

Analysis of the contribution of radar satellite images for the snow cover estimation

Goal: Prediction of snow cover for the EDF hydrological model MORDOR correction

Two snow detection methods based on the study of the wave interaction with the snow:

- Dry snow detection:**
- Wave interaction: Penetration of the wave in the dry snow cover changing the wave polarization
 - Detect the dry snow but also the snow depth.

Lievens & al (2019). Snow depth variability in the Northern Hemisphere mountains observed from space.nature communications.

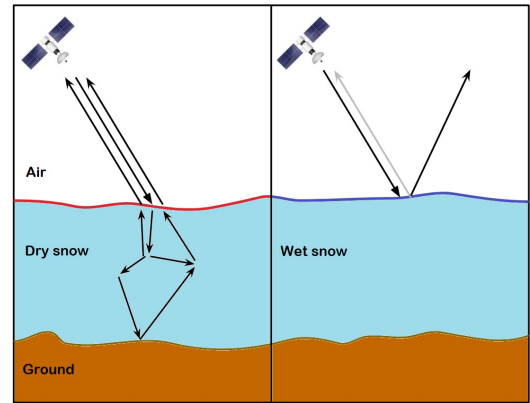
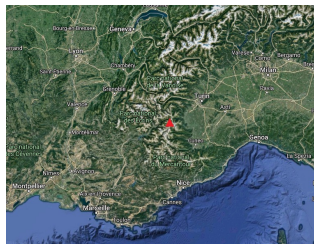


Figure explaining the interaction between the waves and the snow

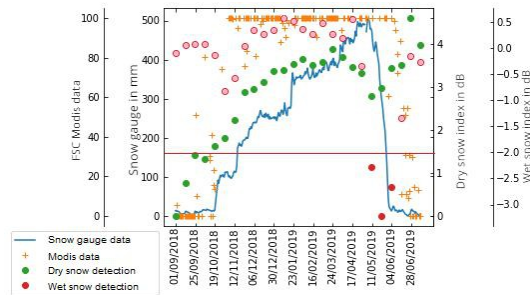
- Wet snow detection:**
- Wave interaction: The wave is directly reflected without penetration causing an energy loss
 - Binary wet snow detection

Nagler & al. (2016). Advancements for Snowmelt Monitoring by Means of Sentinel-1 SAR.remote sensing.

Results on the Guil catchment:



Location of the snow gauge. In the Alpine Guil catchment at 2690m of altitude



Time series comparing snow detection with ground truth

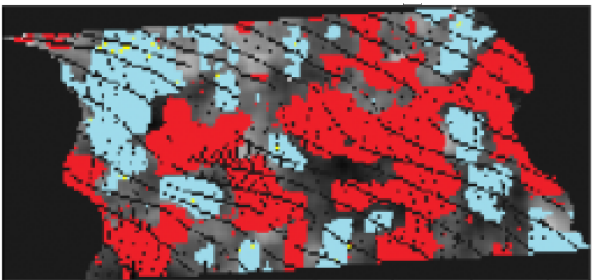
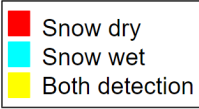


Image showing the complementarity of the two snow detection methods during a period of early snowmelt



Conclusion: Combining dry and wet snow detectors enable to increase the spatial extend of the snow cover detection and to follow it trouhough the season.