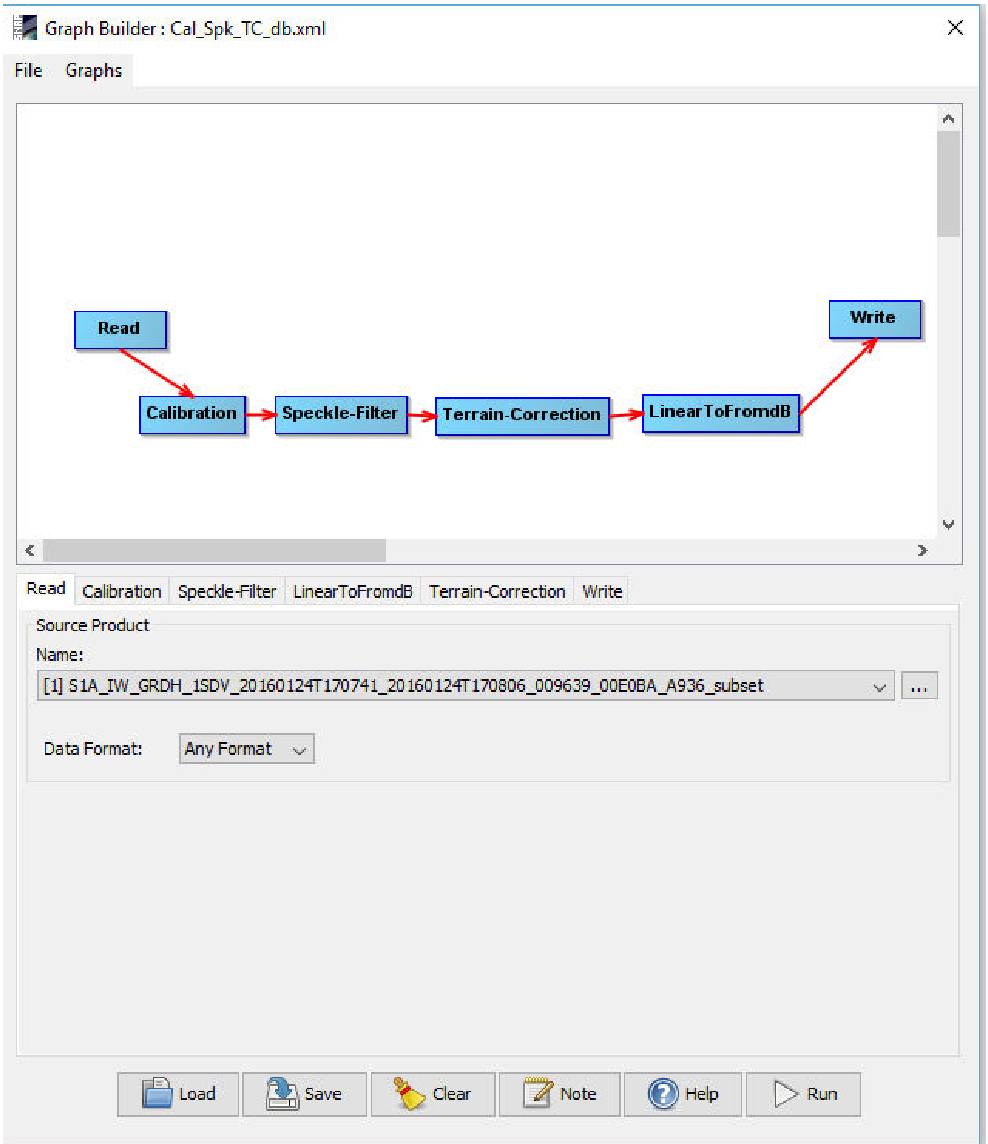
SENTINEL-1 FOR AGRICULTURE MONITORING

Sentinel-1 Dual Pol Time Series Analysis

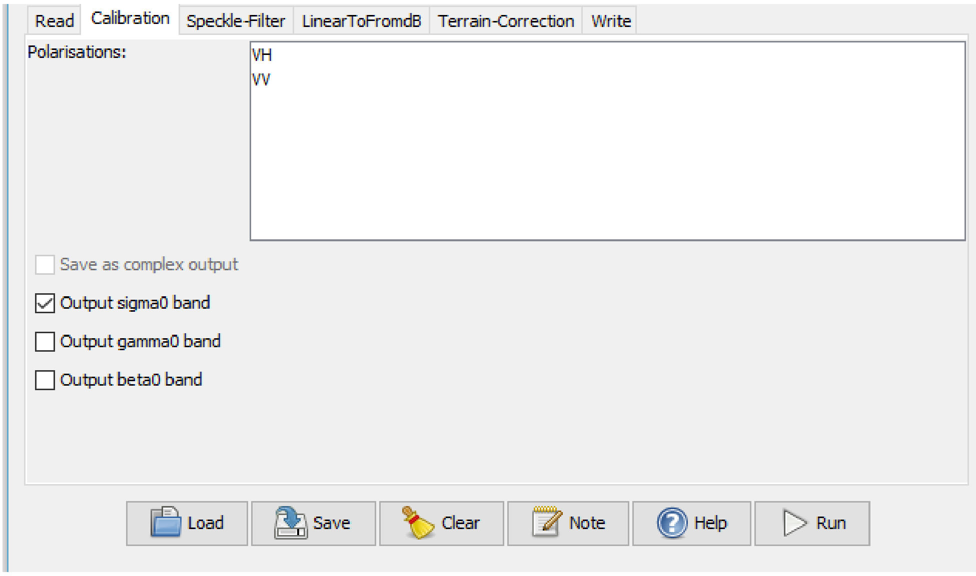
Data: Sentinel-1A IW GRDH 1SDV:

1. S1A_IW_GRDH_1SDV_20160112T170742_20160112T170807_009464_00DB96_2299_subset.dim
2. S1A_IW_GRDH_1SDV_20160124T170741_20160124T170806_009639_00E0BA_A936_subset.dim
3. S1A_IW_GRDH_1SDV_20160205T170741_20160205T170806_009814_00E5C0_8FAB_subset.dim
4. S1A_IW_GRDH_1SDV_20160217T170802_20160217T170827_009989_00EAE9_8994_subset.dim
5. S1A_IW_GRDH_1SDV_20160229T170741_20160229T170806_010164_00EFE2_E0E6_subset.dim
6. S1A_IW_GRDH_1SDV_20160312T170741_20160312T170806_010339_00F4FA_1381_subset.dim
7. S1A_IW_GRDH_1SDV_20160324T170742_20160324T170807_010514_00F9D6_82E4_subset.dim
8. S1A_IW_GRDH_1SDV_20160405T170742_20160405T170807_010689_00FEF3_BD55_subset.dim
9. S1A_IW_GRDH_1SDV_20160417T170743_20160417T170808_010864_01042F_A10C_subset.dim
10. S1A_IW_GRDH_1SDV_20160429T170743_20160429T170808_011039_0109A8_17CB_subset.dim
11. S1A_IW_GRDH_1SDV_20160511T170747_20160511T170812_011214_010F2F_6BEF_subset.dim
12. S1A_IW_GRDH_1SDV_20160523T170747_20160523T170812_011389_0114EB_2B14_subset.dim
13. S1A_IW_GRDH_1SDV_20160604T170753_20160604T170818_011564_011A8B_6206_subset.dim
14. S1A_IW_GRDH_1SDV_20160628T170755_20160628T170820_011914_01258C_8FC4_subset.dim
15. S1A_IW_GRDH_1SDV_20160722T170756_20160722T170821_012264_0130EC_0E23_subset.dim
16. S1A_IW_GRDH_1SDV_20160815T170757_20160815T170822_012614_013C81_EBC5_subset.dim
17. S1A_IW_GRDH_1SDV_20160908T170758_20160908T170823_012964_014825_5663_subset.dim
18. S1A_IW_GRDH_1SDV_20160920T170759_20160920T170824_013139_014DEE_6D15_subset.dim
19. S1A_IW_GRDH_1SDV_20161002T170759_20161002T170824_013314_015387_6F6F_subset.dim
20. S1A_IW_GRDH_1SDV_20161014T170759_20161014T170824_013489_015911_A4CD_subset.dim
21. S1A_IW_GRDH_1SDV_20161026T170759_20161026T170824_013664_015E7F_0237_subset.dim
22. S1A_IW_GRDH_1SDV_20161107T170759_20161107T170824_013839_0163F7_C9AC_subset.dim
23. S1A_IW_GRDH_1SDV_20161201T170758_20161201T170823_014189_016EC6_E2E8_subset.dim
24. S1A_IW_GRDH_1SDV_20161213T170758_20161213T170823_014364_01745F_7A42_subset.dim
25. S1A_IW_GRDH_1SDV_20161225T170758_20161225T170823_014539_0179C8_CF8C_subset.dim

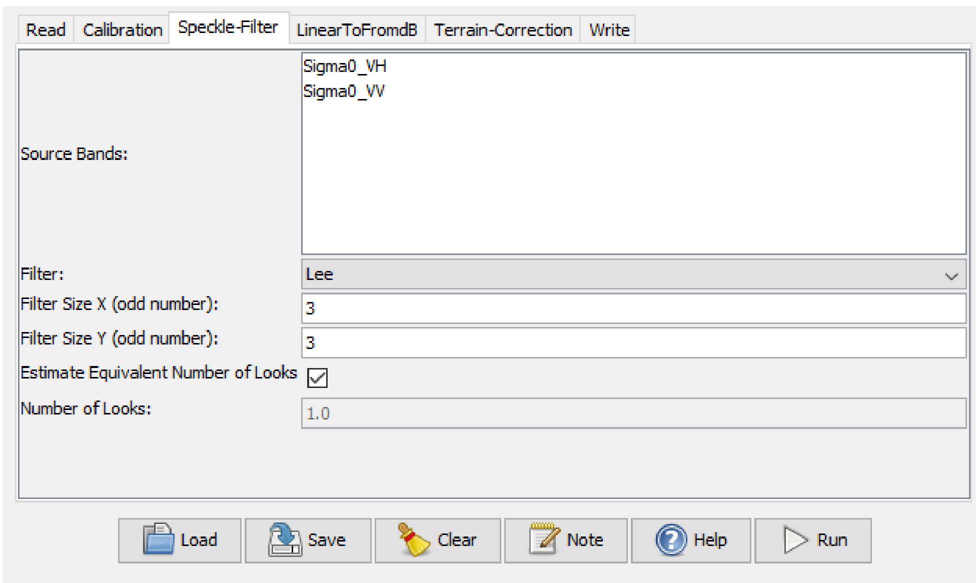
1. Open all files listed above
    - 1.1. File / Open Product
    - 1.2. Browse to data
2. Create processing chain
    - 2.1. Tools / GraphBuilder
    - 2.2. Create the following graph by right mouse clicking and selecting a process, and left clicking on each process to connect them with arrows.
    - 2.3. Below the graph, for each process, apply the settings as shown below:


Graph Builder : Cal_Spk_TC_db.xml
File
Graphs
Read
Calibration
Speckle-Filter
Terrain-Correction
LinearToFromdB
Write
Read
Calibration
Speckle-Filter
LinearToFromdB
Terrain-Correction
Write
Source Product
Name:
[1] S1A_IW_GRDH_1SDV_20160124T170741_20160124T170806_009639_00E0BA_A936_subset
Data Format:
Any Format
Load
Save
Clear
Note
Help
Run

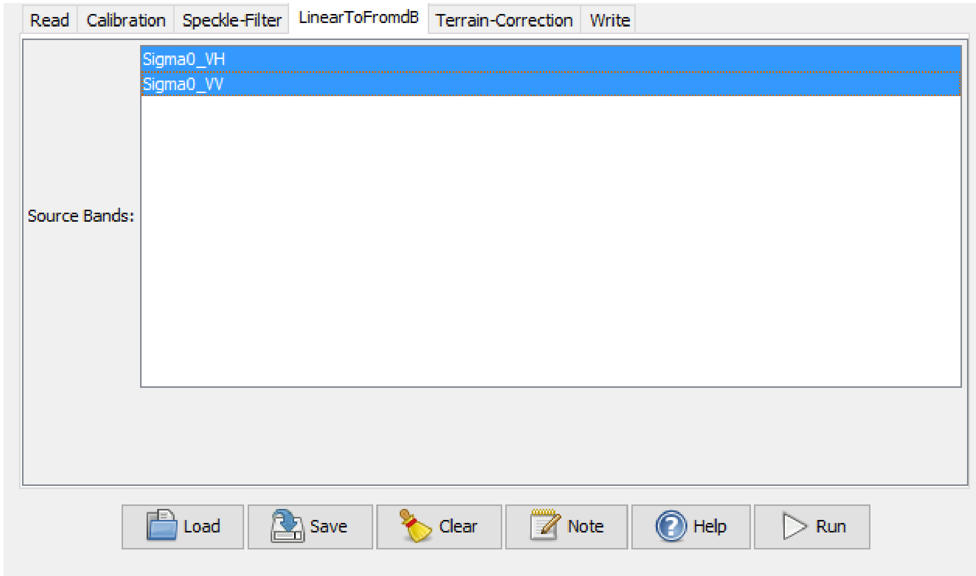
Read



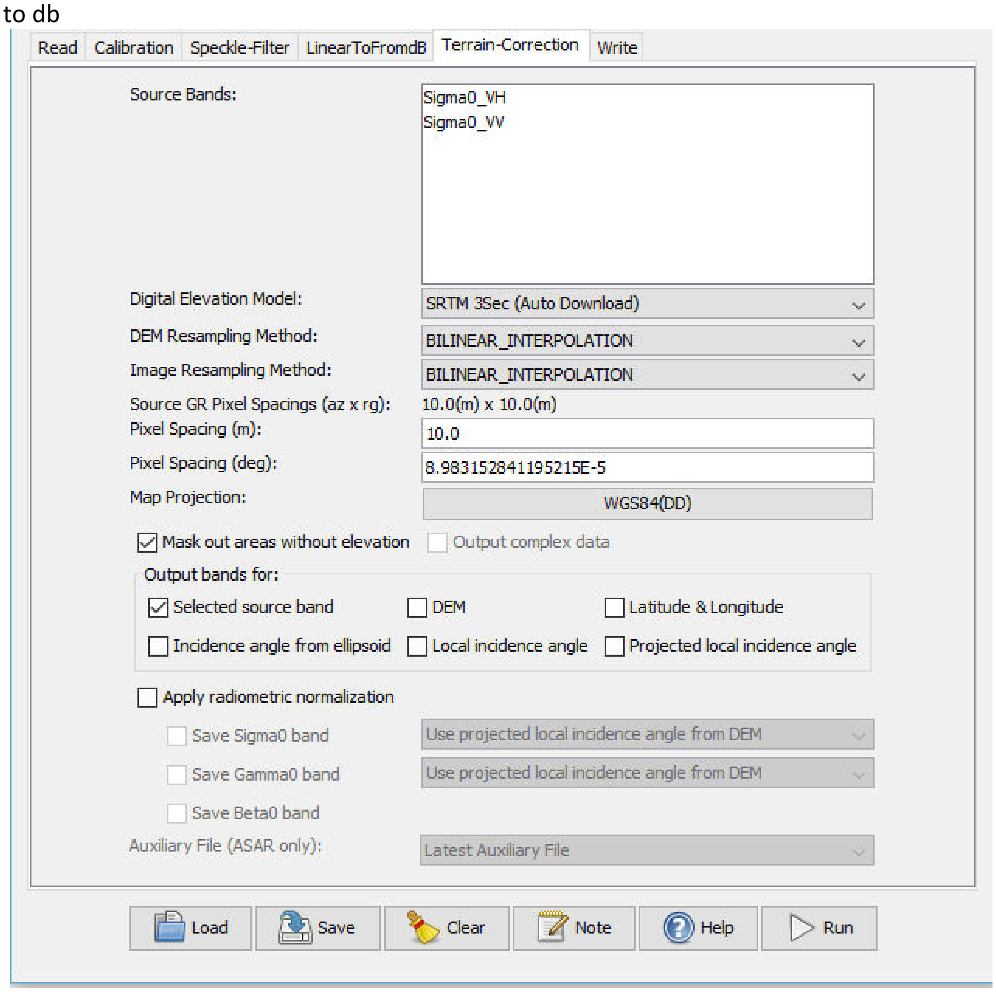
Calibration



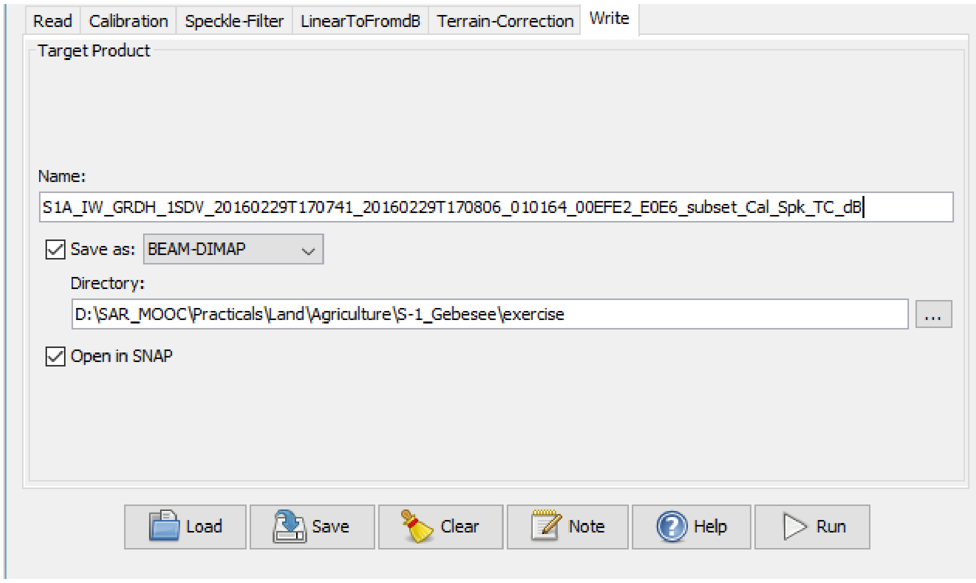
Speckle Filtering



Linear to db



Terrain-Correction



Write

2.4. Select “Save” and save the graph.
2.5. DO NOT select “Run”, instead close the Graph Builder window.

3. Create batch directory
    3.1. Create a new folder in which to save batch processed imagery

4. Batch processing
    4.1. Tools / Batch Processing
    4.2. Select “Add Opened”
    4.3. Select “Load Graph” and browse to the saved graph.
    4.4. Under “Directory” browse to the newly create batch directory
    4.5. Select “Run”

5. Create stack
    5.1. Close all images and reopen batch processed images in the batch folder
    5.2. Radar / Coregistration / Stack Tools / Create Stack
    5.3. Select “Add Opened”
    5.4. In the “2-CreateStack” tab, select the following parameters: “Initial Offset Method”: Product Geolocation
    5.5. In the “Write” tab, select a filename and location
    5.6. Select “Run”

6. Multitemporal, polarimetric analysis
    6.1. View various temporal and polarimetric RGB composites of the speckled filtered stack in dB: Window / Open RGB Image Window
    6.1.1. Example: Red = VV_dB, Green = VH_dB, Blue = VV_dB from the same date
    6.1.2. Example: Red = VH_dB, Green = VH_dB, Blue = VH_dB from three different dates
    6.2. Select “Export Product”

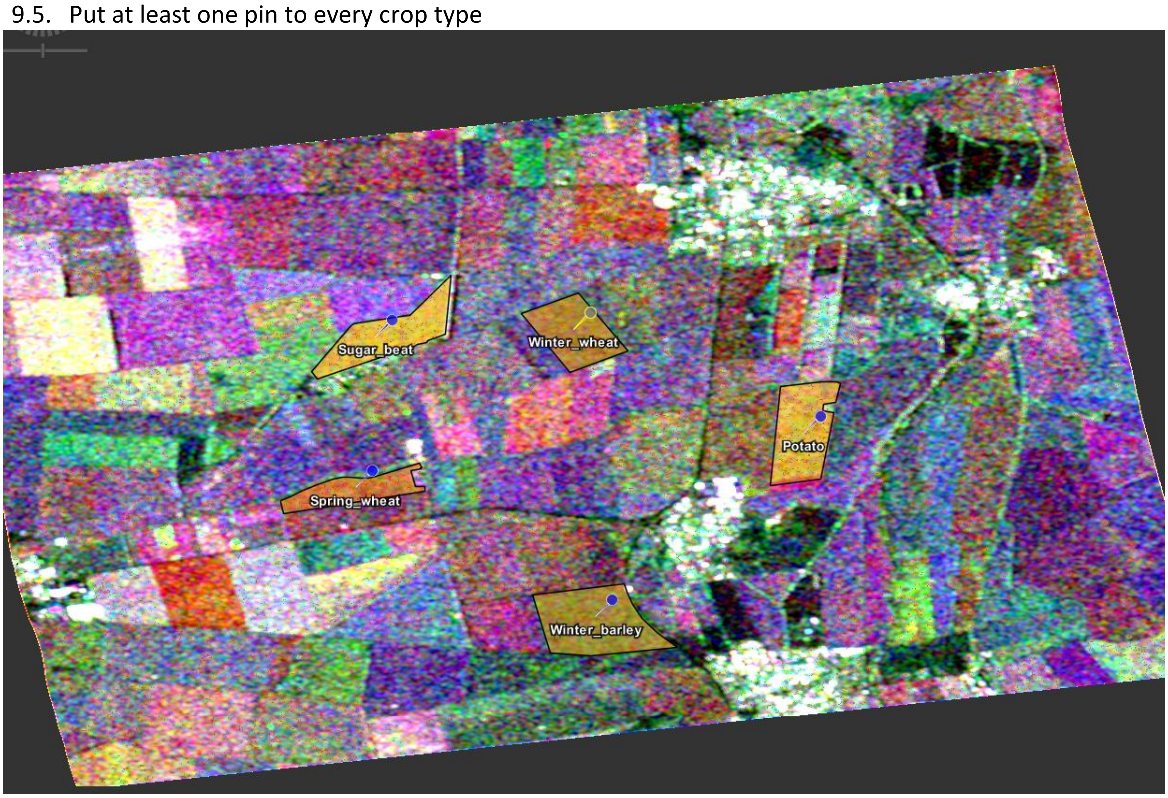
Sentinel-1 backscatter behaviour over different crop types

7. Overlay a shapefile of agricultural crop types from 2016
    7.1. Open RGB Image Window (e.g., R=VH_db_12Jan_2016, Green=VH_db_11May2016, Blue=VH_db_08Sep2016

7.2. In Layer Manager click “Add Layer”
7.3. Select ESRI Shapefile, click “Next”
7.4. Browse to the shapefile “investigated_fields_2016_potato.shp, and select “Open”.
7.5. Select “Finish”
7.6. Add another crop types (Spring wheat, sugar beat, winter barley, winter wheat)

8. View temporal backscatter signature of different crops
    8.1. View / Tool Windows / Radar / Time Series
    8.2. Click Settings in “Time Series”-Box
    8.3. In “Time Series Analysis Settings” click “Add Opened” and then “Apply” (note: open single pre-processed S1 data to create a time series plot; time series plot does not work with a stack)
    8.4. In “Time Series”-Box click “Filter bands” and select e.g. all Bands in VH polarization (or check “select all”)
    8.5. In “Time Series”-Box click “Show at cursor position”
    8.6. Navigate with the cursor to different crop types

9. Temporal backscatter signature with Pin Tool
    9.1. Activate “Tools” (View / Toolbars / Tools)
    9.2. Click “Pin Placing Tool”
    9.3. Click on specific crop type
    9.4. In Pin Manager (View / Toolbars Tool / Window) you can edit and remove your pins
    9.5. Put at least one pin to every crop type



    9.6. In “Time Series”-Box deactivate “Show at cursor position” but activate “Show for all pins”
    9.7. You can export temporal backscatter signature as csv data (“Export graph to text file”) or an image (“Export graph to image file”)