

Experiences in processing Sentinel-1 data with SNAP and analyzing land cover changes in Puhti

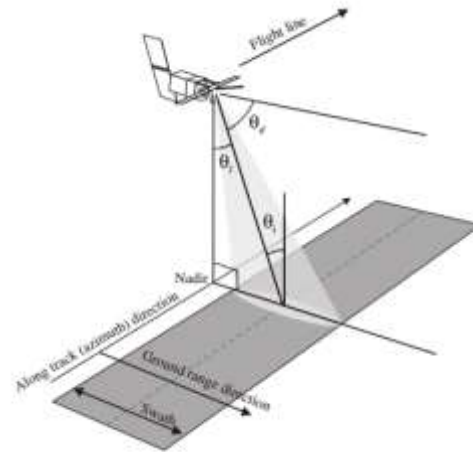


Eetu Jutila
Finnish Environment Institute SYKE
Earth Observation Workshop 16.5.22

https://www.esa.int/ESA_Multimedia/Images/2014/01/Sentinel-1_radar_vision

Sentinel-1 Mission

- 2 Satellites: Sentinel1A & Sentinel1B
- C-band Synthetic Aperture Radar (SAR) instruments
- Revisit time 12 days
- Spatial resolution 20m



Woodhouse, I. H. (2015). Introduction to Microwave Remote Sensing p.266

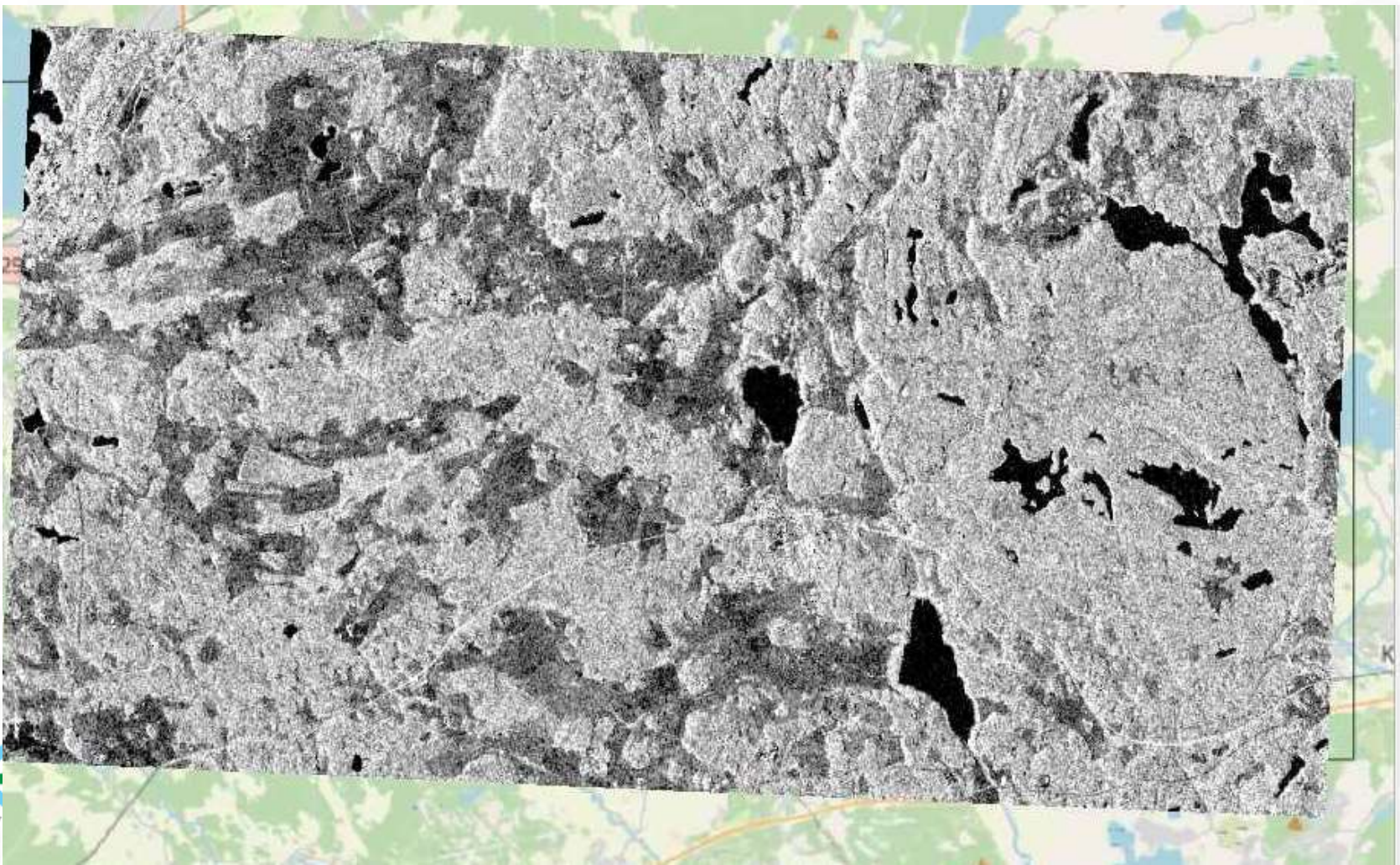
Radar

Pros

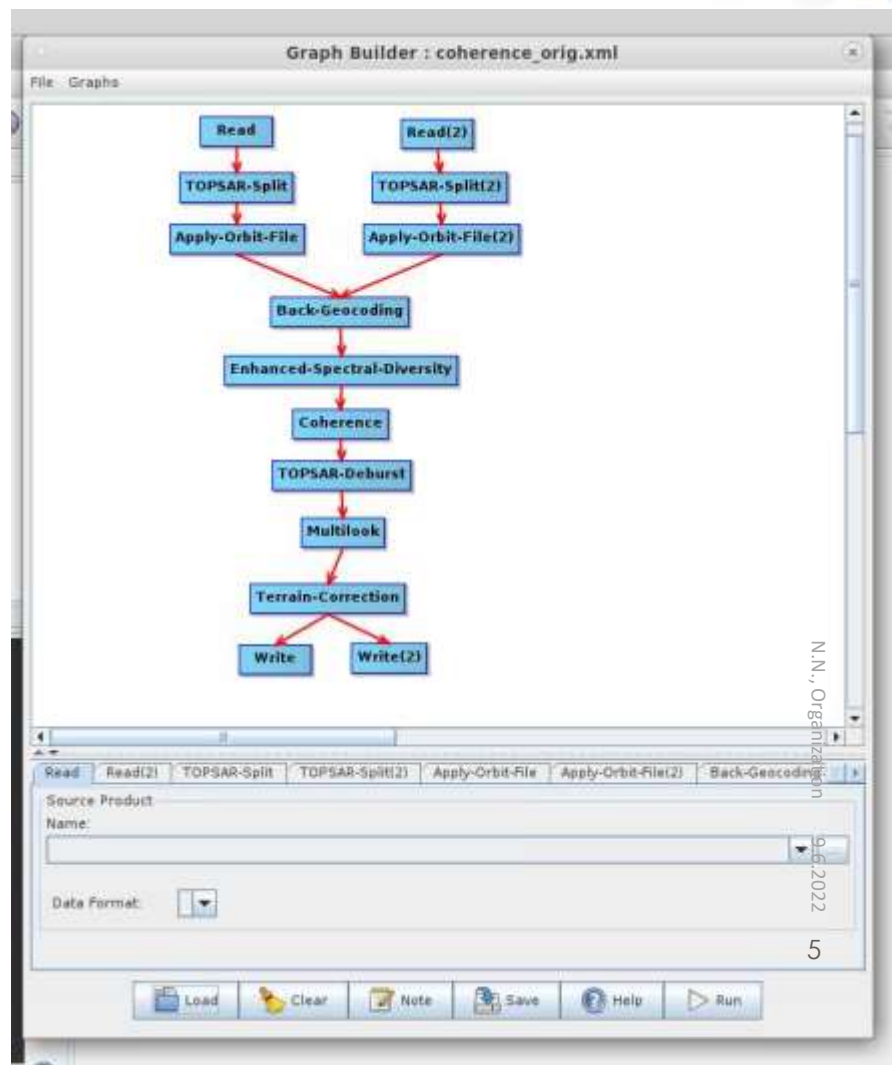
- Doesn't depend on Sun's illumination
- Signal can penetrate clouds and rain
- Constant coverage

Cons

- Complex processing
- Speckle noise
- Not simple to interpret



SNAP Graph Builder



```
#!/bin/bash -l
#SBATCH --job-name=coherence_snap_array_job
#SBATCH --output=out_%A_%a.txt
#SBATCH --error=err_%A_%a.txt
#SBATCH --account=project_2004990
#SBATCH --partition=small
#SBATCH --time=04:00:00
#SBATCH --ntasks=1
#SBACCH --nodes=1
#SBATCH --cpus-per-task=4
#SBATCH --mem-per-cpu=20G
#SBATCH --array=1-42
#SBATCH --gres=nvme:30
##SBATCH --mail-type=BEGIN,END
### Load SNAP module
module load snap

### For looping through all the files:

### Make a list of input files. This folder has 3 S2L2 images
readlink -f /scratch/project_2004990/jutilaee/mtk_kehitys/S1_SLC2/* > input_SLC_images.txt

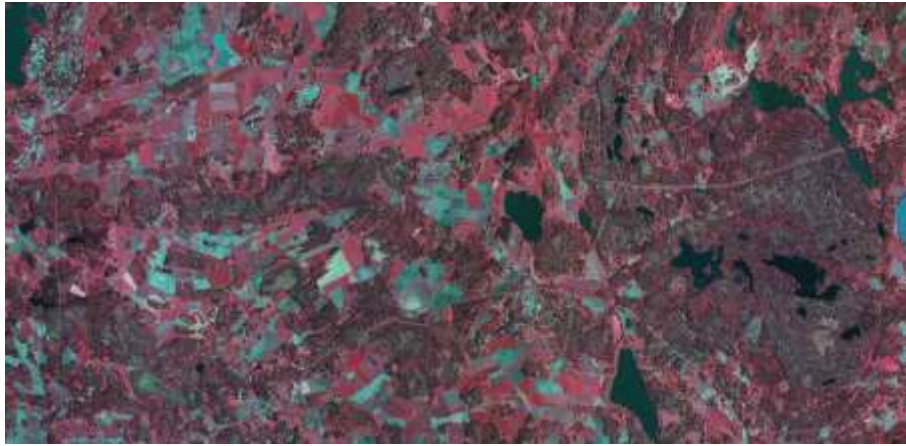
### Select the inputfile row by row
image_path1=$(sed -n ${SLURM_ARRAY_TASK_ID}p ./input_SLC_images.txt)
image_path2=$(sed -n ((${SLURM_ARRAY_TASK_ID}+1))p ./input_SLC_images.txt)

### Parse image basename to be used in output filename
image_filename1="$(basename -- $image_path1)"
#image_filename="${image_filename%.*}"

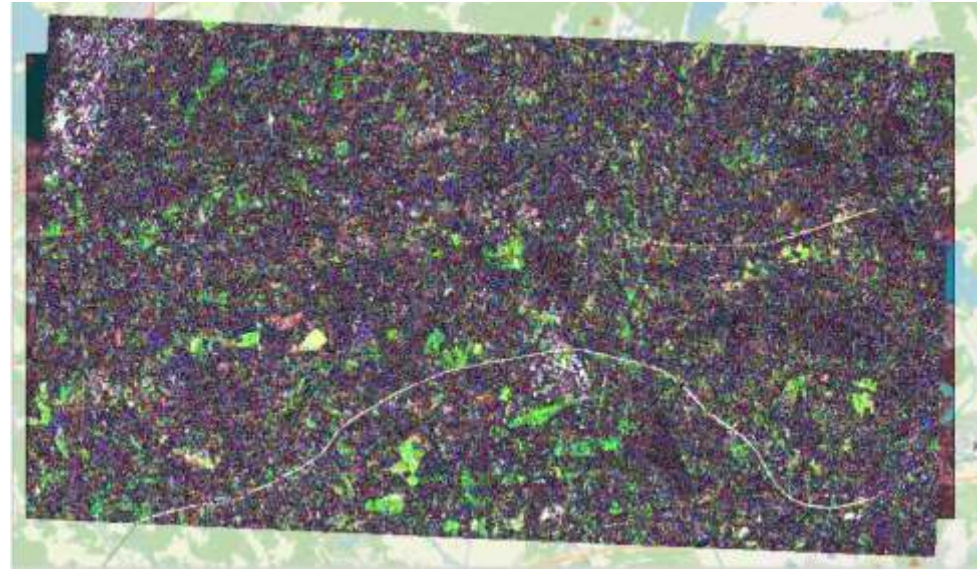
### Assign an output_folder-
output_folder=/scratch/project_2004990/jutilaee/mtk_kehitys/coherence2
# Assign output filenames
out_file1=${output_folder}/${image_filename1}_coh.dim
out_file2=${output_folder}/${image_filename1}_coh.tif
# Set custom SNAP user dir
source snap_add_userdir $LOCAL_SCRATCH/cache_"$SLURM_ARRAY_TASK_ID"

### -q is num of cores, -t is target file, -SsourceProduct is the xml inside each SAFE folder
gpt coherence_orig.xml -q 4 -c 65G -J-Xmx75G -t ${output_folder} -PsourceProduct1=${image_path1} -PsourceProduct2=${image_path2} -Poutfile1=${out_file1} -Poutfile2=${out_file2} -e
```

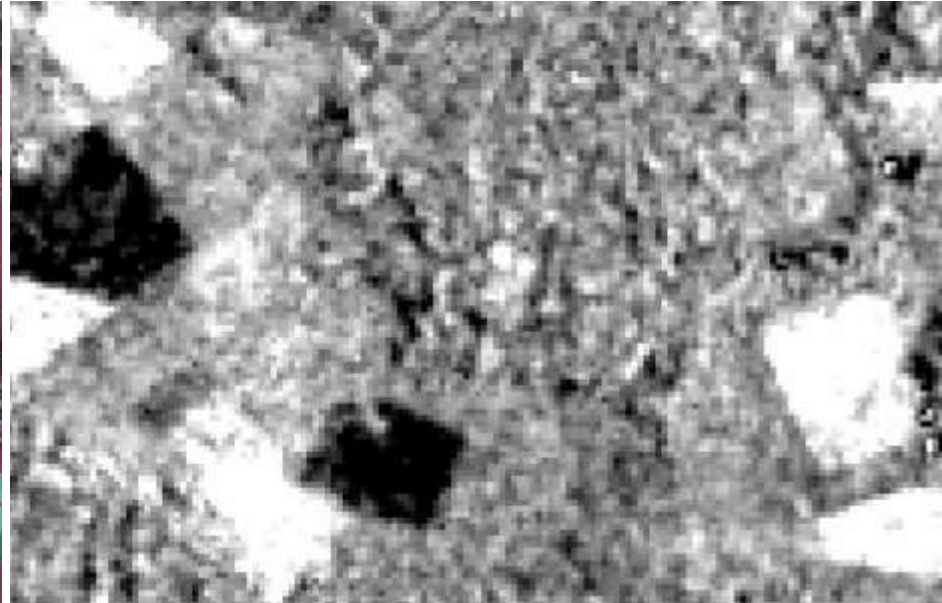
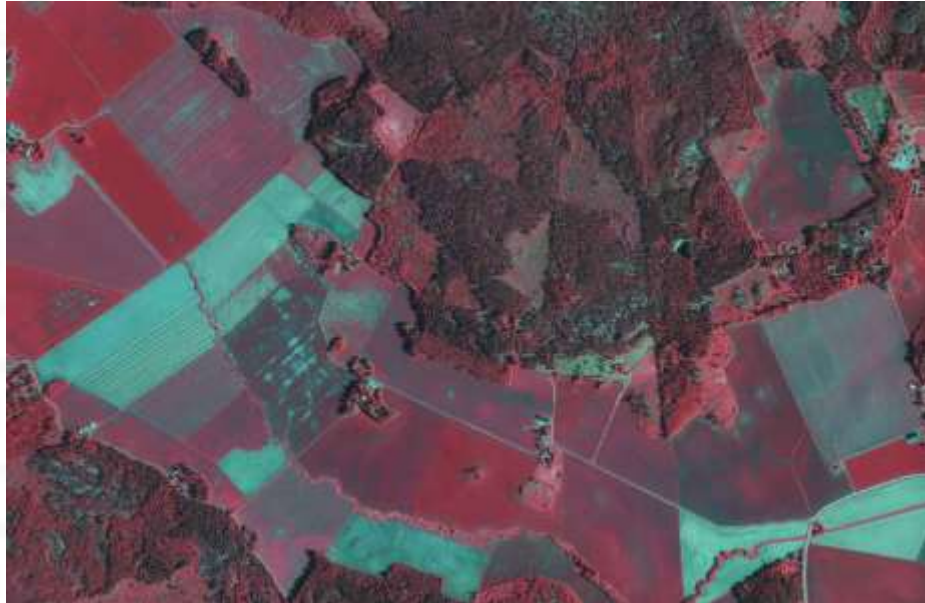
Coherence stack



Ortophoto: Finnish Land Survey (NLS)



Log-ratio



Ortophoto: Finnish Land Survey (NLS)

Thank you!