

SENTINEL-1 SCIENTIFIC DATA HUB

SENTINEL-1 TOOLBOX

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Obsah prezentace

I. Sentinel-1 Scientific Data HUB

- Registrace/přihlášení
- Vyhledávání
- Stažení dat

II. Sentinel-1 Toolbox

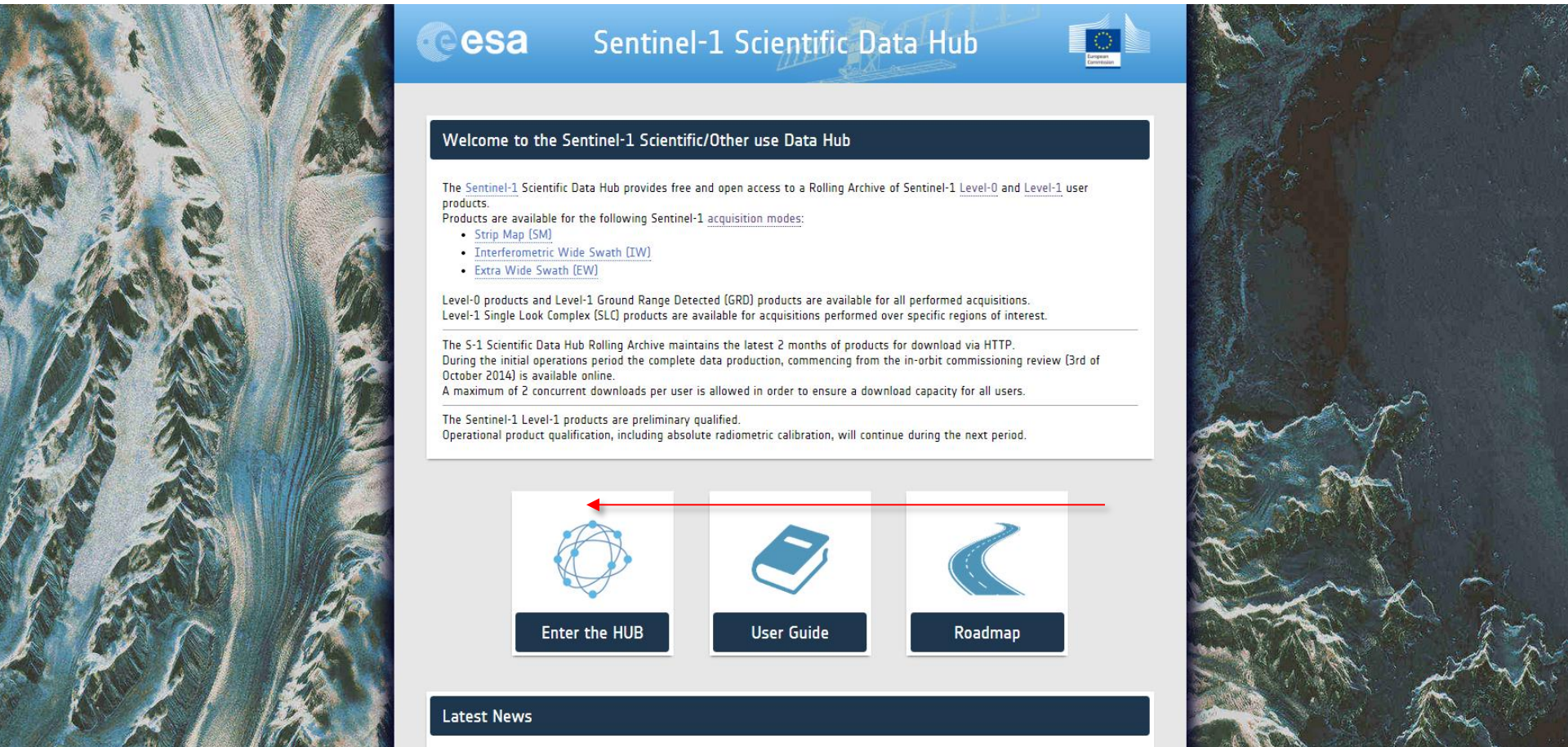
- Free software
- Načtení
- Vizualizace
- Zpracování dat

Délka prezentace 30 minut



Sentinel-1 Scientific Data Hub

<https://scihub.esa.int/>



Sentinel-1 Scientific Data Hub

Welcome to the Sentinel-1 Scientific/Other use Data Hub

The [Sentinel-1](#) Scientific Data Hub provides free and open access to a Rolling Archive of Sentinel-1 [Level-0](#) and [Level-1](#) user products.

Products are available for the following Sentinel-1 [acquisition modes](#):

- [Strip Map \(SM\)](#)
- [Interferometric Wide Swath \(IW\)](#)
- [Extra Wide Swath \(EW\)](#)

Level-0 products and Level-1 Ground Range Detected (GRD) products are available for all performed acquisitions. Level-1 Single Look Complex (SLC) products are available for acquisitions performed over specific regions of interest.

The S-1 Scientific Data Hub Rolling Archive maintains the latest 2 months of products for download via HTTP. During the initial operations period the complete data production, commencing from the in-orbit commissioning review (3rd of October 2014) is available online.

A maximum of 2 concurrent downloads per user is allowed in order to ensure a download capacity for all users.

The Sentinel-1 Level-1 products are preliminary qualified. Operational product qualification, including absolute radiometric calibration, will continue during the next period.



Enter the HUB



User Guide



Roadmap

Latest News

Roadmap



Roadmap

Roadmap

Rev. 8 - 11 Dec 2014

Data Hub features	Oct 2014	Dec 2014	Q1 2015	Q2 2015
Product retrieval via HTTP	☒			
Product Search and Preview	☒			
Shopping cart	☒			
Metalink download manager support	☒			
Advanced query via text search bar	☒			
Initial batch scripting capability	☒			
New Data Hub Graphical User Interface			☐	
Products pre-compression			☐	
New "Advanced Search" filters		☒		
Support for query parameter relative orbit number for interferometric pair searches		☒		
Geographical Coordinates entry box			☐	
Improved Internet Browsers compatibility		☒		
Support for pause/resume downloads		☒		
Enhanced query capability via batch scripting		☒		
Integrated online help			☐	
Saved Search Query improvements			☐	
Mobile Interface			☐	
Predictive Search			☐	
Search results ranking preferences				☐
Download time estimates				☐
Download of product subset				☐

User Guide



User Guide

Sentinel-1 Data Offer
The Data Hub Rolling Archive
Free and Open data access
Full-text Search and Saved Search Queries
Products Online Inspection
Products Download and quota
Batch scripting
E-mail Notification
User Guide

Scientific Data Hub Overview

Rev. 79 - 11 Dec 2024

The Sentinel-1 Scientific Data Hub provides free and open access to a Rolling Archive of Sentinel-1 Level-0 and Level-1 user products.

Sentinel-1 Data Offer

The Sentinel-1 data offer for the Scientific Data Hub consists of [Level-0](#) and [Level-1](#) user products for the following acquisition modes:

- [Strip Map \(SM\)](#)
- [Interferometric Wide Swath \(IW\)](#)
- [Extra Wide Swath \(EW\)](#)

The Data Hub Rolling Archive



The S-1 Scientific data Hub Rolling Archive maintains the latest 2 months of products for download via HTTP.

Free and Open data access



Anyone can register online via [self-registration](#). The self-registration process is automatic and immediate. Registration grants access rights for searching and downloading Sentinel-1 products. Sentinel-1 products are available at no cost for anybody. The data available through the Data Hub is governed by the [Terms and Conditions](#) of the use and distribution of Sentinel data, which the User is deemed to have accepted by using the Sentinel data.

Full-text Search and Saved Search Queries



Search query on the products stored on the rolling archive and filtering of results via a full-text search bar. Predefined search filters for the different acquisition modes, product types, product levels and geographical areas. "Make your own" search via specific semantics (boolean operators and wildcards). Text search query can be saved and used for activating the e-mail notification service and for batch scripting.

Products Online Inspection



Online inspection of the searched products by browsing and pre-viewing the product metadata and measurements without downloading it. A preview panel displays information on the product contents and structure.

Products Download and quota



Sentinel-1 products are provided for download via HTTP in the .ZIP archive file format. Compression is not applied. Click and download, shopping cart, batch download. A maximum of 2 concurrent downloads per user is allowed in order to ensure a download capacity for all users.

Batch scripting



The Data Hub exposes the Open Data Protocol ([OData](#)) interface for accessing the EO data stored on the rolling archive. This protocol is based on top of the well-supported [HTTPS/ REST](#) transfer protocol that can be handled by a large set of client tools as simple as common Web browsers, download-managers or computer programs such as [curl](#) or [wget](#). The Odata protocol provides easy access to the Data Hub and can be used for building URI for performing search queries and product downloads offering to the users the capability to remotely run scripts in batch mode.

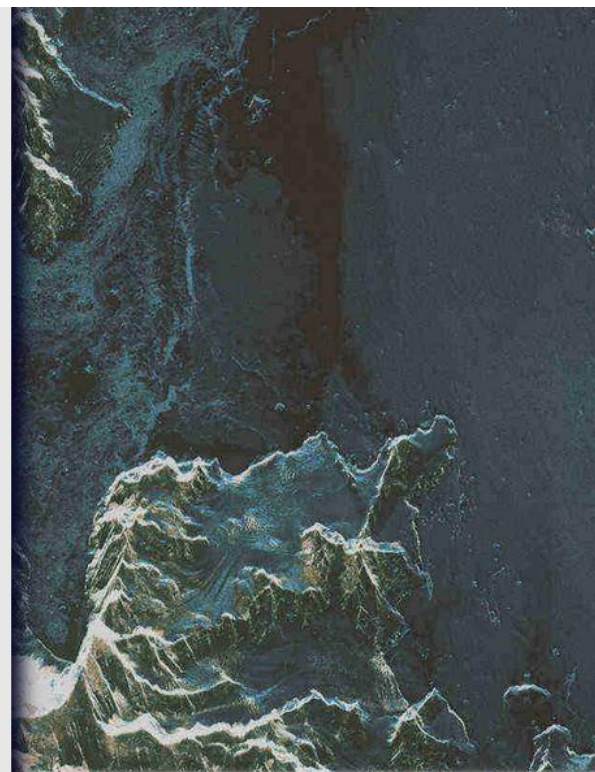
E-mail Notification



Automatic E-mail notification is offered to the users for informing about the availability of new EO data matching the user defined saved search query. E-mail frequency is predefined.

User Guide

- [Self Registration](#)



User Guide

- [Self Registration](#)
- [GUI](#)
- [Full Text Search](#)
- [Advanced Search](#)
- [APIs and Batch Scripting](#)

For more details or request of help support please send an e-mail to eosupport@copernicus.esa.int

Enter the HUB



- ***https://scihub.esa.int/dhus/***
- snadná a rychlá registrace
- přihlášení

 **Sentinel-1 Scientific Data Hub** 

[Overview](#) [About](#)

Forgot your password?

username: password: [Login](#)

Overview

The Sentinel Data Hub is a web based system designed to provide EO data users with distributed mirror archives and bulk dissemination capabilities for the Sentinel-1 products.

Detailed information on Sentinel-1 products and Data Access mechanisms is available at <https://sentinel.esa.int/web/sentinel/sentinel-data-access>

References:

- <http://www.copernicus.eu/>
- <https://sentinel.esa.int/>

For a brief guide to the Sentinel Data Hub please click [here](#).

Some users have experienced problems while using IE9 (e.g. self-registration). This issue will be fixed in the enhanced web version of the Data Hub. For the time being we suggest using alternative browsers (IE10 or 11, Chrome, Firefox, Safari)

[Register](#)

Registrace



Sentinel-1 Scientific Data Hub



Forgot your password?

OverviewAbout

username: password:

Register

Please fill this form to start the registration procedure then you will receive a mail with a link to validate your mail address. Finally an administrator will be able to let you access to the Sentinel Data Hub.

Special chars are not allowed in the registration form, i.e.: + - & [] ! () { } [] ^ " ~ * ? : \ \$ ' <blank space>.
Please do not use these within the username otherwise the registration button is not enabled.

Username			
Password		Confirm it	
E-mail		Confirm it	
Firstname		Lastname	
Domain	Atmosphere ▼		
Usage	Research ▼		
Country			

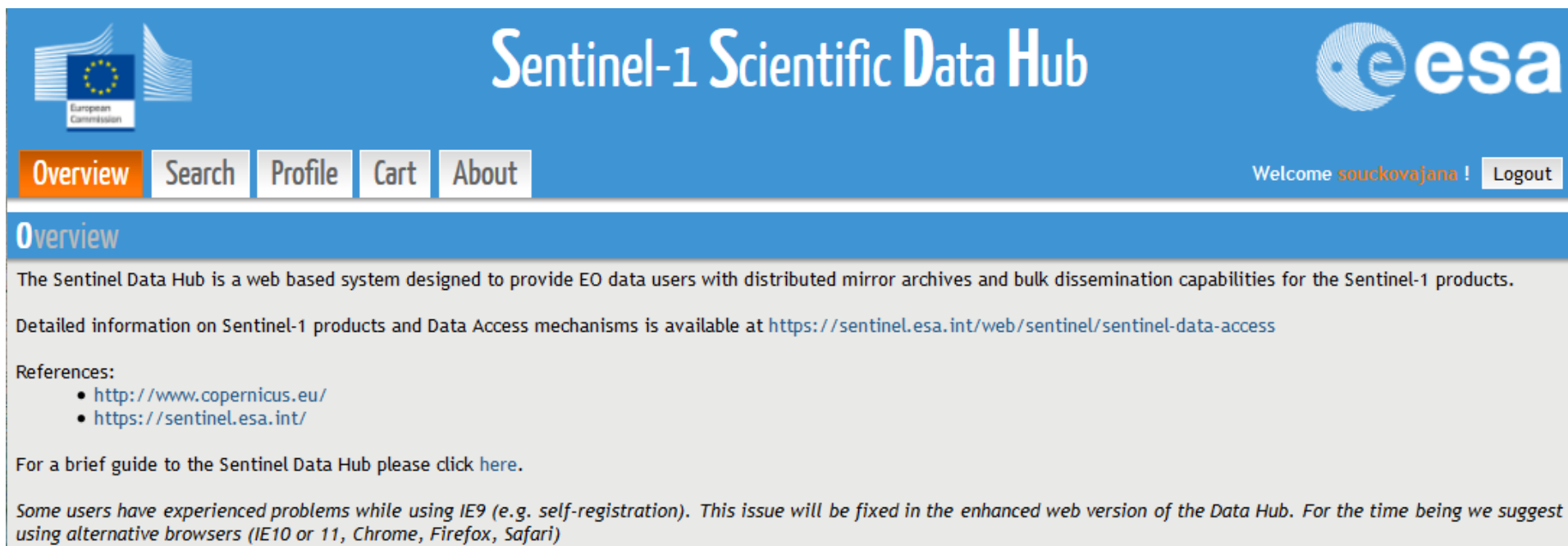
By registering in this website you are deemed to have accepted the [T&C for Sentinel data use](#).

Register

Sentinel-1 Scientific Data Hub

Po přihlášení:

- Search - vyhledávání a seznam vyhledaných produktů
- Profile - profil uživatele, změna hesla, uložené výsledky vyhledávání
- Cart - seznam produktů uživatele připravených ke stažení



The screenshot shows the Sentinel-1 Scientific Data Hub website. The header is blue with the European Commission logo on the left, the title "Sentinel-1 Scientific Data Hub" in the center, and the ESA logo on the right. Below the header is a navigation bar with buttons for "Overview" (highlighted in orange), "Search", "Profile", "Cart", and "About". On the right of the navigation bar, it says "Welcome souckovajana !" and has a "Logout" button. The main content area has a blue header with the word "Overview" in white. Below this, it states: "The Sentinel Data Hub is a web based system designed to provide EO data users with distributed mirror archives and bulk dissemination capabilities for the Sentinel-1 products." It then provides a link for detailed information: "https://sentinel.esa.int/web/sentinel/sentinel-data-access". There is a "References:" section with two links: "http://www.copernicus.eu/" and "https://sentinel.esa.int/". A note at the bottom says: "For a brief guide to the Sentinel Data Hub please click [here](#)." At the very bottom, a disclaimer states: "Some users have experienced problems while using IE9 (e.g. self-registration). This issue will be fixed in the enhanced web version of the Data Hub. For the time being we suggest using alternative browsers (IE10 or 11, Chrome, Firefox, Safari)".

 **Sentinel-1 Scientific Data Hub** 

Overview Search Profile Cart About

Welcome **souckovajana !** Logout

Overview

The Sentinel Data Hub is a web based system designed to provide EO data users with distributed mirror archives and bulk dissemination capabilities for the Sentinel-1 products.

Detailed information on Sentinel-1 products and Data Access mechanisms is available at <https://sentinel.esa.int/web/sentinel/sentinel-data-access>

References:

- <http://www.copernicus.eu/>
- <https://sentinel.esa.int/>

For a brief guide to the Sentinel Data Hub please click [here](#).

Some users have experienced problems while using IE9 (e.g. self-registration). This issue will be fixed in the enhanced web version of the Data Hub. For the time being we suggest using alternative browsers (IE10 or 11, Chrome, Firefox, Safari)

Profile

- profil uživatele, změna hesla, uložené výsledky vyhledávání

[Overview](#) [Search](#) **[Profile](#)** [Cart](#) [About](#) Welcome **souckovajana** ! [Logout](#)

Profile

MY INFORMATION

MY SAVED SEARCHES

Username

souckovajana

E-mail *

janasouckova@email.cz

Firstname *

Jana

Domain *

Land

Usage *

Education

Country *

Czech Republic

Address

Phone

Save Modifications

Old Password

New Password

Confirm it

Change password

Allowed functions

Search

Download

[Overview](#) [Search](#) **[Profile](#)** [Cart](#) [About](#) Welcome **souckovajana** ! [Logout](#)

Profile

MY INFORMATION

MY SAVED SEARCHES

Display 1 to 1 of 1 saved searches

footprint:"intersects(50.5, 14.2)" AND DESCENDING AND VV+VH AND relativeorbitnumber:22

Cart

- seznam produktů vybraných uživatelem



Sentinel-1 Scientific Data Hub



OverviewSearchProfile**Cart**About

Welcome **souckovajana** !Logout

Cart

Display 1 to 2 of 2 products in your cart

	S1A_IW_GRDH_1SDV_20150429T050908_20150429T050933_005694_0074ED_9F47 https://scihub.esa.int/dhus/odata/v1/Products('97a838a3-8fa9-4780-9e91-f89d3da4e4d2')/\$value	  
Date : 2015-04-29T05:09:08.756Z, Instrument : SAR-C, Mode : IW, Satellite : Sentinel-1, Size : 1 GB		
	S1A_IW_SLC__1SDV_20150429T050907_20150429T050934_005694_0074ED_0563 https://scihub.esa.int/dhus/odata/v1/Products('67657d02-1236-44fb-bcab-fbff012452e6')/\$value	  
Date : 2015-04-29T05:09:07.820Z, Instrument : SAR-C, Mode : IW, Satellite : Sentinel-1, Size : 7 GB		

Page size: 25 ▾

FirstPrevious1NextLast

Clear your cartDownload your cart

Vyhledávání

Overview Search Profile Cart About Welcome dmsa_test_user | Logout

Search

map tool

select map layer

remove selection

full-text search bar

save the search query

advanced search

Base Layer

- ☐ Hybrid
- ☐ Road
- ☐ Aerial

Overlays

- ☒ Graticule
- ☒ All Footprint Layer

Request done

toggle

draw region/navigate on map

view product

download product

add product to download cart

search results

results per page

Page size: 100

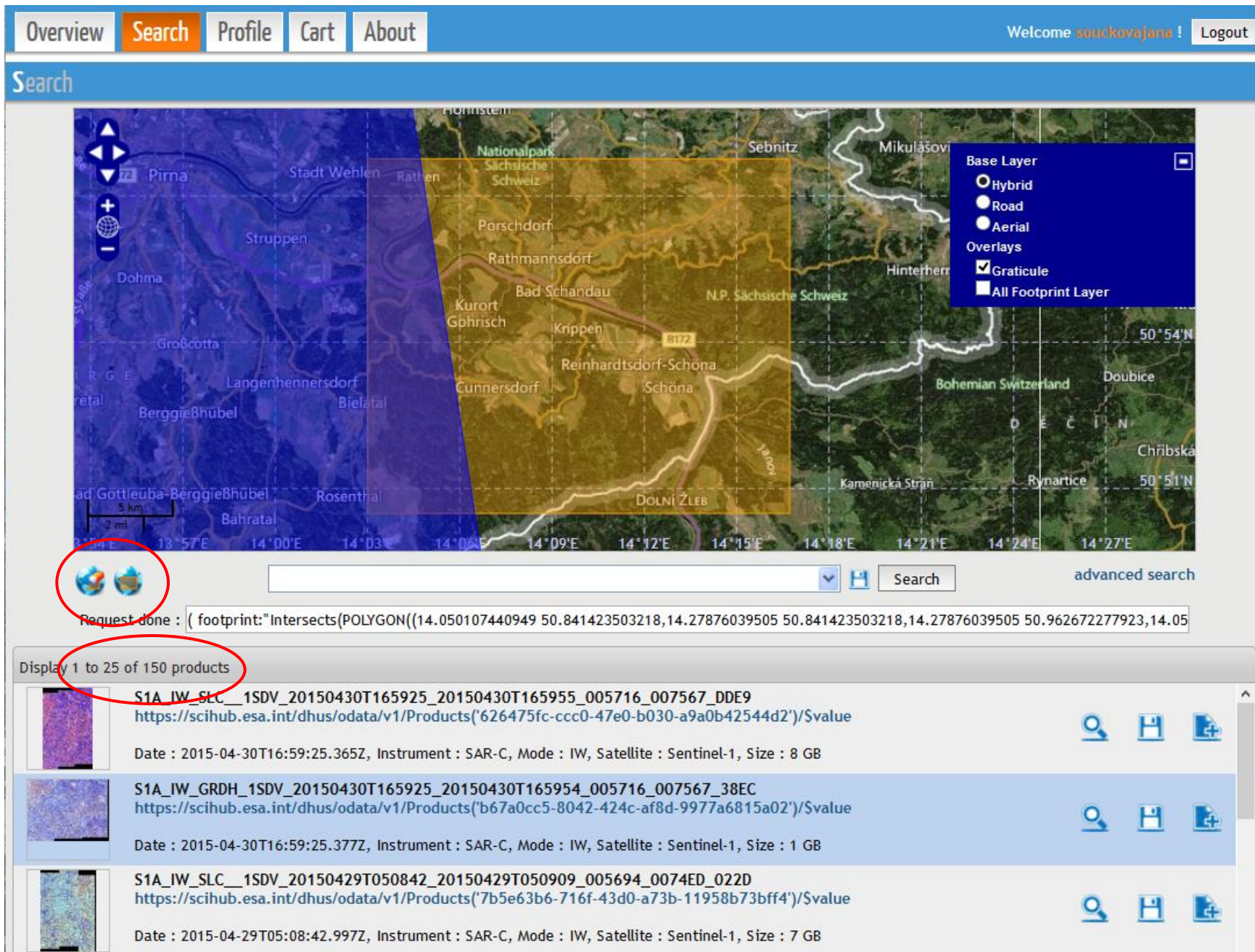
First Previous 59 60 61 62 63 Next Last

Jednoduché vyhledávání – výběr polygonem

Overview Search Profile Cart About

Welcome souckováJana ! Logout

Search



Base Layer

- Hybrid
- Road
- Aerial

Overlays

- ☒ Graticule
- ☐ All Footprint Layer

Request done : (footprint:"Intersects(POLYGON((14.050107440949 50.841423503218,14.27876039505 50.841423503218,14.27876039505 50.962672277923,14.050107440949 50.962672277923,14.050107440949 50.841423503218)))"

Display 1 to 25 of 150 products

	S1A_IW_SLC_1SDV_20150430T165925_20150430T165955_005716_007567_DDE9 https://scihub.esa.int/dhus/odata/v1/Products('626475fc-ccc0-47e0-b030-a9a0b42544d2')/\$value Date : 2015-04-30T16:59:25.365Z, Instrument : SAR-C, Mode : IW, Satellite : Sentinel-1, Size : 8 GB	  
	S1A_IW_GRDH_1SDV_20150430T165925_20150430T165954_005716_007567_38EC https://scihub.esa.int/dhus/odata/v1/Products('b67a0cc5-8042-424c-af8d-9977a6815a02')/\$value Date : 2015-04-30T16:59:25.377Z, Instrument : SAR-C, Mode : IW, Satellite : Sentinel-1, Size : 1 GB	  
	S1A_IW_SLC_1SDV_20150429T050842_20150429T050909_005694_0074ED_022D https://scihub.esa.int/dhus/odata/v1/Products('7b5e63b6-716f-43d0-a73b-11958b73bff4')/\$value Date : 2015-04-29T05:08:42.997Z, Instrument : SAR-C, Mode : IW, Satellite : Sentinel-1, Size : 7 GB	  

Jednoduché vyhledávání – podle hesla



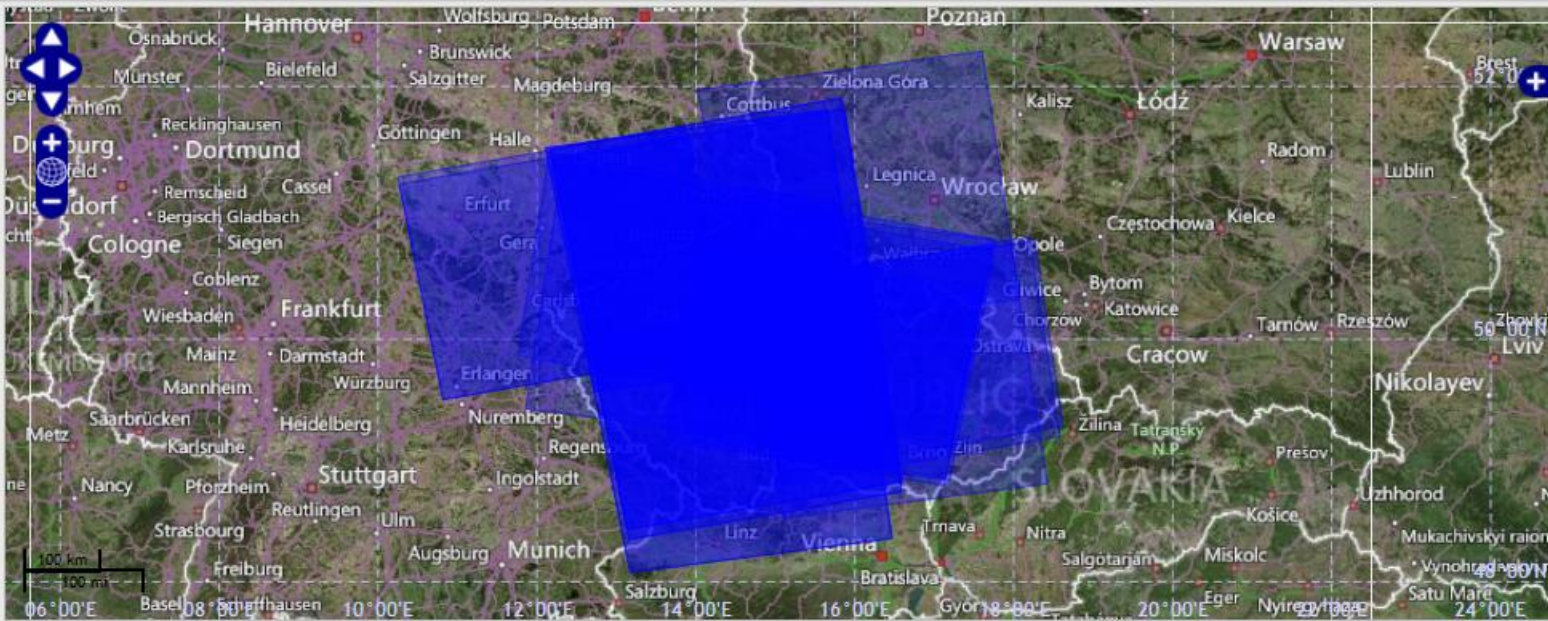
Sentinel-1 Scientific Data Hub



[Overview](#) [Search](#) [Profile](#) [Cart](#) [About](#)

Welcome souckovajana ! [Logout](#)

Search



[advanced search](#)

Request done : Praha

Display 1 to 25 of 212 products



S1A_IW_SLC_1SDV_20150430T165925_20150430T165955_005716_007567_DDE9
[https://scihub.esa.int/dhus/odata/v1/Products\('626475fc-ccc0-47e0-b030-a9a0b42544d2'\)/\\$value](https://scihub.esa.int/dhus/odata/v1/Products('626475fc-ccc0-47e0-b030-a9a0b42544d2')/$value)
Date : 2015-04-30T16:59:25.365Z, Instrument : SAR-C, Mode : IW, Satellite : Sentinel-1, Size : 8 GB



S1A_IW_GRDH_1SDV_20150430T165925_20150430T165954_005716_007567_38EC



Pole pro jednoduché vyhledávání – fulltext

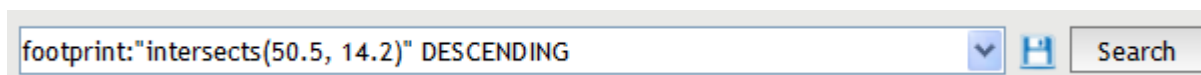
Podrobně na <https://scihub.esa.int/userguide/FullTextSearch>

Následuje pouze výběr možností:

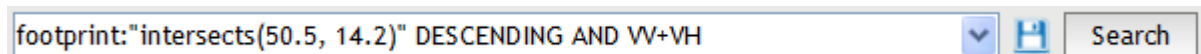
- Souřadnice bodu *footprint:"intersects(50.5, 14.2)"*,



- Sestupná/vzestupná dráha *DESCENDING/ASCENDING*



- Polarizace *HH, VV, HV, VH, HH HV (nebo HH+HV), VV VH*



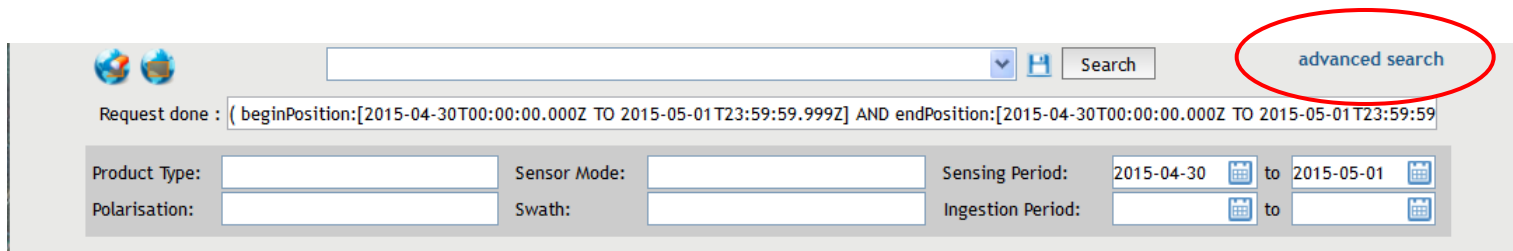
- Číslo tracku/relativní orbity *relativeorbitnumber:5*

footprint:'intersects(50.5, 14.2)' AND DESCENDING AND VV+VH AND relativeorbitnumber:22

Pokročilé vyhledávání – 6 dalších parametrů

- lze kombinovat s výběrem pomocí polygonu/fulltextu

- **Product Type:** SLC (single look complex), GRD (ground range detected)
- **Sensor Mode:** SM (Stripmap), IW (Interferometric Wide Swath), EW (Extra-Wide Swath)
- **Sensing Period:** čas pořízení dat senzorem, záznam u každé řádky snímku
- **Polarisation:** HH, VV, HV, VH, HH HV, VV VH
- **Swath Accepted:** S1, S2, S3, S4, S5, S6, IW, IW1, IW2, IW3, EW, EW1, EW2, EW3, EW4, EW5
- **Ingestion Period:** datum publikace dat do archivu (Data Hub rolling archive)



The screenshot displays the Data Hub search interface. At the top, there is a search bar with a dropdown arrow and a 'Search' button. To the right of the search bar, the text 'advanced search' is circled in red. Below the search bar, the 'Request done' section shows a complex query: '(beginPosition:[2015-04-30T00:00:00.000Z TO 2015-05-01T23:59:59.999Z] AND endPosition:[2015-04-30T00:00:00.000Z TO 2015-05-01T23:59:59.999Z]'. Below this, there are several input fields for search criteria: 'Product Type', 'Sensor Mode', 'Sensing Period' (with date pickers for '2015-04-30' and '2015-05-01'), 'Polarisation', 'Swath', and 'Ingestion Period' (with date pickers for '2015-04-30' and '2015-05-01').

Pokročilé vyhledávání

- ukázka kombinace času pořízení a zájmového území

Overview Search Profile Cart About Welcome souckovajana! Logout

Search



Base Layer
○ Hybrid
● Road
● Aerial
Overlays
☒ Graticule
☐ All Footprint Layer

advanced search

Request done : (beginPosition:[2015-04-30T00:00:00.000Z TO 2015-05-01T23:59:59.999Z] AND endPosition:[2015-04-30T00:00:00.000Z TO 2015-05-01T23:59:59.999Z]

Product Type: Sensor Mode: Sensing Period: 2015-04-30 to 2015-05-01
Polarisation: Swath: Ingestion Period: to

Display 1 to 2 of 2 products

 S1A_IW_SLC_1SDV_20150430T165925_20150430T165955_005716_007567_DDE9
[https://scihub.esa.int/dhus/odata/v1/Products\('626475fc-ccc0-47e0-b030-a9a0b42544d2'\)/\\$value](https://scihub.esa.int/dhus/odata/v1/Products('626475fc-ccc0-47e0-b030-a9a0b42544d2')/$value)
Date : 2015-04-30T16:59:25.365Z, Instrument : SAR-C, Mode : IW, Satellite : Sentinel-1, Size : 8 GB

 S1A_IW_GRDH_1SDV_20150430T165925_20150430T165954_005716_007567_38EC
[https://scihub.esa.int/dhus/odata/v1/Products\('b67a0cc5-8042-424c-af8d-9977a6815a02'\)/\\$value](https://scihub.esa.int/dhus/odata/v1/Products('b67a0cc5-8042-424c-af8d-9977a6815a02')/$value)
Date : 2015-04-30T16:59:25.377Z, Instrument : SAR-C, Mode : IW, Satellite : Sentinel-1, Size : 1 GB

View product – přesměruje na detailní informace



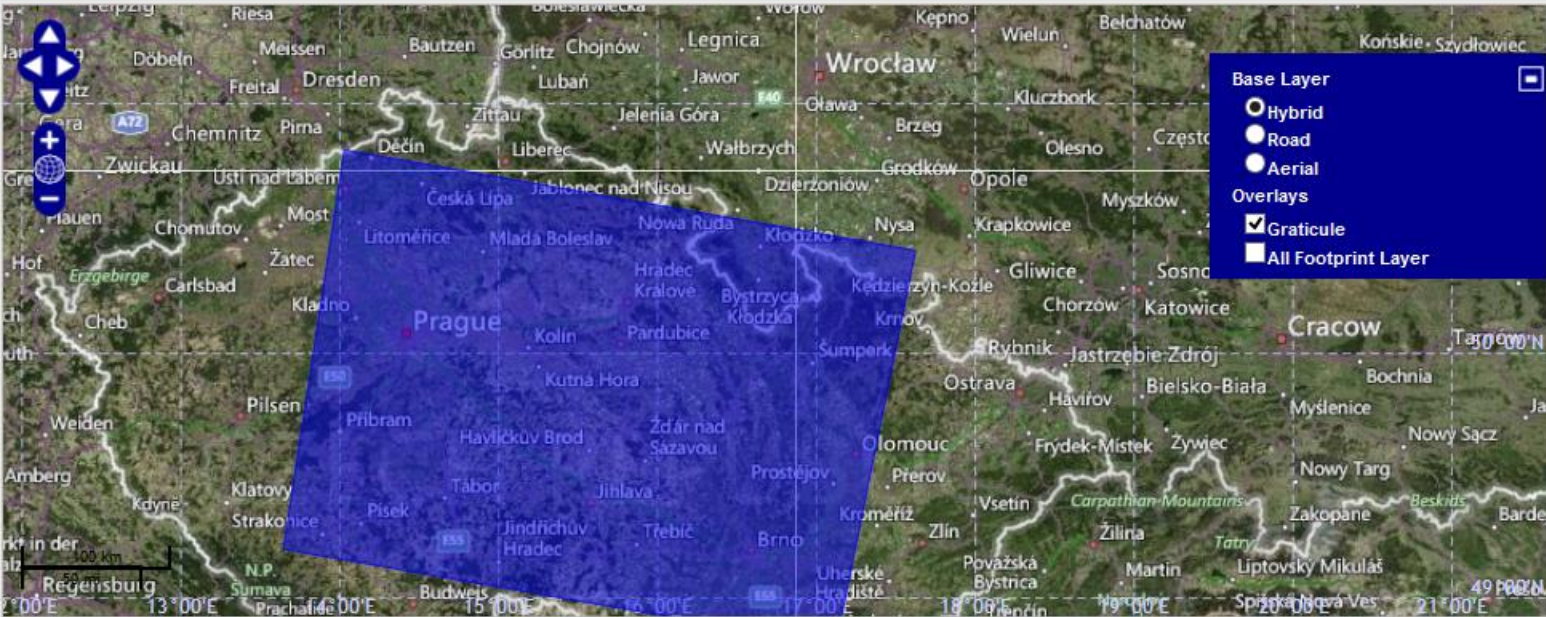
Sentinel-1 Scientific Data Hub



[Overview](#) [Search](#) [Profile](#) [Cart](#) [About](#)

Welcome souckovářana ! [Logout](#)

Search



Base Layer

- ☐ Hybrid
- ☐ Road
- ☐ Aerial

Overlays

- ☒ Graticule
- ☐ All Footprint Layer



footprint:"intersects(50.5, 14.2)" AND DESCENDING AND WV+VH AND relativeorb

Request done : footprint:"intersects(50.5, 14.2)" AND DESCENDING AND WV+VH AND relativeorbitnumber:22

Display 1 to 25 of 35 products



S1A_IW_SLC__1SDV_20150429T050907_20150429T050934_005694_0074ED_0563
[https://scihub.esa.int/dhus/odata/v1/Products\('67657d02-1236-44fb-bcab-fb012452e6'\)/\\$value](https://scihub.esa.int/dhus/odata/v1/Products('67657d02-1236-44fb-bcab-fb012452e6')/$value)

Date : 2015-04-29T05:09:07.820Z, Instrument : SAR-C, Mode : IW, Satellite : Sentinel-1, Size : 7 GB

S1A_IW_GRDH_1SDV_20150429T050908_20150429T050933_005694_0074ED_9E47



View product

View product – Quicklook



Sentinel-1 Scientific Data Hub

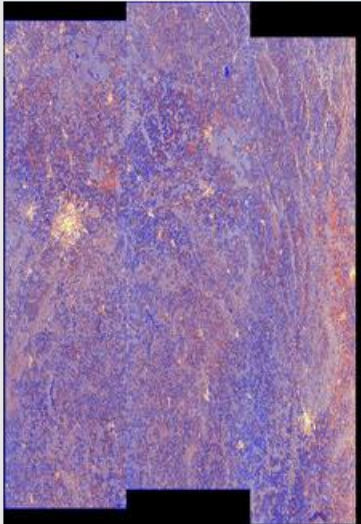


[Overview](#) [Search](#) [Profile](#) [Cart](#) [About](#)

Welcome [souckovajano](#) ! [Logout](#)

View product 'S1A_IW_SLC__1SDV_20150429T050907_20150429T050934_005694_0074ED_0563'

[Quicklook](#) [Summary](#) [Product](#) [Platform](#) [Instrument](#)





Download the product

-  S1A_IW_SLC__1SDV_20150429T050907_...
-  annotation
-  measurement
-  preview
-  support
-  S1A_IW_SLC__1SDV_20150429T05090...
-  manifest.safe

View product – Summary



Sentinel-1 Scientific Data Hub



[Overview](#) [Search](#) [Profile](#) [Cart](#) [About](#)

Welcome **souckovajana** ! [Logout](#)

View product 'S1A_IW_SLC__1SDV_20150429T050907_20150429T050934_005694_0074ED_0563'

[Quicklook](#) [Summary](#) [Product](#) [Platform](#) [Instrument](#)

Date: 2015-04-29T05:09:07.820Z
Instrument: SAR-C
Mode: IW
Satellite: Sentinel-1
Size: 7 GB

Download the product

- S1A_IW_SLC__1SDV_20150429T050907_...
- annotation
- measurement
- preview
- support
- S1A_IW_SLC__1SDV_20150429T05090...
- manifest.safe



View product – Product



Sentinel-1 Scientific Data Hub



[Overview](#) [Search](#) [Profile](#) [Cart](#) [About](#)

Welcome [souckovajana](#) ! [Logout](#)

View product 'S1A_IW_SLC__1SDV_20150429T050907_20150429T050934_005694_0074ED_0563'

[Quicklook](#) [Summary](#) [Product](#) [Platform](#) [Instrument](#)

Acquisition Type : NOMINAL
Cycle number : 47
Format : SAFE
Ingestion Date : 2015-04-29T14:00:16.992Z
Mission datatake id : 29933
Orbit number (start) : 5694
Orbit number (stop) : 5694
Pass direction : DESCENDING
Phase identifier : 1
Polarisation : VV VH
Product class : S
Product class description : SAR Standard L1 Product
Product composition : Slice
Product level : L1
Product type : SLC
Relative orbit (start) : 22
Relative orbit (stop) : 22
Sensing start : 2015-04-29T05:09:07.820Z
Sensing stop : 2015-04-29T05:09:34.791Z
Slice number : 5
Start relative orbit number : 22



Download the product

 S1A_IW_SLC__1SDV_20150429T050907_...

 annotation

 measurement

 preview

 support

 S1A_IW_SLC__1SDV_20150429T05090...

 manifest.safe

View product – Platform

View product 'S1A_IW_SLC__1SDV_20150429T050907_20150429T050934_005694_0074ED_0563'

Quicklook | Summary | Product | **Platform** | Instrument

Carrier rocket : Soyuz
Launch date : April 3rd, 2014
Mission type : Earth observation
NSSDC identifier : 0000-000A
Operator : European Space Agency
Satellite description : <https://sentinel.esa.int/web/sentinel/missions/sentinel-1>
Satellite name : Sentinel-1
Satellite number : A

Download the product

- S1A_IW_SLC__1SDV_20150429T050907_...
- annotation
- measurement
- preview
- support
- S1A_IW_SLC__1SDV_20150429T05090...
- manifest.safe

View product – Instrument

View product 'S1A_IW_SLC__1SDV_20150429T050907_20150429T050934_005694_0074ED_0563'

Quicklook | Summary | Product | Platform | **Instrument**

Instrument abbreviation : SAR-C SAR
Instrument description : <https://sentinel.esa.int/web/sentinel/missions/sentinel-1>
Instrument mode : IW
Instrument name : Synthetic Aperture Radar (C-band)
Instrument swath : IW1 IW2 IW3

Download the product

- S1A_IW_SLC__1SDV_20150429T050907_...
- annotation
- measurement
- preview
- support
- S1A_IW_SLC__1SDV_20150429T05090...
- manifest.safe

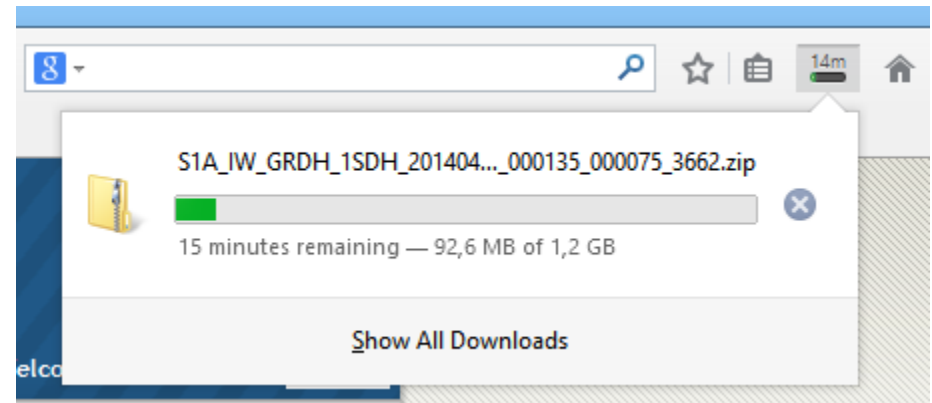
Stažení dat

3 možnosti:

1. ihned po vyhledání
2. ze zobrazeného detailu snímku
3. více snímků najednou – přidáním do seznamu ke stažení (Cart) a po té stažení všech dat najednou

pozor na velikost dat

➤ s prostorovým rozlišením a polarizací roste jejich objem, jeden snímek > 1GB



1. Download Product – 2 varianty

- Kliknout na odkaz pod názvem snímku
- Kliknout na ikonu diskety

Overview Search Profile Cart About

Welcome souckova.jana! Logout

Search

Base Layer

- ☐ Hybrid
- ☐ Road
- ☐ Aerial

Overlays

- ☒ Graticule
- ☐ All Footprint Layer

Opening S1A_IW_SLC_1SDV_20150429T050907_20150429...

You have chosen to open:

...150429T050907_20150429T050934_005694_0074ED_0563.zip
which is: Compressed (zipped) Folder (4,4 GB)
from: <https://scihub.esa.int>

What should Firefox do with this file?

- ☐ Open with Průzkumník Windows (default)
- ☒ Save File
- ☐ Do this automatically for files like this from now on.

OK Cancel

Request done : footprint:"intersects(50.5, 14.2)" AND DESCEND

Display 1 to 25 of 35 products

S1A_IW_SLC_1SDV_20150429T050907_20150429T050934_005694_0074ED_0563
[https://scihub.esa.int/dhus/odata/v1/Products\('6765'\)](https://scihub.esa.int/dhus/odata/v1/Products('6765'))

Date : 2015-04-29T05:09:07.820Z, Instrument : SAR-C,

S1A_IW_GRDH_1SDV_20150429T050908_20150429T050934_005694_0074ED_0563
[https://scihub.esa.int/dhus/odata/v1/Products\('97a8'\)](https://scihub.esa.int/dhus/odata/v1/Products('97a8'))

Download product

2. View product - Download the product

The screenshot displays the Sentinel-1 Scientific Data Hub interface. At the top, there are logos for the European Commission and ESA, along with the title "Sentinel-1 Scientific Data Hub". Navigation tabs include Overview, Search, Profile, Cart, and About. A user is logged in as "souckovajana". The main heading is "View product 'S1A_IW_SLC__1SDV_20150429T050907_20150429T050934_005694_0074ED_0563'".

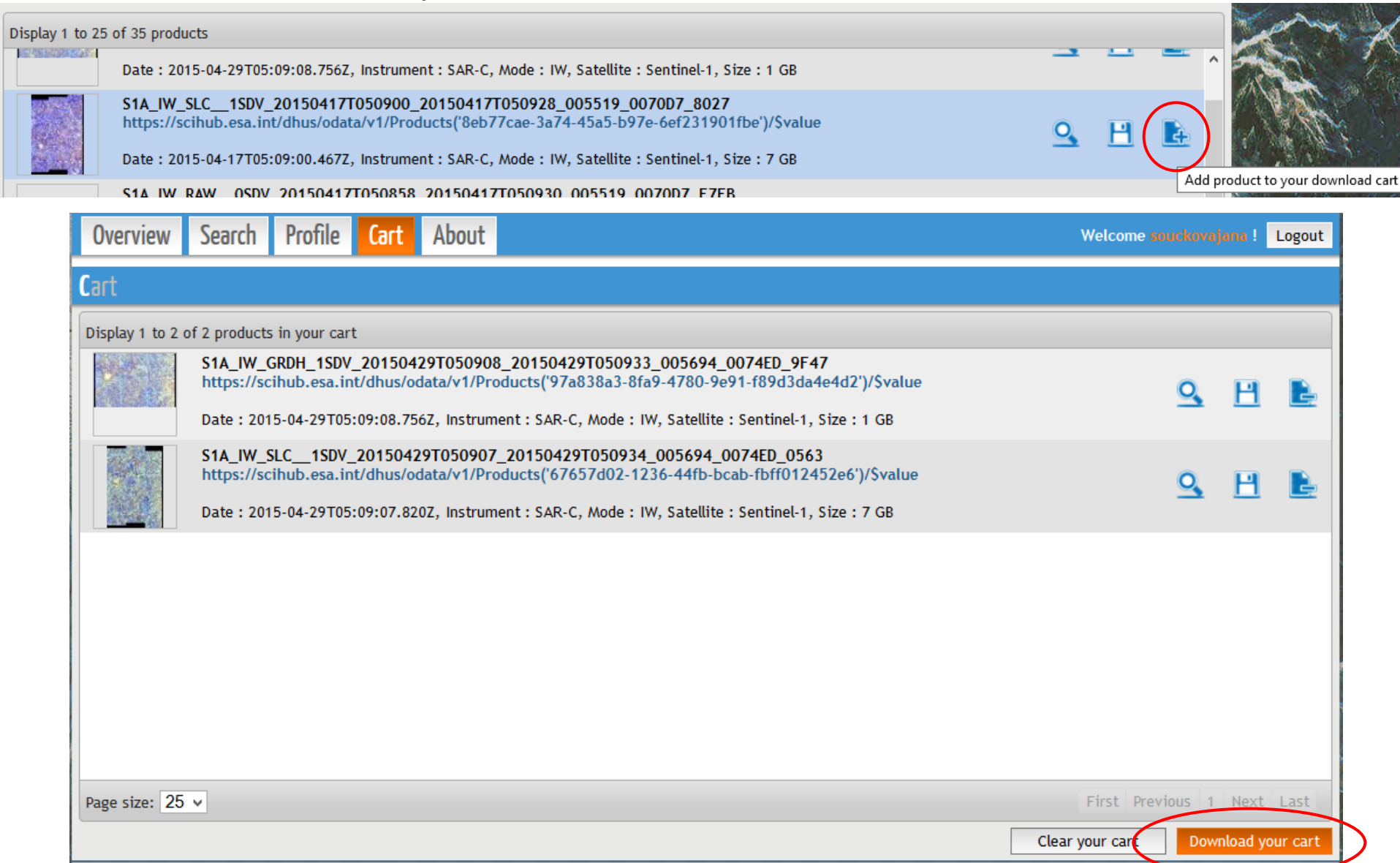
Below the heading, there are tabs for Quicklook, Summary, Product, Platform, and Instrument. The "Download the product" tab is selected and circled in red. To the left of the tabs, product details are listed:

- Carrier rocket : Soyuz
- Launch date : April 3rd, 2014
- Mission type : Earth observation
- NSSDC identifier : 0000-000A
- Operator : European Space Agency
- Satellite description : <https://sentinel.esa.int/web/sentinel/missions/sentinel-1>
- Satellite name : Sentinel-1
- Satellite number : A

At the bottom left, there is a map of the Czech Republic with a yellow rectangular area indicating the satellite's footprint. The map shows major cities like Prague, Brno, and Ostrava, and is bordered by Germany, Poland, and Slovakia.

On the right, a download dialog box is open. It shows the file name "S1A_IW_SLC__1SDV_20150429T050907_20150429T050934_005694_0074ED_0563.zip" and its size of 4.4 GB. The dialog asks "What should Firefox do with this file?" and offers three options: "Open with Průzkumník Windows (default)", "Save File" (which is selected), and "Do this automatically for files like this from now on." (which is unchecked). The "OK" and "Cancel" buttons are at the bottom right of the dialog.

3. Add product to your download cart – přidají se do uloženého seznamu produktů (záložka Cart). Download your Cart – stáhne obsah seznamu s odkazy na uložení dat ve formátu XML.



Display 1 to 25 of 35 products

Date : 2015-04-29T05:09:08.756Z, Instrument : SAR-C, Mode : IW, Satellite : Sentinel-1, Size : 1 GB

S1A_IW_SLC__1SDV_20150417T050900_20150417T050928_005519_0070D7_8027
[https://scihub.esa.int/dhus/odata/v1/Products\('8eb77cae-3a74-45a5-b97e-6ef231901fbe'\)/\\$value](https://scihub.esa.int/dhus/odata/v1/Products('8eb77cae-3a74-45a5-b97e-6ef231901fbe')/$value)

Date : 2015-04-17T05:09:00.467Z, Instrument : SAR-C, Mode : IW, Satellite : Sentinel-1, Size : 7 GB

S1A_IW_RAW__0SDV_20150417T050858_20150417T050930_005519_0070D7_F7EB

Add product to your download cart

Overview Search Profile **Cart** About

Welcome souckovajana ! Logout

Cart

Display 1 to 2 of 2 products in your cart

S1A_IW_GRDH_1SDV_20150429T050908_20150429T050933_005694_0074ED_9F47
[https://scihub.esa.int/dhus/odata/v1/Products\('97a838a3-8fa9-4780-9e91-f89d3da4e4d2'\)/\\$value](https://scihub.esa.int/dhus/odata/v1/Products('97a838a3-8fa9-4780-9e91-f89d3da4e4d2')/$value)

Date : 2015-04-29T05:09:08.756Z, Instrument : SAR-C, Mode : IW, Satellite : Sentinel-1, Size : 1 GB

S1A_IW_SLC__1SDV_20150429T050907_20150429T050934_005694_0074ED_0563
[https://scihub.esa.int/dhus/odata/v1/Products\('67657d02-1236-44fb-bcab-fbff012452e6'\)/\\$value](https://scihub.esa.int/dhus/odata/v1/Products('67657d02-1236-44fb-bcab-fbff012452e6')/$value)

Date : 2015-04-29T05:09:07.820Z, Instrument : SAR-C, Mode : IW, Satellite : Sentinel-1, Size : 7 GB

Page size: 25 ▾

First Previous 1 Next Last

Clear your cart Download your cart

Data HUB APIs

- Doposud popisován přístup k archivu přes grafické rozhraní
- Další možnosti přístupu k obsahu archivu – vyhledávání, stahování:

1. Open Data Protocol (OData)

- Vyhledávání a stahování dat přes webového klienta užitím jednoduchých HTTP zpráv
- př. vyhledání všech SLC snímků v archivu
`https://scihub.esa.int/dhus/odata/v1/Products?\$select=Id&\$filter=substringof\('SLC',Name\)`
- př. stažení dat – do internetového prohlížeče zadat url snímku
`https://scihub.esa.int/dhus/odata/v1/Products\('97a838a3-8fa9-4780-9e91-f89d3da4e4d2'\)/\$value`

2. Open Search (Solr)

- Další možnosti dotazování na data, které nejsou možné pomocí OData.

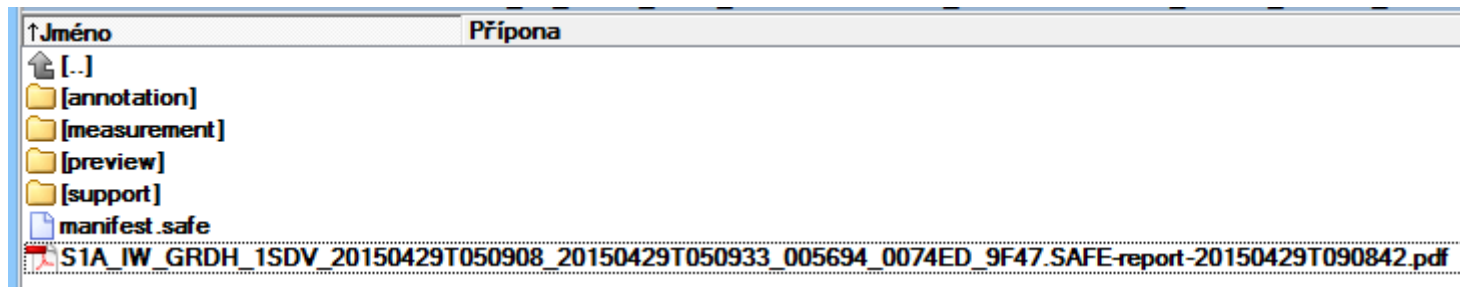
3. Batch scripting

- Využití Odata a Open Search URI ve skriptu spouštěném na pozadí

Více na <https://scihub.esa.int/userguide/BatchScripting>

Stažená data

Komprimovaná – ZIP - Snímky ve formátu TIFF



Prohlížení a zpracování dat
např. pomocí sady nástrojů

Sentinel-1 Toolbox

<https://sentinel.esa.int/web/sentinel/toolboxes/sentinel-1>

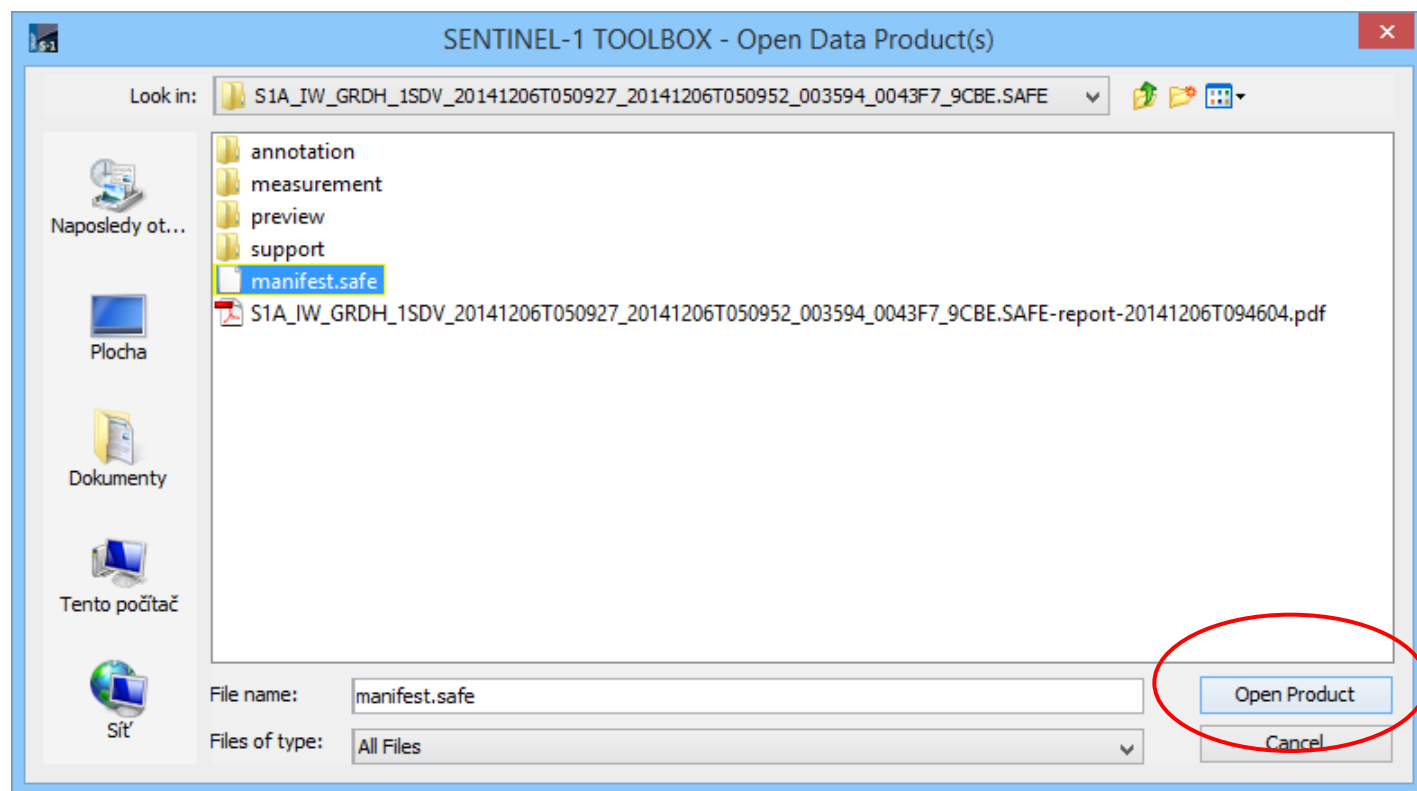
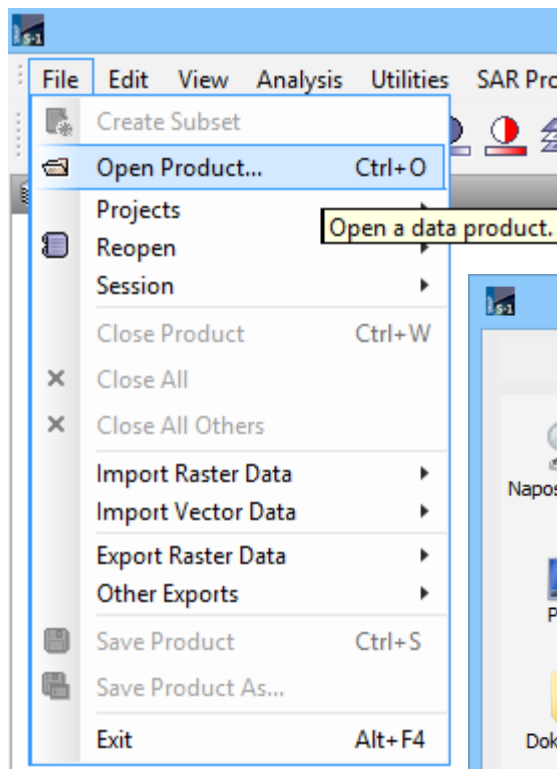


Sentinel-1 Toolbox (S1TBX)

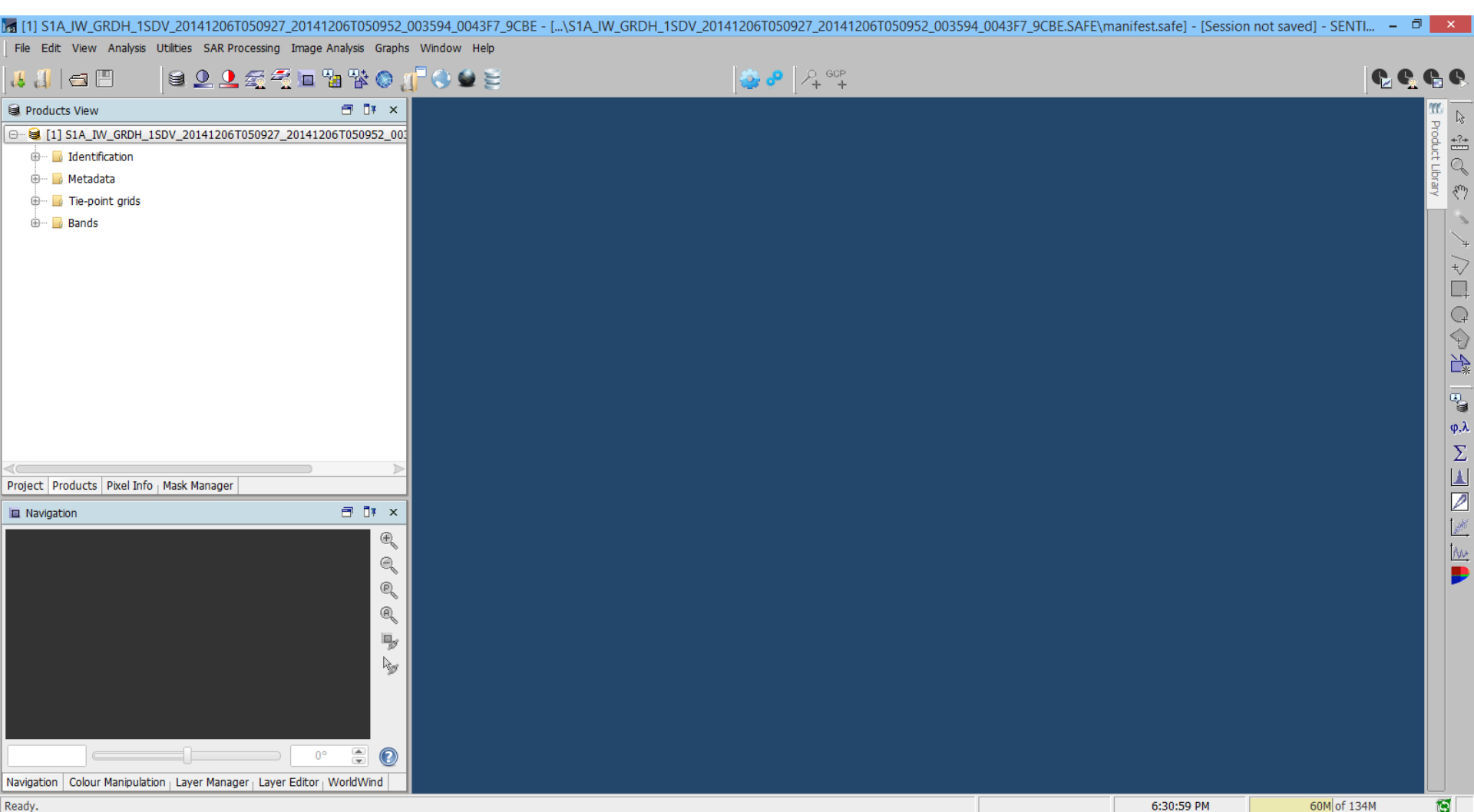


- volně stažitelná sada nástrojů
- aktuální verze 1.1.0
- podporuje data Sentinel-1, ERS-1 & 2, Envisat; ALOS PALSAR, TerraSAR-X, COSMO-SkyMed a RADARSAT-2
- mohou být spouštěny z příkazové řádky, ale jsou též integrovány v grafickém rozhraní (to je velmi podobné NESTu)
- zpracování, čtení, zapisování, vizualizace a analýza dat
- obsahuje nástroje pro kalibraci, filtraci spekle, koregistraci, ortorektifikaci, mozaikování, konverzi dat, polarimetrii i interferometrii
- open source - GNU public license – zdrojový kód v Javě
- podporované OS: MS Windows XP, Vista, 7 a 8, Linux, Mac OS X
- kompatibilní s S2TBX, S3TBX a PolSARpro

Načtení dat I

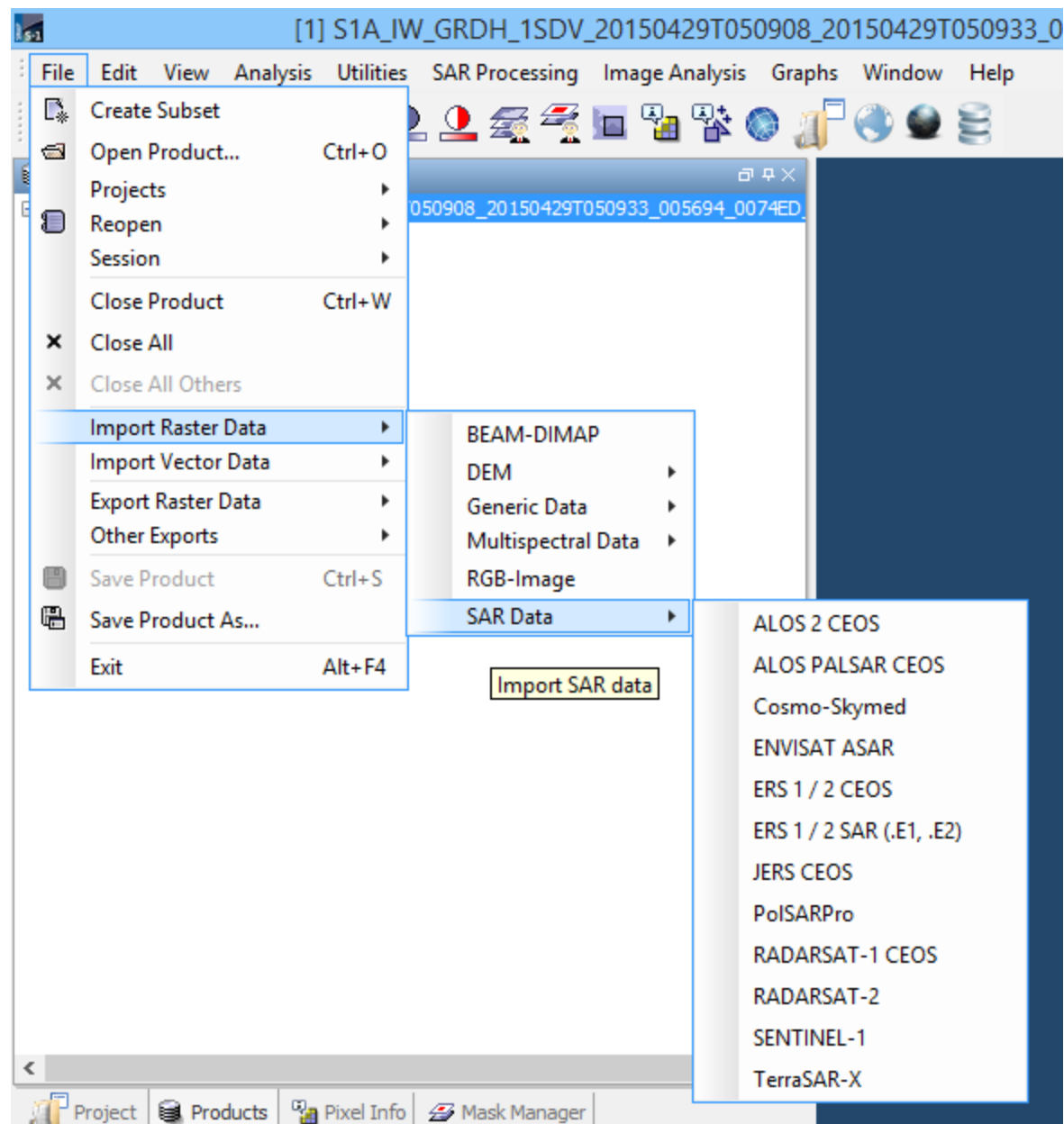


- obrazová data se automaticky nezobrazí



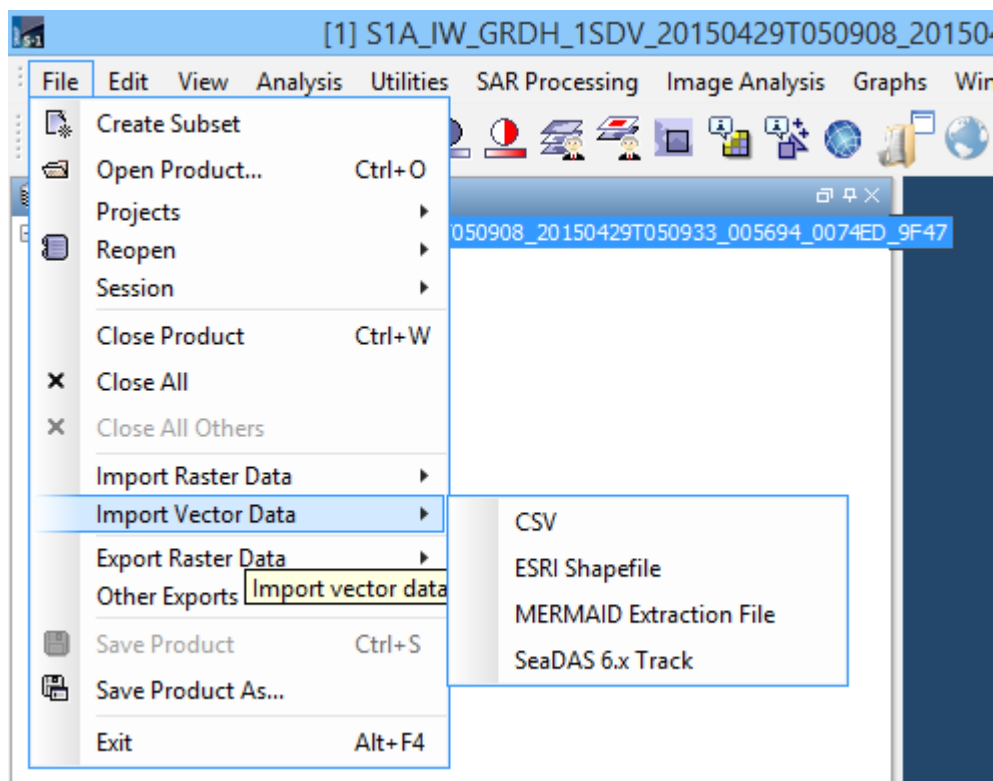
Načtení dat

- rastrová data

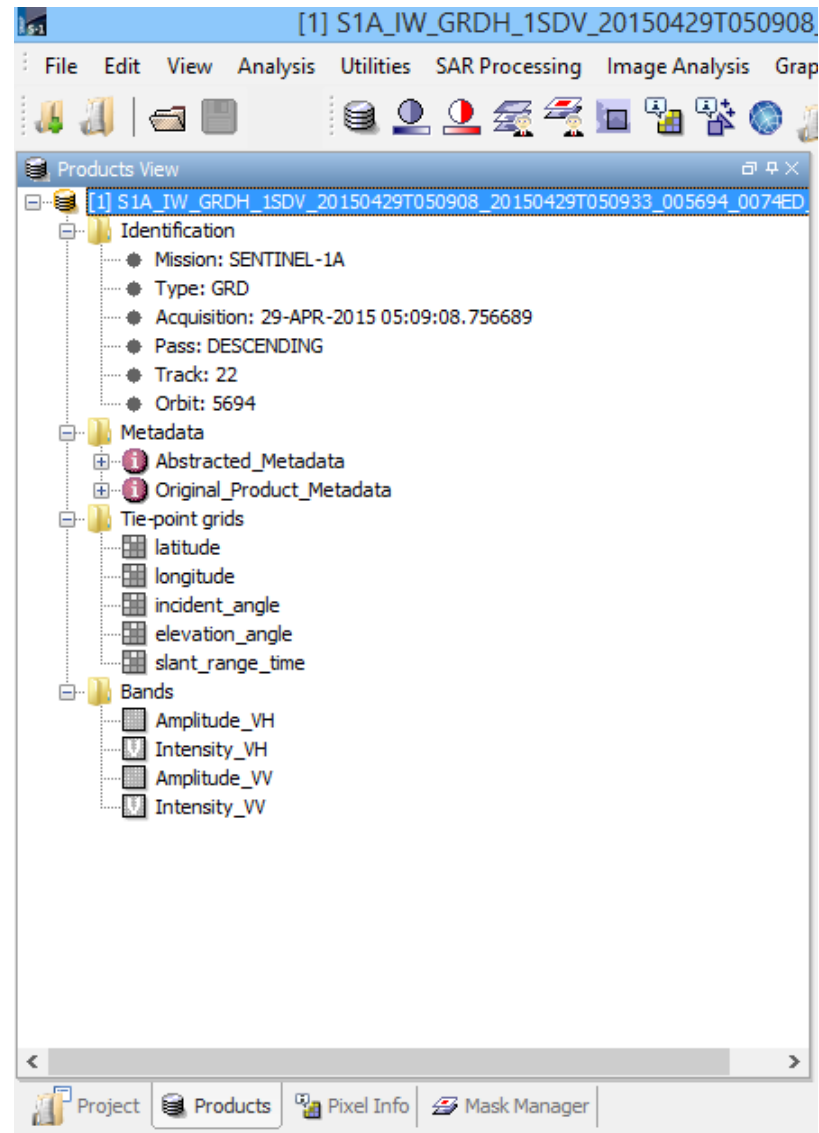


Načtení dat III

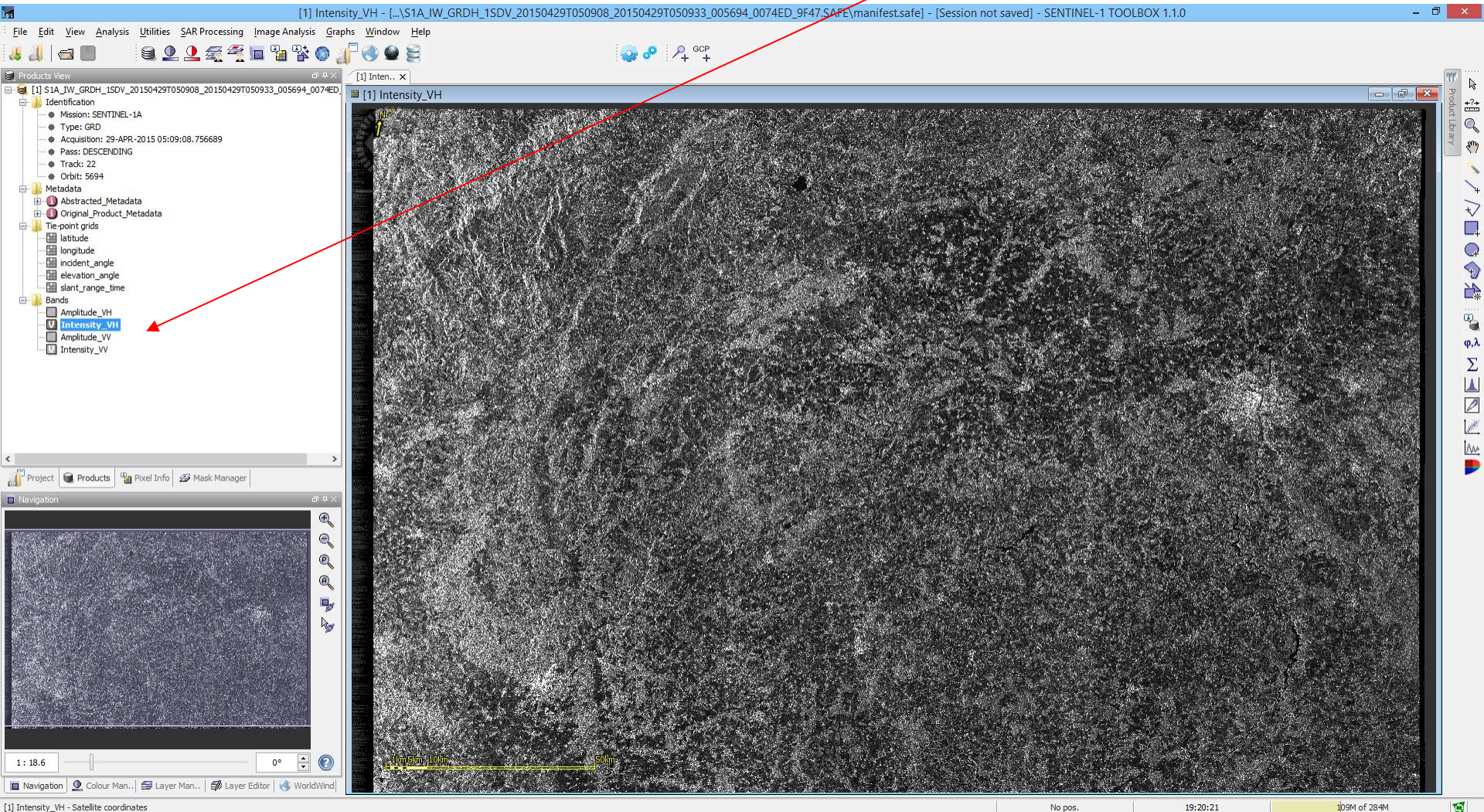
- vektorová data



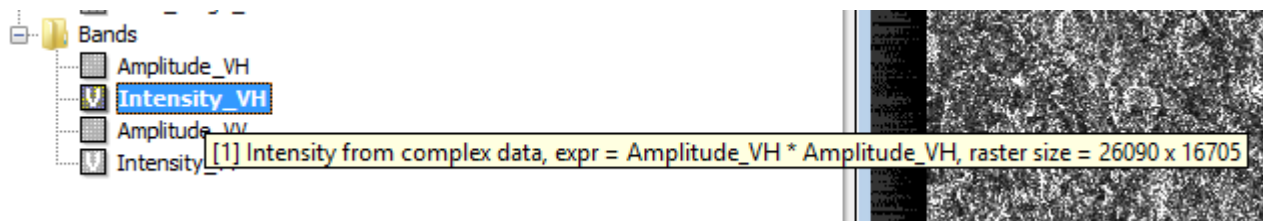
Okno Products View



- snímek otevřeme dvojklikem na jeho název
- info o metadatech obdobně

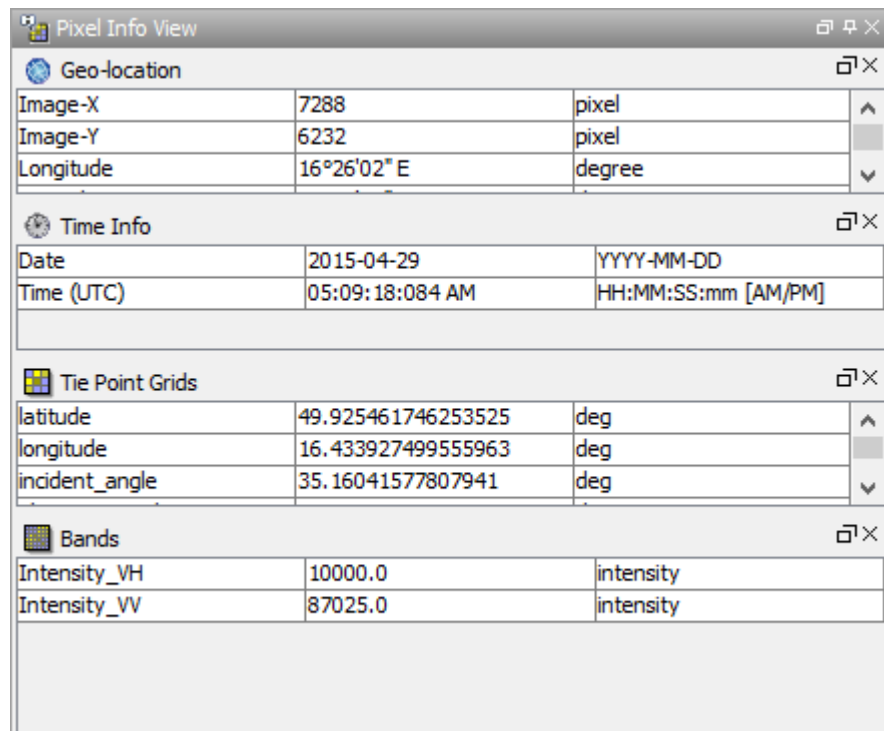


- V - v ikoně znamená virtuální, data tedy nejsou uložena, ale pokaždé se pro zobrazení vypočtou z nějakých uložených
- zde $\text{Intenzita} = \text{Amplituda} * \text{Amplituda}$



Okno Pixel Info

- zobrazuje informace o hodnotách pixelu na pozici kurzoru



The screenshot shows a software window titled "Pixel Info View" with a standard Windows-style title bar (minimize, maximize, close buttons). The window is divided into four main sections, each with a header and a table of data:

- Geo-location**: Contains a table with three rows: Image-X (7288, pixel), Image-Y (6232, pixel), and Longitude (16°26'02" E, degree).
- Time Info**: Contains a table with two rows: Date (2015-04-29, YYYY-MM-DD) and Time (UTC) (05:09:18:084 AM, HH:MM:SS:mm [AM/PM]).
- Tie Point Grids**: Contains a table with three rows: latitude (49.925461746253525, deg), longitude (16.433927499555963, deg), and incident_angle (35.16041577807941, deg).
- Bands**: Contains a table with two rows: Intensity_VH (10000.0, intensity) and Intensity_VV (87025.0, intensity).

Each section header has a small icon and a maximize/close button. The tables have a light gray background and black text.

Geo-location		
Image-X	7288	pixel
Image-Y	6232	pixel
Longitude	16°26'02" E	degree

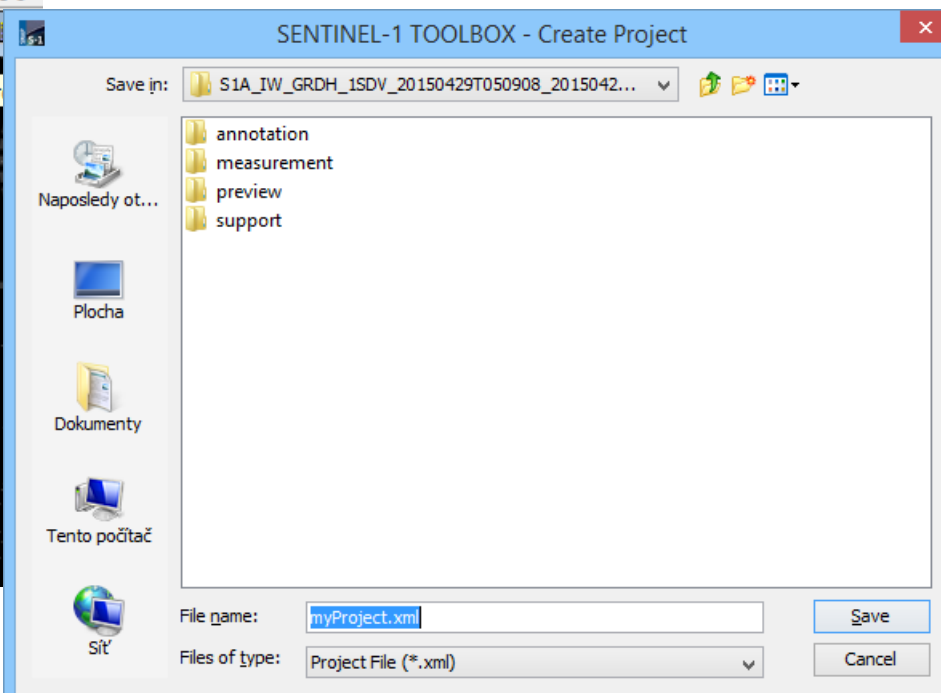
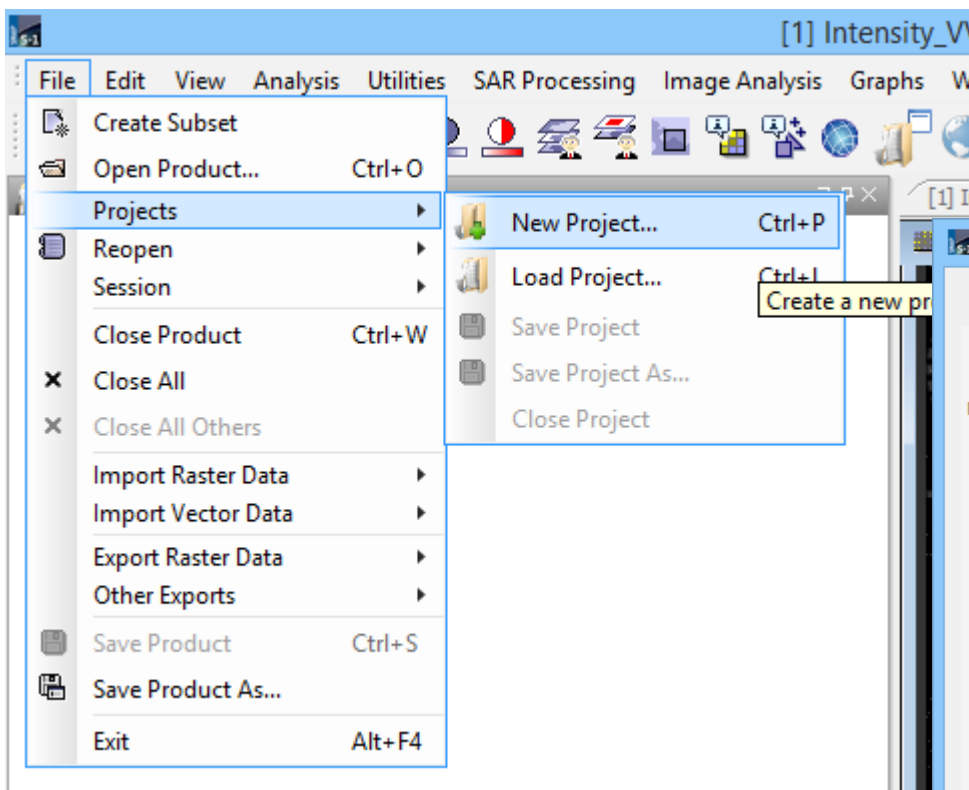
Time Info		
Date	2015-04-29	YYYY-MM-DD
Time (UTC)	05:09:18:084 AM	HH:MM:SS:mm [AM/PM]

Tie Point Grids		
latitude	49.925461746253525	deg
longitude	16.433927499555963	deg
incident_angle	35.16041577807941	deg

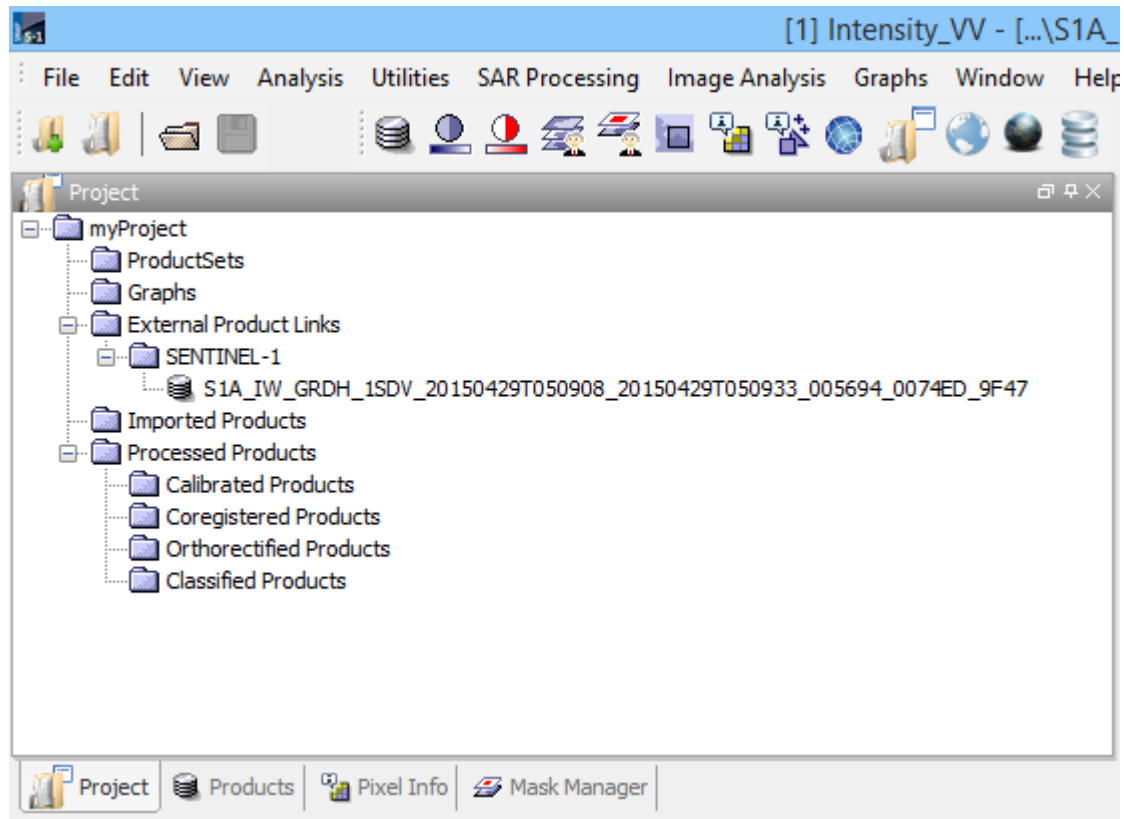
Bands		
Intensity_VH	10000.0	intensity
Intensity_VV	87025.0	intensity

Uložení projektu

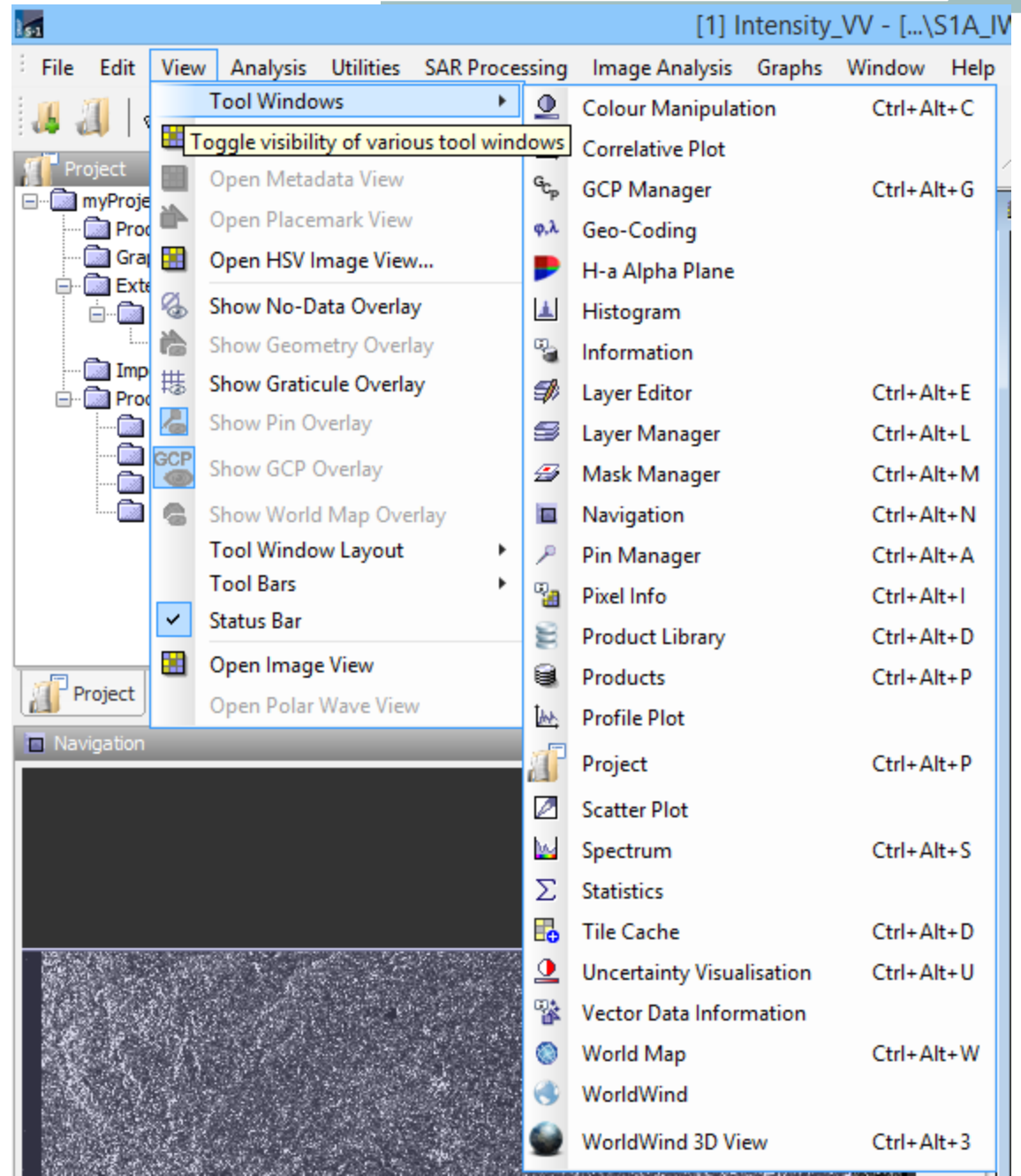
- zamezení ztráty rozpracovaných dat při přerušení činnosti
- slouží k uložení způsobu vizualizace již jednou načtených dat, virtuálních vrstev, masek apod.



Project View

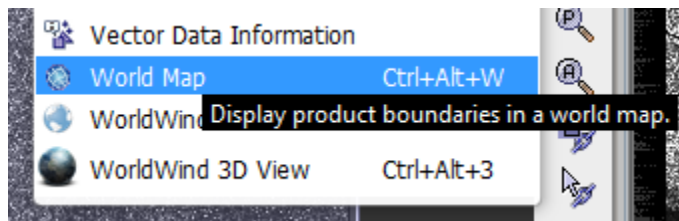


Zobrazení řady dalších oken nástrojů

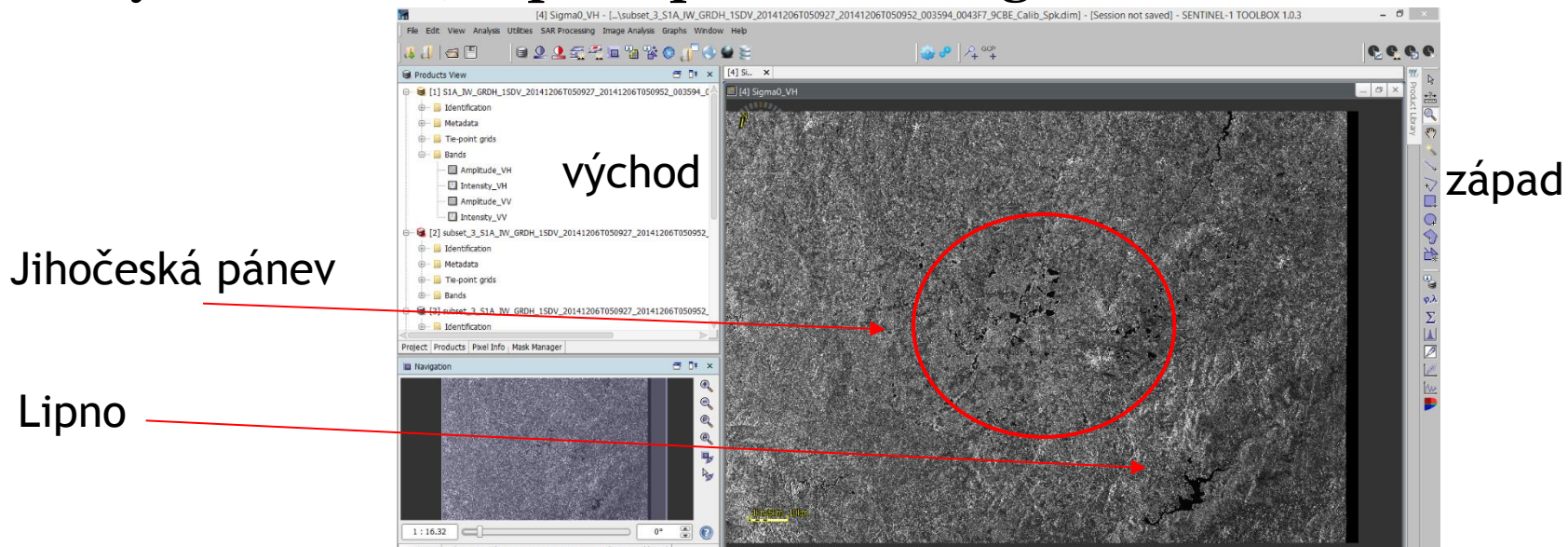


Zobrazení hranic snímku v mapě

- pro jednoduchou orientaci



- nezpracovaný snímek se často zobrazuje obráceně (východ vlevo, západ vpravo) kvůli geometrii snímání



Základní zpracování SAR dat

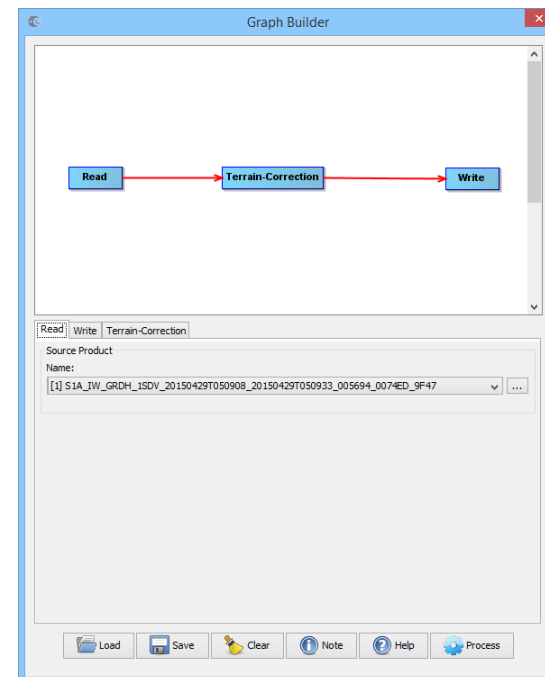
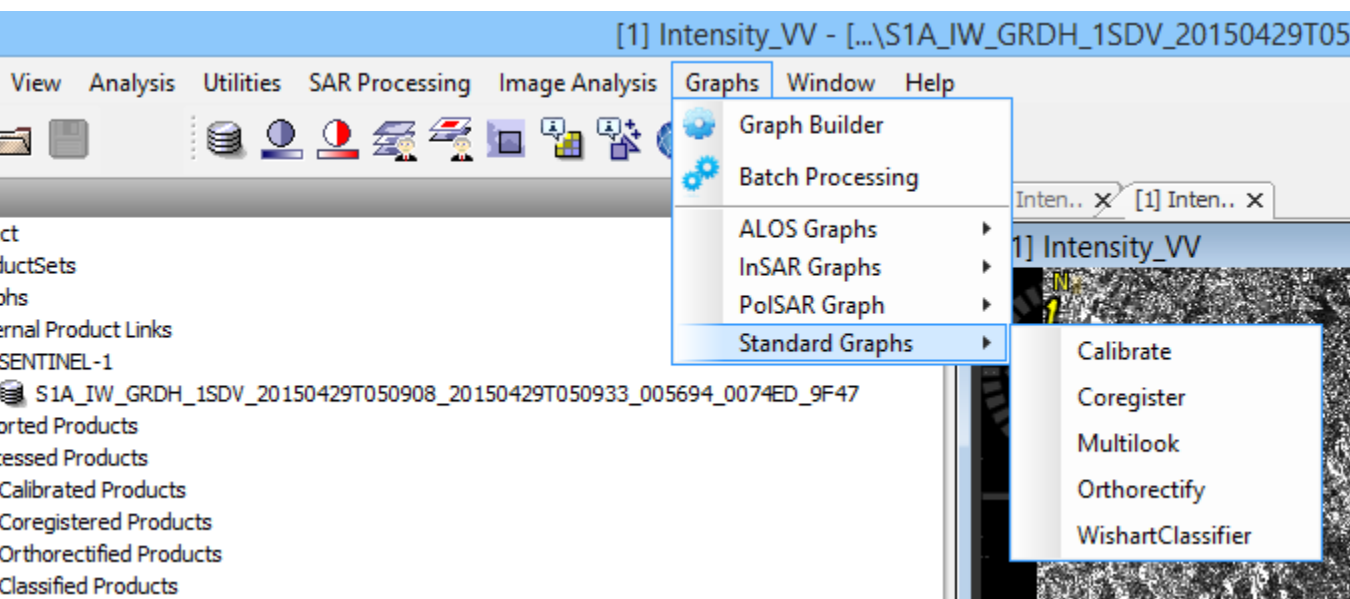
- vždy záleží na účelu

Obvyklý postup zpracování GRD dat:

- **kalibrace** - nejčastěji z DN hodnoty (amplituda/intenzita) na sigma nought (obvykle v dB)
- **filtrace spekle** - odstranění speckle („šumu“). Chceme původní hodnoty, nebo „zprůměrované“ ?
- **topografická korekce** - oprava terénních vlivů
- **koregistrace** - „ztotožnění“, máme-li více snímků

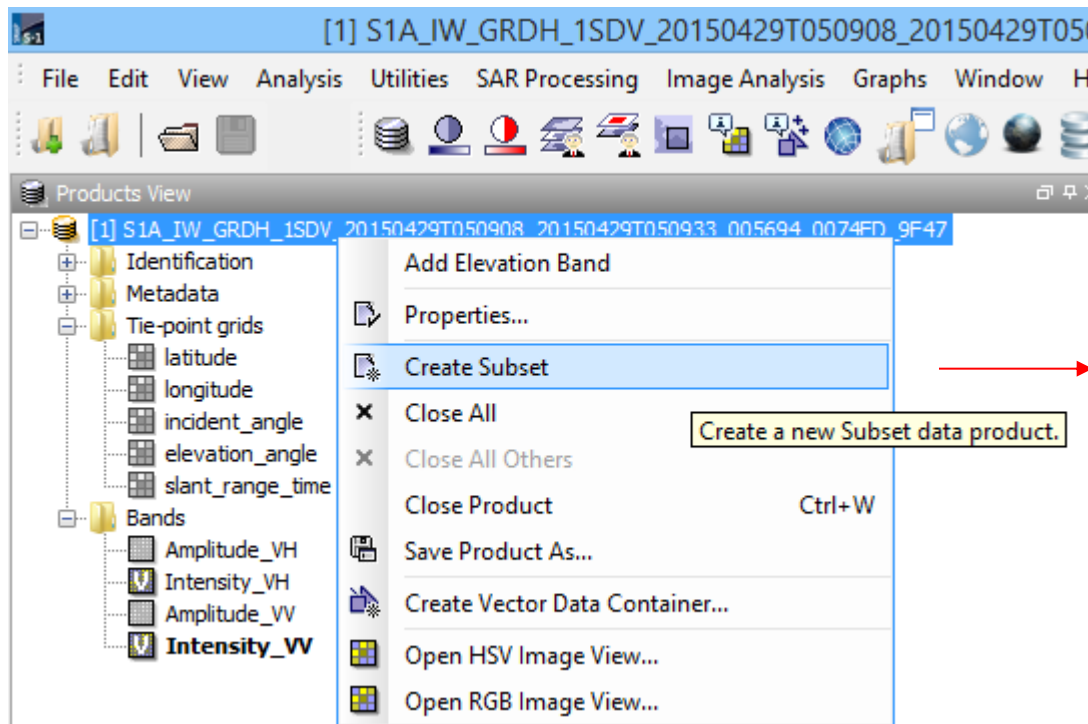
Graph builder, Batch processing

- nejsnazší způsob zpracování jednoho či dvou snímků - postupně „proklikáme“ nabízené nástroje
- chceme zpracovat více dat stejným postupem a se stejným nastavením?
 - Graph builder - umožňuje vytvořit a spustit řetězec událostí od načtení dat, jejich zpracování až po export
 - Batch processing - seznam dat ke zpracování

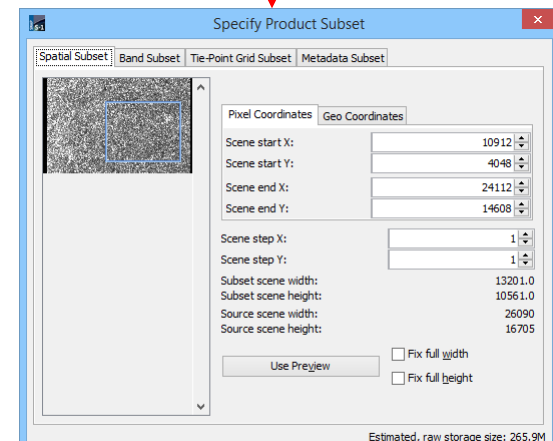
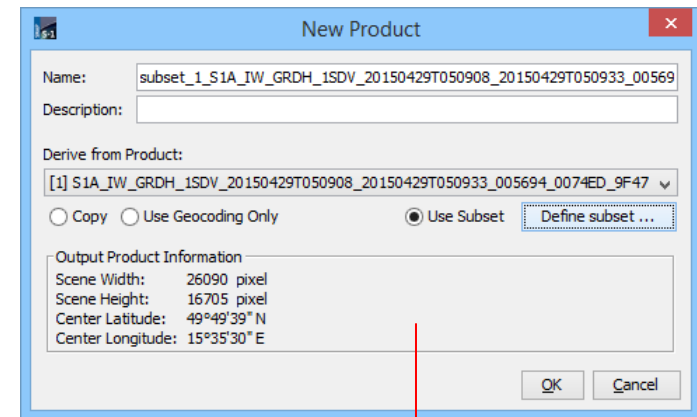


Moc velké území? > oříznutí dat

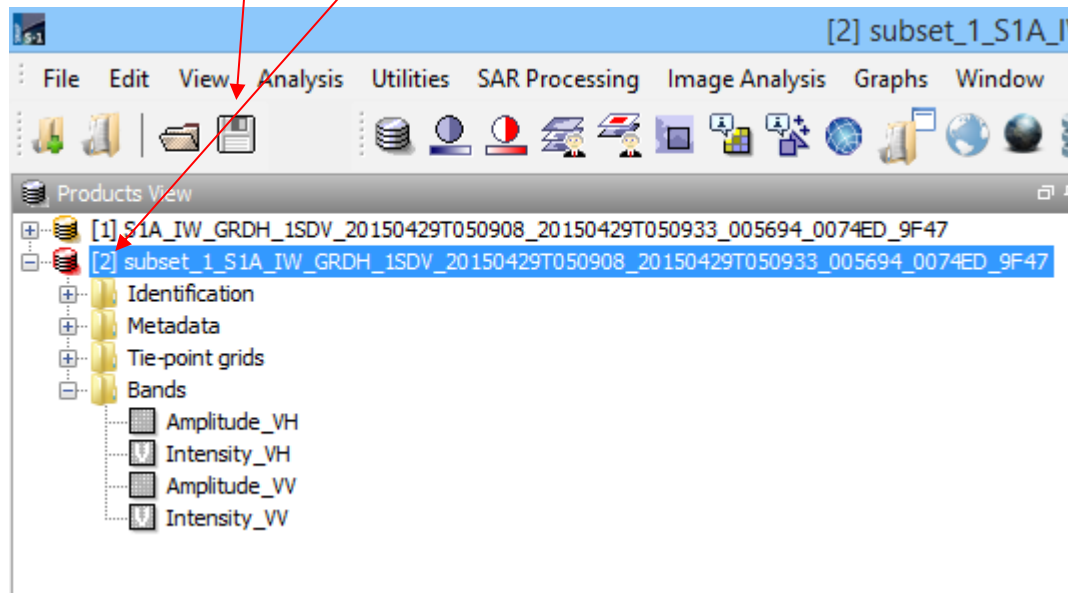
- Pravým tl. myši na snímek > Create Subset > Use subset > Define subset > nastavit velikost výřezu > OK



Create a new Subset data product.

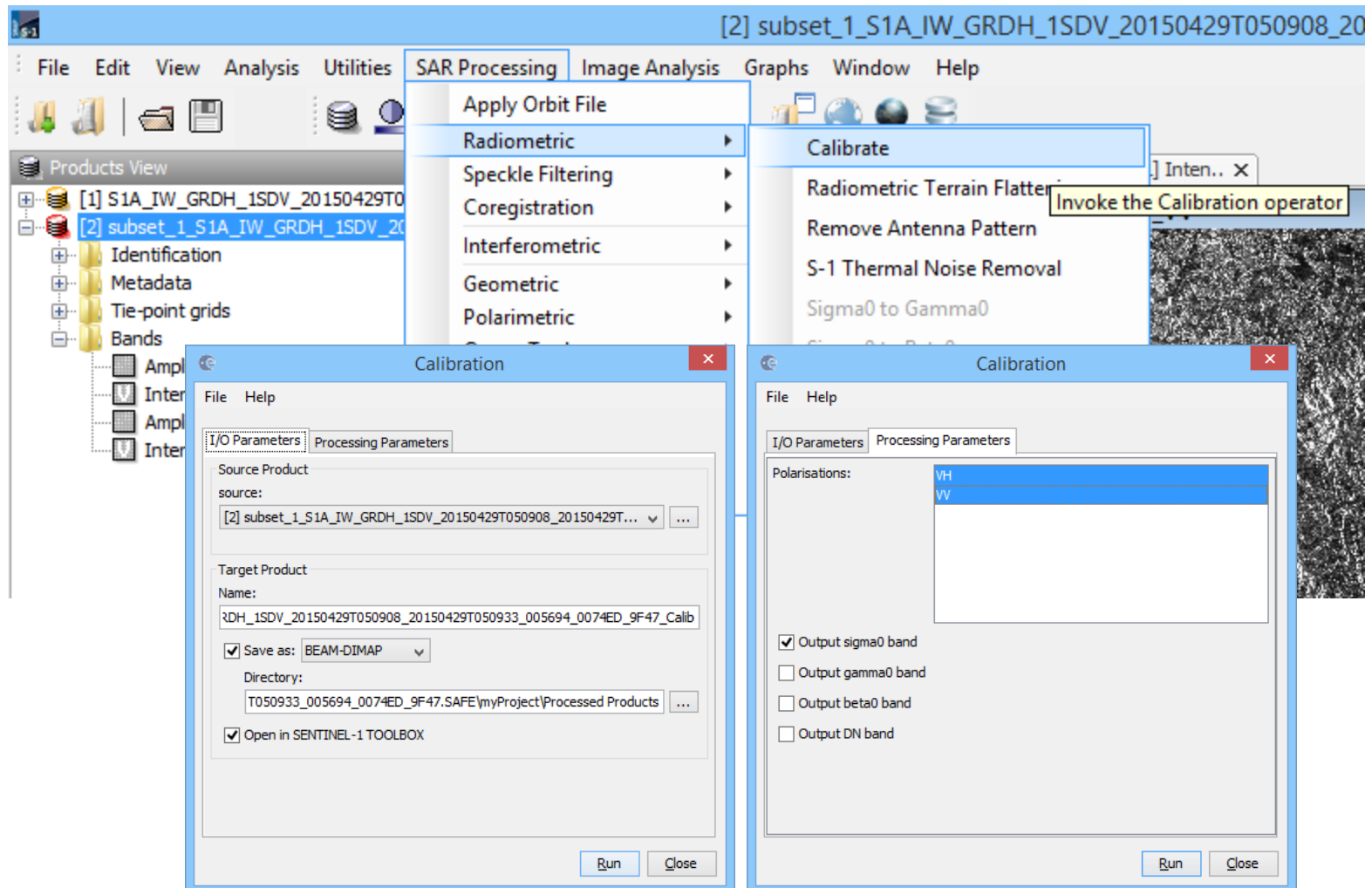


- pokud je ikona „dat“ červeně zvýrazněna – data nejsou uložena
- pokud dáme uložit projekt, nabídne nám uložení výřezu



Kalibrace dat

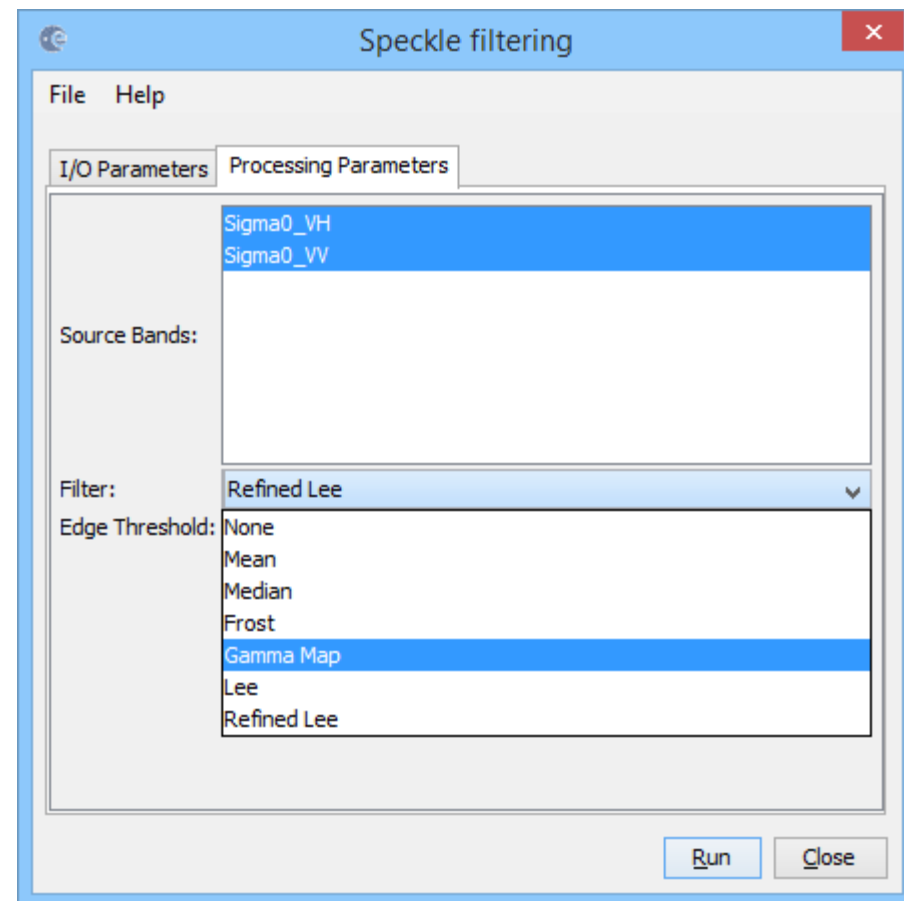
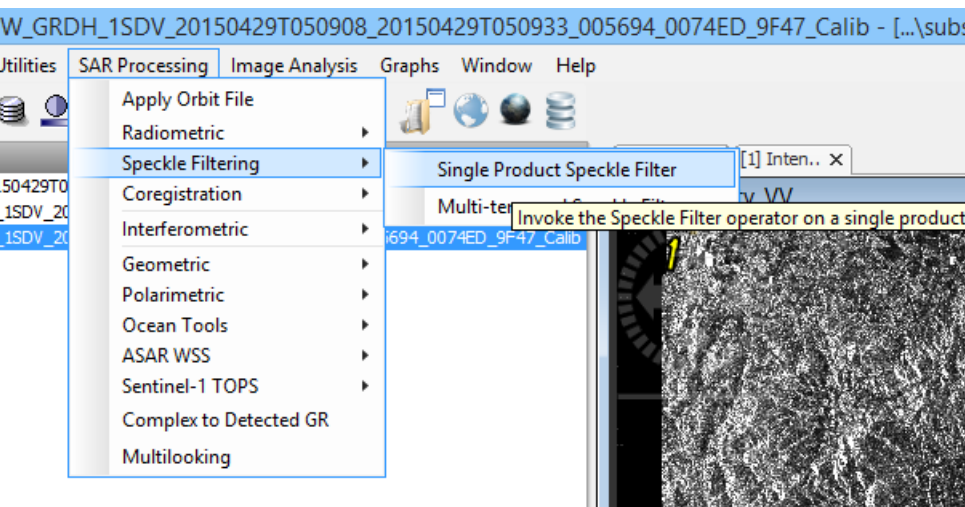
- SAR Processing > Radiometric Correction > Calibrate > Run



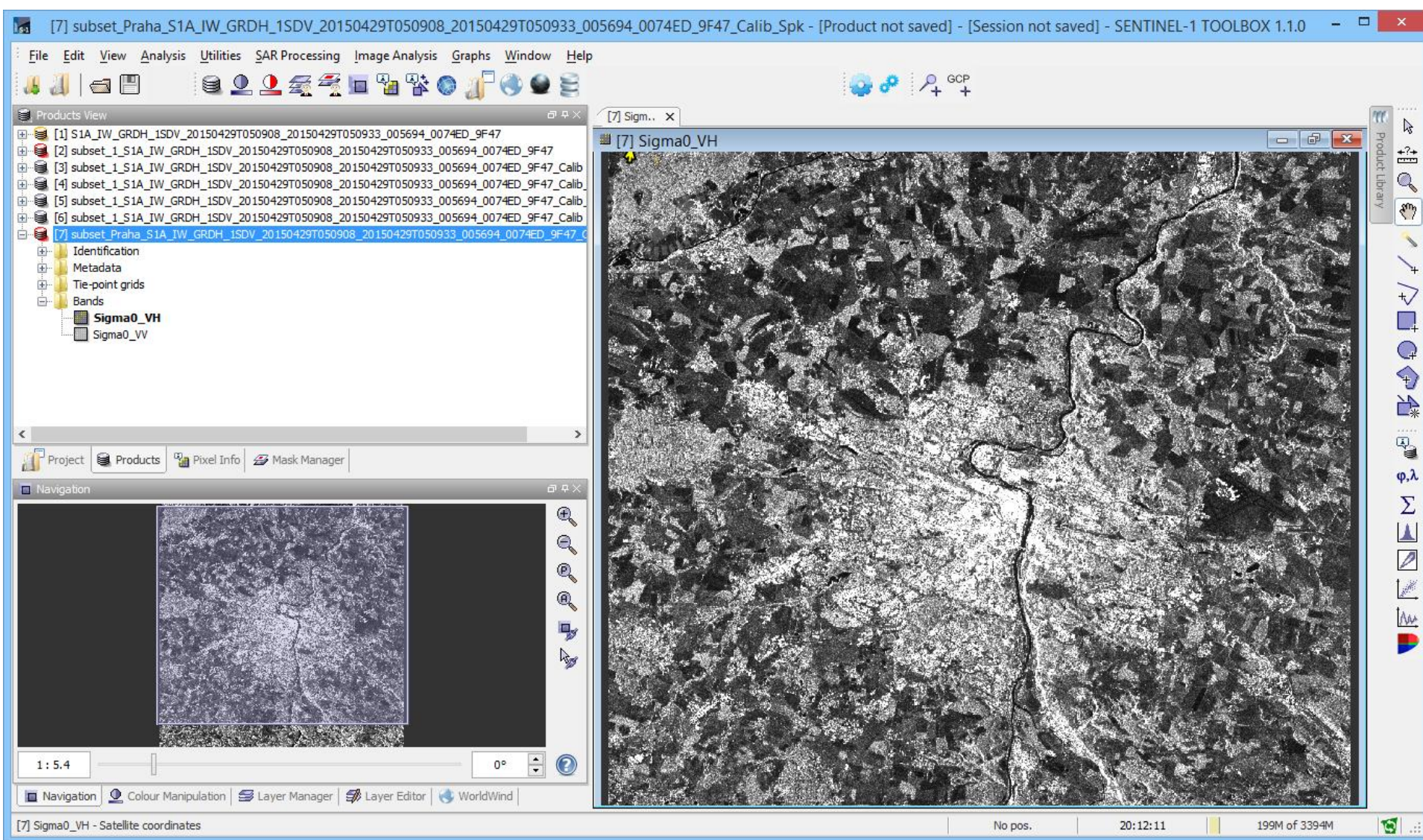
Filtrace speckle

- SAR Processing > Speckle Filtering > Single Product speckle filter >

zvolený filtr závisí na datech
a na jejich využití

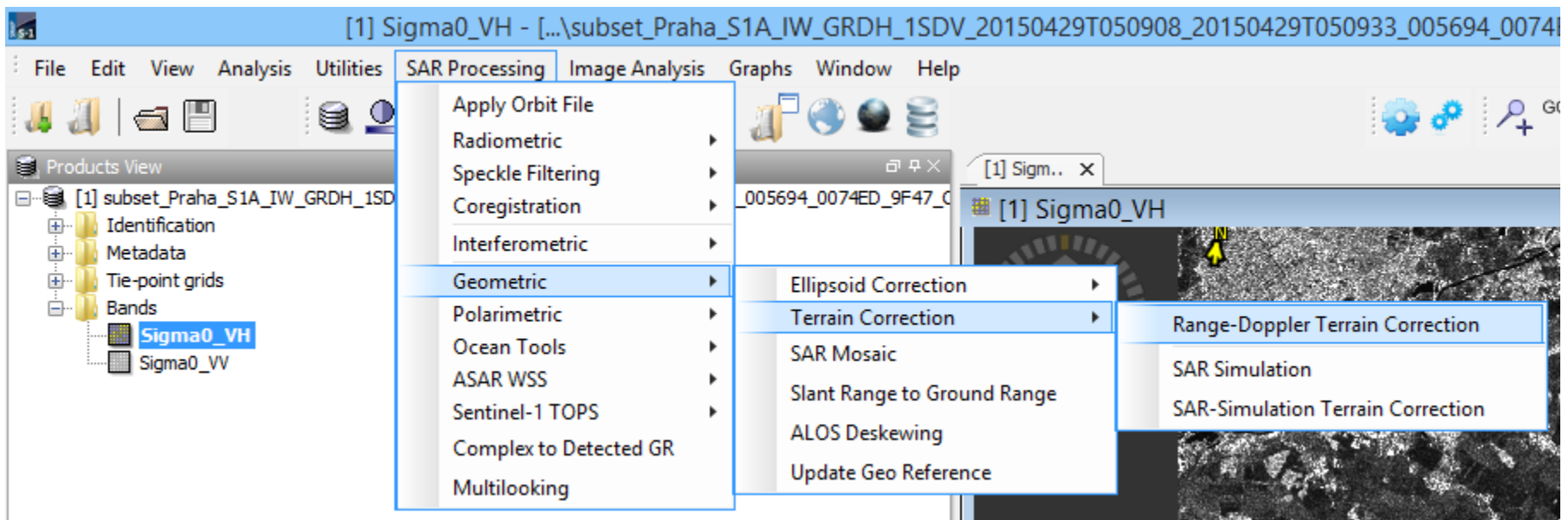


Data v sigma nought v dB – Praha (stále ještě stranově obráceně)



Topografická korekce

- SAR Processing > Geometric > Terrain Correction > Range-Doppler Terrain Correction



File Help

I/O Parameters Processing Parameters

Source Product

source:

[1] subset_Praha_S1A_IW_GRDH_1SDV_20150429T050908_20150429T050933_0

Target Product

Name:

subset_Praha_S1A_IW_GRDH_1SDV_20150429T050908_20150429T050933_0056

☒ Save as: BEAM-DIMAP

Directory:

rence_copernicus\S1A_IW_GRDH_1SDV_20150429T050908_20150429T050933_0056

☒ Open in SENTINEL-1 TOOLBOX

Pokud není připojení k internetu,
použijeme uložený DEM - External DEM

Digital Elevation Model: SRTM 3Sec (Auto Download)

DEM Resampling Method: ASTER 1sec GDEM

Image Resampling Method: SRTM 1Sec Grid

Source GR Pixel Spacings (az x rg): GETASSE30 (Auto Download)

Pixel Spacing (m): SRTM 3Sec (Auto Download)

Pixel Spacing (deg): ACE30 (Auto Download)

Map Projection: ACE2_5Min (Auto Download)

☒ Mask out areas without elevation

Output bands for:

☒ Selected source band ☐ DEM ☐ Latitude & Longitude

☐ Incidence angle from ellipsoid ☐ Local incidence angle ☐ Projected local incidence angle

File Help

I/O Parameters Processing Parameters

Source Bands: Sigma0_VH
Sigma0_VV

Digital Elevation Model: SRTM 3Sec (Auto Download)

DEM Resampling Method: NEAREST_NEIGHBOUR

Image Resampling Method: NEAREST_NEIGHBOUR

Source GR Pixel Spacings (az x rg): 9.99(m) x 10.0(m)

Pixel Spacing (m): 10.0

Pixel Spacing (deg): 8.983152841195215E-5

Map Projection: WGS84(DD)

☐ Mask out areas without elevation

Output bands for:

☒ Selected source band ☒ DEM ☐ Latitude & Longitude

☐ Incidence angle from ellipsoid ☐ Local incidence angle ☐ Projected local incidence angle

☐ Apply radiometric normalization

☐ Save Sigma0 band Use projected local incidence angle from DEM

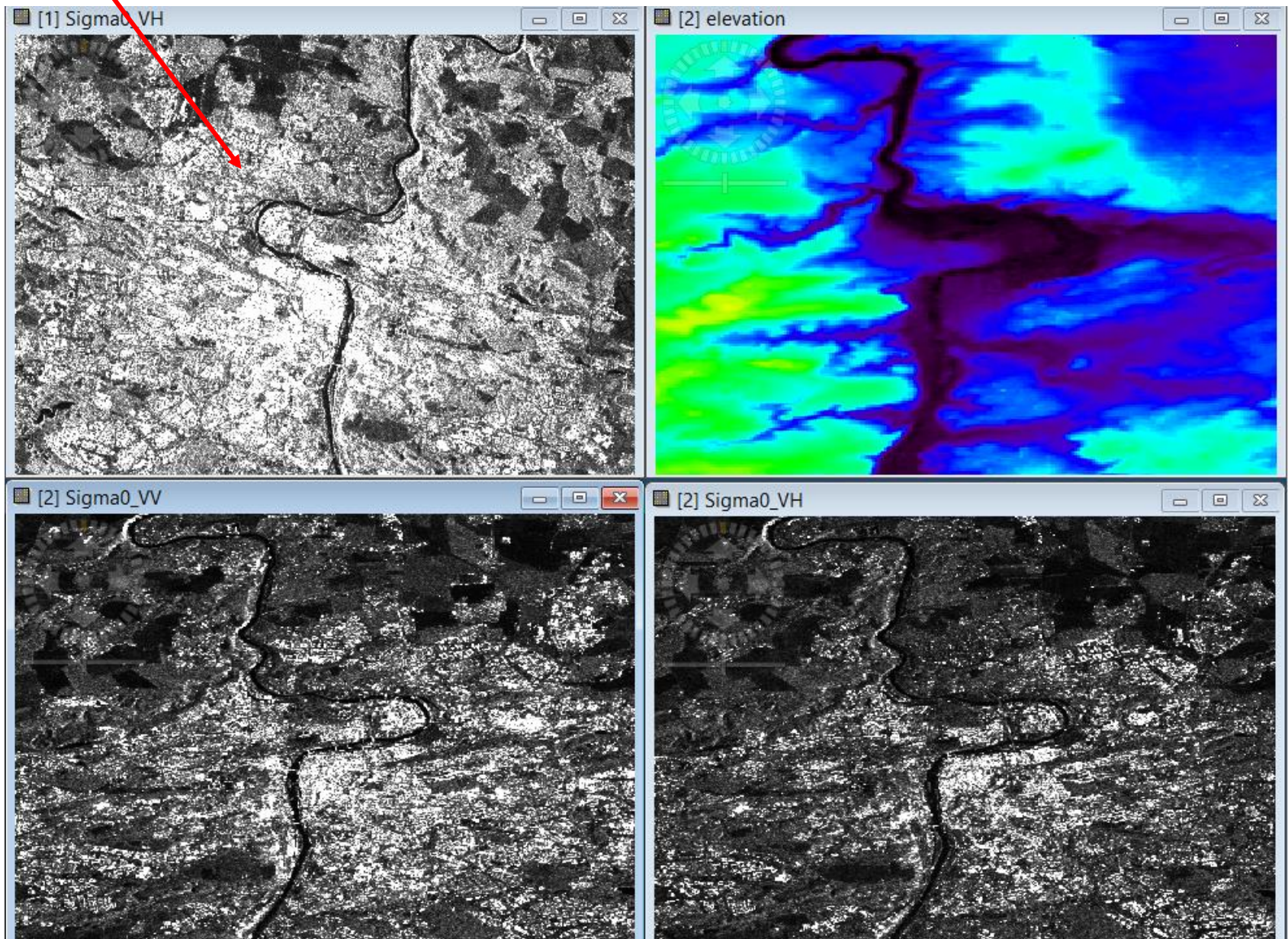
☐ Save Gamma0 band Use projected local incidence angle from DEM

☐ Save Beta0 band

Auxiliary File (ASAR only): Latest Auxiliary File

Run Close

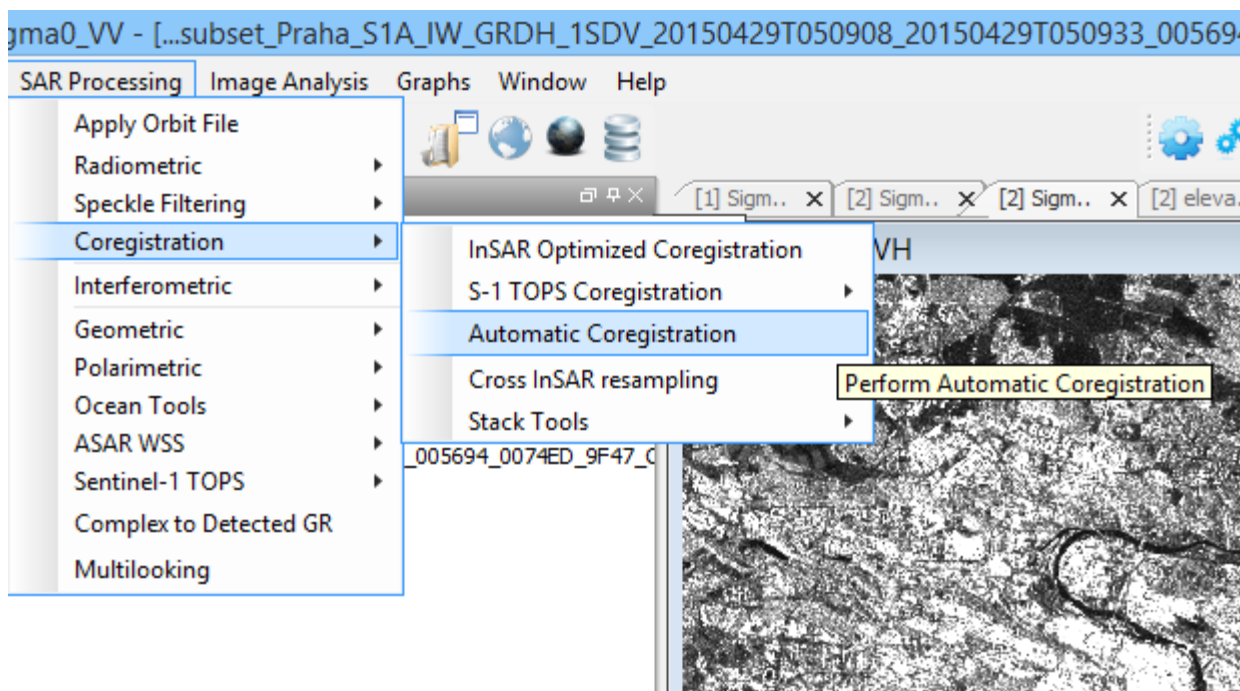
- PŘED a PO topografické korekci



Chceme porovnat více snímků?

> koregistrace

- další snímky zpracovat obdobně (oříznutí, kalibrace, filtrace spekle, terénní korekce)
- teprve potom je možné provést koregistraci snímků



Koregistrace

- SAR Processing > Coregistration > Automatic Coregistration

The image displays four screenshots of the 'Automatic Coregistration' dialog box, arranged in a 2x2 grid. Each window has a blue title bar with the text 'Automatic Coregistration' and a close button (X) in the top right corner. The dialog box contains several tabs: 'ProductSet-Reader', 'CreateStack', 'GCP-Selection', 'Warp', and 'Write'.

Top-left screenshot: The 'ProductSet-Reader' tab is active. It shows a table with the following data:

File Name	Type	Acquisition	Track	Orbit
Lipno_subset_3_S1A_I...	GRD	06Dec2014	22	3594
Lipno3_subset_S1A_I...	GRD	04Jan2015	95	4017

Top-right screenshot: The 'Warp' tab is active. It shows the following settings:

- RMS Threshold (pixel accuracy): 0.5
- Warp Polynomial Order: 1
- Interpolation Method: Nearest-neighbor interpolation
- ☐ Show Residuals

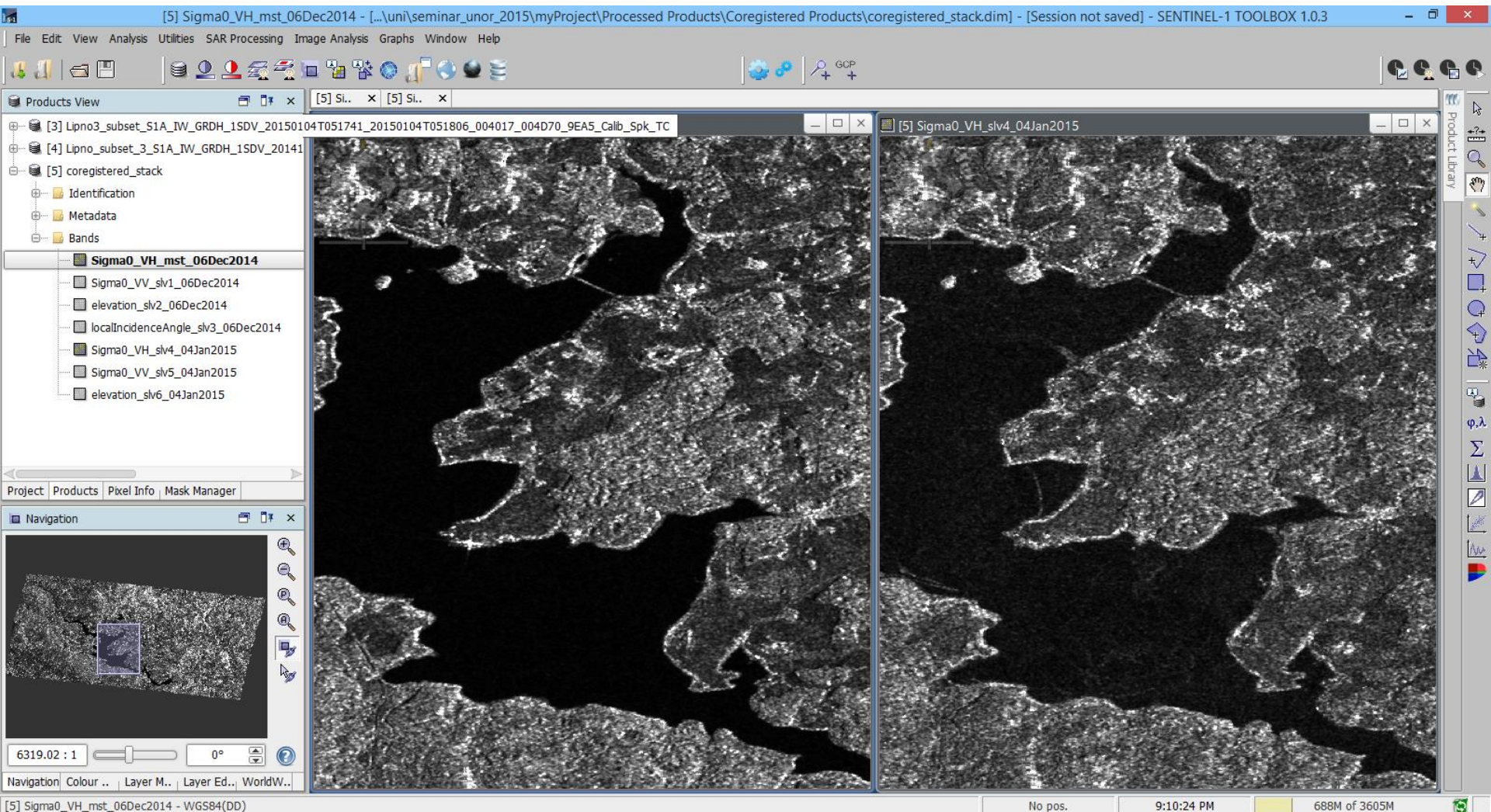
Bottom-left screenshot: The 'GCP-Selection' tab is active. It shows the following settings:

- Master: Lipno_subset_3_S1A_IW_GRDH_1SDV_20...
- Resampling Type: NEAREST_NEIGHBOUR
- Output Extents: Master
- Find Optimal Master button

Bottom-right screenshot: The 'Write' tab is active. It shows the following settings:

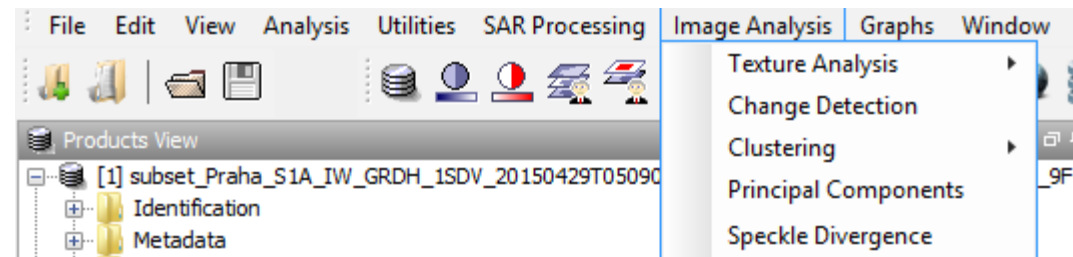
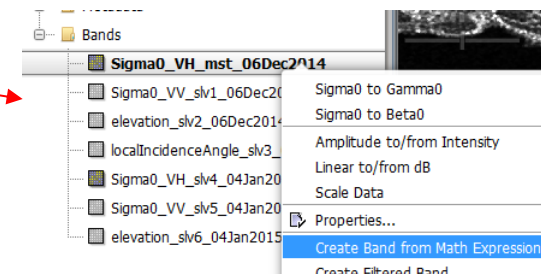
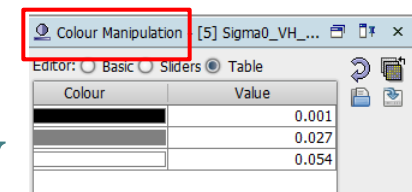
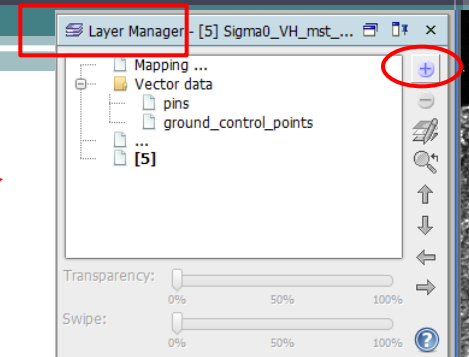
- Target Product: (empty text box)
- Name: coregistered_stack
- ☒ Save as: BEAM-DIMAP
- Directory: cuments\uni\seminar_unor_2015\myProject\Processed Products\Coregistered Products
- ☒ Open in SENTINEL-1 TOOLBOX

Výsledek koregistrace > pixely sjednocené podle vybraného snímku



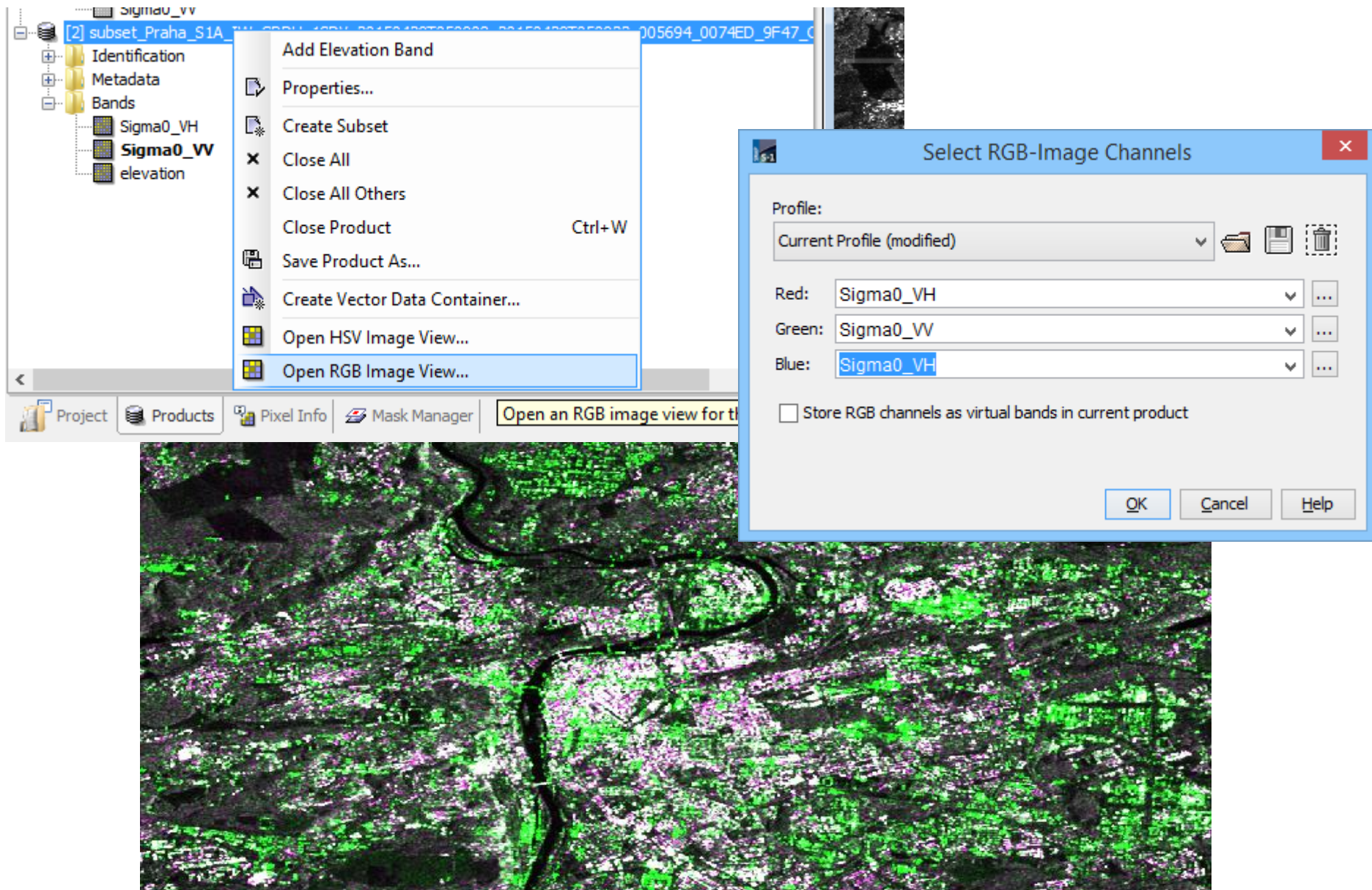
Další tipy

- Přidání vektorové vrstvy
- Prahování hodnot
 - např. jen úpravou barev pro určité hodnoty
- Band math (pravým tl. na snímek)
 - např. rozdíl hodnot mezi snímky etc.
- Analýza obrazu



- Export do KMZ
 - File > Other Exports > Export Product as Google Earth KMZ...

- Vizualizace v RGB – pravým tlačítkem myši na název snímku



Další software

Sentinel-2 Toolbox <https://sentinel.esa.int/web/sentinel/toolboxes/sentinel-2>

Sentinel-3 Toolbox <https://sentinel.esa.int/web/sentinel/toolboxes/sentinel-3>

Bezplatné pro zpracování SAR dat

- NEST (ESA Next SAR Toolbox) – zejména zpracování SAR dat <https://earth.esa.int/web/nest/home>
- PolSARpro – radarová polarimetrie <http://earth.eo.esa.int/polsarpro/>
- RAT (Radar Tools) <http://radartools.berlios.de/>
- radarová interferometrie - DORIS, Stamps

Komerční

- ENVI SARscape
- Erdas Imagine
- Gamma http://www.gamma-rs.ch/no_cache/software.html
- Photomod RADAR <http://www.racurs.ru/?page=86>

Tutoriály i pro začátečníky

- Fundamentals of Remote Sensing (NCCRS) – obsahuje i základy mikrovlnného snímání <http://www.nrcan.gc.ca/earth-sciences/geomatics/satellite-imagery-air-photos/satellite-imagery-products/educational-resources/9309>
- Radar Courses (ESA) http://earth.esa.int/applications/data_util/SARDOCS/spaceborne/RadarCourses/
- A Tutorial on Synthetic Aperture Radar (DLR) <http://elib.dlr.de/82313/1/SAR-Tutorial-March-2013.pdf>
- Polarimetry Tutorial (ESA) <http://earth.eo.esa.int/polsarpro/tutorial.html>
- Tutorial Radar Polarimetry (NCCRS) <https://www.nrcan.gc.ca/earth-sciences/geomatics/satellite-imagery-air-photos/satellite-imagery-products/educational-resources/9579>
- odkazy na další tutoriály: <http://epsilon.nought.de/>

Dotazy?

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