



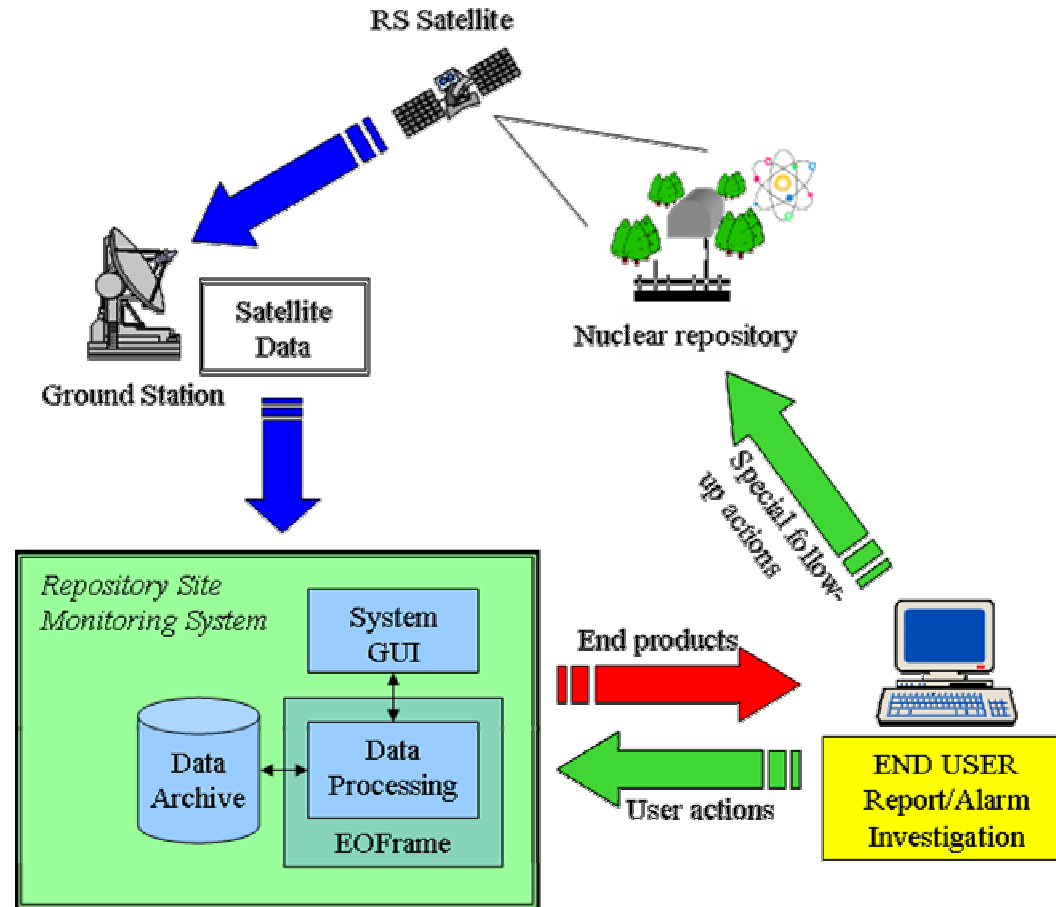
Change detection at a nuclear repository site

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Repository Site Monitoring Application

- Objective:
 - To develop and implement a pilot version of a monitoring system of a repository using multi-instrument earth observation data and other data
- Status in 17.1.2005
 - The Requirement Specification document has been reviewed, updated and finalised.
 - The satellite data acquisition plan has been completed and the data sets available so far have been purchased.
 - The Category-1 proposal for future ASAR data has been prepared and submitted to ESA.
 - The method development work addressing both optical and SAR data has been in good progress and preliminary results are available.

Overview of the repository site monitoring system



(Figure from Requirement Specification document)

Category-1 proposal to ESA for ASAR data

ESA EO Principal Investigator Portal - Netscape

ESA EO Principal Investigator Portal

esa Earth Observation
Principal Investigator Portal

14-Jan-2005 UT Contact us

Exploitation Results & News	PI Main Area
Results	ID 3079
News	Title Monitoring of spent nuclear fuel geological repositories using SAR data
Search	Type Category-1
Focus on PI	Submission status is: <i>on hold</i>
Round table	Overview Of Detailed Submission in the browser
AO Submission	Overview Of Detailed Submission by email
Cat-1 & Open AOs	
Previous AOs	
Update & Reporting	List of Events
Services	No events
About this site	
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Transferring data from eopie.esa.int...

- For Category-1 use the prices of ASAR products are based on the cost of reproduction (typically not more than 10 % of the list prices)
- The proposal has been submitted to ESA on December 2, 2004
- Typically results of the evaluation are provided in about 8 weeks after submission

SAR data acquisition

- only baseline data available so far for Envimon work
- drawback of the baseline data in system development work is the short time span of the acquisitions
- waiting for Cat-1 proposal evaluation result to acquire novel ASAR data

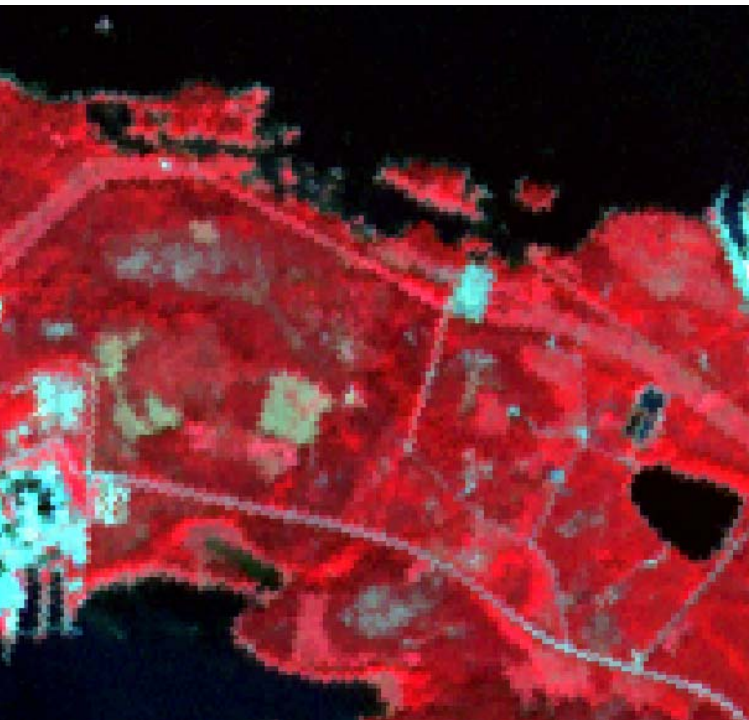
Sensor	Acquisition date	Inc. angle (deg)	Image type	Pass type D/A	Resolution/Pixel size (m)	Rect. error (m)	Weather data		
							T C	H %	R mm
ASAR	14.8.2003	23	ASA_IMS_1P HH IS2	D	25/ 4	6	+15	97	5.8
ASAR	18.9.2003	23	ASA_IMS_1P HH IS2	D	25/ 4	6	+14	91	-
ASAR	23.10.2003	23	ASA_IMS_1P HH IS2	D	25/ 4	6	-2	69	-
ASAR	27.11.2003	23	ASA_IMS_1P HH IS2	D	25/ 4	8	+3	98	8.6
ASAR	20.1.2004	23	ASA_IMP_1P VV IS2	D	30/12.5	N/A	-13	91	0.3
Envimon data:									

Optical satellite data acquisition

- new ASTER and Landsat images purchased for Envimon
- baseline data and ASTER data used in method development work

Sensor	Type	Acquisition date	Channel(s)	Resol./ Pixel size (m)	Rect. error (m)
QUICKBIRD	Panchromatic	9.9.2002	ch 1: 450 – 900 nm	0.62	2
QUICKBIRD	Multispectral	9.9.2002	ch 1: 450 – 520 nm ch 2: 520 – 600 nm ch 3: 630 – 690 nm ch 4: 760 – 900 nm	2.5	2
ASTER	Multispectral	6.8.2002	ch 1: 520 – 600 nm ch 2: 630 – 690 nm ch 3: 760 – 860 nm	15	30
ASTER	Thermal	6.8.2002	ch 1: 10.25 – 10.95 μm	90	50
Envimon data:					
ASTER	VNIR,SWIR,TIR	1.9.2003		15-90	
Landsat 7	ETM	26.9.2000		30	
Landsat 7	ETM	16.4.2002		30	

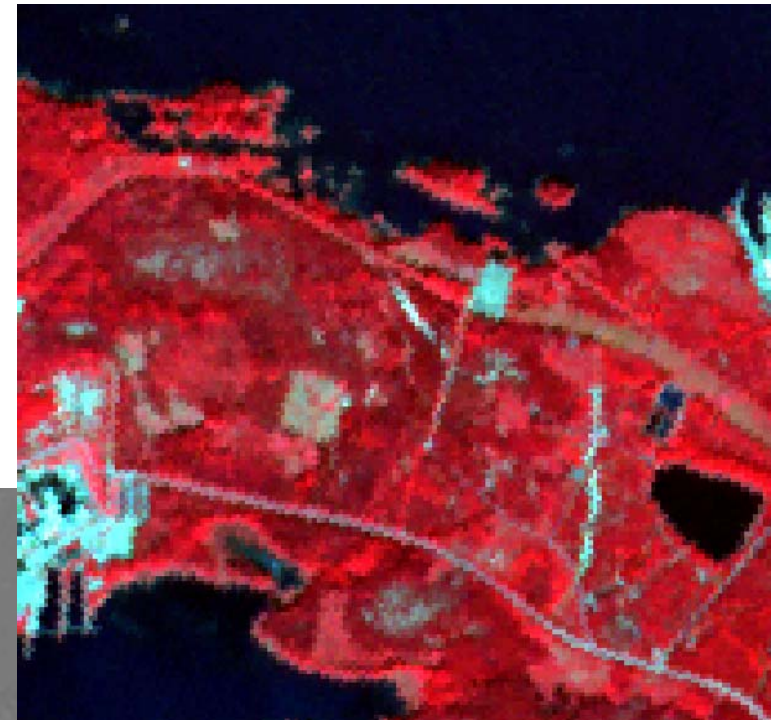
Change monitoring using optical satellite data



6.8.2002

ASTER IMAGE

- georeferenced
- corrected for atmospheric absorption
- CIR (Colour IR)
- resolution 15 m
- Red - Near IR band
- Green - Red band
- Blue - Green band

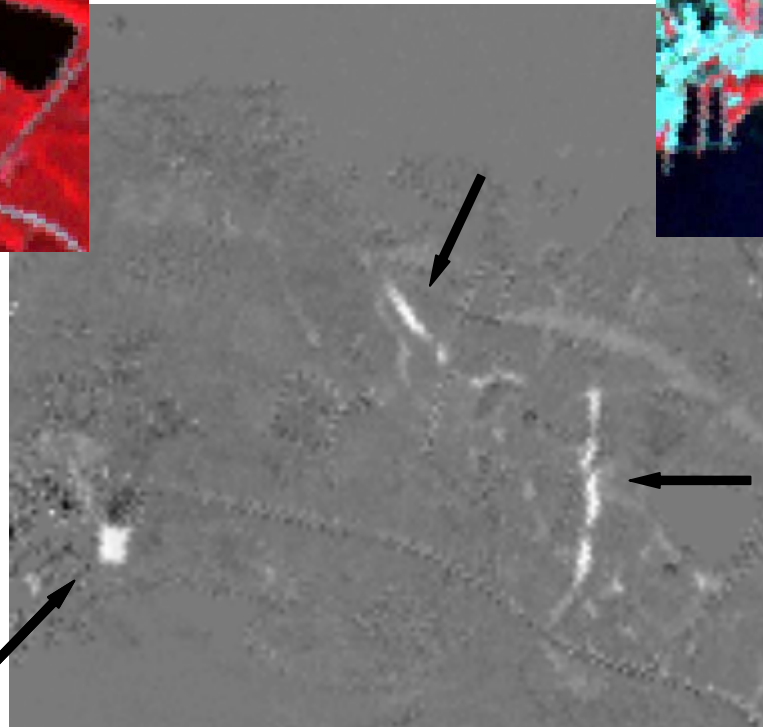


1.9.2003

DIFFERENCE IMAGE

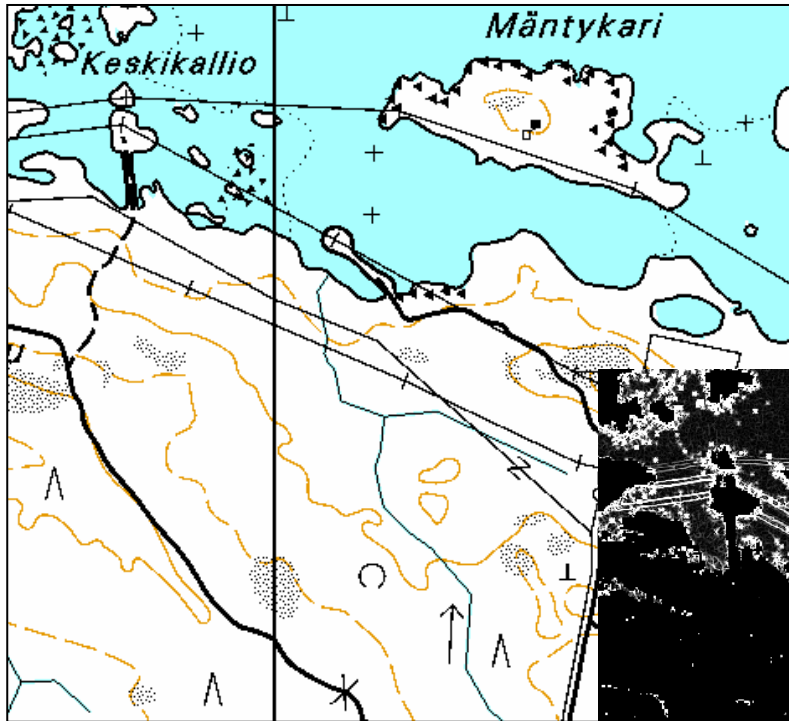
- red band (0.66 μm)

Car park extended

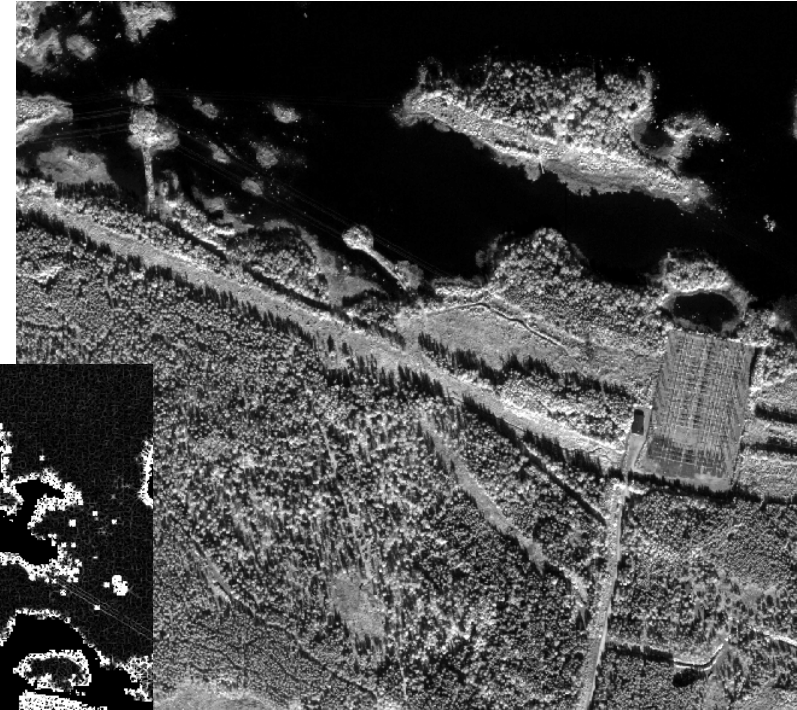


Clear cuts for construction work

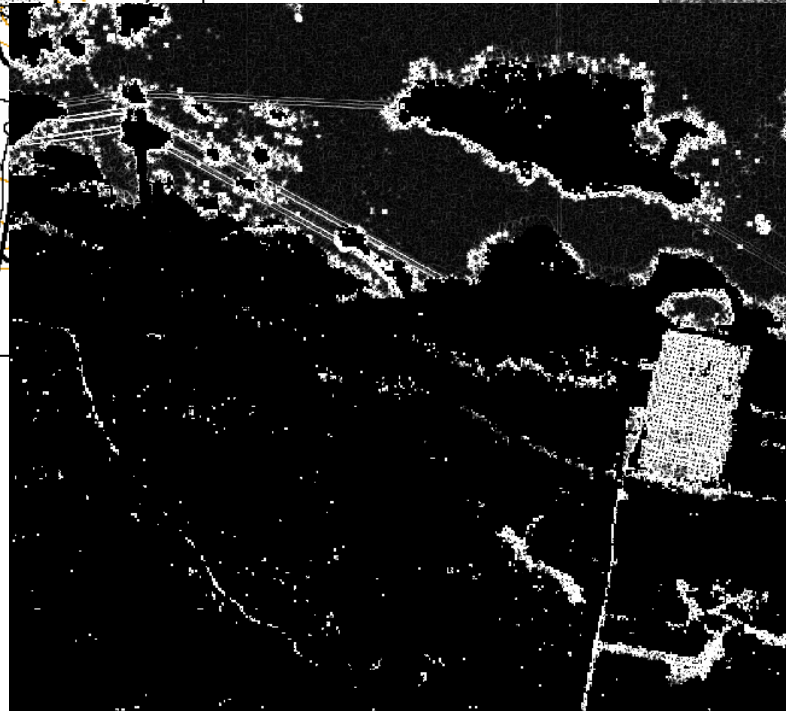
Structure detection from optical satellite data



Topographical map
1999

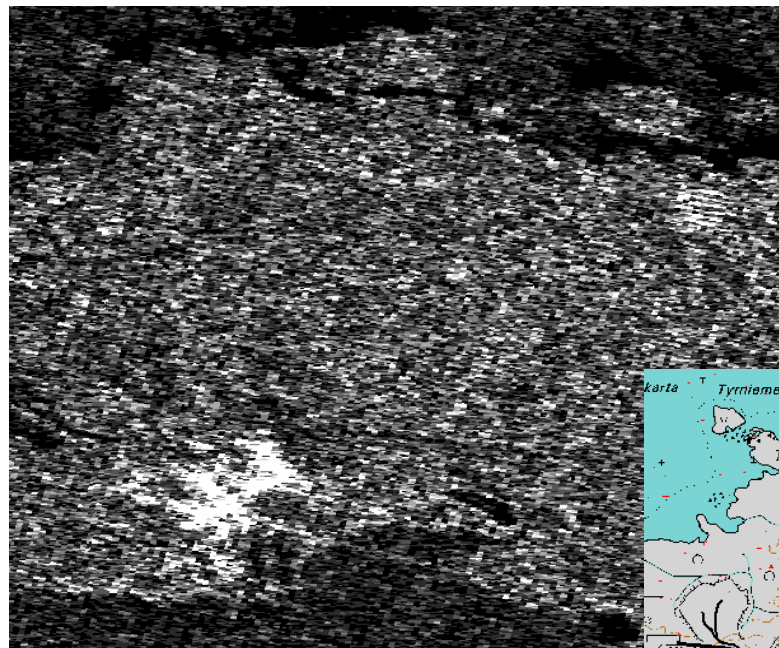


QuickBird pan (0.6 m)
9.9.2002



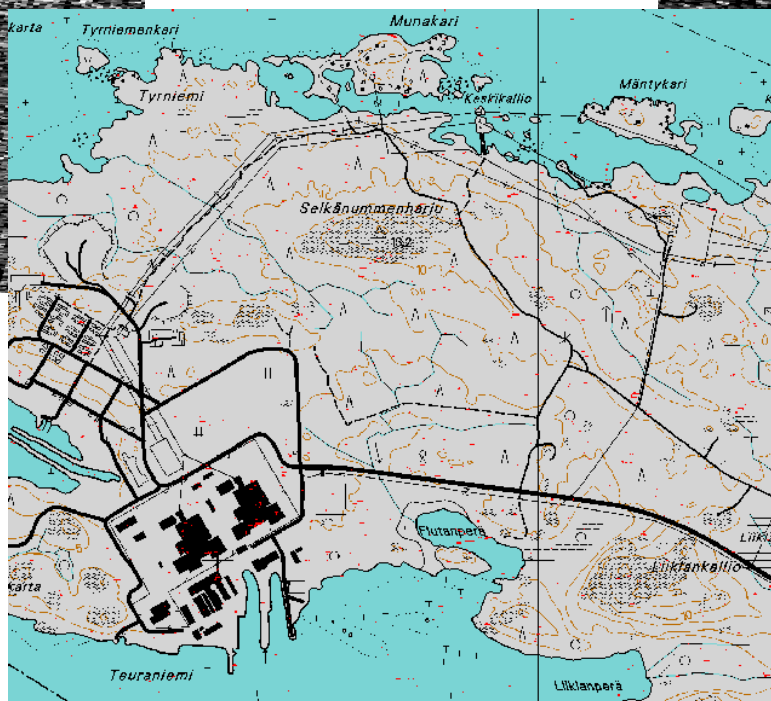
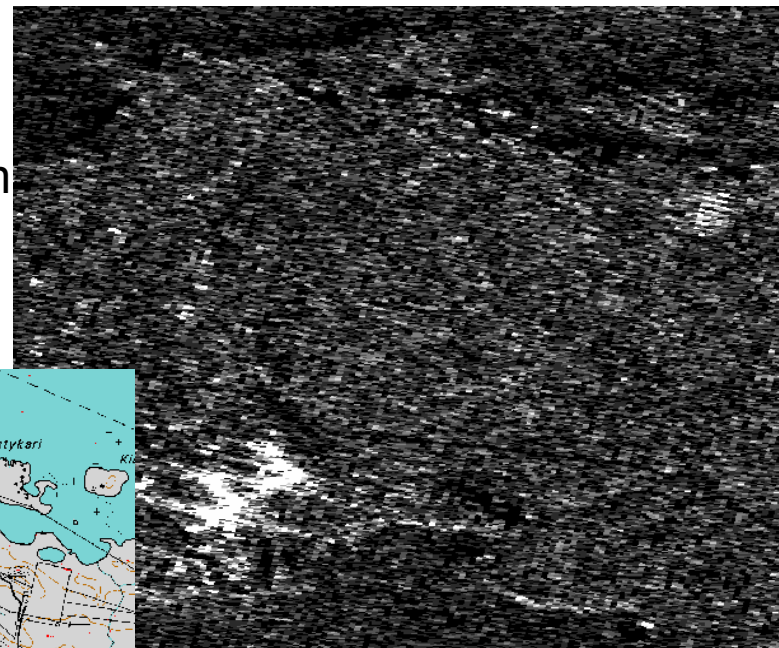
Line detection in non-vegetated areas
(Vegetation thresholded using NDVI)

Change detection using Synthetic Aperture Radar (SAR) data



Envisat ASAR

- C-band (6 cm)
- ground resolution 30 m



ASAR - 14.8.2003
Single Look Complex (SLC)

ASAR - 27.11.2003
Single Look Complex (SLC)

ASAR changes (in red)