FLOOD MAPPING

Data: Sentinel-1A IW GRDH 1SSV:

- S1A_IW_GRDH_1SSV_20150320T114745_20150320T114810_005115_0066FA_82D7
- S1A_IW_GRDH_1SSV_20150904T114747_20150904T114812_007565_00A772_B9FD

1. Open the 2 S1 images in SNAP
   1.1. File / Open Product… (use control key to select multiple files)

2. Inspect the images
   2.1. Select plus icons [MAC = triangle icon] by filenames in "Product Explorer", expand "Bands" folder and double click on "Amplitude".
   2.2. Synchronise the displays (in the Navigation tab)
   2.3. On which images can you see floods?
   2.4. When were the images acquired (see metadata)?
   2.5. Where are the floods (View / Tool Windows / World Map)?

3. Crop the images to include only general area of floods
   3.1. Raster / Subset…
   3.2. Crop first the image with floods
   3.3. Open the cropped flood image, then open the archive (non-flood) image and crop the archive to the same extent as the viewer (the synchronised displays will show the same extent)

4. Multi Look the images by a factor of 3x3
   4.1. Radar / Multilooking. In "Processing Parameters" change "Number of Range Looks" and "Number of Azimuth Looks" both to 3. Select "Run"

5. Calibrate images
   5.1. Radar / Radiometric / Calibrate

6. Terrain correct the images
   6.1. Radar / Geometric / Terrain Correction / Range-Doppler Terrain Correction
   6.2. For one of the two images, in the "Processing Parameters" tab, select "DEM" in the "Output bands for" check boxes.

7. Convert bands to decibel
   7.1. In the "Product Explorer" window, right click on the band name, and select "Linear to/from dB"
   7.2. Now right click on the new dB band and select "Convert Band"
   7.3. Save the image

8. Stack terrain corrected images
   8.1. Radar / Coregistration / Stack Tools / Create Stack
   8.2. In the first tab (1-ProcuctSet-Reader) use the plus icons to insert the terrain corrected images to the list.
   8.3. In the second tab (2-CreateStack) select "Product Geolocation" as the "Initial Offset Method".
   8.4. In the third tab (3-Write) select the output name and directory. Then select "Run".

9. Check the coregistration
   9.1. Double click to open one of the bands of the stack
   9.2. Select the Layer Manager: View / Tool Windows / Layer Manager
   9.3. Select the plus icon (Add Layer)
   9.4. Select "Image of Band / Tie-Point Grid"
   9.5. Select "Next" and select one of the other bands from the stack

9.6. Repeat the steps above for the third band

9.7. Back in the "Layer Manager" window, select and deselect the check boxes of the three bands (or use the transparency slider) to compare the flood image with the archive and the DEM

10. View RGB composite

10.1. With the Stacked image selected in the "Product Explorer" window, select: Window / Open RGB Image Window

10.2. Select the 20 March image in the red channel and the 4 September image in both the green and blue channels

10.3. Stretch the histogram of the various channels in the "Colour Manipulation" tab by sliding the triangular sliders to either side of the histograms

11. Save the image in Google Earth kmz format and view in Google Earth

11.1. File / Export / Other / View as Google Earth KMZ

11.2. Double click on the saved KMZ file to open it in Google Earth

11.3. Use the transparency slider in Google Earth to compare the flood map with the optical imagery