

Assimilation of Surface Melt Extent Estimated by Microwave Satellite Into the Regional Climate Model MAR

Case Study over the Antarctic Peninsula

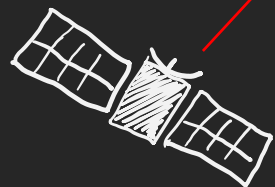
Thomas **DETHINNE**, Christoph **KITTEL**,
Quentin **GLAUDE**, Xavier **FETTWEIS** & Anne **ORBAN**



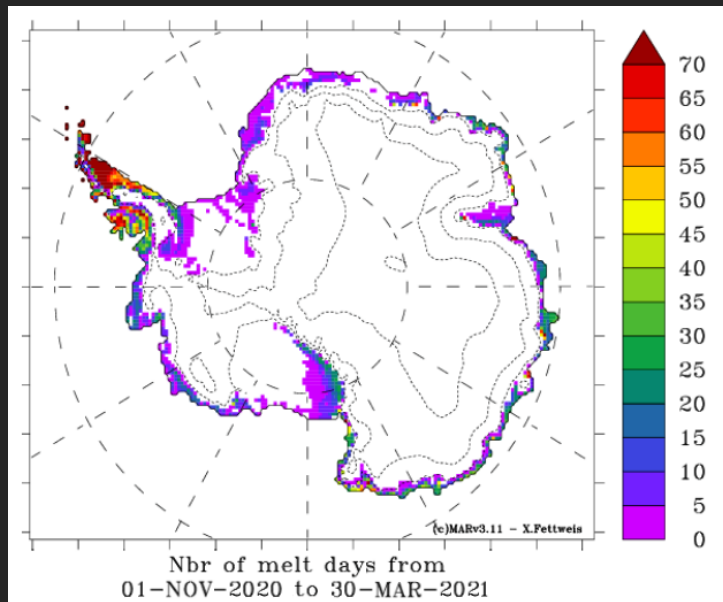
(Regional Climate Model)

Sets of equations

Global
Circulation
Model

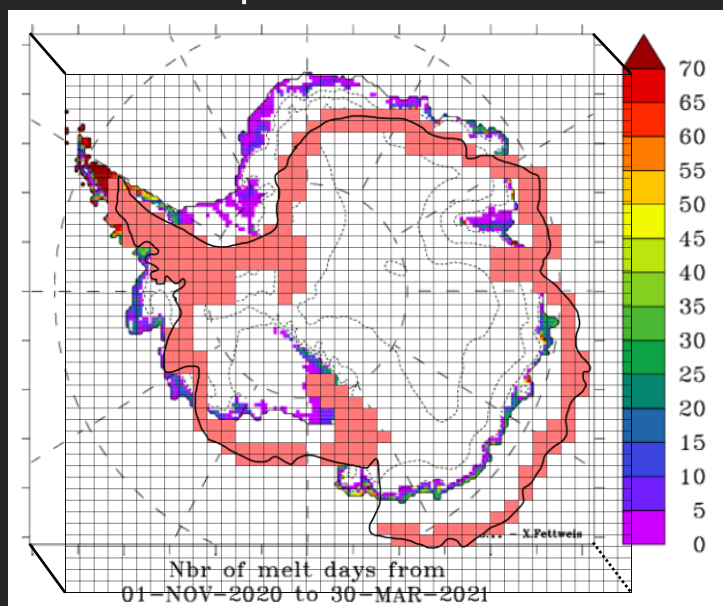


(RCM + Assimilation)



Nbr of melt days from
01-NOV-2020 to 30-MAR-2021

Uncertainties quantification
+
Better quantification of surface melt

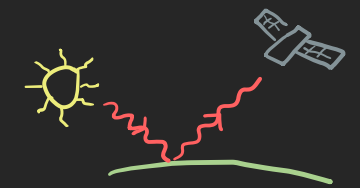


Nbr of melt days from
01-NOV-2020 to 30-MAR-2021

Satellites Used

Microwave Satellites (>GHz) — Capacity to spot the presence of water in the snowpack

Passive



AMSR2



SSMIS



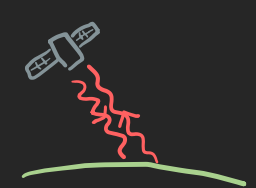
GCOM (JAXA)

18,7 GHz → 10km

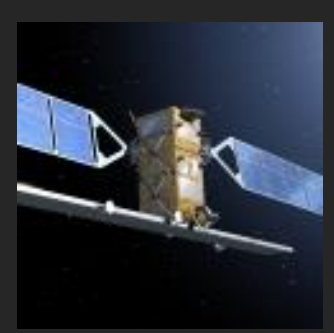
F-17, F-18 (US Air Force)

19,35 GHz → 25km

Active



C-SAR

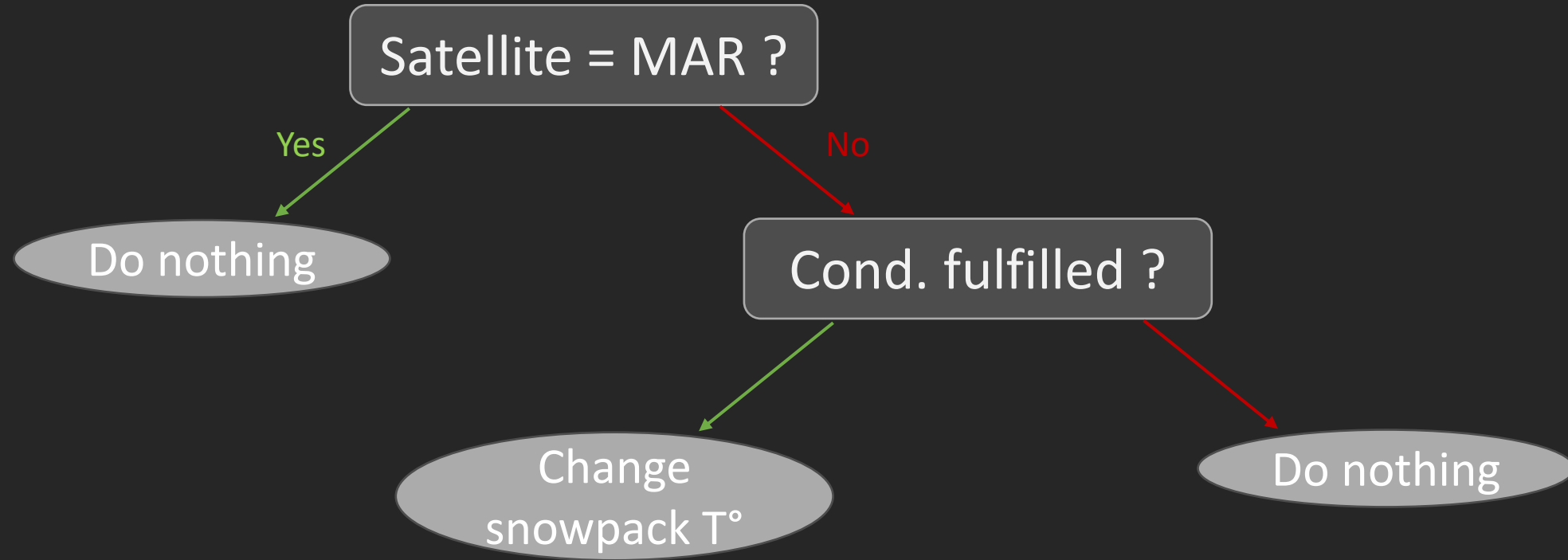


SENTINEL-1 (COPERNICUS)

5,4 GHz → "10"m (1km)

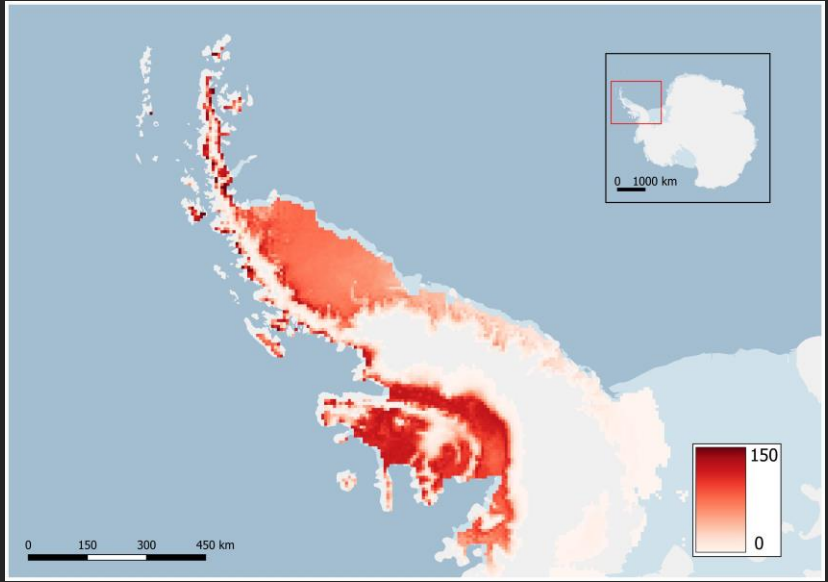
Assimilation

≈ Forcing by matching the state of liquid water

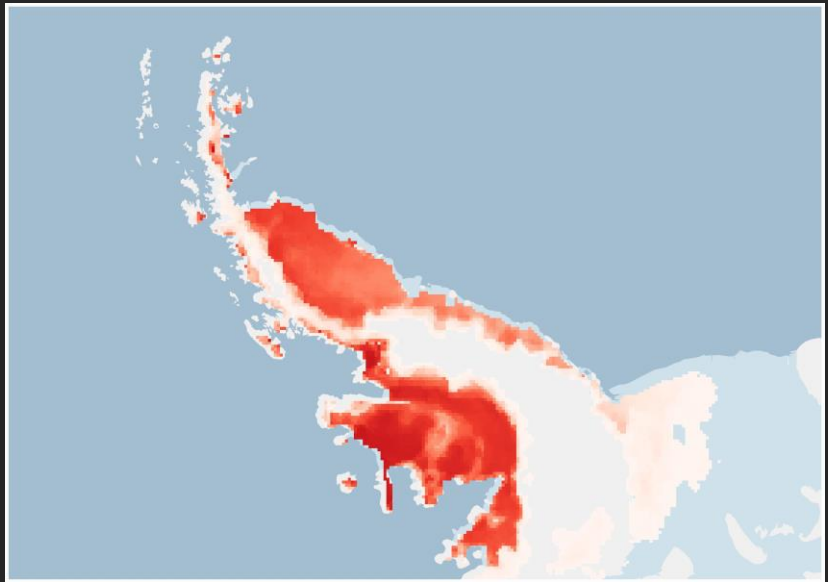


Number of days of melt between the 1/10/2019 and the 30/04/2020

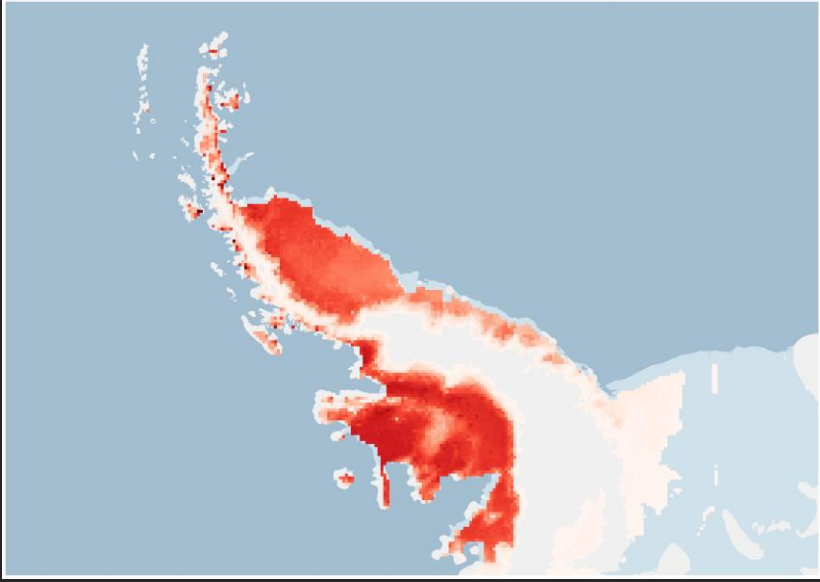
MAR



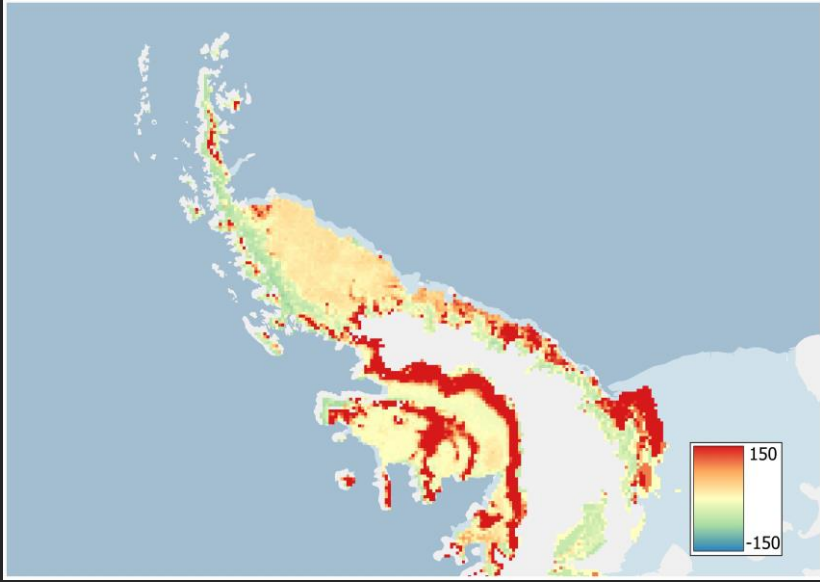
AMSR2



MAR + AMSR2



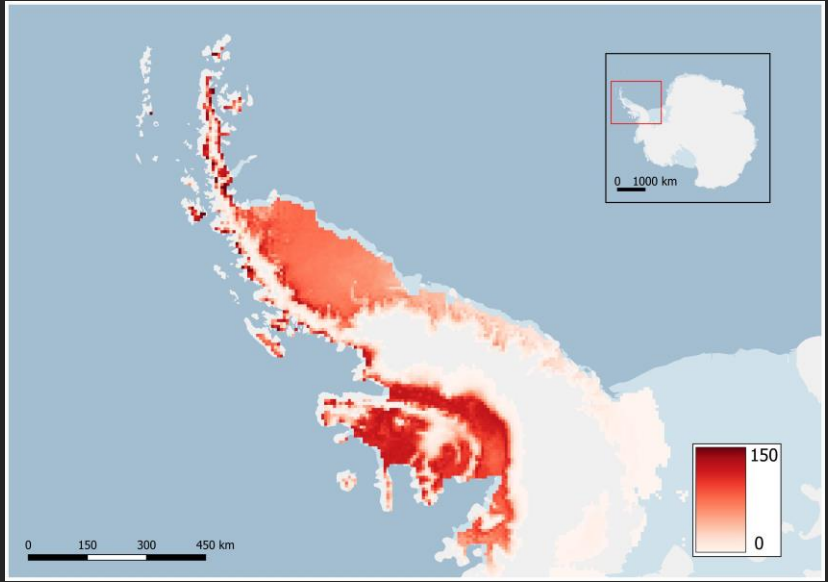
Differences
(% Melt Days)



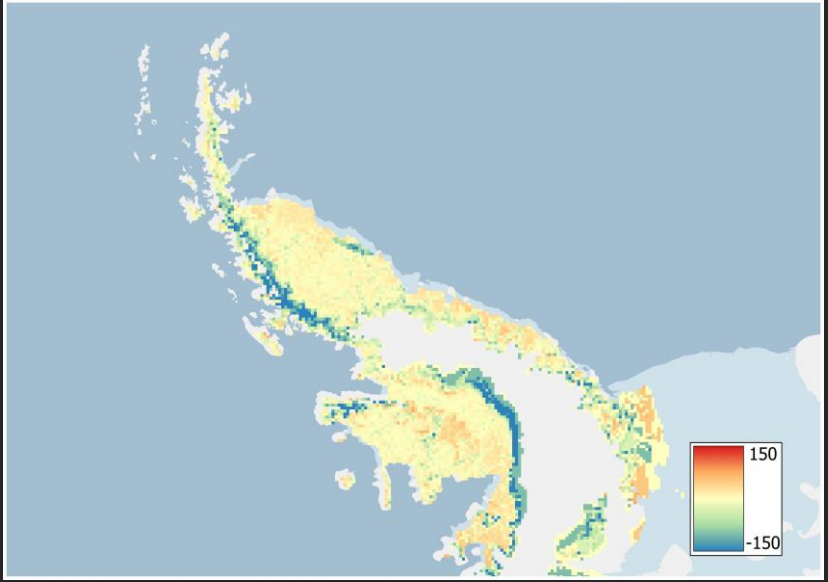
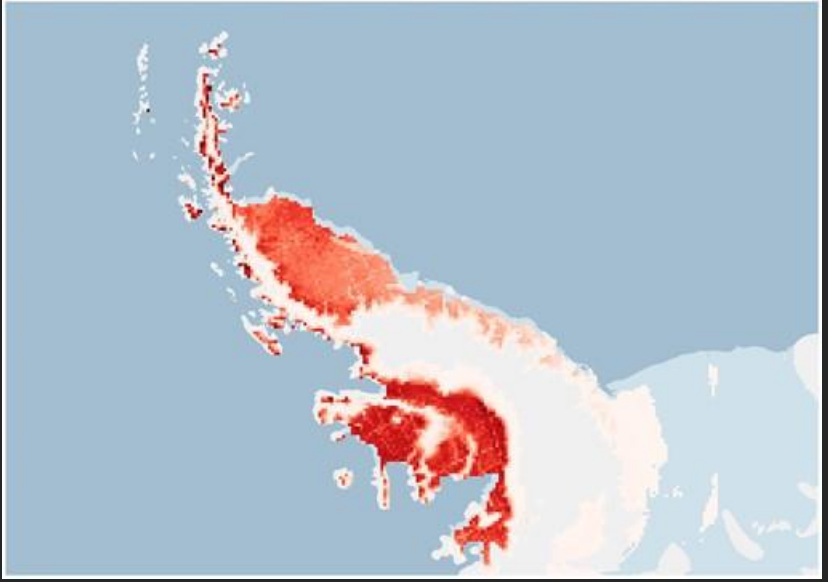
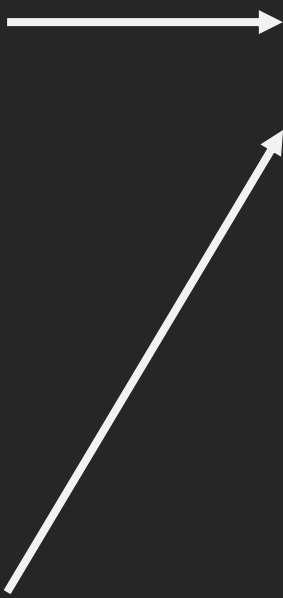
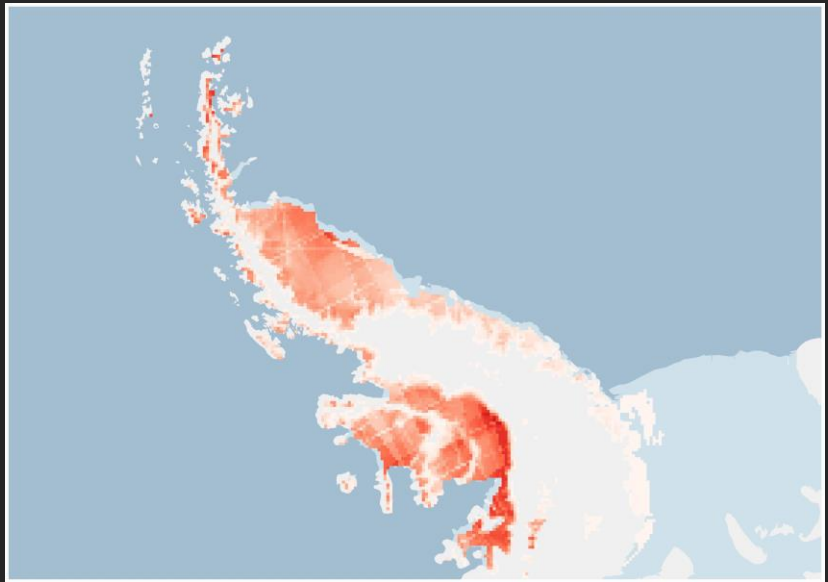
Basemap : Quantarctica3
[Matsuoka *et al.*, 2021]

Number of days of melt between the 1/10/2019 and the 30/04/2020

MAR



Sentinel-1

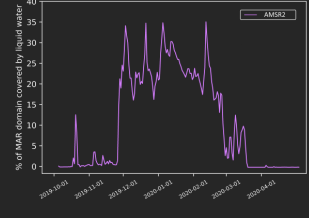
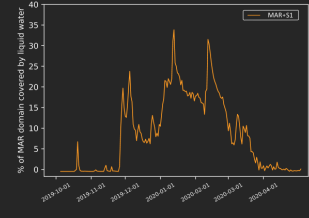
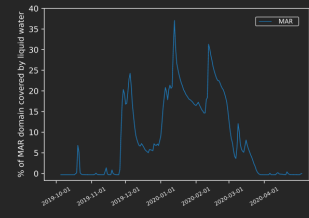
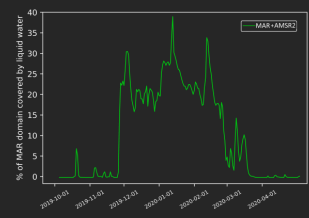
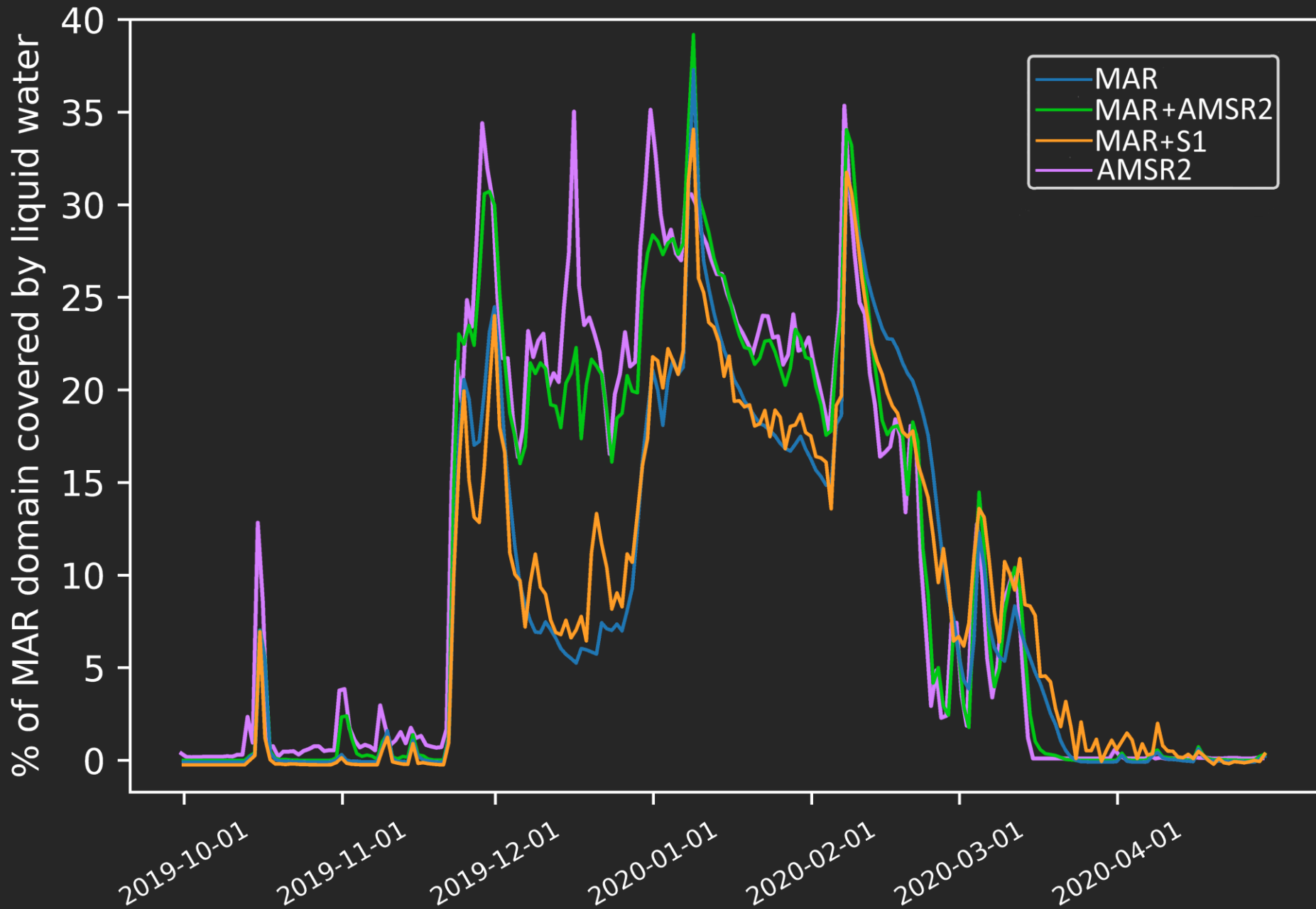


MAR + Sentinel-1

Differences
(% Melt Days)

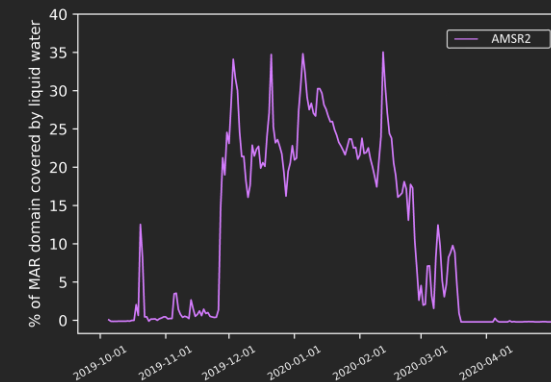
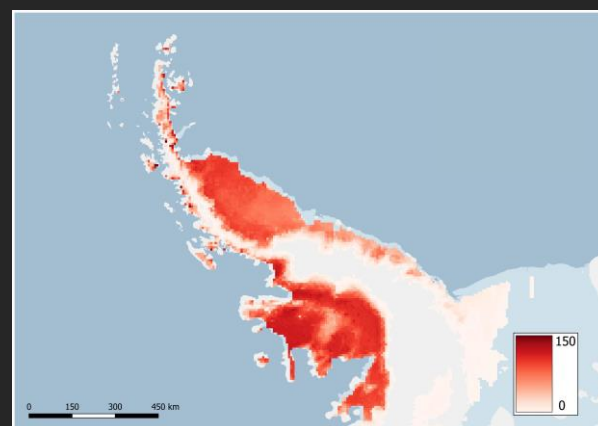
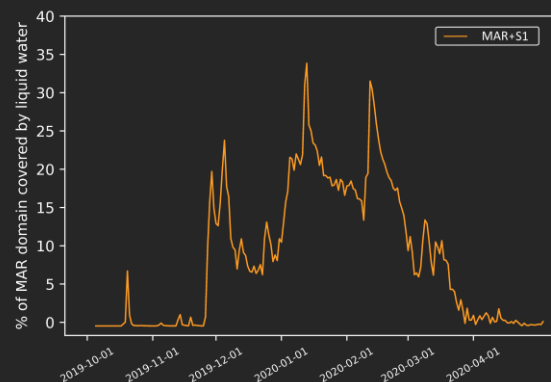
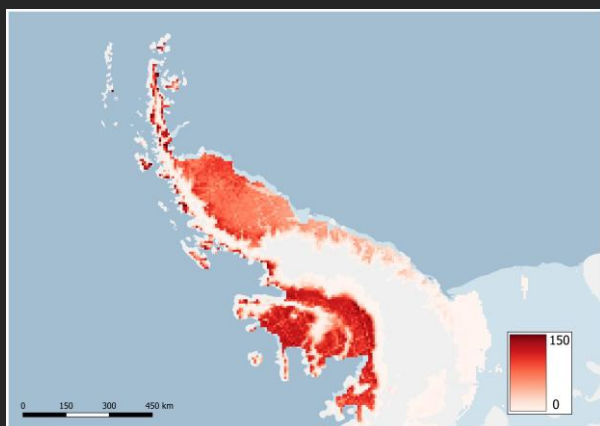
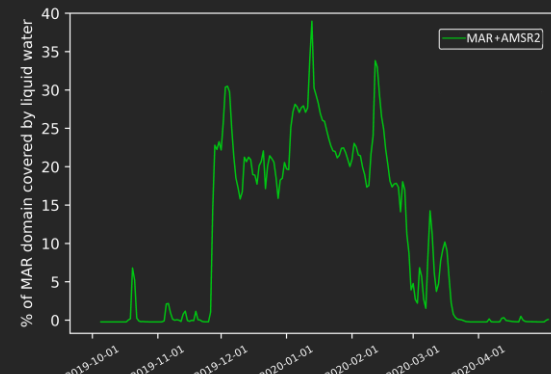
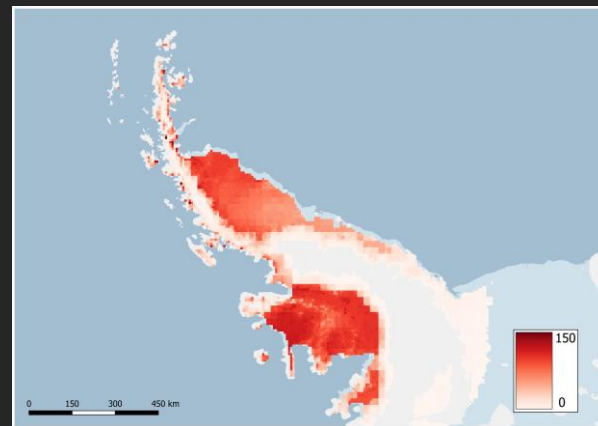
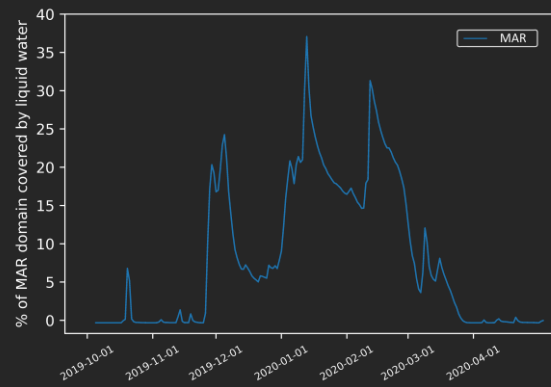
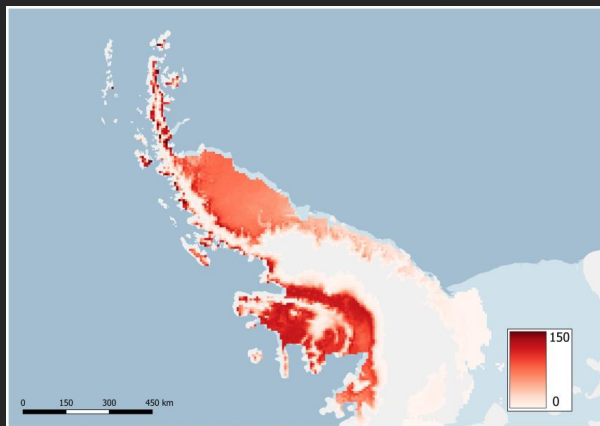
Basemap : Quantarctica3
[Matsuoka *et al.*, 2021]

Results



Enhancements for the assimilations:

- Considering the acquisition time of the satellites
- Creating a single mask of surface melt extent by fusing the satellites together
- Assimilation of Sentinel-3 derived albedo



Abstract and contact →

