



# Satellite detection of firn aquifers in the Antarctic Peninsula

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This presentation participates in OSPP



Outstanding Student & PhD  
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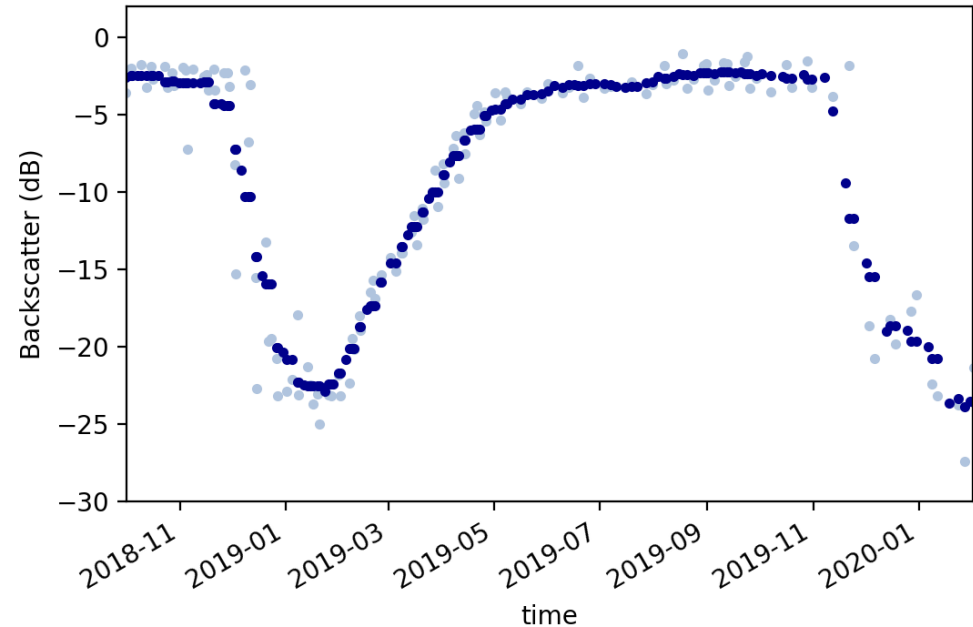
## Data: Sentinel-1A and 1B (S1)

- C-band synthetic-aperture radar (5.4 GHz)
- 2014 – 2022 (used 2017 – 2020)
- Co-polarization band HH
- Used spatial resolution: 1x1 km<sup>2</sup>
- Google Earth Engine Python API

## Detection algorithm:

Principle: Timeseries of radar backscatter are different for aquifer and non-aquifer locations

→ Delayed increase of backscatter after melt season in case of an aquifer



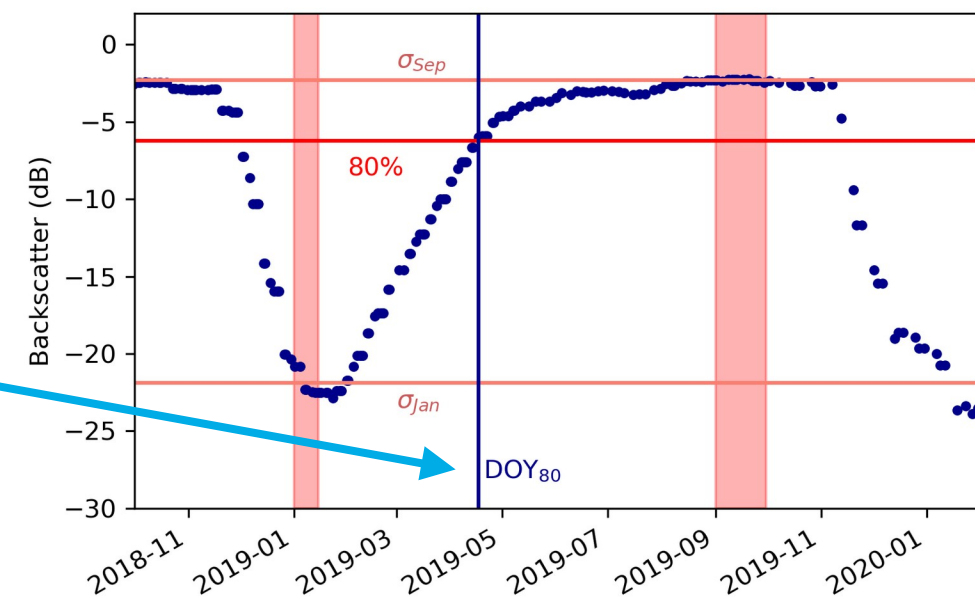


Day Of the Year at which **80%** of  
September value are reached  
=  $DOY_{80}$

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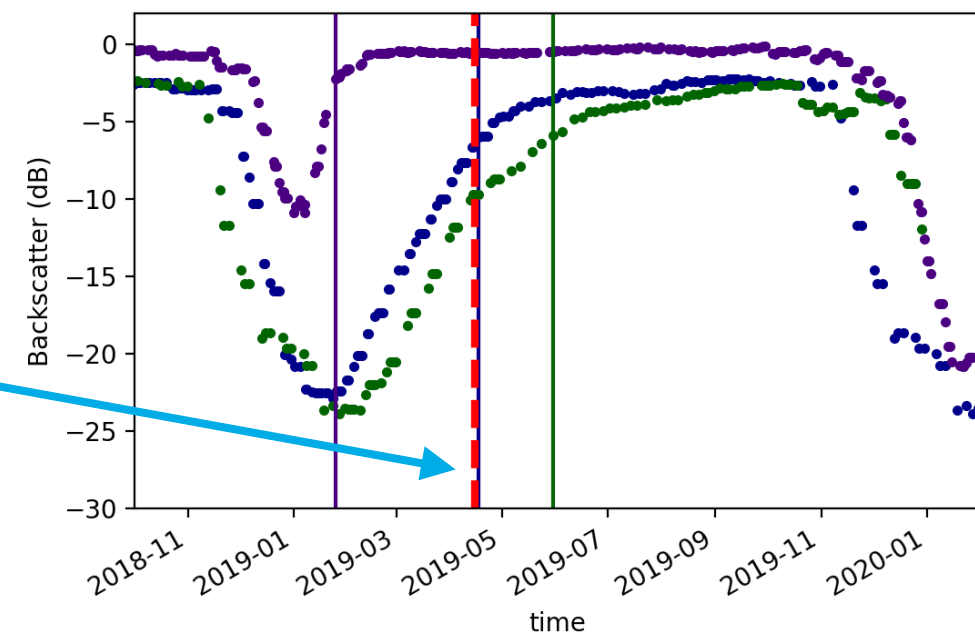
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Aquifer detection threshold:  
 $\text{DOY}_{80} \geq 105$  (mid-April)

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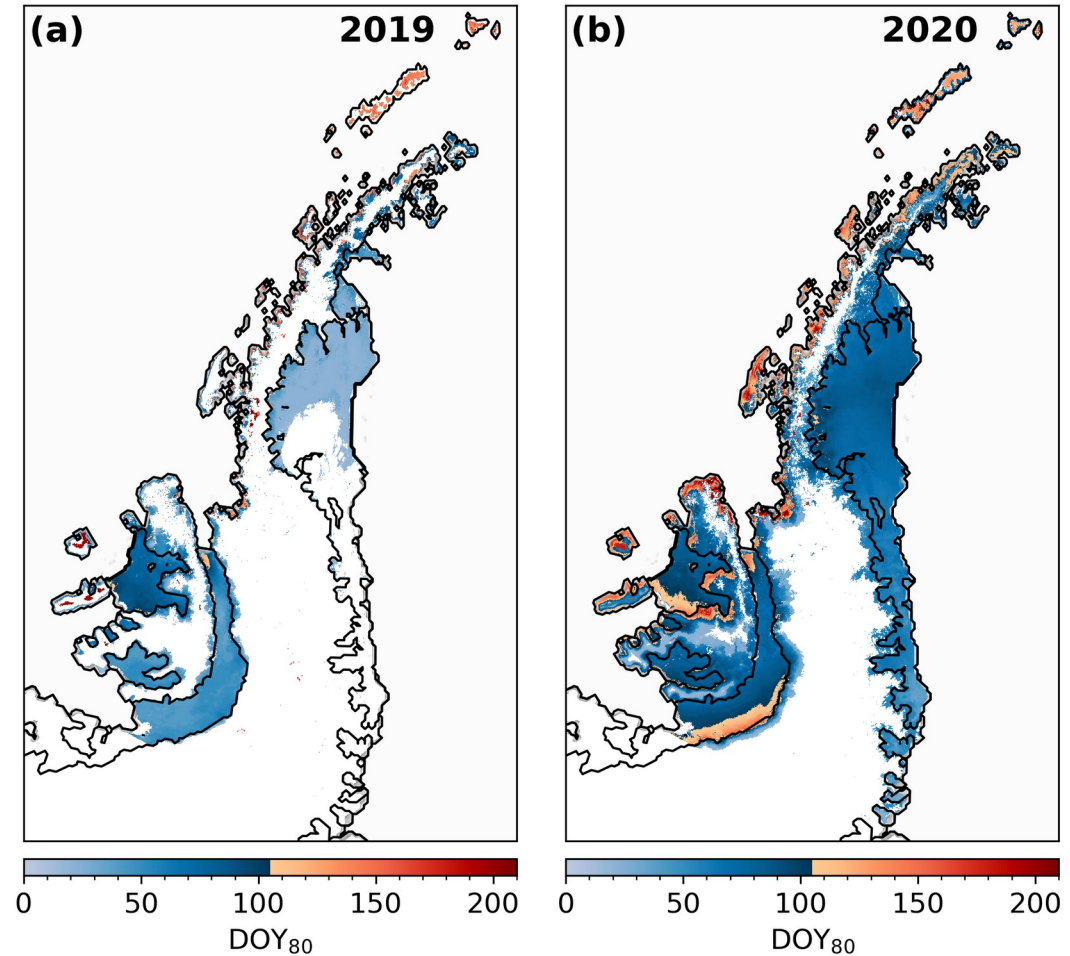
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## Resulting $DOY_{80}$ for the Antarctic Peninsula at 1x1 km<sup>2</sup> resolution

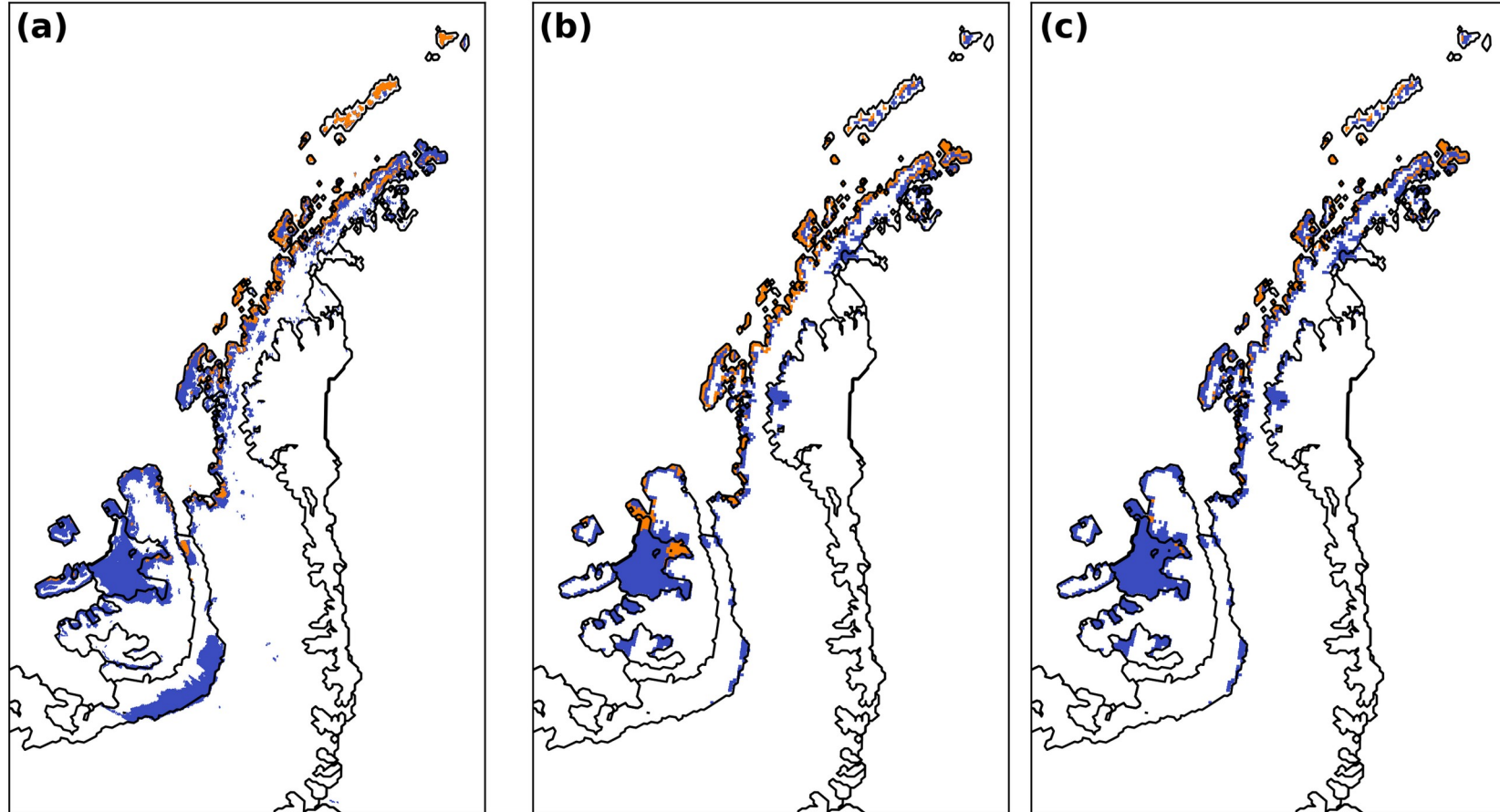
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## Sentinel-1 detection algorithm

## IMAU-FDM (Firn Densification Model)



## Firn aquifers are detected at high accumulation and high melt sites

