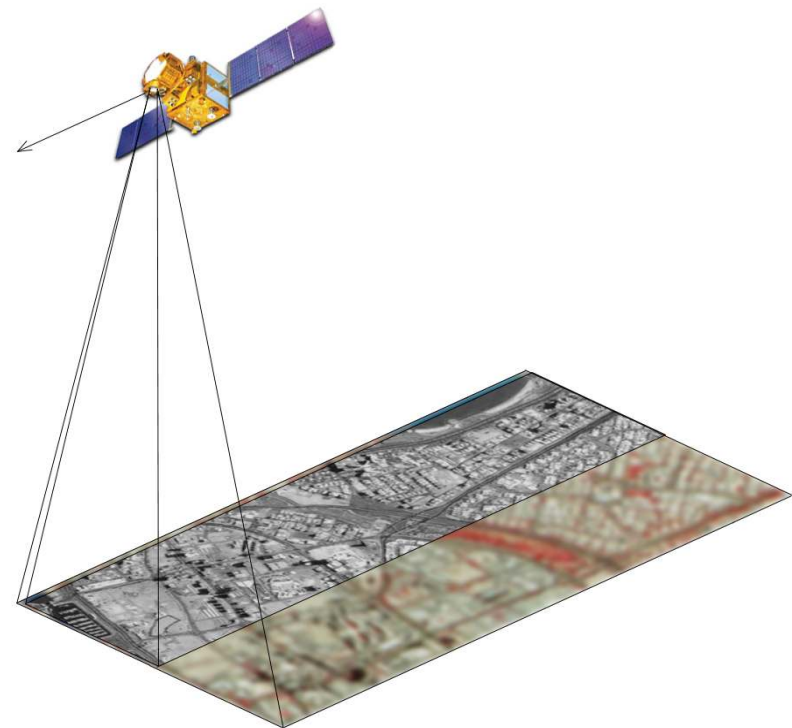
- IRS-P5 Cartosat-1 Stereo

Altitude: 618 km



- IRS-P6 Resourcesat-1

Altitude: 817 km



Nadir Acquisition

Collection of contiguous coverages



1- IRS Cartosat-1 Stereo Pairs

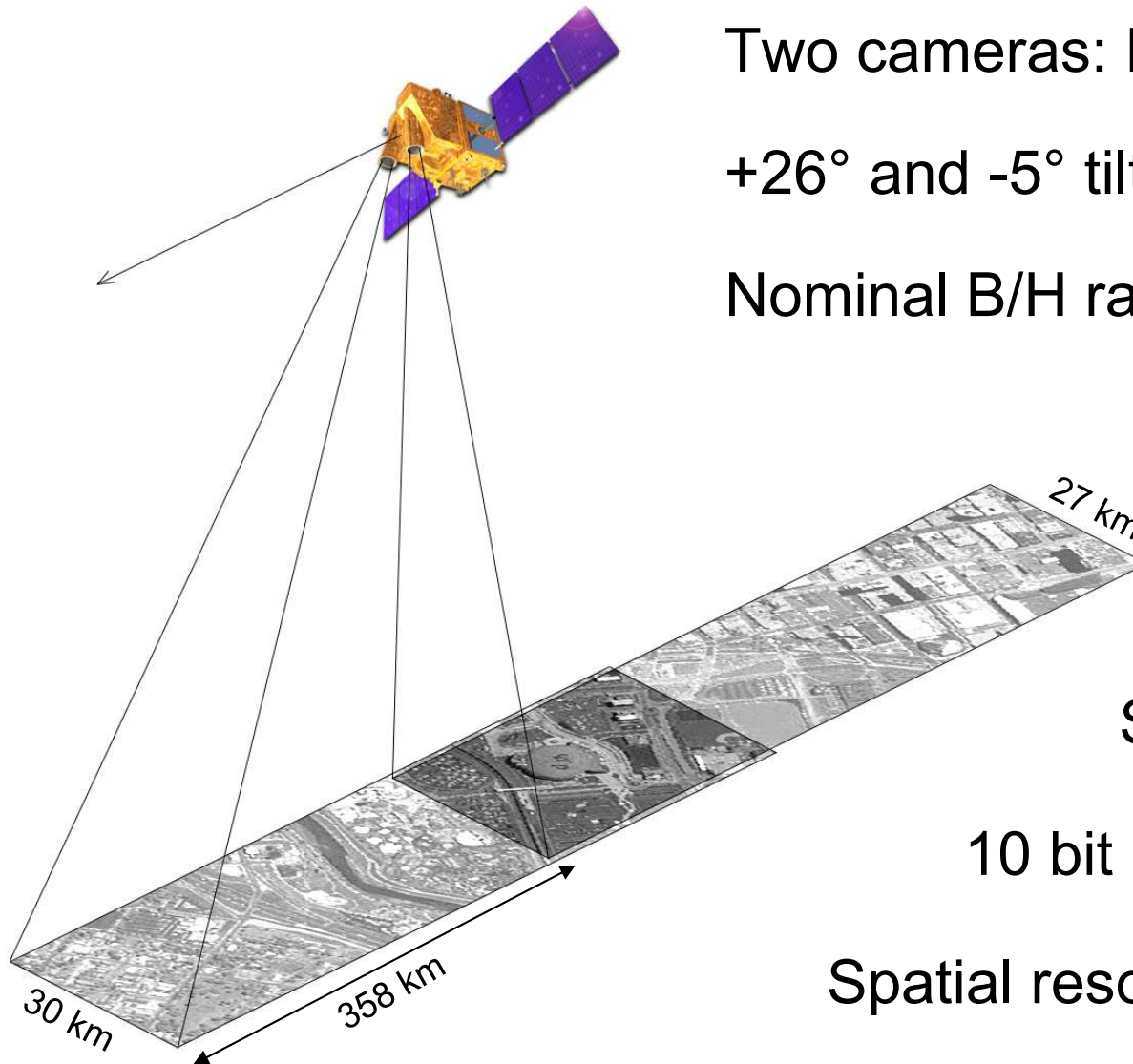
2- IRS-P6 Resourcesat-1

# In Flight Stereo

Two cameras: PAN-Fore & PAN-Aft

+26° and -5° tilt along the track

Nominal B/H ratio 0.62

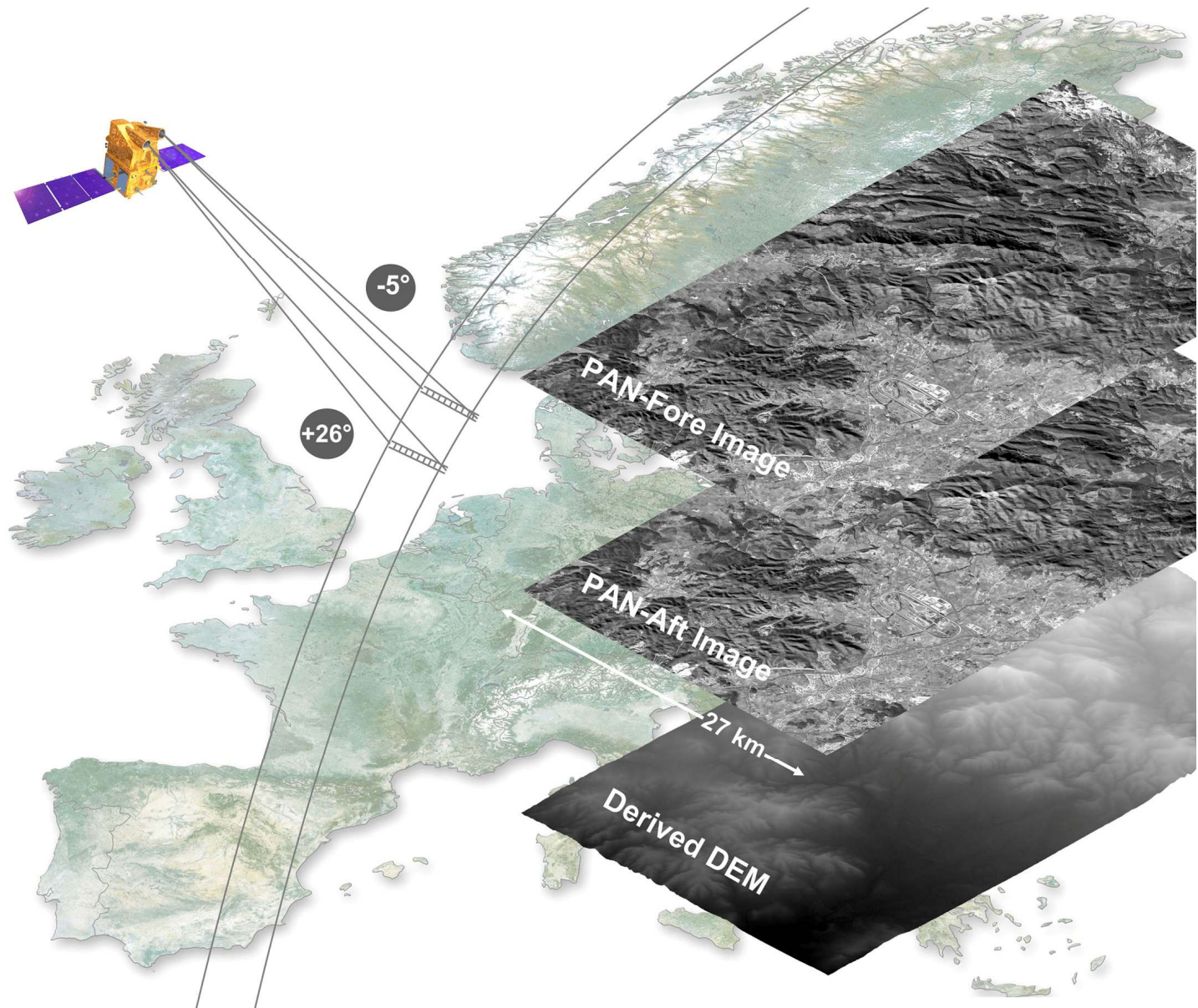


Swath 27.5 km

10 bit resolution

Spatial resolution 2.5 m

# In Flight Stereo





Algier

IRS-P5 PAN-Aft

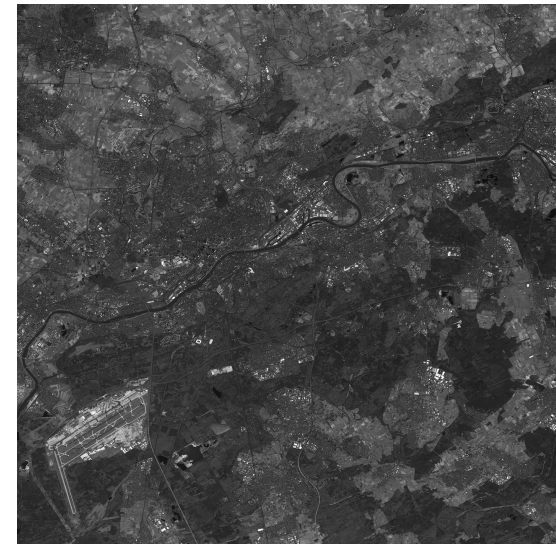
2.5 m / 10 bit / 27 km / PAN



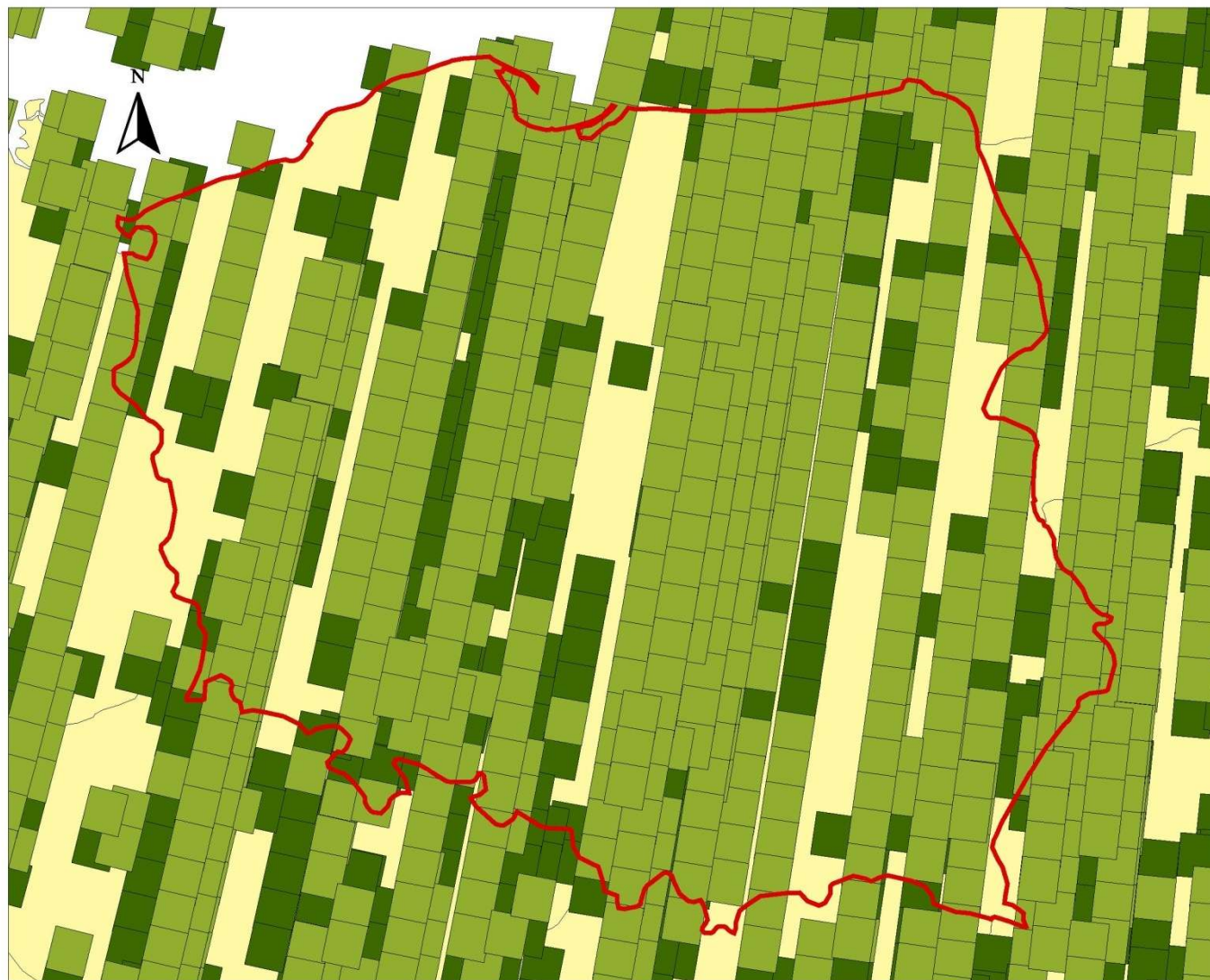
# Cartosat-1 over Frankfurt





PAN-Aft acquired  
on 1. April 2009



# Poland: IRS-P5 Stereo Coverage - Cloudfree



Layer Stacking:

-  [cc] = 0  
10-Nov-07 - 26-May-09
-   $0 < [cc] \leq 10$   
10-Nov-07 - 26-May-09

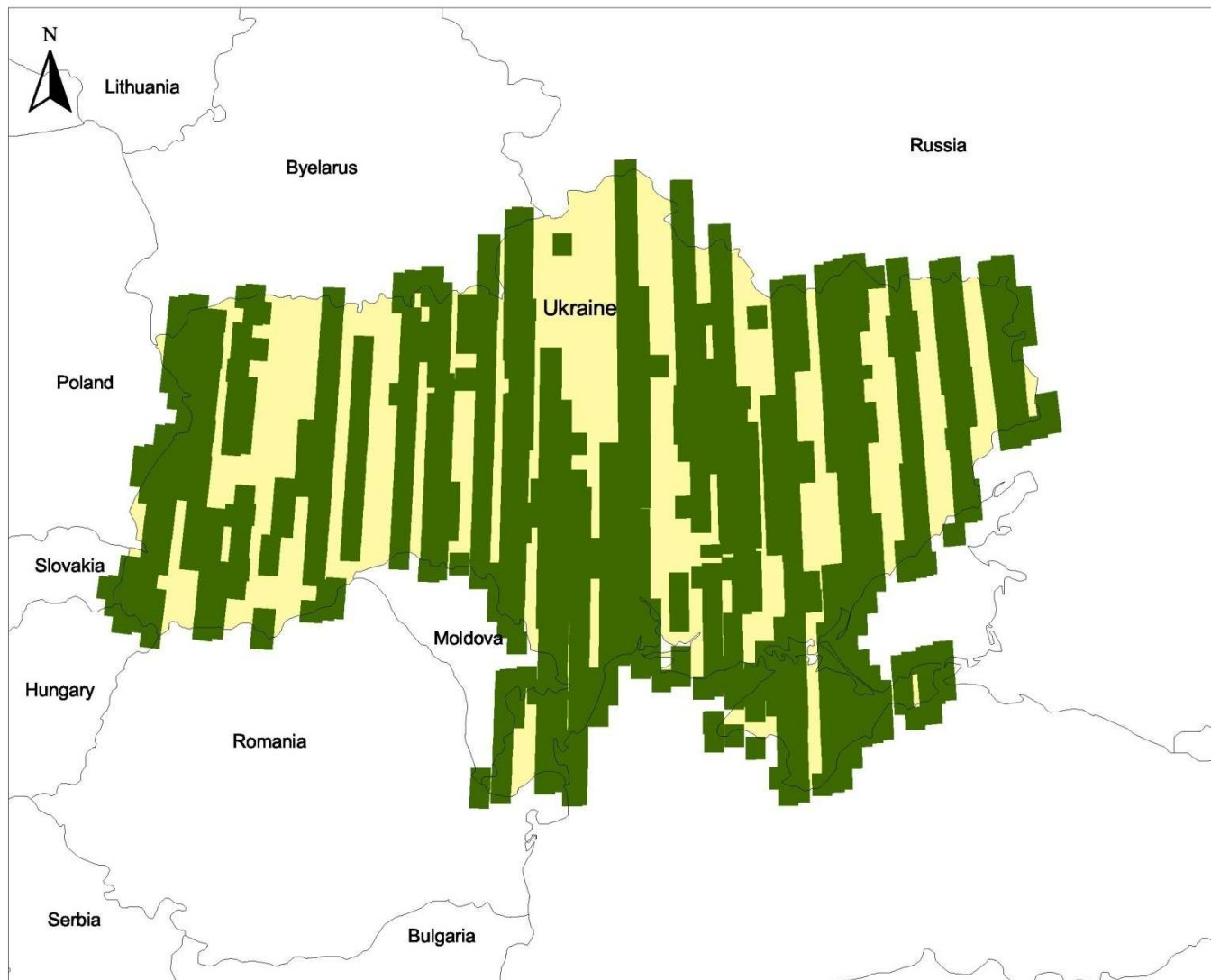
Data considered until:  
26-May-2009

0 100 Kilometers



Copyright 2009 Euromap GmbH Neustrelitz

# Ukraine: IRS-P5 Stereo Coverage - Cloudfree



Layer Stacking:

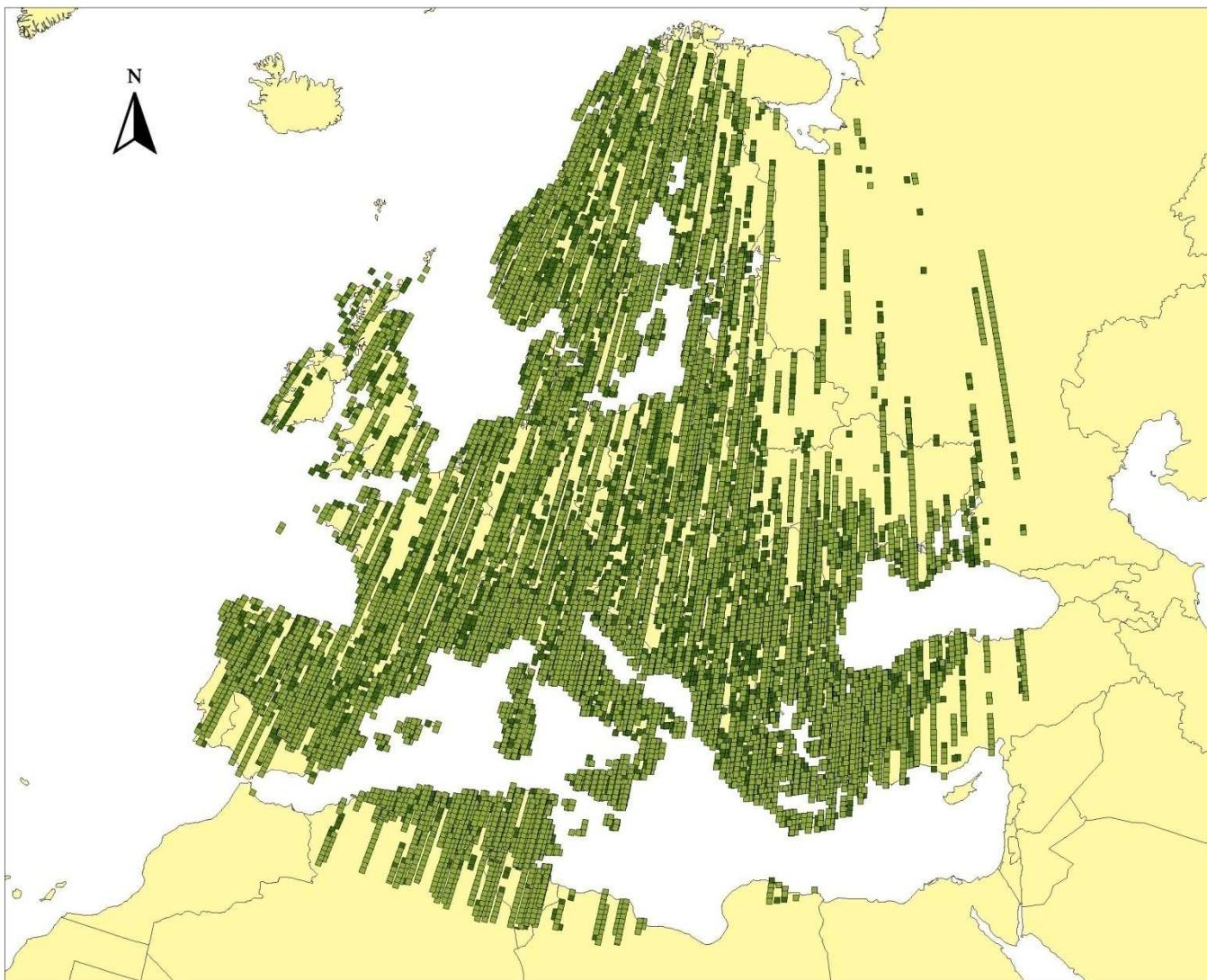
0 <= [cc] <= 10

0 300 Kilometers



Data considered until:  
19-Mar-2009

Copyright 2009 Euromap GmbH Neustrelitz

# Europe: IRS-P5 Stereo Coverage - Cloudfree



Layer Stacking:

-  [cc] = 0  
10-Nov-07 - 24-Apr-09
-   $0 < [cc] \leq 10$   
10-Nov-07 - 24-Apr-09

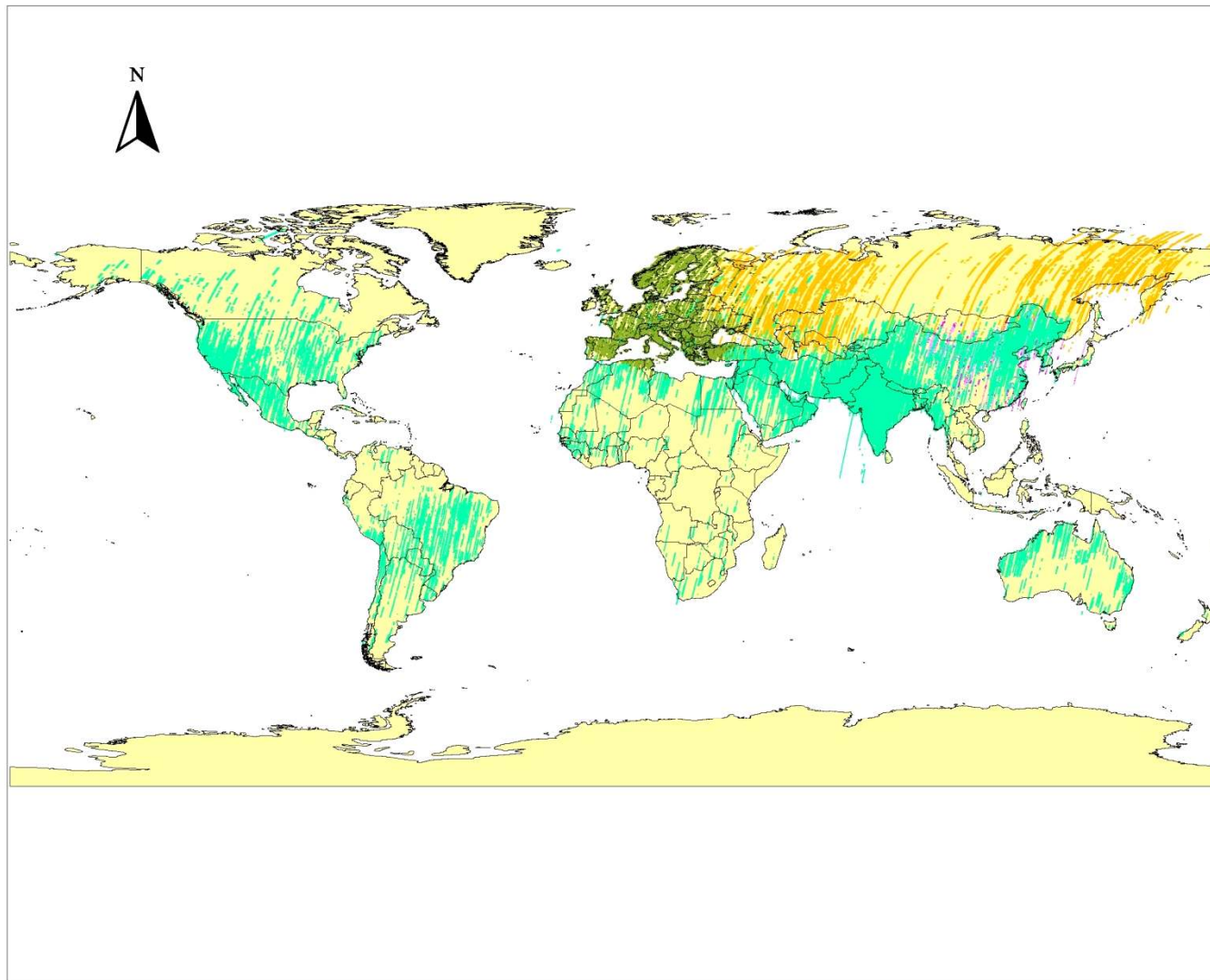
Data considered until:  
24-Apr-2009

0 1000 Kilometers





Copyright 2009 Euromap GmbH Neustrelitz


# IRS-P5 Stereopairs World





## Layer Stacking:


 [cc] = 0  
10-Nov-07 - 25-Feb-09

  $0 < [cc] \leq 10$   
10-Nov-07 - 25-Feb-09


 [cc] = 0  
12-May-05 - 12-Feb-09

 [cc] = 0  
03-May-07 - 01-Sep-08

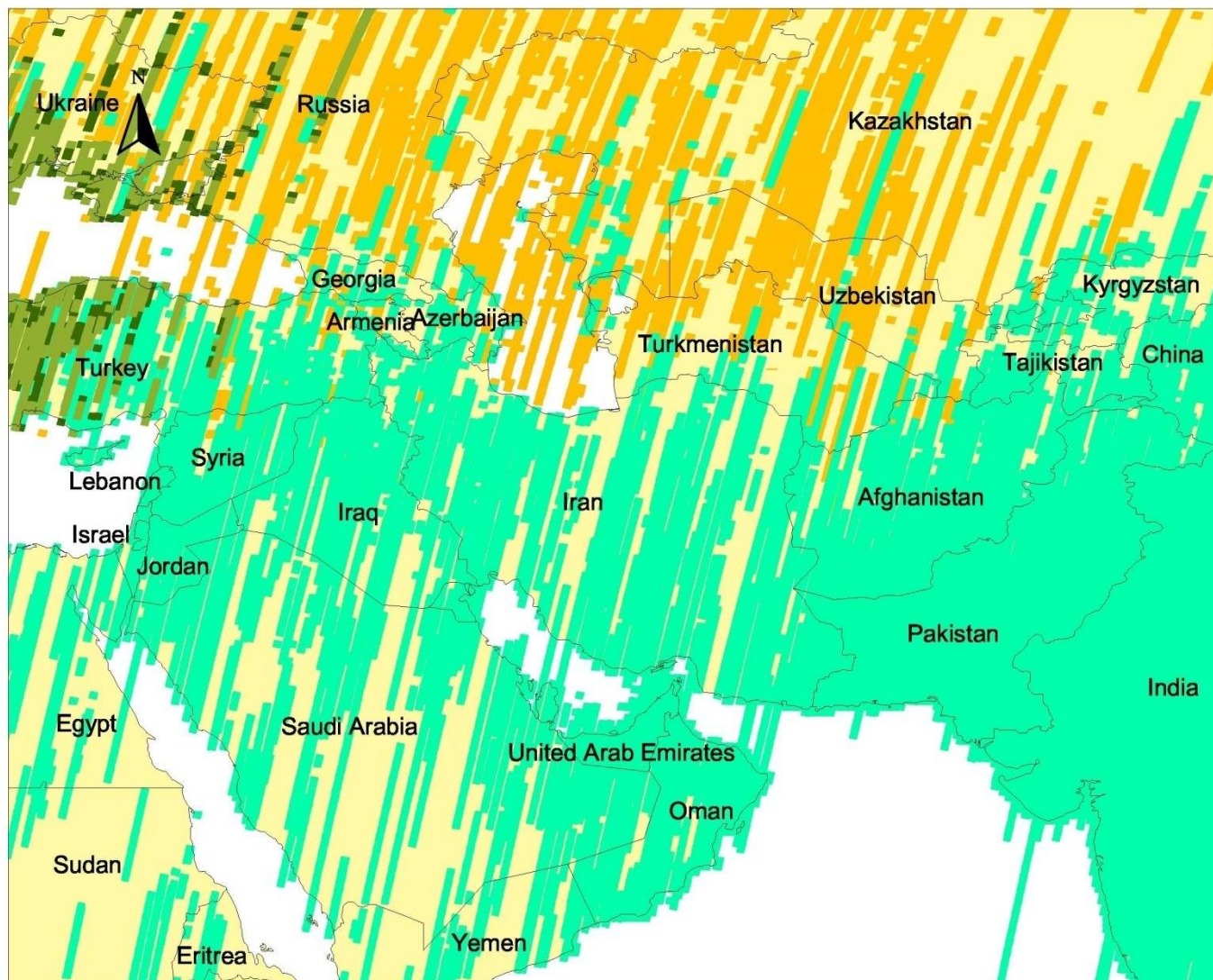
 [cc] = 0  
16-May-08 - 21-Jan-09

  $0 < [cc] \leq 10$   
16-May-08 - 21-Jan-09




Data considered until:  
25-Feb-2009

0 1000 Kilometers  


# Middle East: IRS-P5 Stereo Coverage - Cloudfree



Layer Stacking:

-  [cc] = 0  
10-Nov-07 - 06-Mar-09
-  0 < [cc] <= 10  
10-Nov-07 - 06-Mar-09
-  [cc] = 0  
12-May-05 - 12-Feb-09
-  [cc] = 0  
03-May-07 - 01-Sep-08

Data considered until:  
06-Mar-2009

0 1000 Kilometers

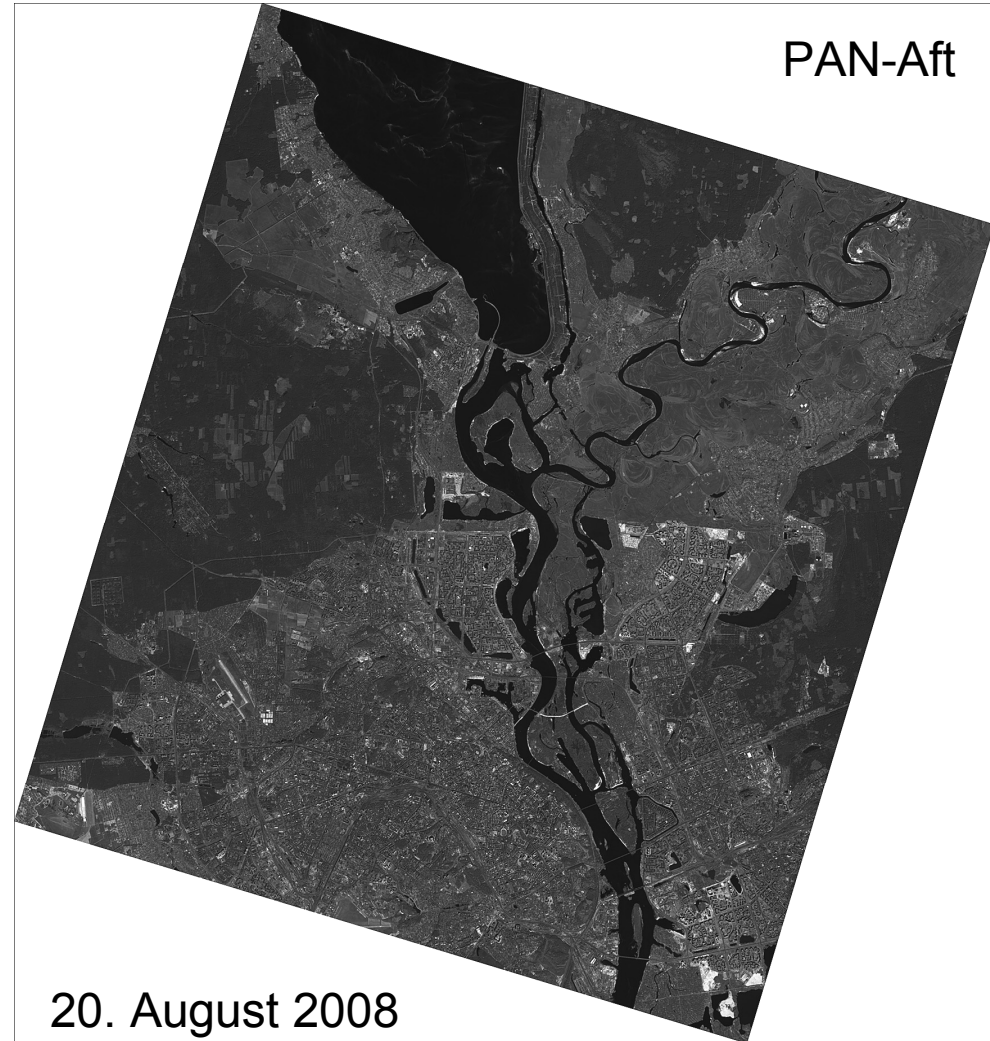


Copyright 2009 Euromap GmbH Neustrelitz

# Cartosat-1 over Kiev



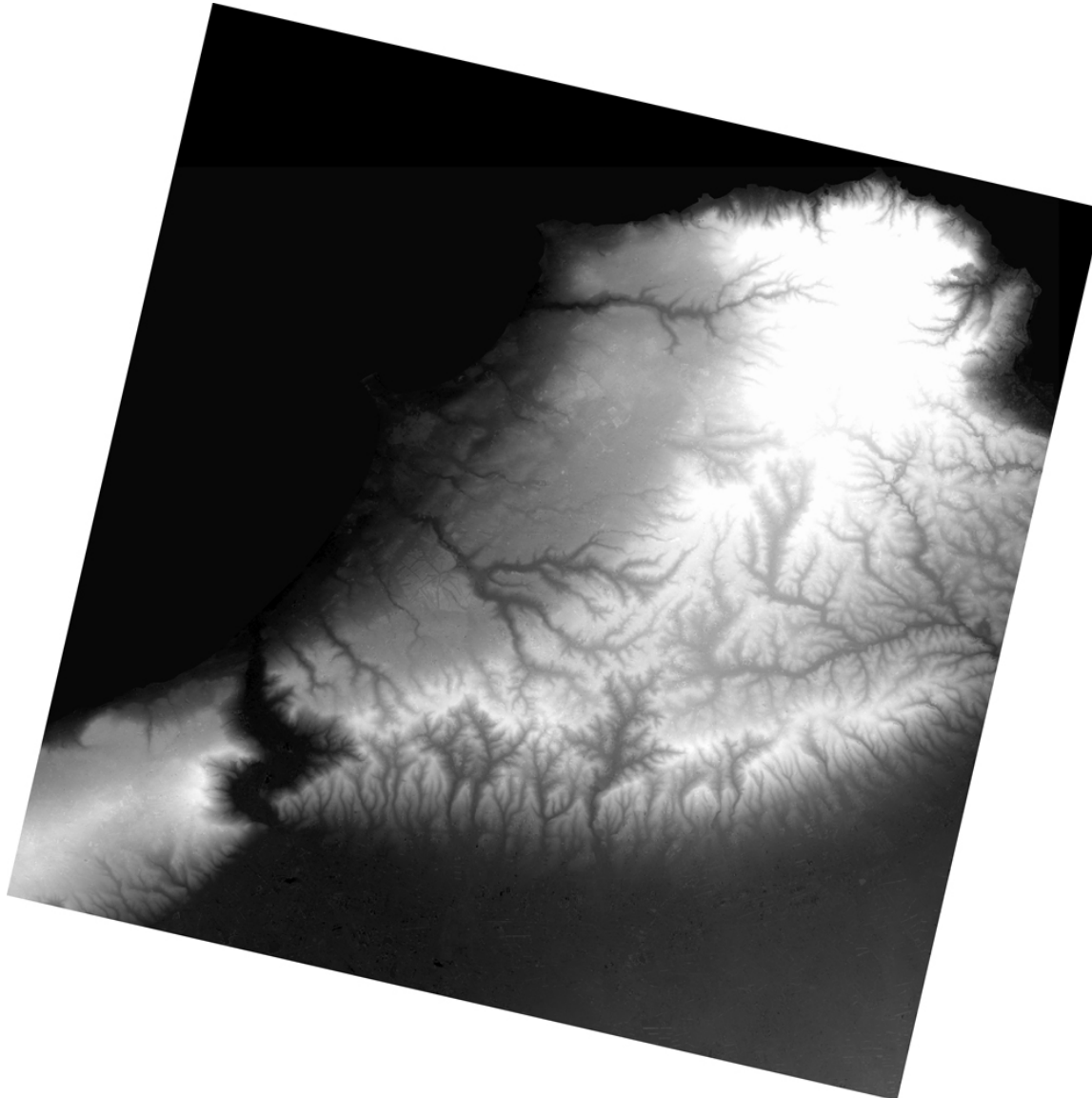
**euromap** IRS-P5 PAN-A  
path: 247 row: 168  
20-AUG-2008  
A GAF COMPANY



20. August 2008



# Digital Elevation Models



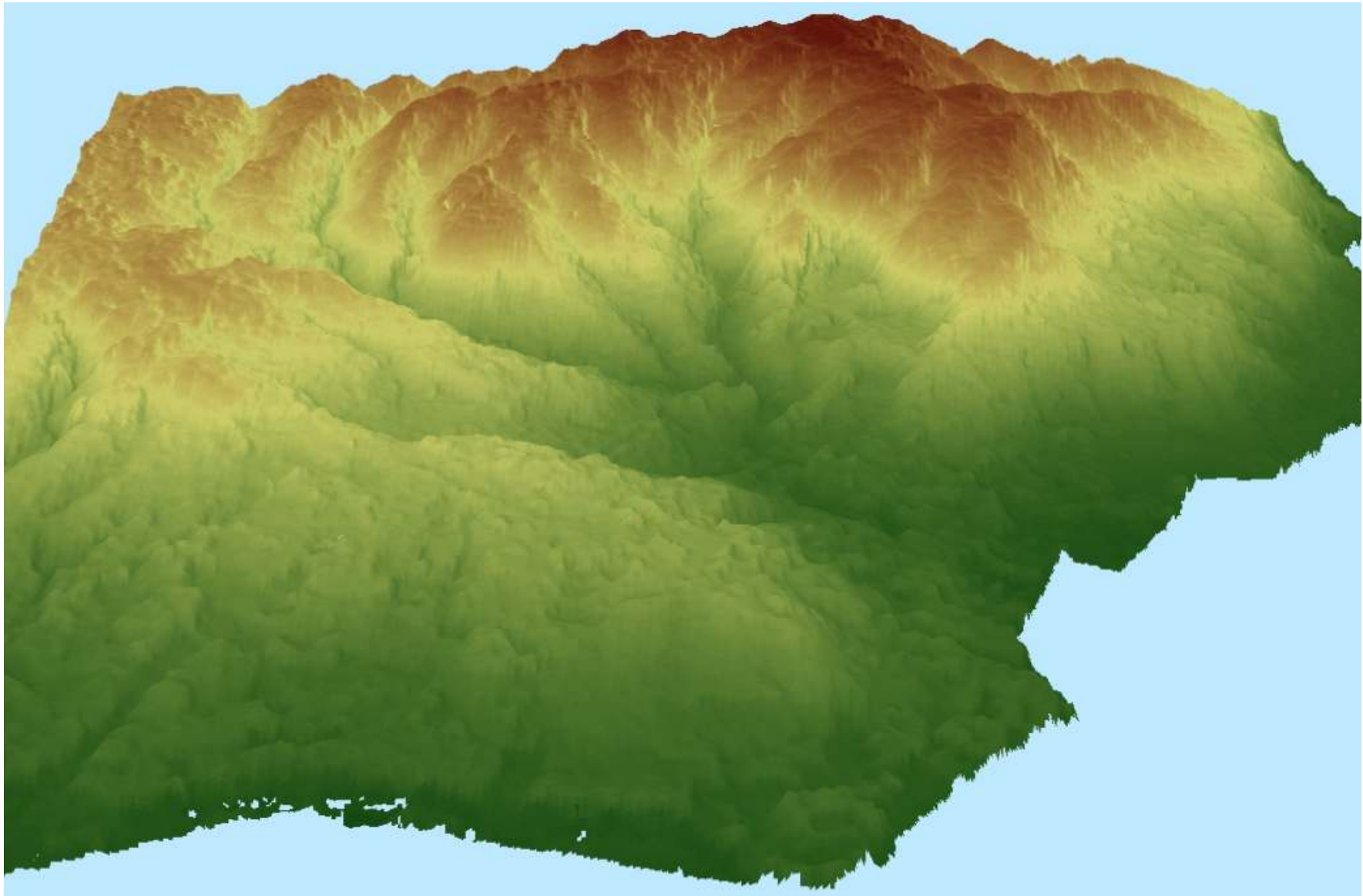
One stereopair:

- PAN-Fore
- PAN-Aft

Derived products:

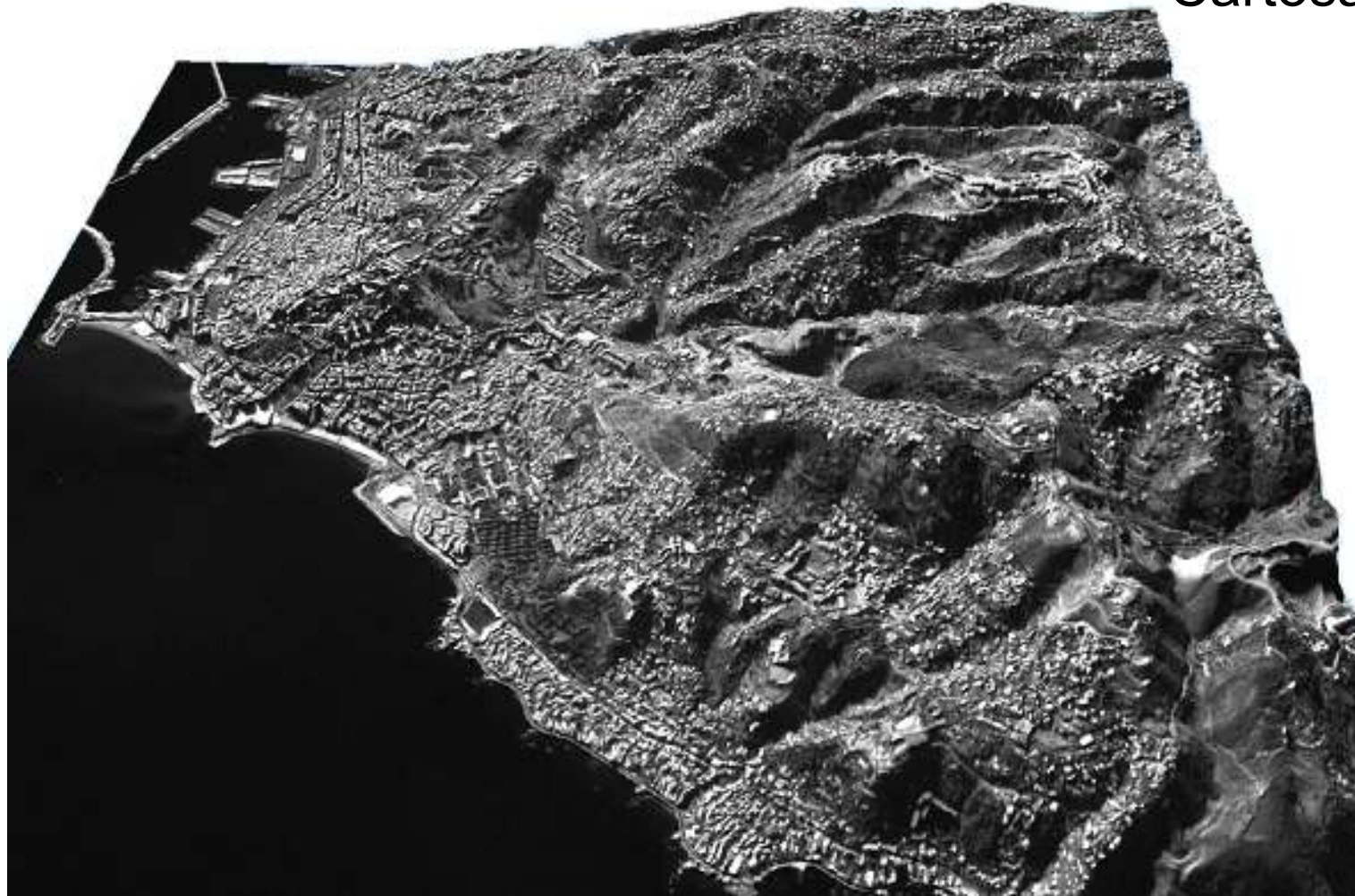
- Scene-based DEM
- Orthoimage
- 3D visualization

# Algier - Extracted DEM



# 3D Terrain Visualization

2.5 m ortho image draped over  
Cartosat-1 DEM



# Specifications of the DEMs

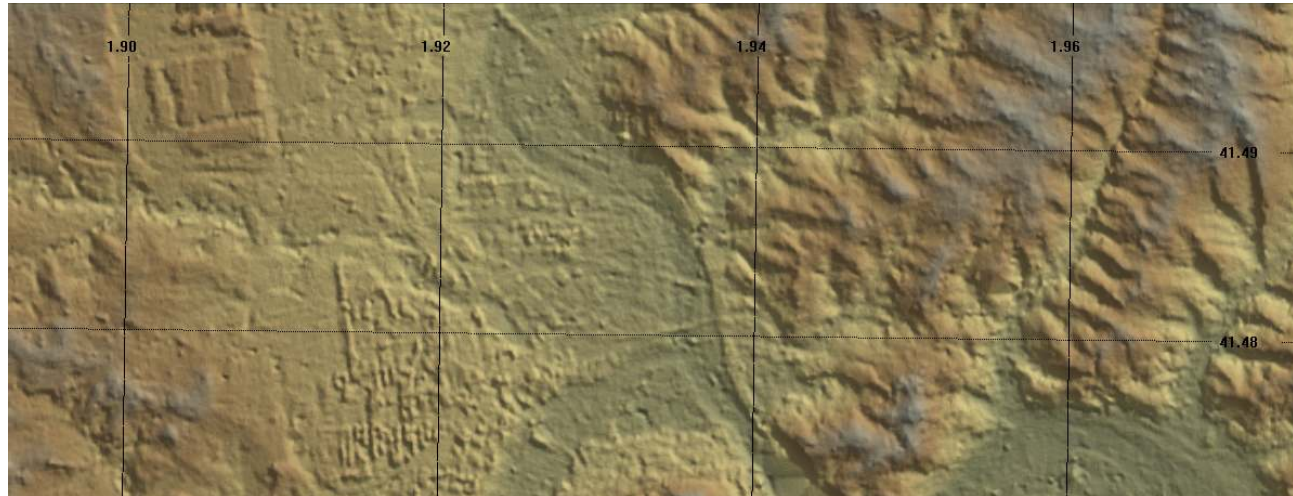
Fulfilment of mapping tasks up to 1:12.500 scale

- DEM post spacing 10 m
- Spatial reference system UTM / WGS84
- Height reference EGM96
- DEM file format GeoTIFF (16 bit)
- Orthoimage pixel size 2.5 m

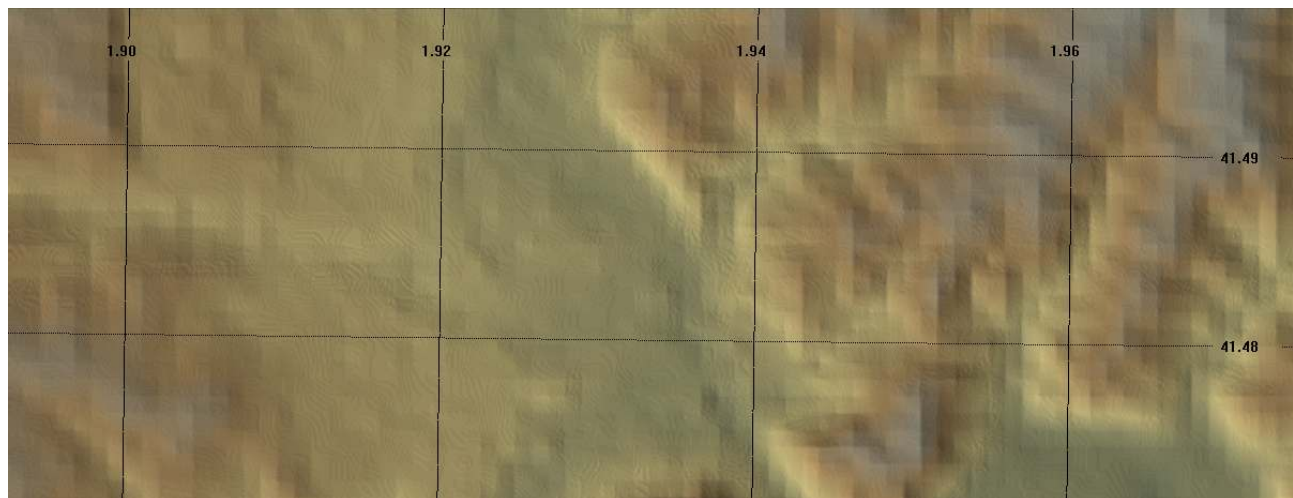
We will meet specifications of DTED Level 3 with  
positional accuracy: 10 m CE90 horizontal  
10 m LE90 vertical

More details about different levels on request.

# Digital Elevation Models

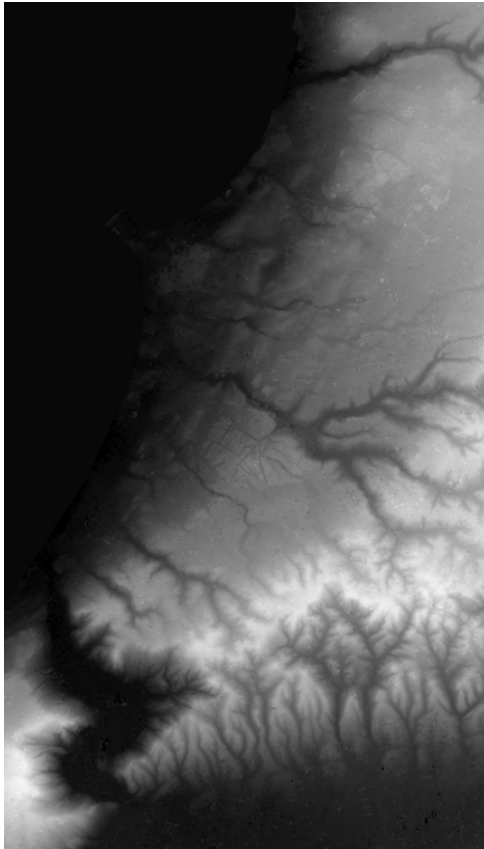


Cartosat-1  
DEM, 10 m



SRTM-C  
DEM, 90 m

# Euro-Maps 3D



We will market our DEMs under the name Euro-Maps 3D.

Euro-Maps 3D will be available on scene or km<sup>2</sup> basis.

Our mosaicked DEMs will be delivered as 0.5° x 0.5° tiles.

Software



Production





1- IRS-P5 Cartosat-1 Stereo

2- IRS-P6 Resourcesat-1

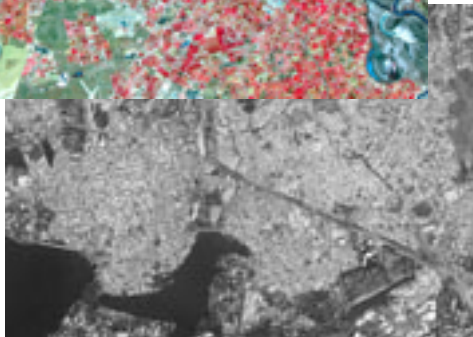
# IRS-P6 Resourcesat-1



AWiFS: 60 m / 4 bands / 740 km



LISS-III: 20 m / 4 bands / 140 km



LISS-IV Mono: 5 m / 1 band / 70 km



LISS-IV Merge: 5 m / 3 bands / 70 km



# IRS-P6 Resourcesat-1 Fact Sheet

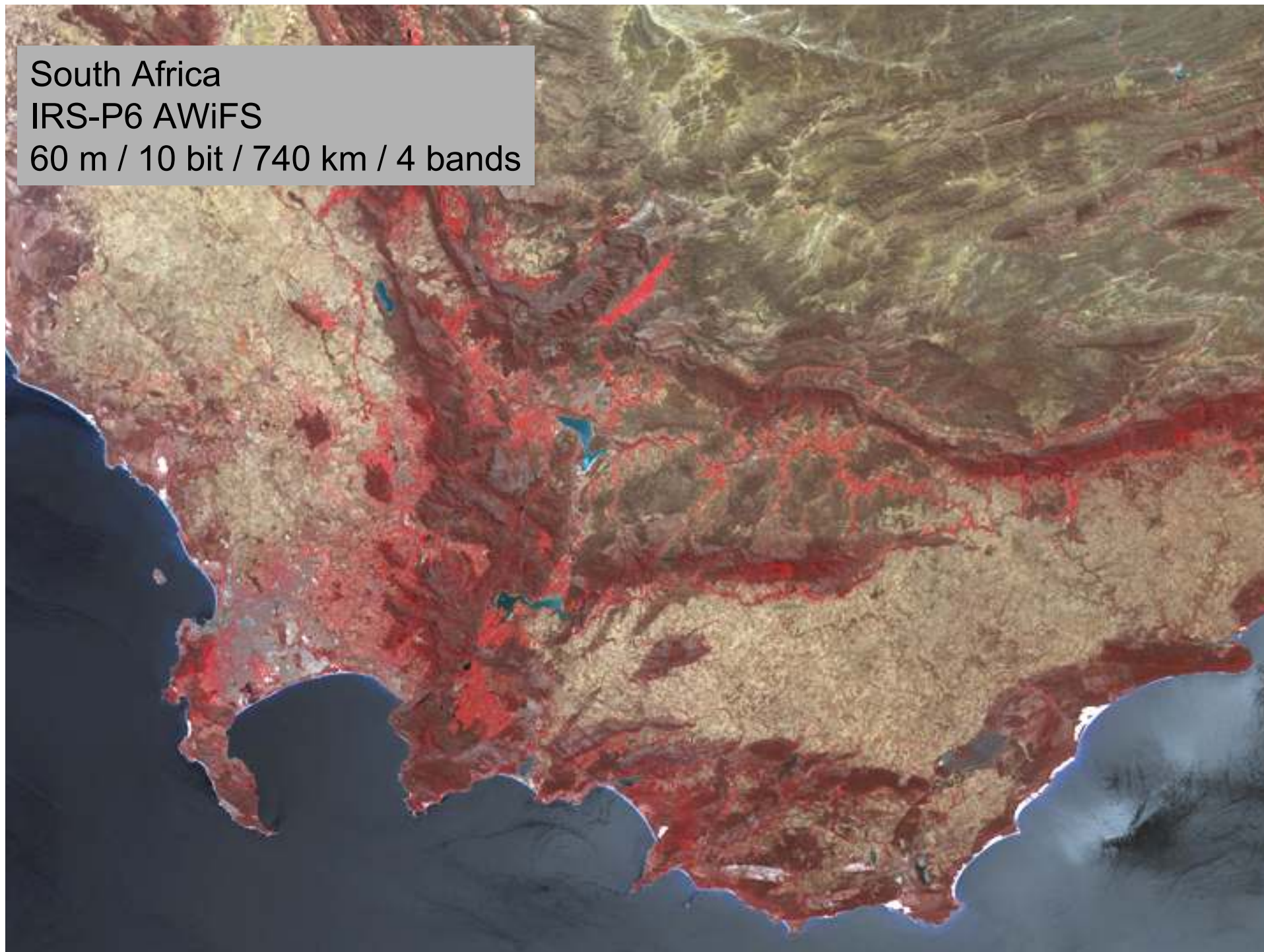
Sensor			LISS-IV		LISS-III	AWiFS
Mode			Mono	MX		
Spatial resolution	B2	green	5.8 m	5.8 m	23.5 m	56 m .. 70 m
	B3	red		5.8 m	23.5 m	56 m .. 70 m
	B4	NIR		5.8 m	23.5 m	56 m .. 70 m
	B5	SWIR			23.5 m	56 m .. 70 m
Swath-width			70 km	23.9 km	140 km	740 km
Radiometric Resolution, Quantisation	all Bands		7 bit	7 bit	7 bit	10 bit
Spectral coverage	B2	green	620-680 nm	520-590 nm	520-590 nm	520-590 nm
	B3	red		620-680 nm	620-680 nm	620-680 nm
	B4	NIR		770-860 nm	770-860 nm	770-860 nm
	B5	SWIR			1550-1700 nm	1550-1700 nm
CCD arrays (number of arrays * No. of elements)	B2	green	1 * 12000	1 * 12000	1 * 6000	2 * 6000
	B3	red		1 * 12000	1 * 6000	2 * 6000
	B4	NIR		1 * 12000	1 * 6000	2 * 6000
	B5	SWIR			1 * 6000	2 * 6000

# AWiFS – 23 February 2009

← 370 km → ← 370 km →



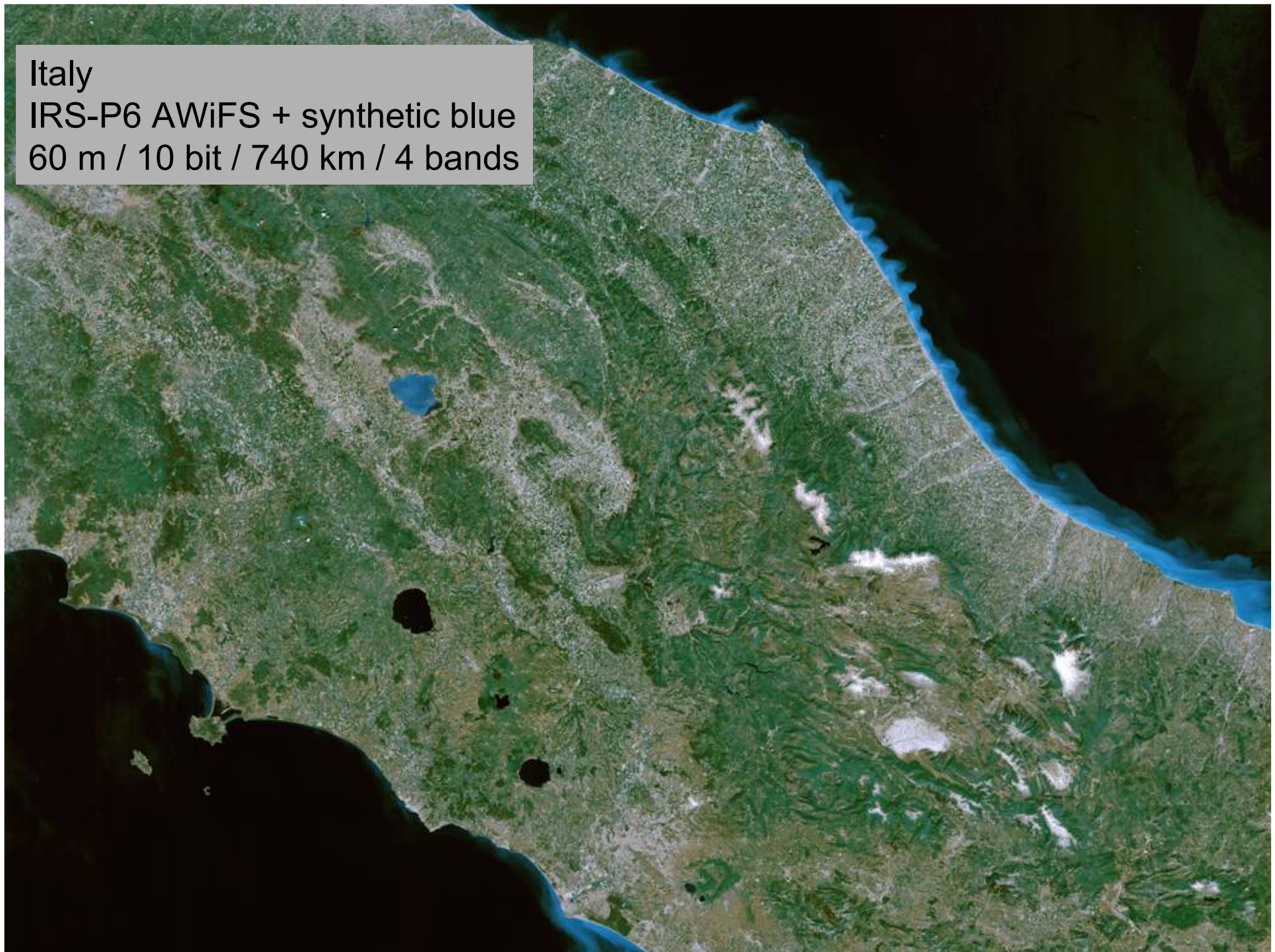
South Africa  
IRS-P6 AWiFS  
60 m / 10 bit / 740 km / 4 bands



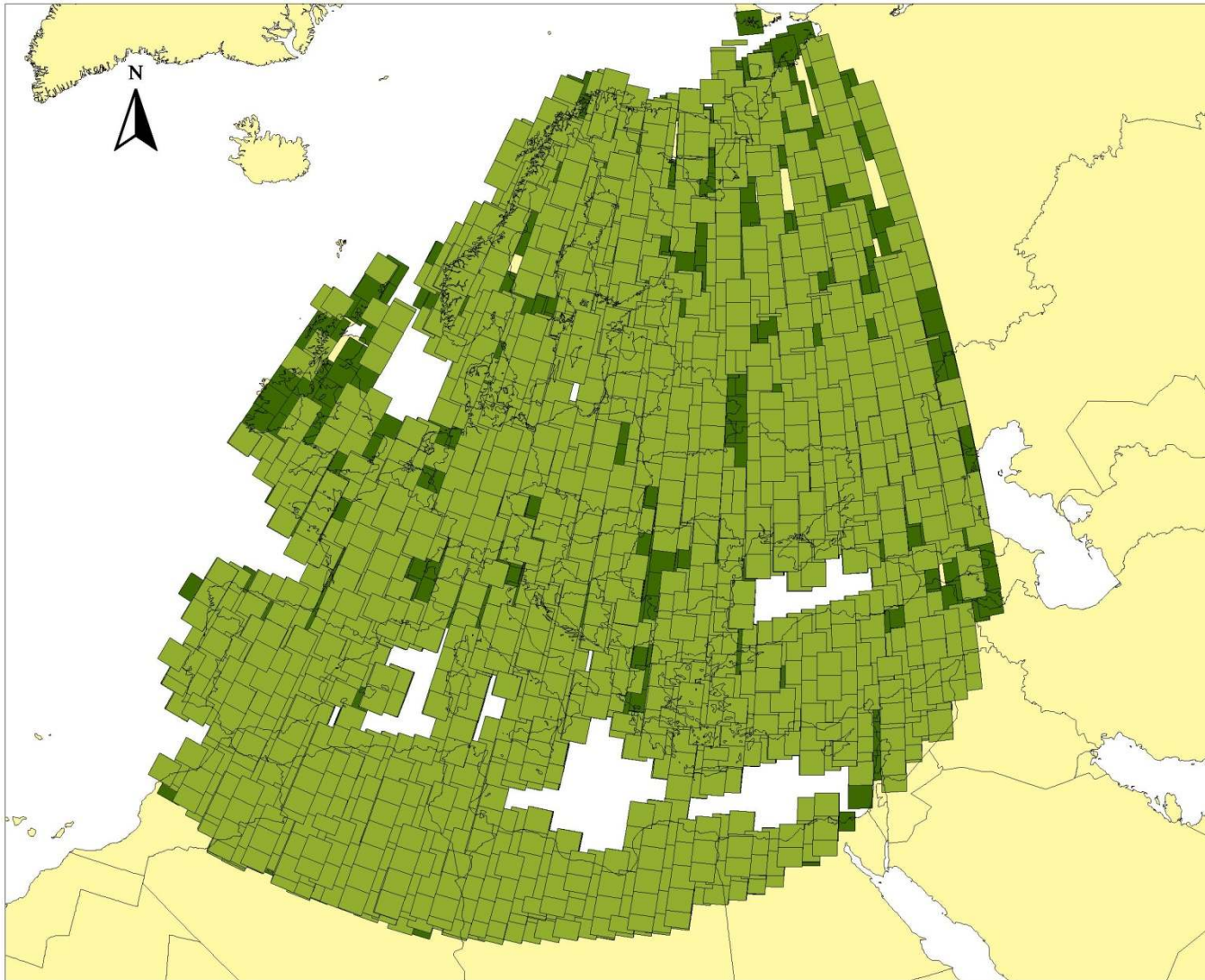
Italy

IRS-P6 AWiFS + synthetic blue


60 m / 10 bit / 740 km / 4 bands




# IRS-P6 LISS-III - Cc



Layer Stacking:

 [cc] = 0  
01-Apr - 31-Oct '08  
01-Apr - 31-Oct '07  
01-Apr - 31-Oct '06

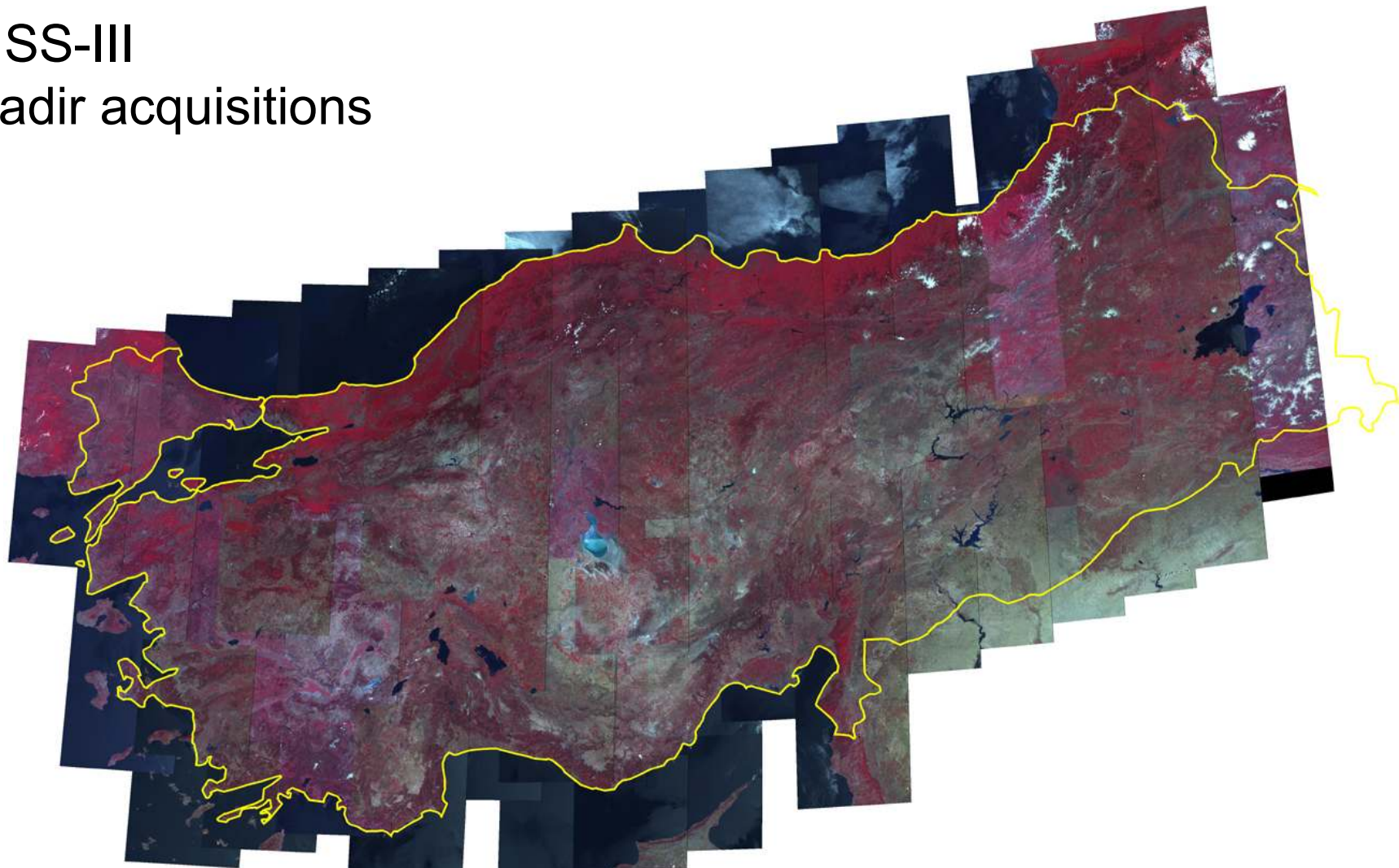
 [cc] <= 10  
01-Apr - 31-Oct '08  
01-Apr - 31-Oct '07  
01-Apr - 31-Oct '06

Data considered until:  
06-Feb-2009

0  3000 Kilometers

# Full coverage of Turkey in 2006

LISS-III  
Nadir acquisitions



# Euro-Maps Ortho-Mosaics

5 m resolution (up to 1:25,000)

Natural colour, balanced  
and enhanced

Ortho-corrected, bundle adjusted

10-15 m CE90 horizontal accuracy



**EURO**   
**MAPS** 

# Euro-Maps Ortho-Mosaics

Available for  
immediate  
delivery:

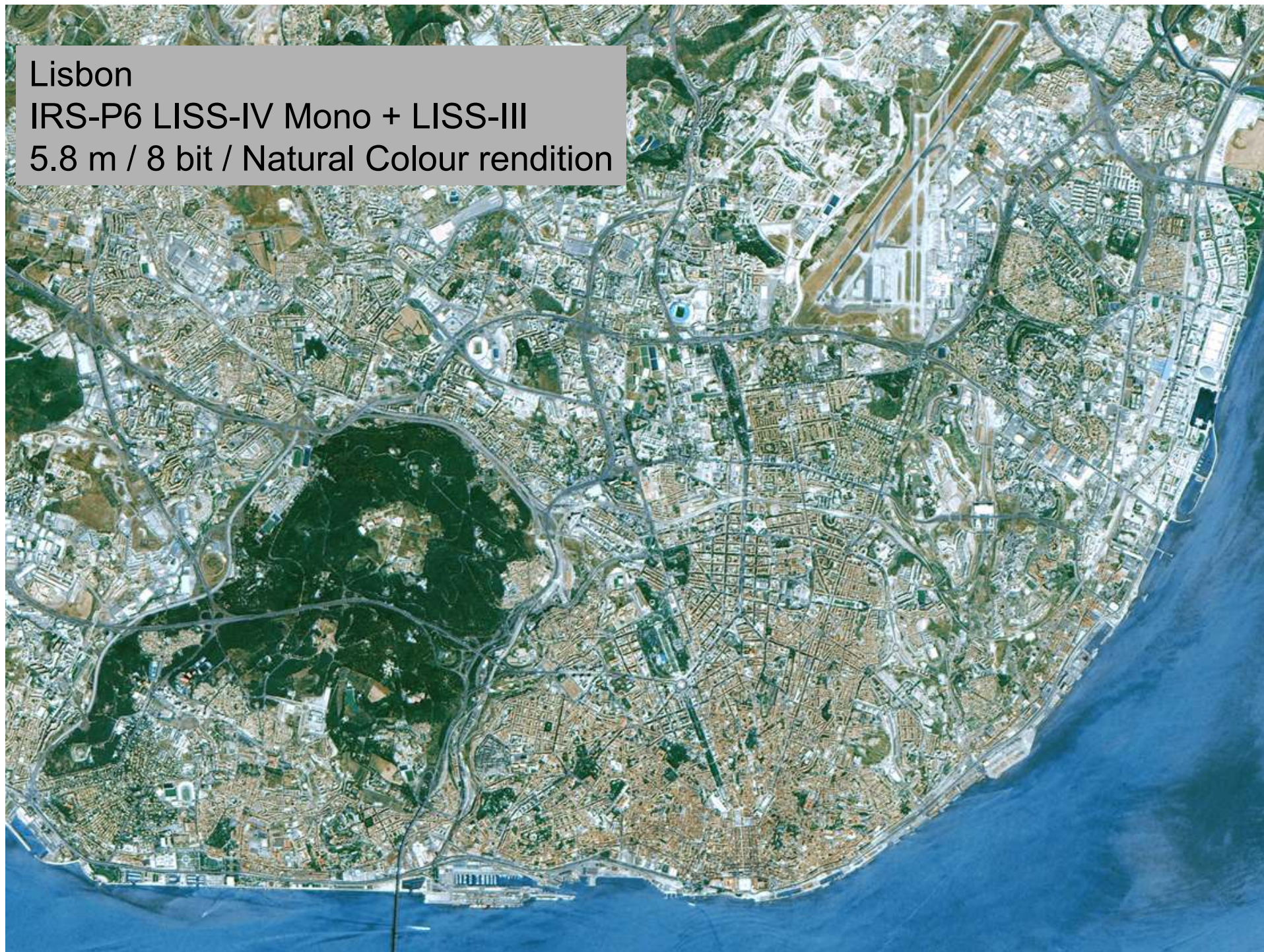
- Germany
- Switzerland
- Austria
- Italy
- Spain
- Portugal
- Poland



**EURO**   
 **MAPS**



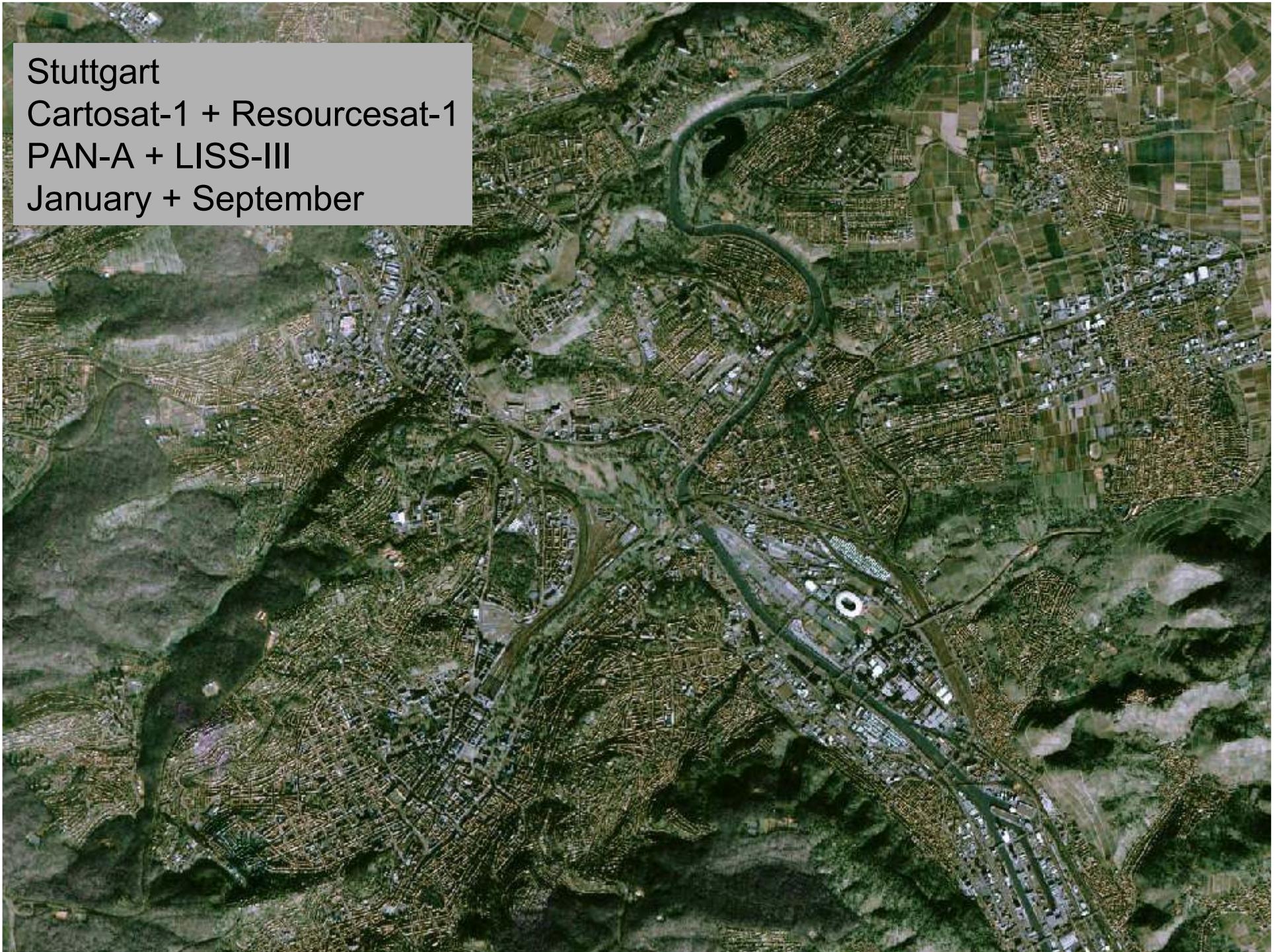
Lisbon  
IRS-P6 LISS-IV Mono + LISS-III  
5.8 m / 8 bit / Natural Colour rendition



new merge product: 2.5 m natural colour

produced by merging Cartosat-1 PAN-Aft data  
and IRS-P6 Resourcesat-1 LISS-III data.

Stuttgart  
Cartosat-1 + Resourcesat-1  
PAN-A + LISS-III  
January + September



Rome Fiumicino  
Cartosat-1 + Resourcesat-1  
PAN-A + LISS-III





Thank you for your attention

[www.euromap.de](http://www.euromap.de)