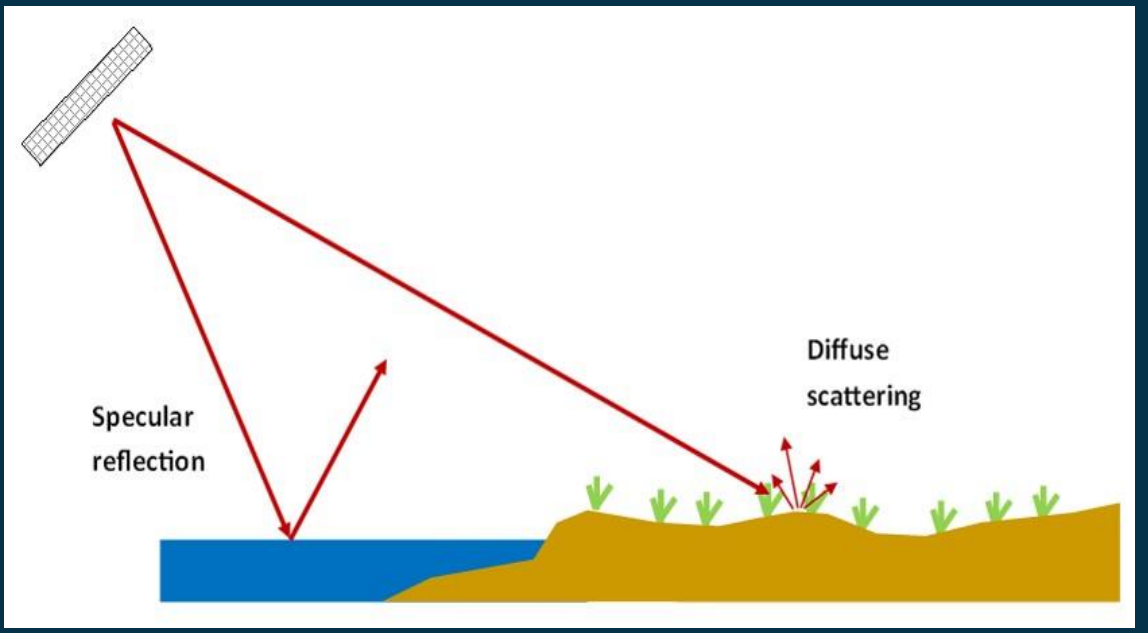
SAR for flooding

Radar mapping of water masses is based on the difference between the backscattering mechanisms of a land surface and those of a water surface.

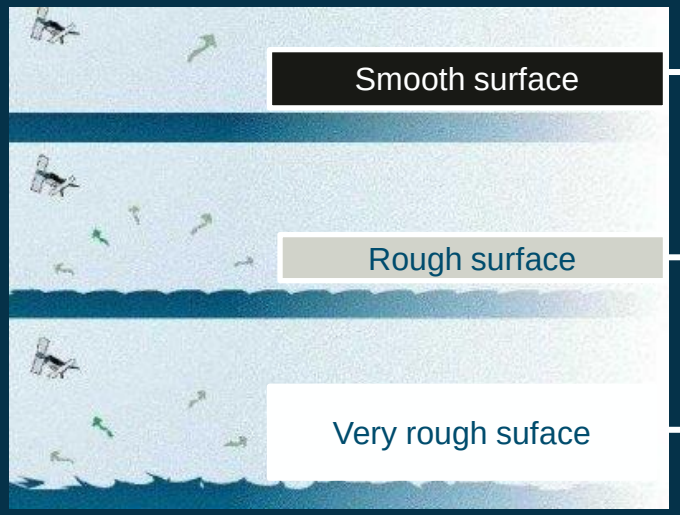
Calm water surface → smooth → specular backscatter (wave is directed away from the sensor) → sensor measures low values for that pixel → colour black.

Ground surface → rough → diffuse backscatter (part of wave is directed back to the sensor) → sensor measures higher values for that pixel → colour from grey to white



https://eo-college.org/courses/echoes-in-space/lessons/water/topic/introduction-to-water-bodies/

SAR for flooding



LOW BACKSCATTER = DARK PIXEL

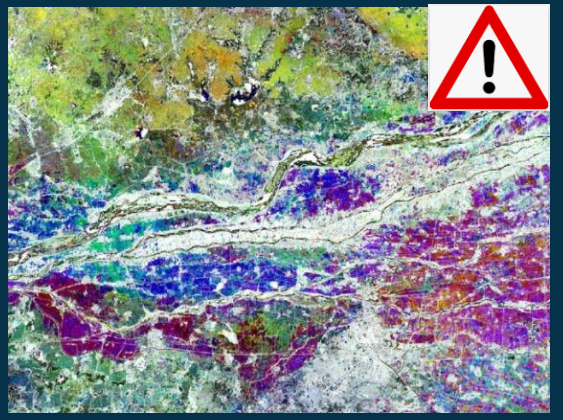
INTERMEDIATE BACKSCATTER = GREY PIXEL

HIGH BACKSCATTER = WHITE PIXEL

CALM WATER, ROADS

CROPS (with rougher surface)

CROPS (with less rough surface)



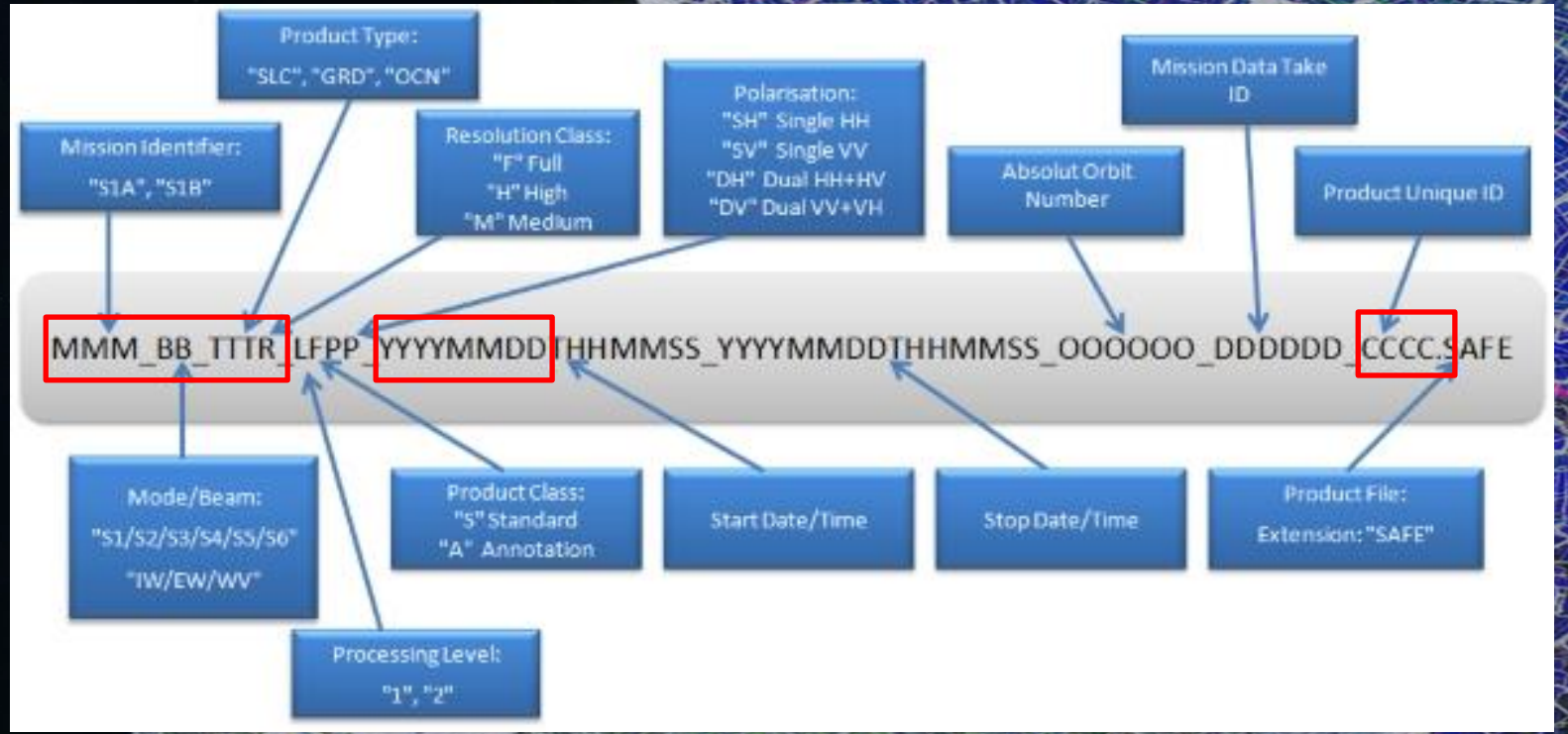
A radar image can be displayed in colour after manipulation in the SNAP toolbox.
It is not always displayed in greyscale!

SNAP & Sentinel User Guides

- SNAP: Free satellite image processing software: https://eo4society.esa.int/resources/snap/
- User guides for all Sentinel satellites: https://sentinel.esa.int/web/sentinel/user-guides

Includes information on the naming convention:

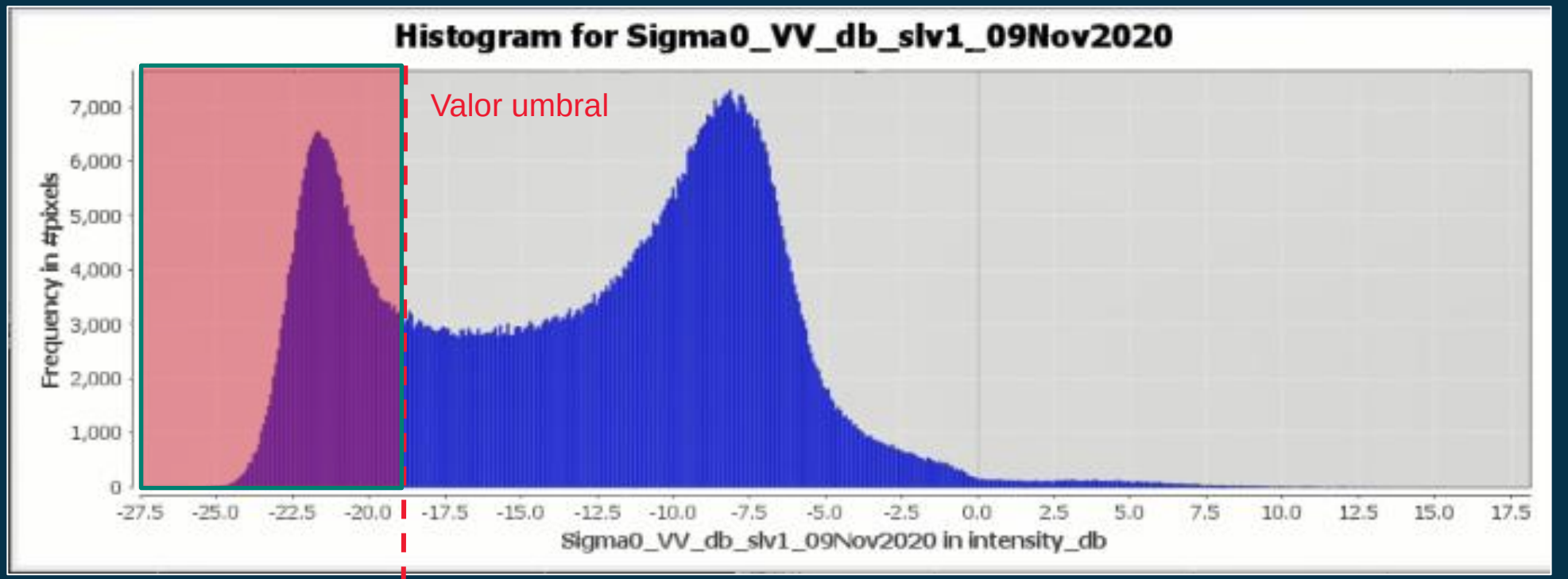
S1A_IW_GRDH_1SDV_20201109T120140_20201109T120209_035171_041B17_8D95



USER GUIDES

- Sentinel-1 SAR
  - Overview
  - Applications
  - Acquisition Modes
  - Product Types and Processing Levels
  - Resolutions
  - Revisit and Coverage
  - Naming Conventions
  - Data Formats
  - Products and Algorithms
  - Cal/Val
  - Definitions
  - S1-SAR Document Library

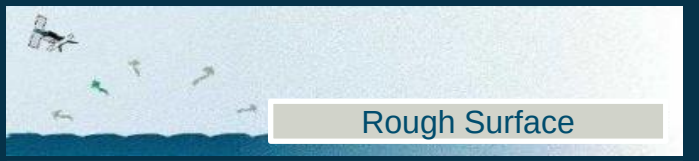
Create a flood zone mask



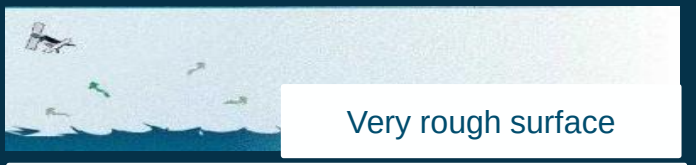
Potentially flooded pixels

Pixels potentially NOT flooded

Low backscatter = dark pixel



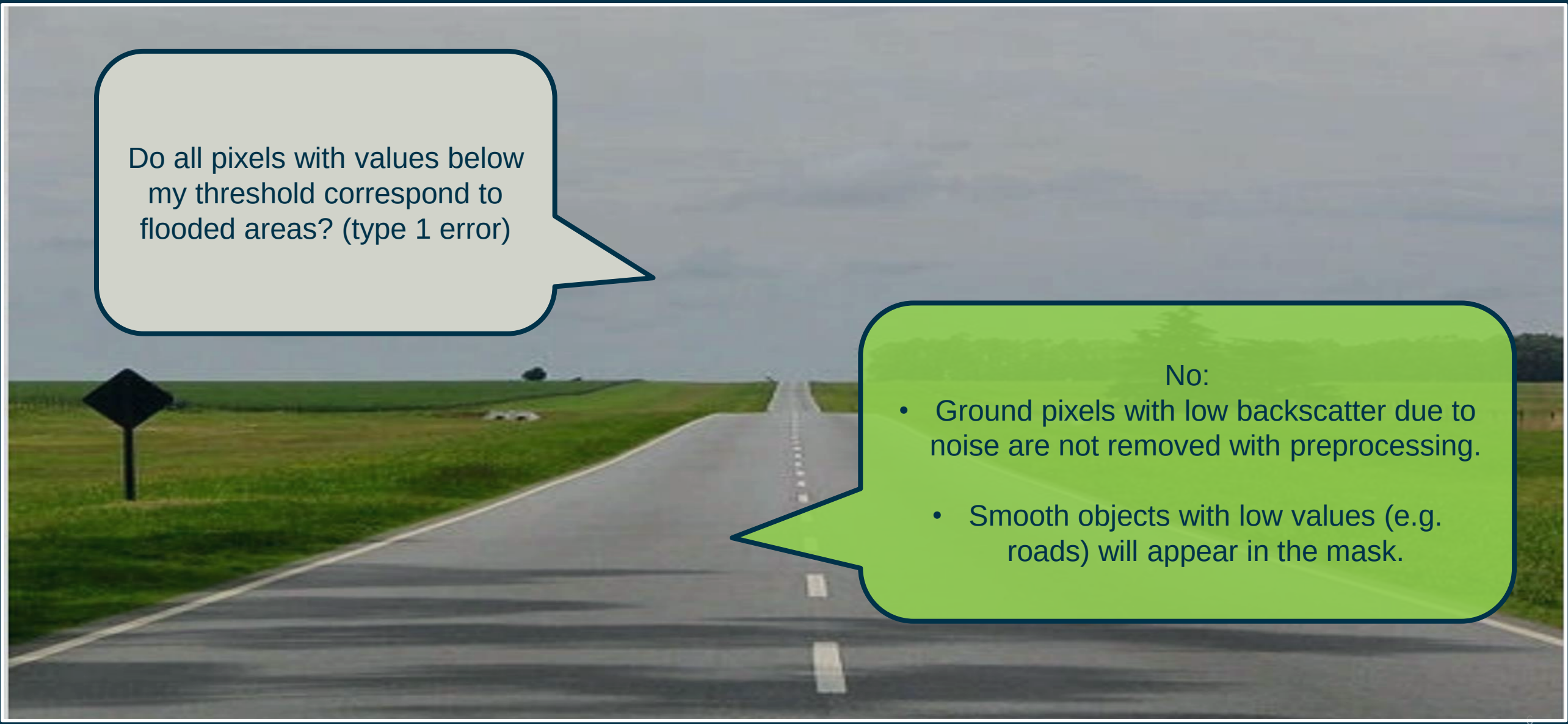
Medium backscatter = grey pixel



High backscatter = white pixel

Some questions:

Some questions:



Do all pixels with values below my threshold correspond to flooded areas? (type 1 error)

No:

- Ground pixels with low backscatter due to noise are not removed with preprocessing.
- Smooth objects with low values (e.g. roads) will appear in the mask.

Some questions:

Some questions: