

Observation and Simulation of blowing snow in Adélie Land

Hubert Gallée¹, Alexandre Trouvilliez¹,
Cécile Agosta¹, Christophe Genthon¹,
Vivent Favier¹ and Florence Naaim-Bouvet²

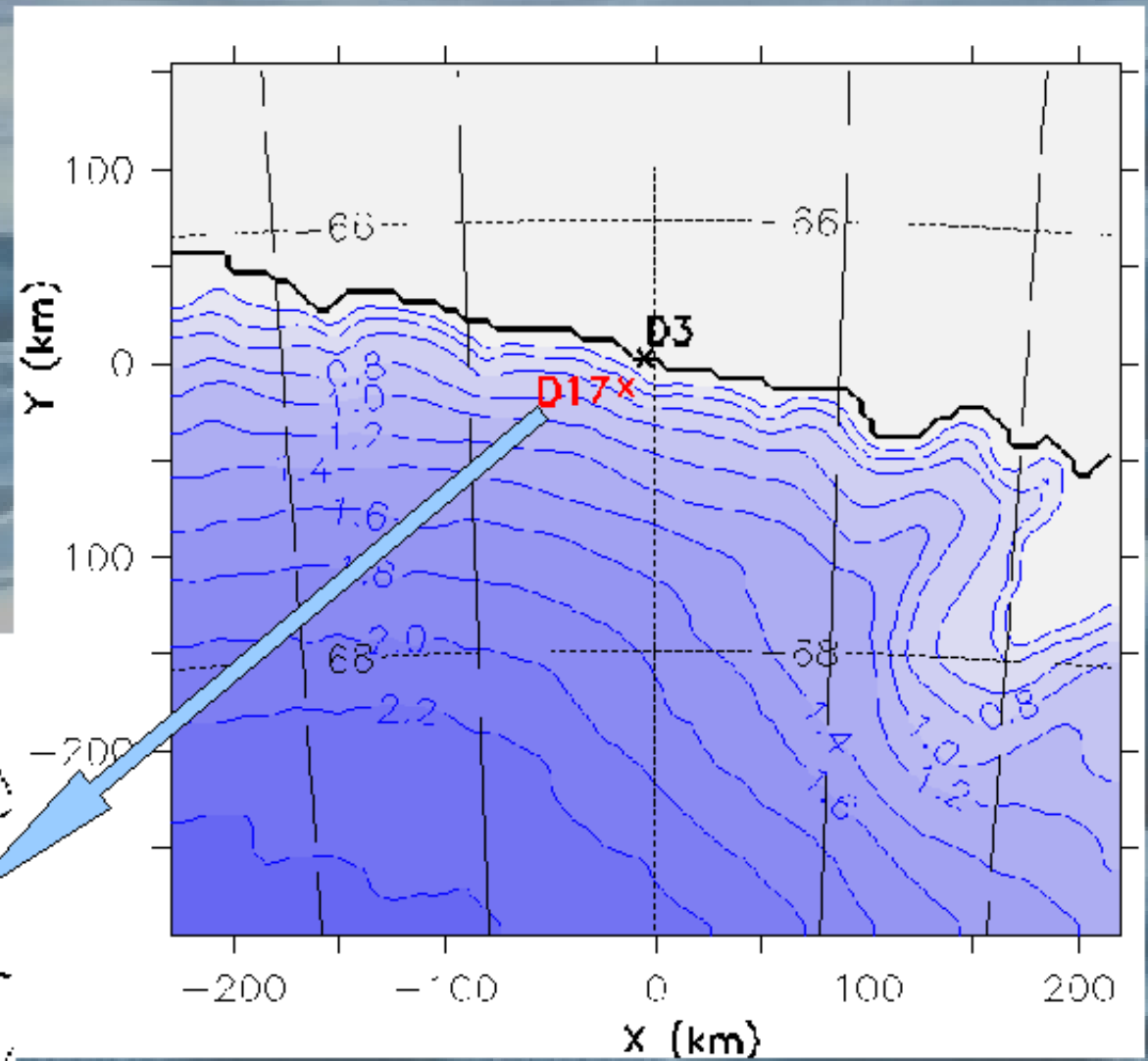
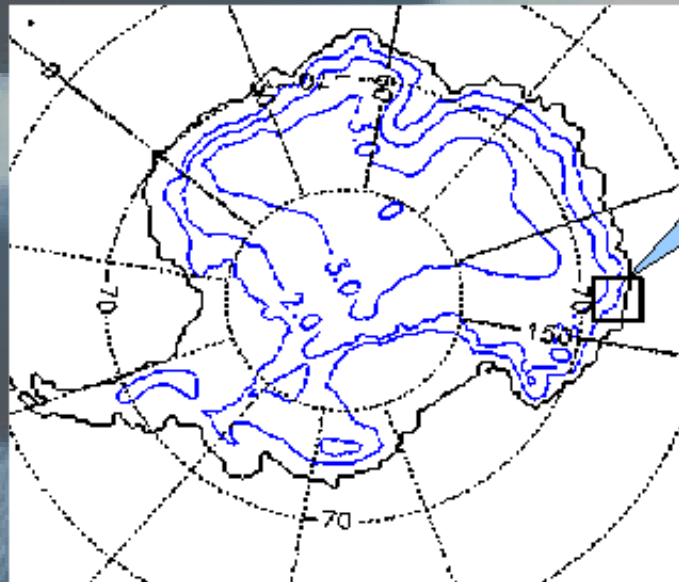
1.



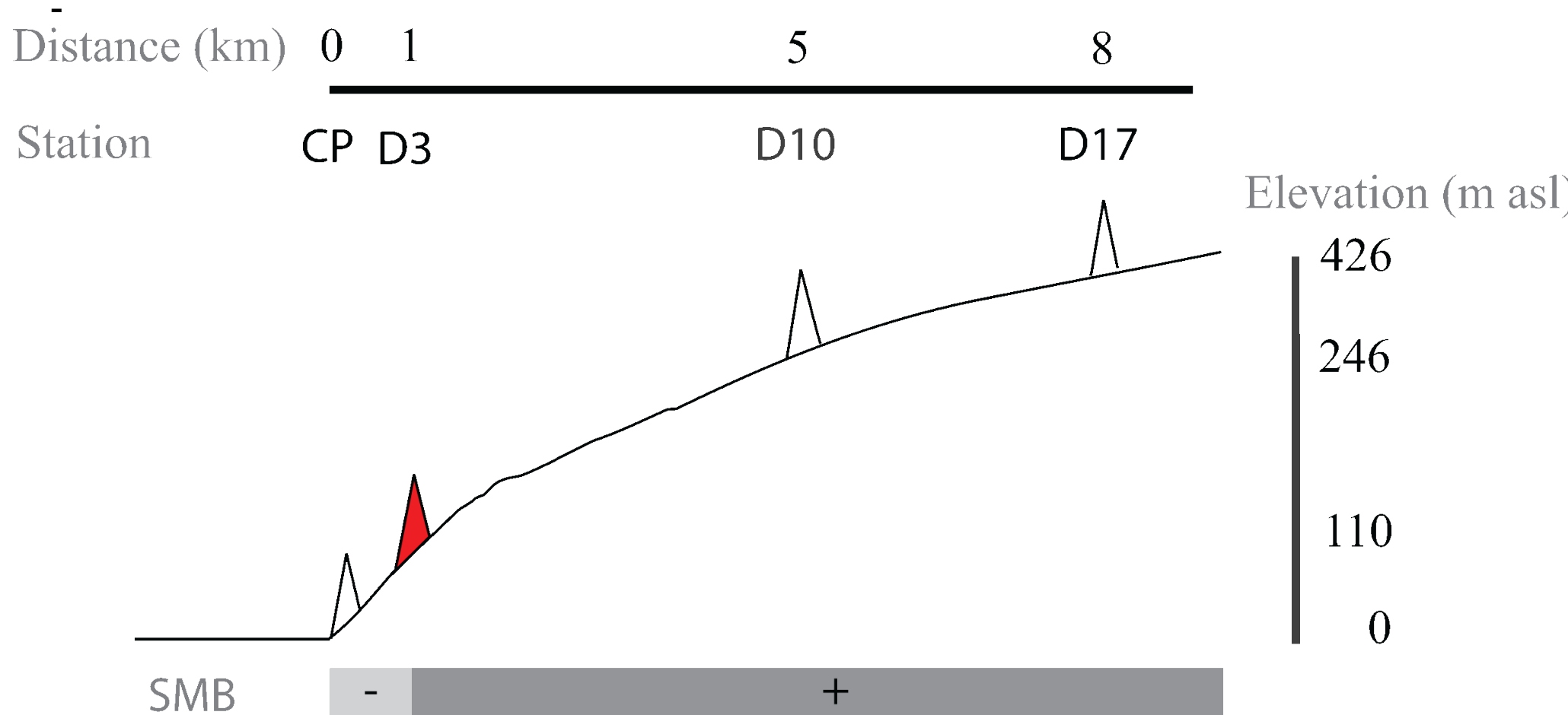
2.



Adélie Land

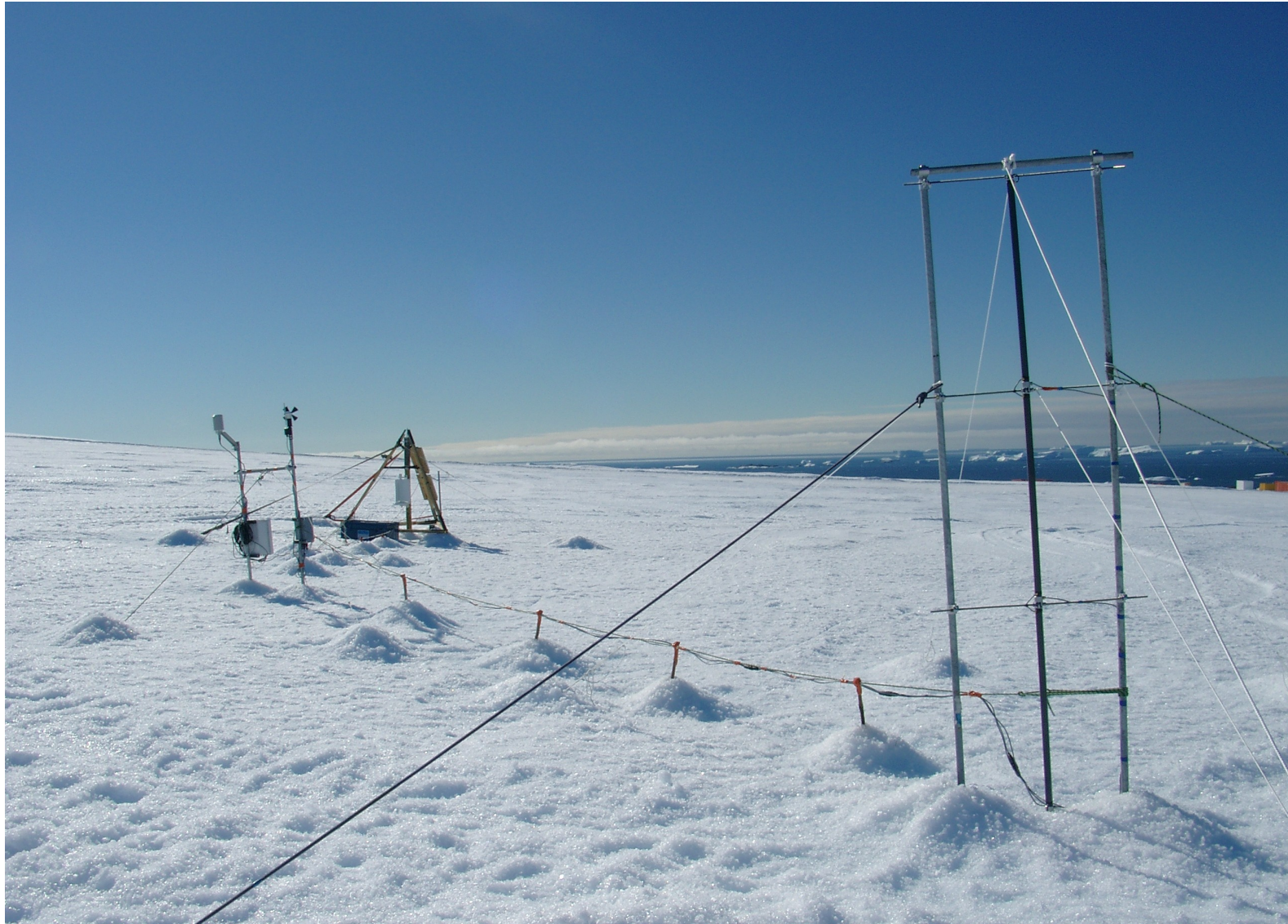


Adélie Land



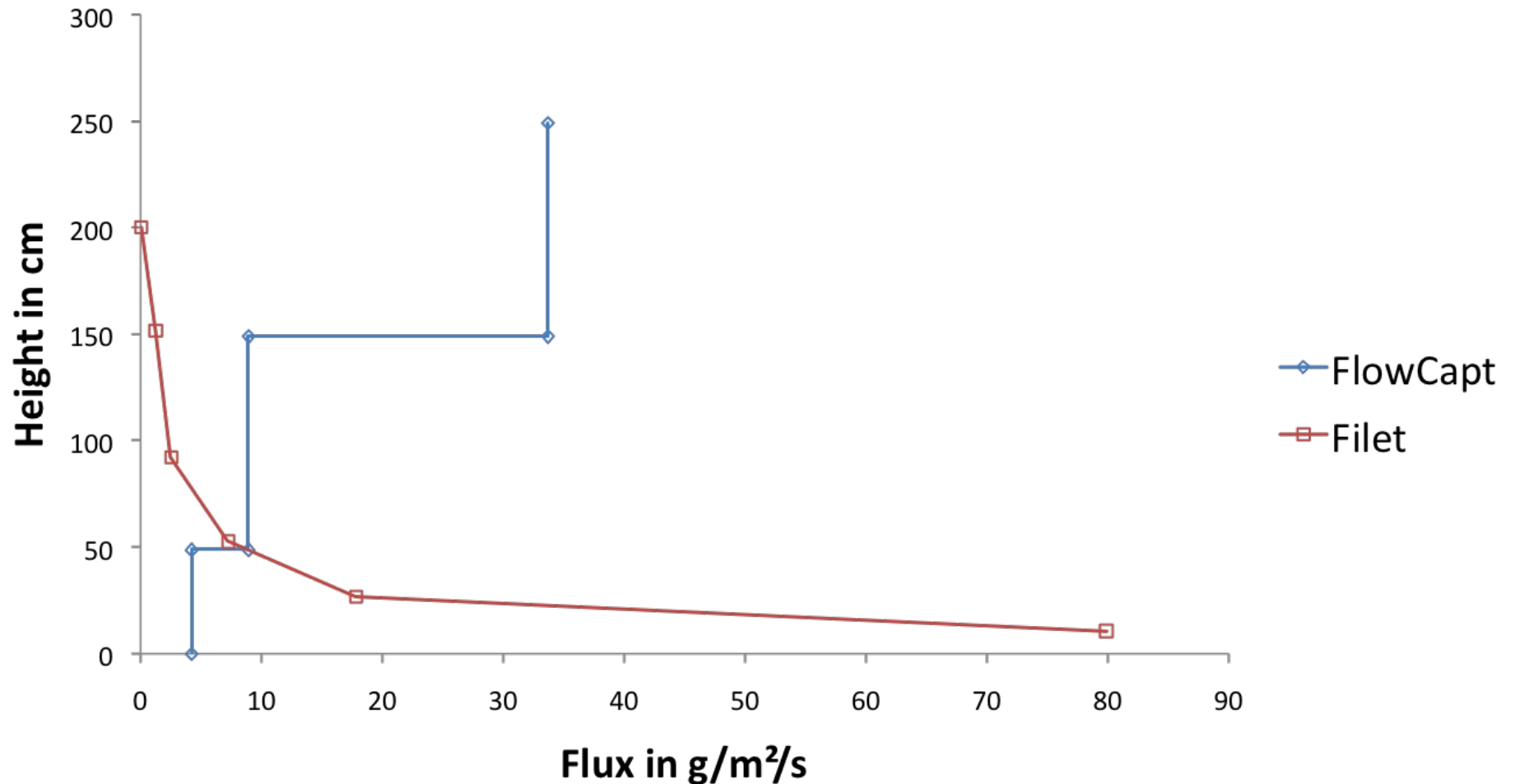
Automatic weather stations (AWS) in Adélie land during 2010.
In red, the Automatic snow station (ASS) associated with an AWS.

Automatic Snow Station



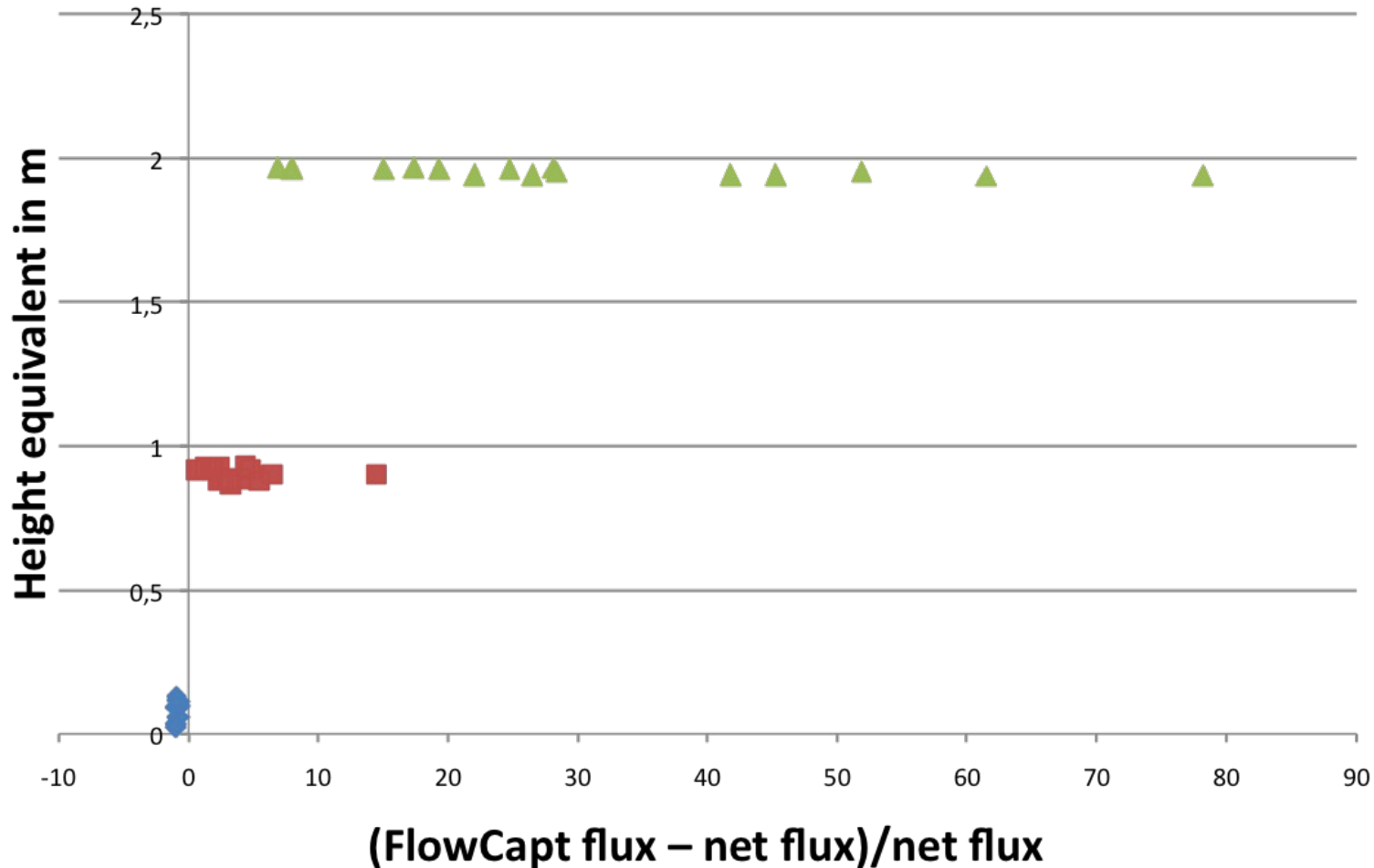
The three FlowCaps of 1m each made by IAV technology at D3.
They estimate the blowing snow flux by acoustic technology.

Overestimation made by the FlowCapt



The fluxes recorded by the FlowCapt increase with the height. Butterfly net (filet) measurements decrease with it. Exemple of the 18/01/2010 between 18h30 and 19h

Errors increase with height



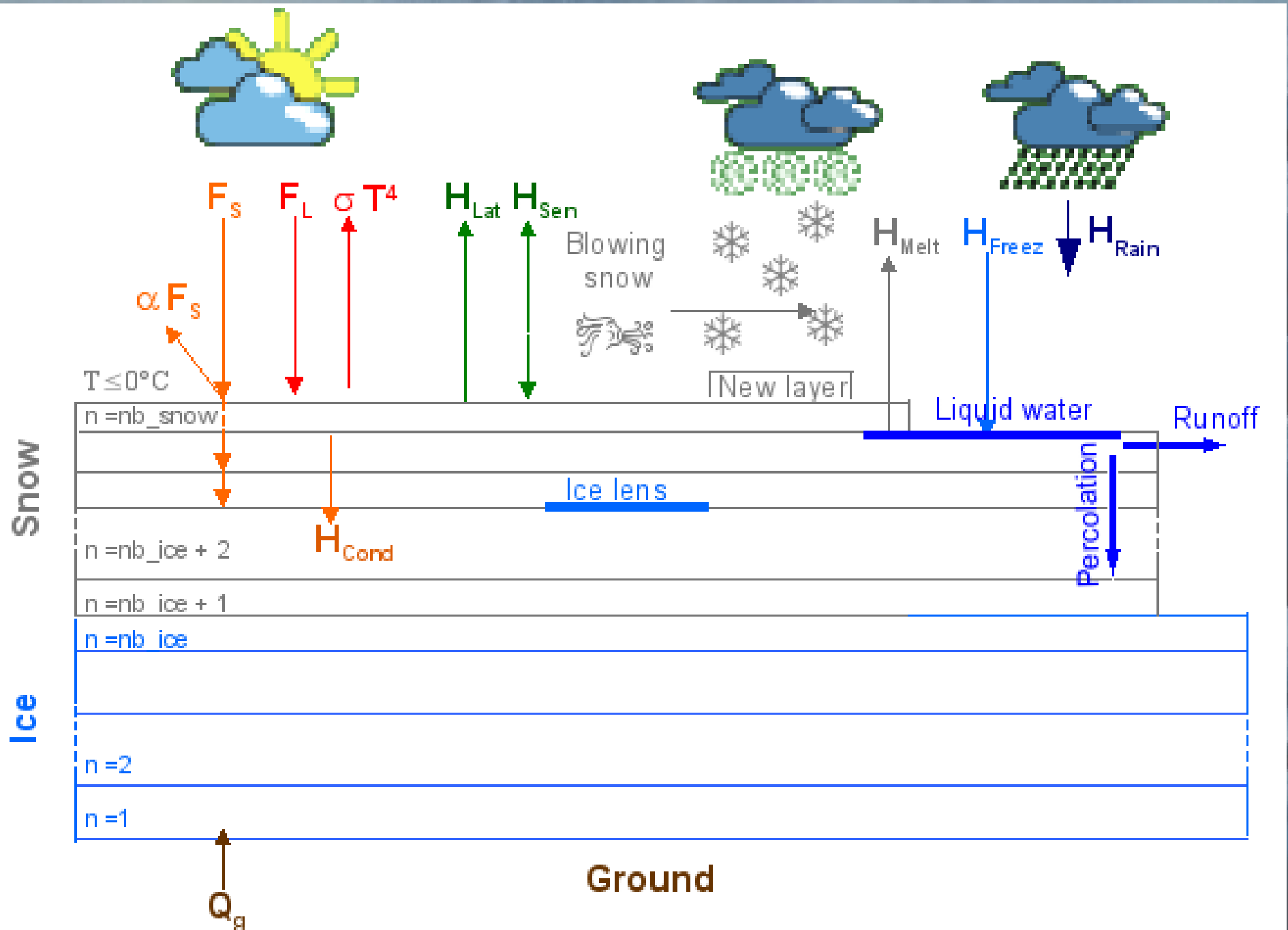
The errors is du to the increasing windspeed with the height.

Coupling

- atmosphere,**
- blowing snow and**
- snow pack**

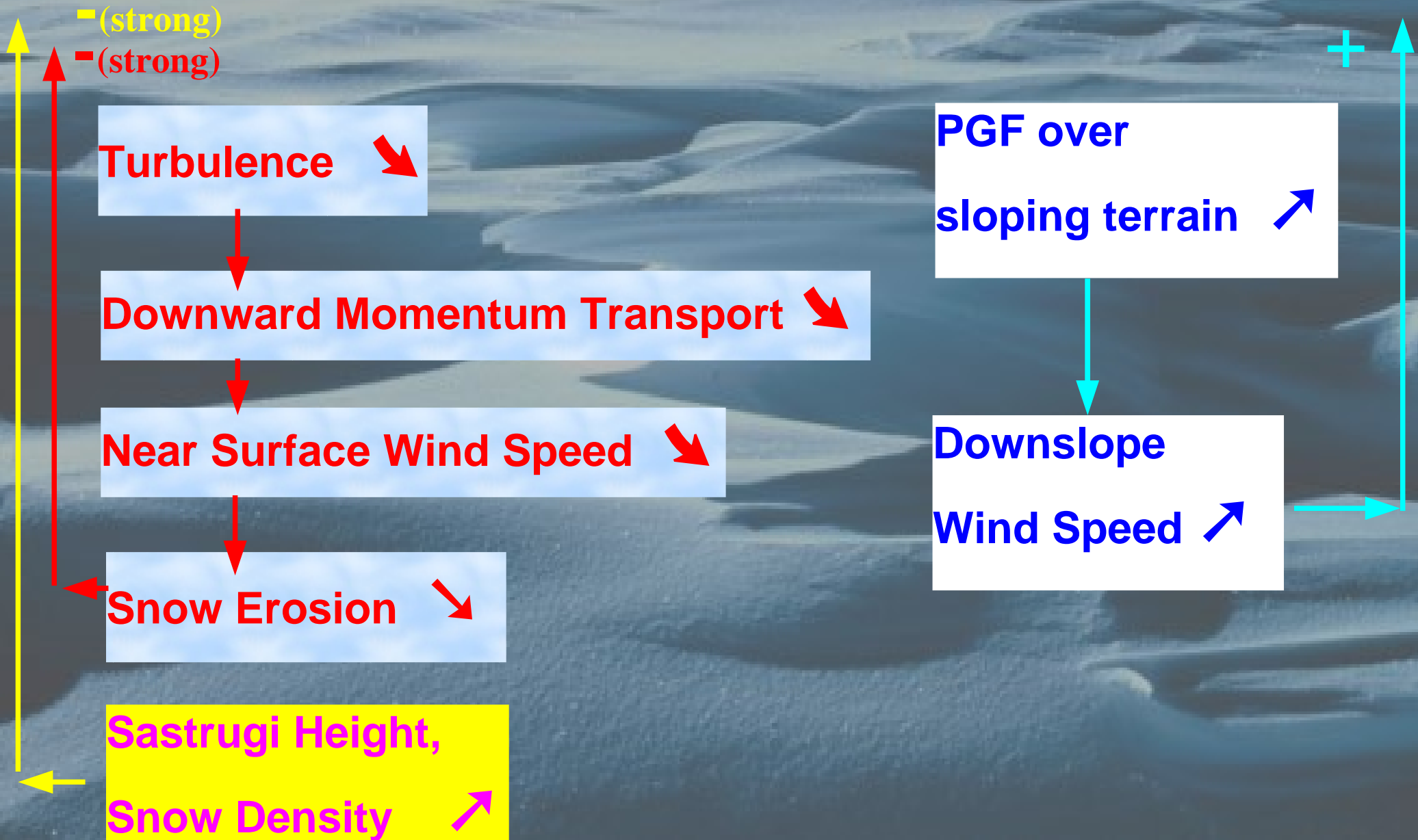
in MAR

The Snow Model

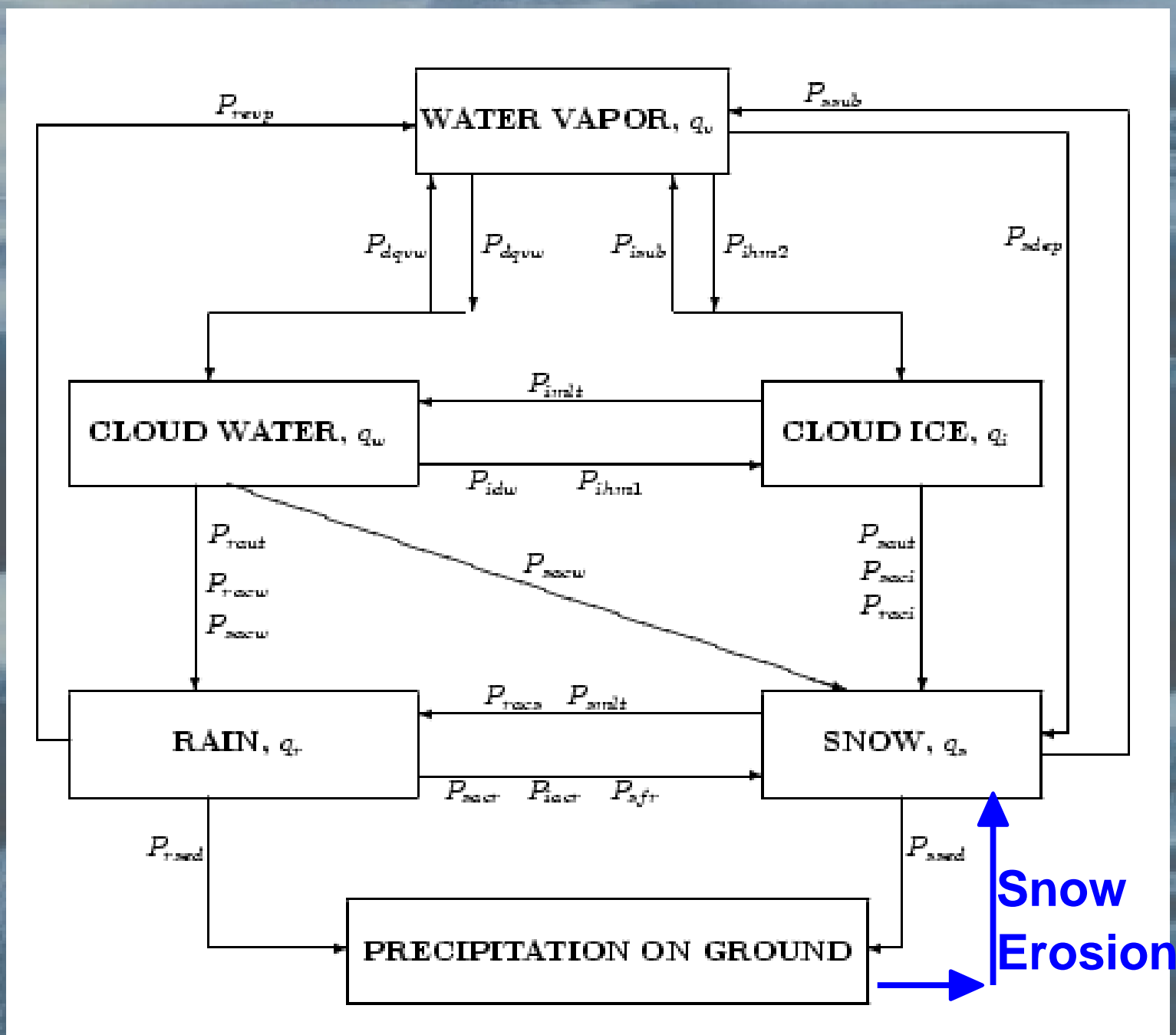


Blowing Snow: complex processes

Near Surface Fluid density (snow particles: weight / sublimation)

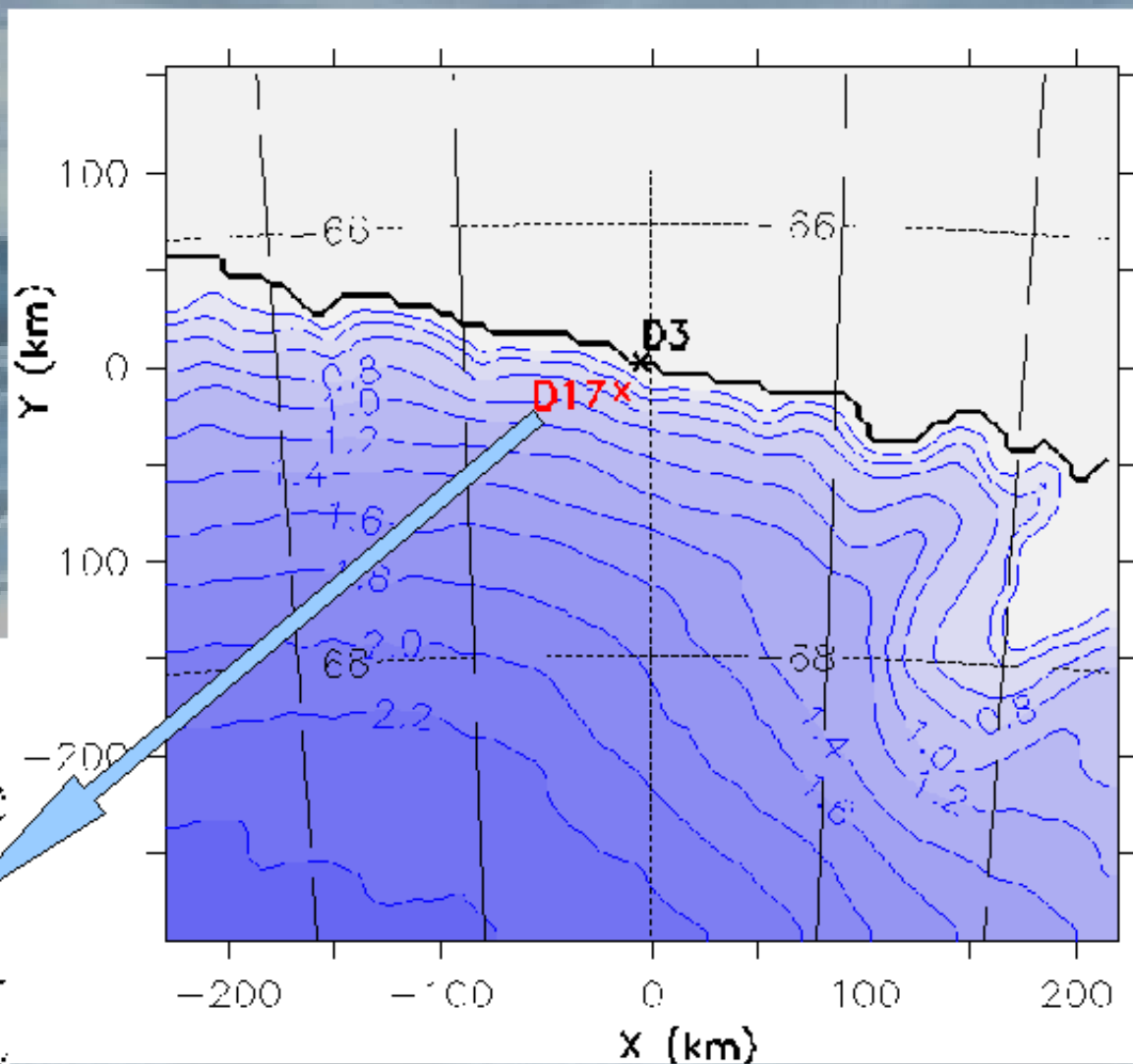
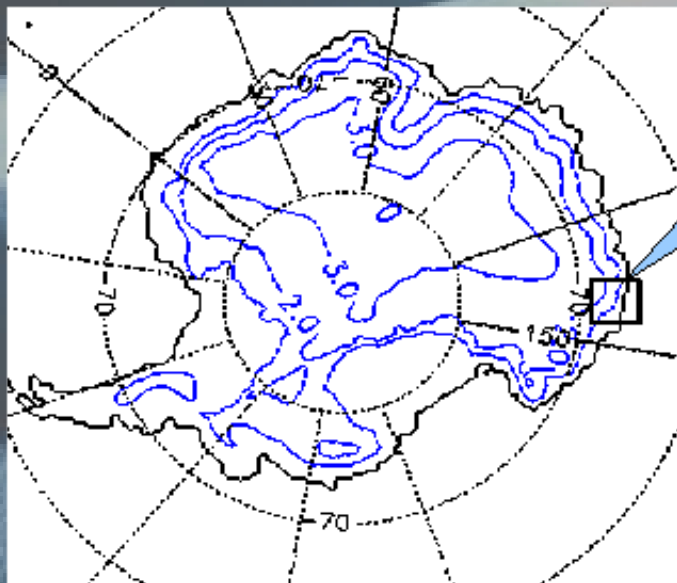


Blowing Snow / Cloud Microphysical Model

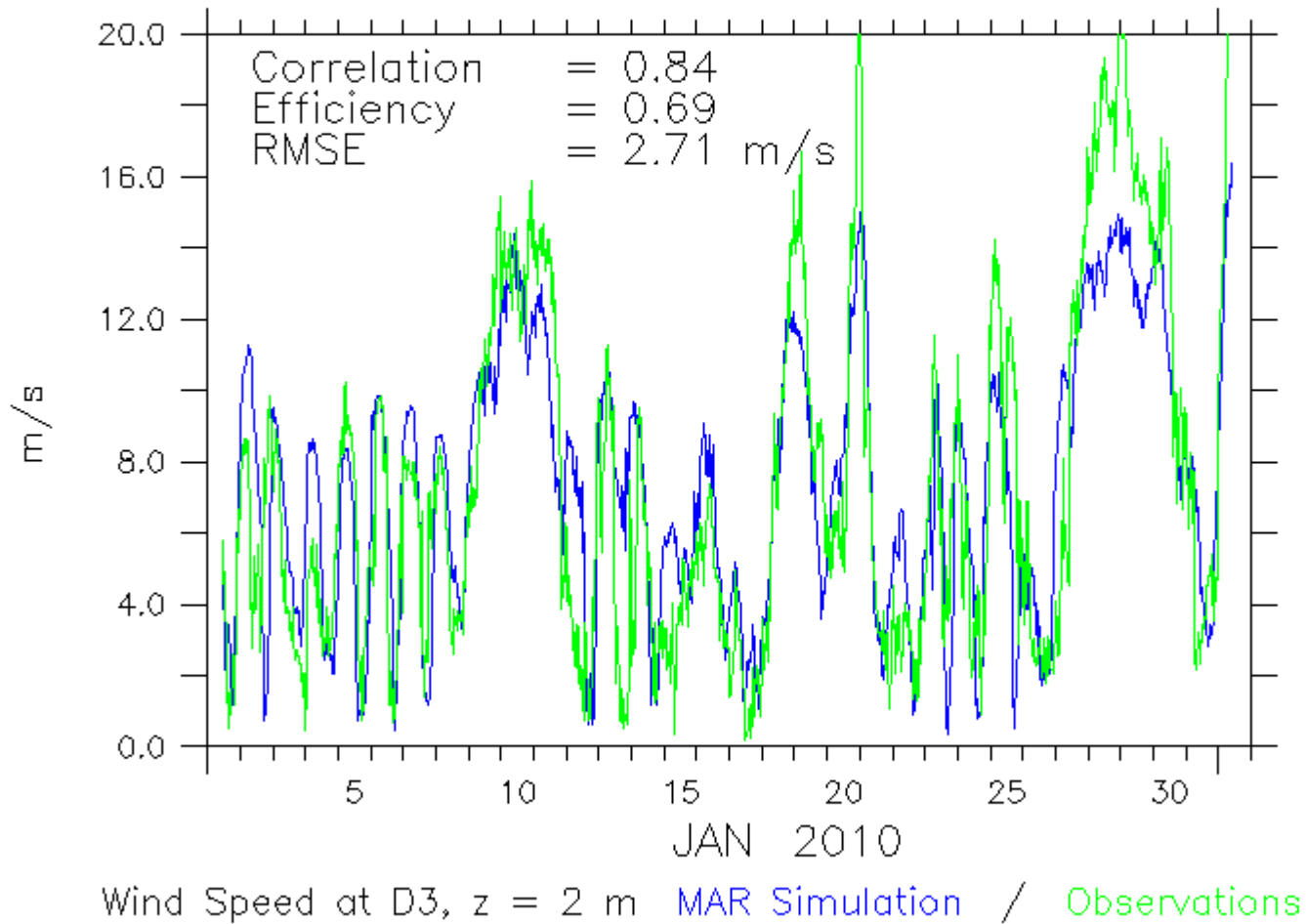


MAR over Adélie Land

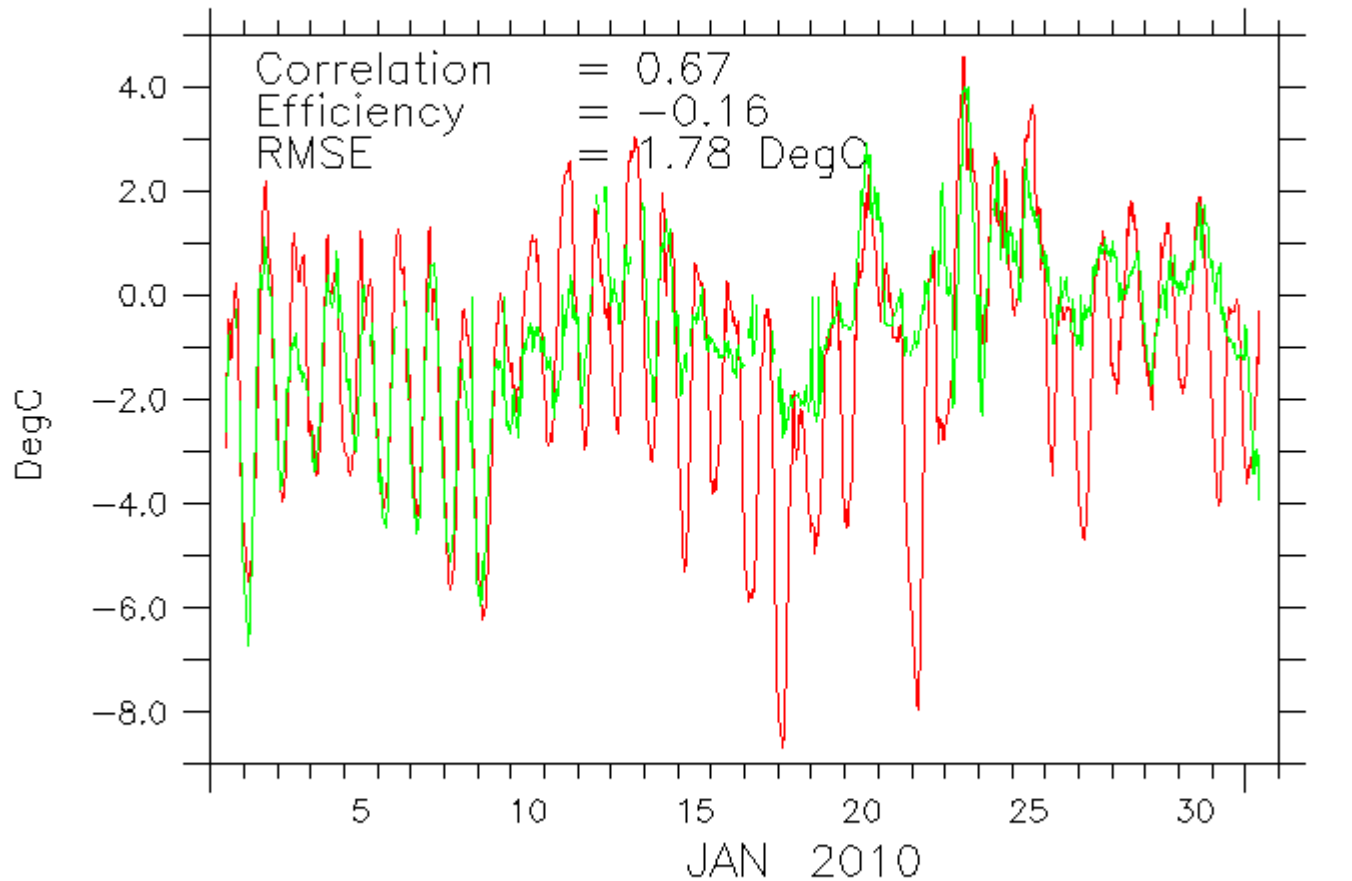
$dx = 5 \text{ km}$,
60 levels,
 $z_{\text{SBL}} = 2 \text{ m}$



MAR over Adélie Land



MAR over Adélie Land



Temperature at D3, z = 2 m **MAR Simulation** / **Observations**

MAR over Adélie Land (D3)

Temperature

| DLW(MAR) –
DLW(OBS) |
< 90 W m⁻²

Correlation

0.67

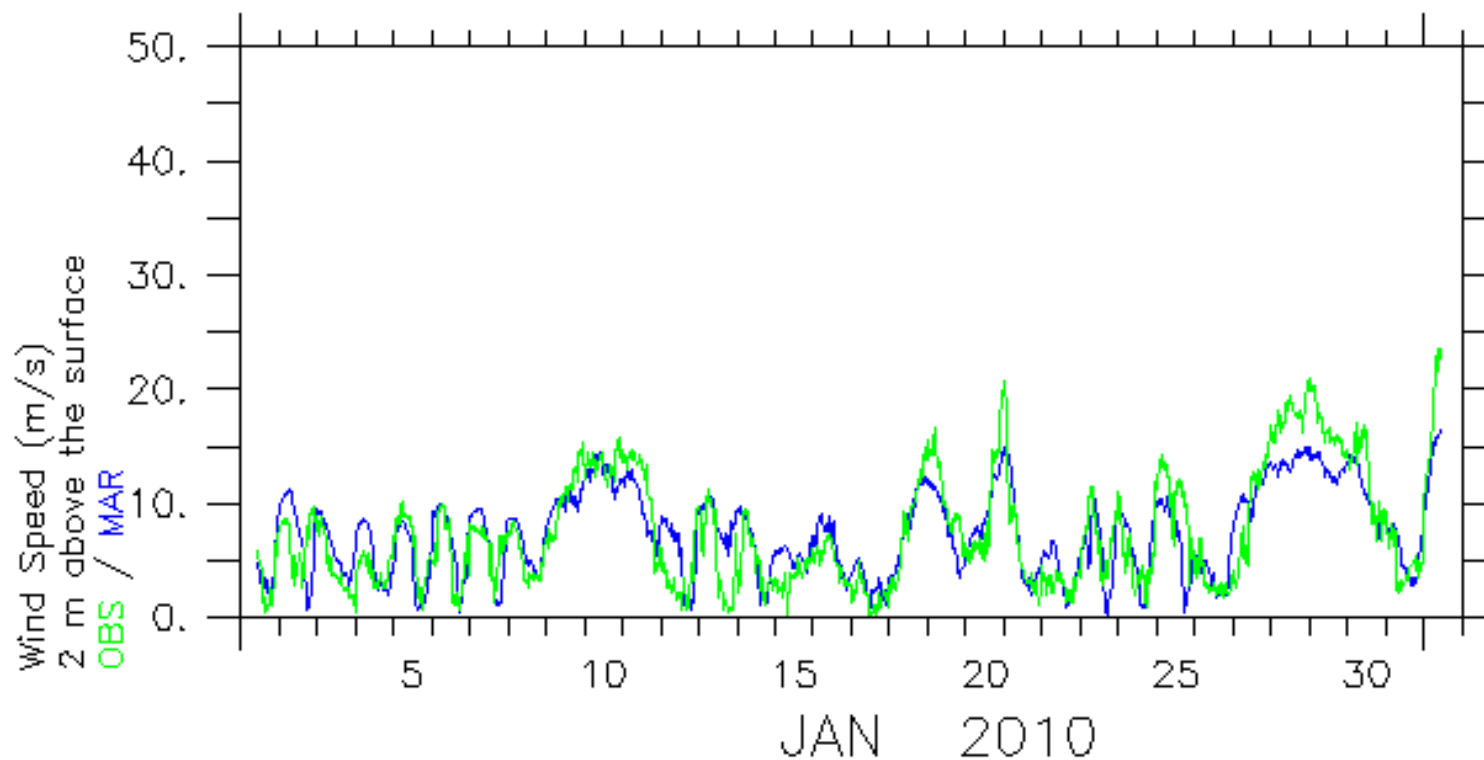
0.78

Efficiency

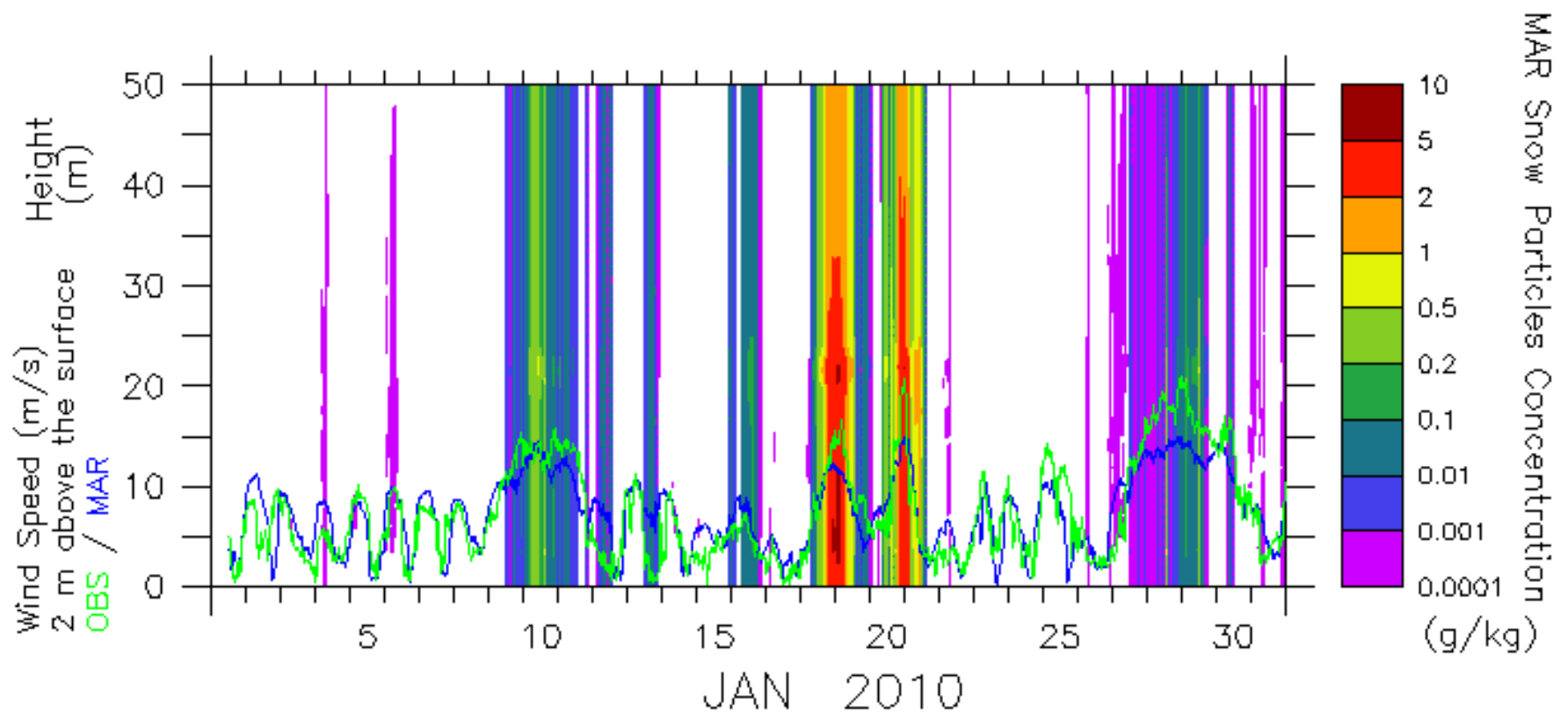
- 0.16

0.46

MAR over Adélie Land

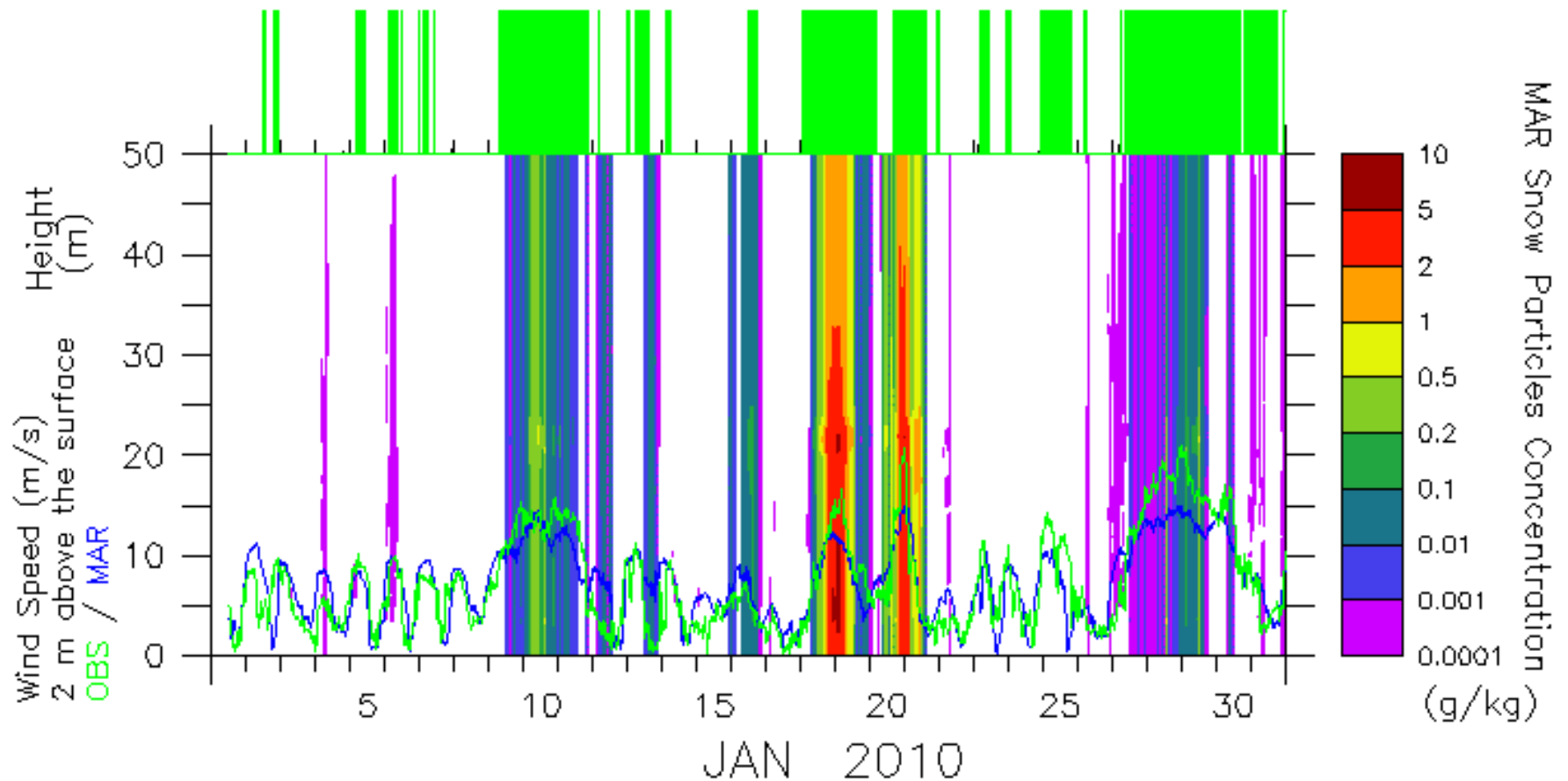


MAR over Adélie Land

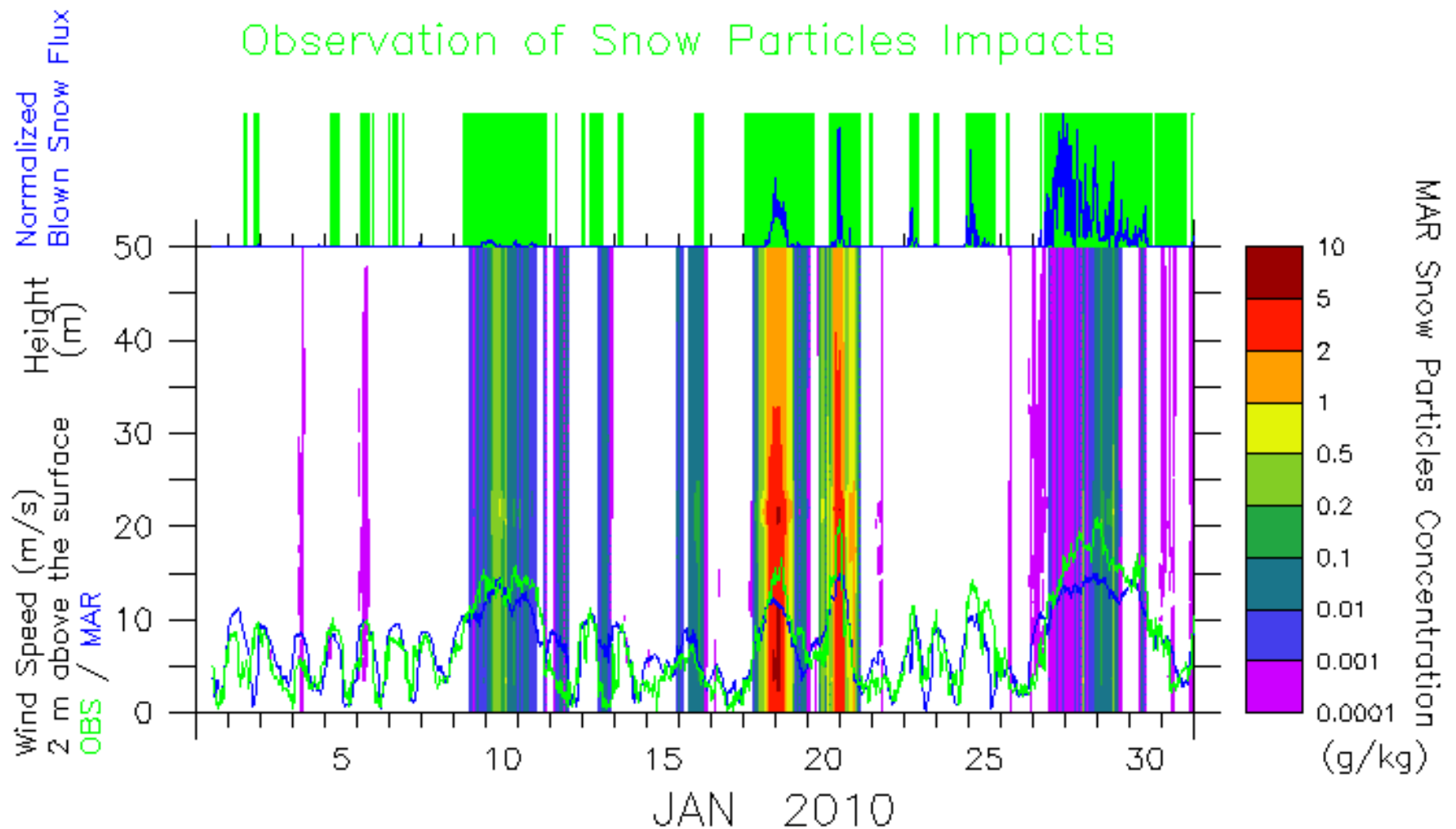


MAR over Adélie Land

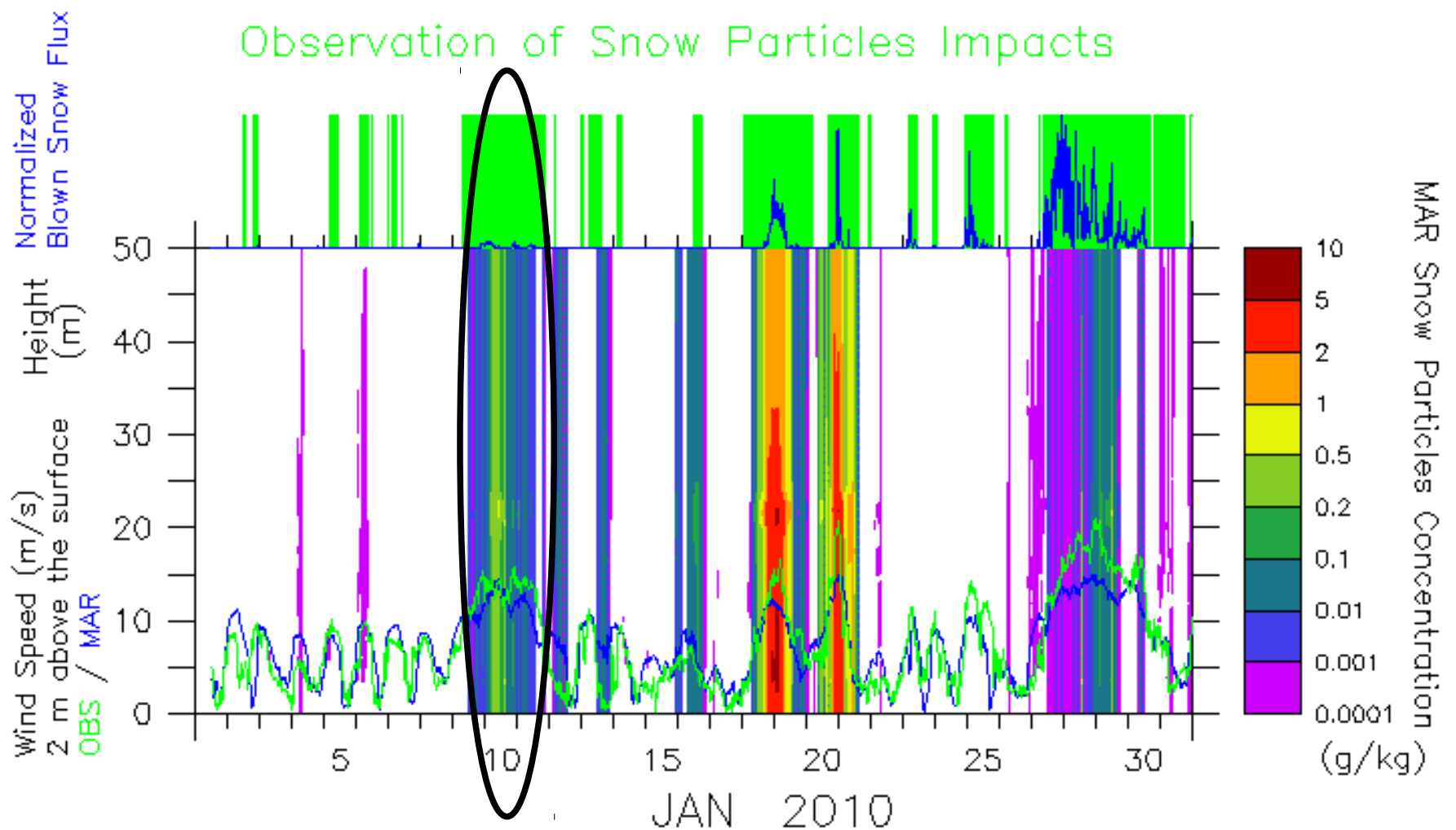
Observation of Snow Particles Impacts



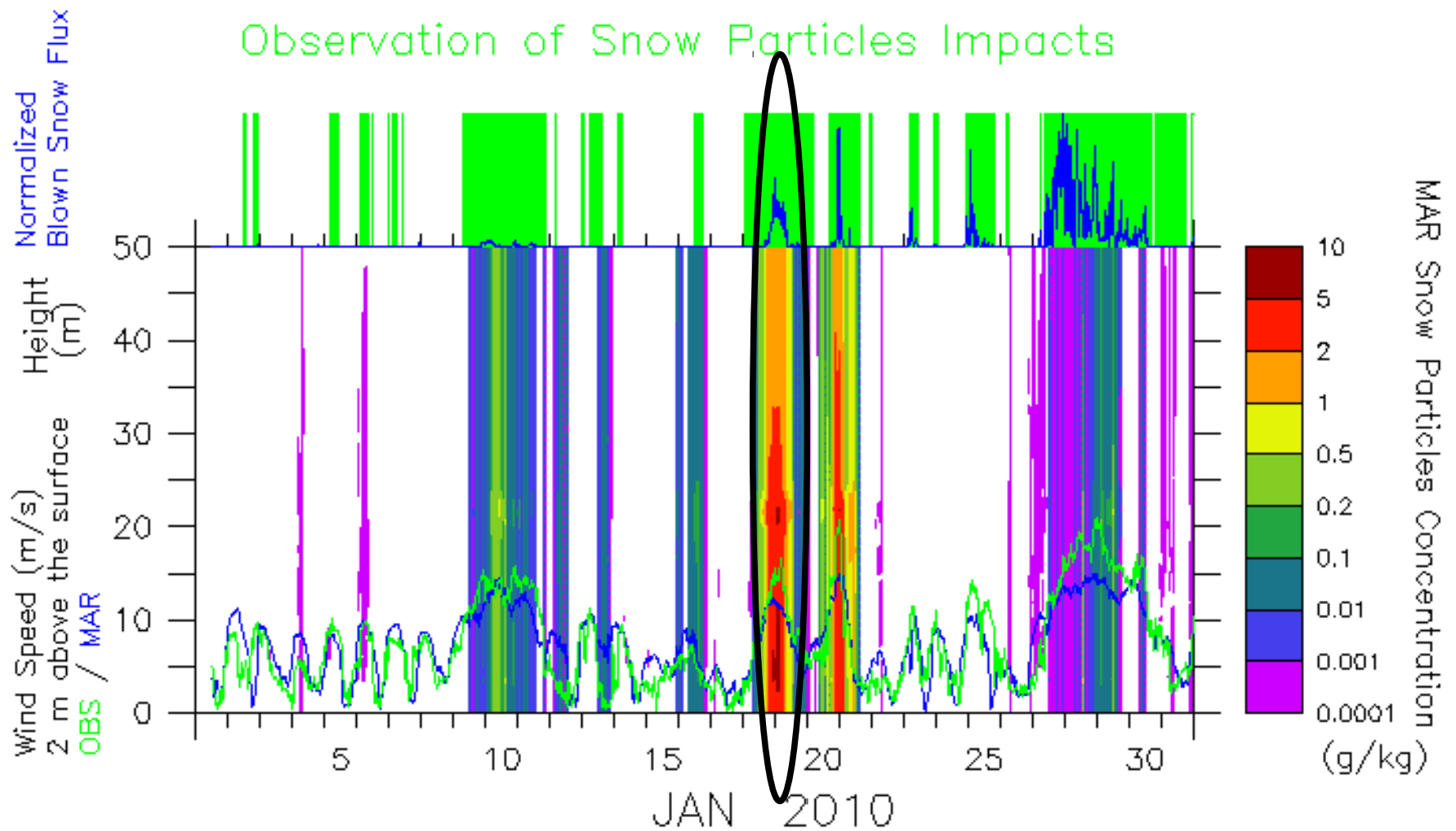
MAR over Adélie Land



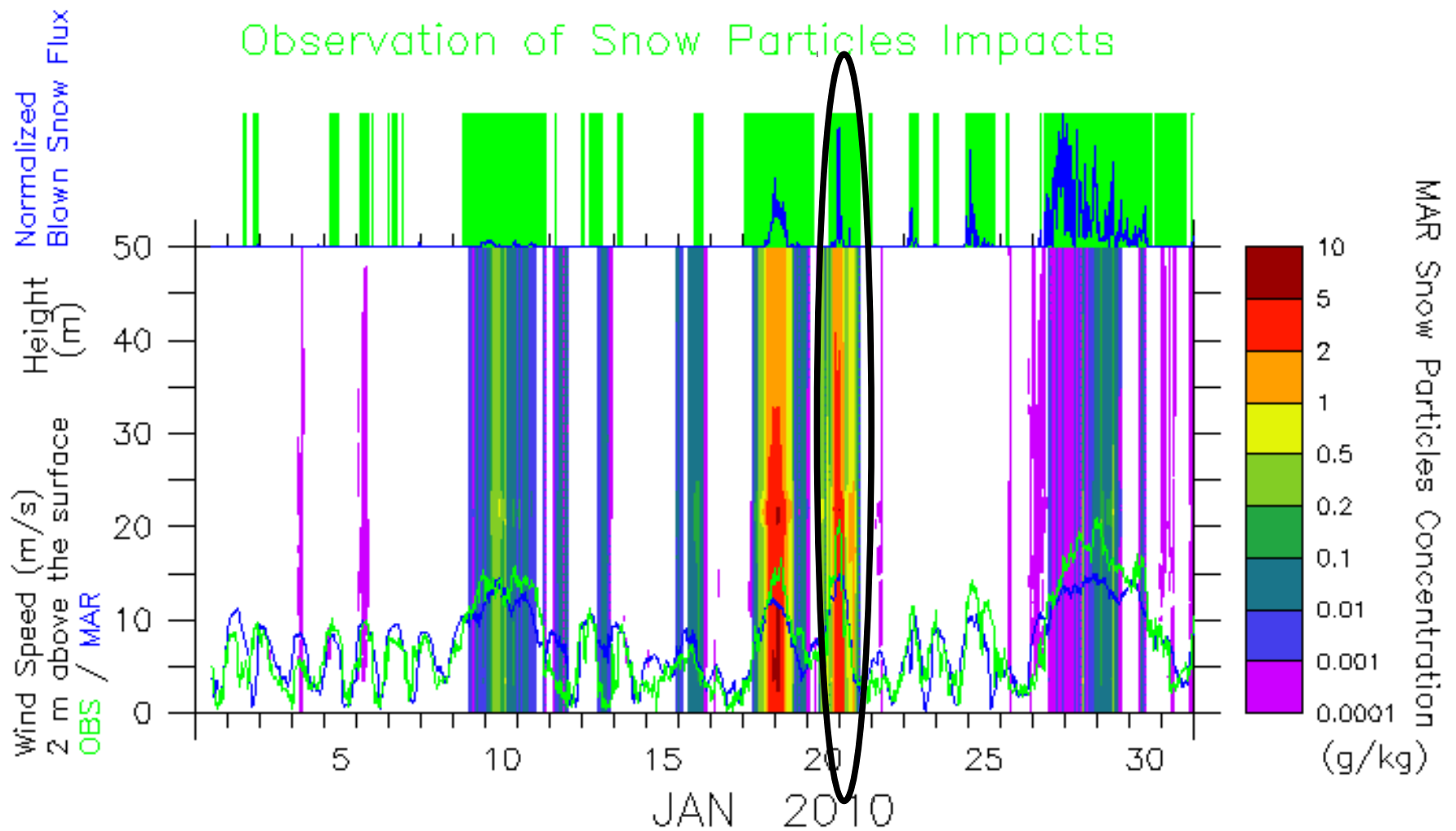
MAR over Adélie Land



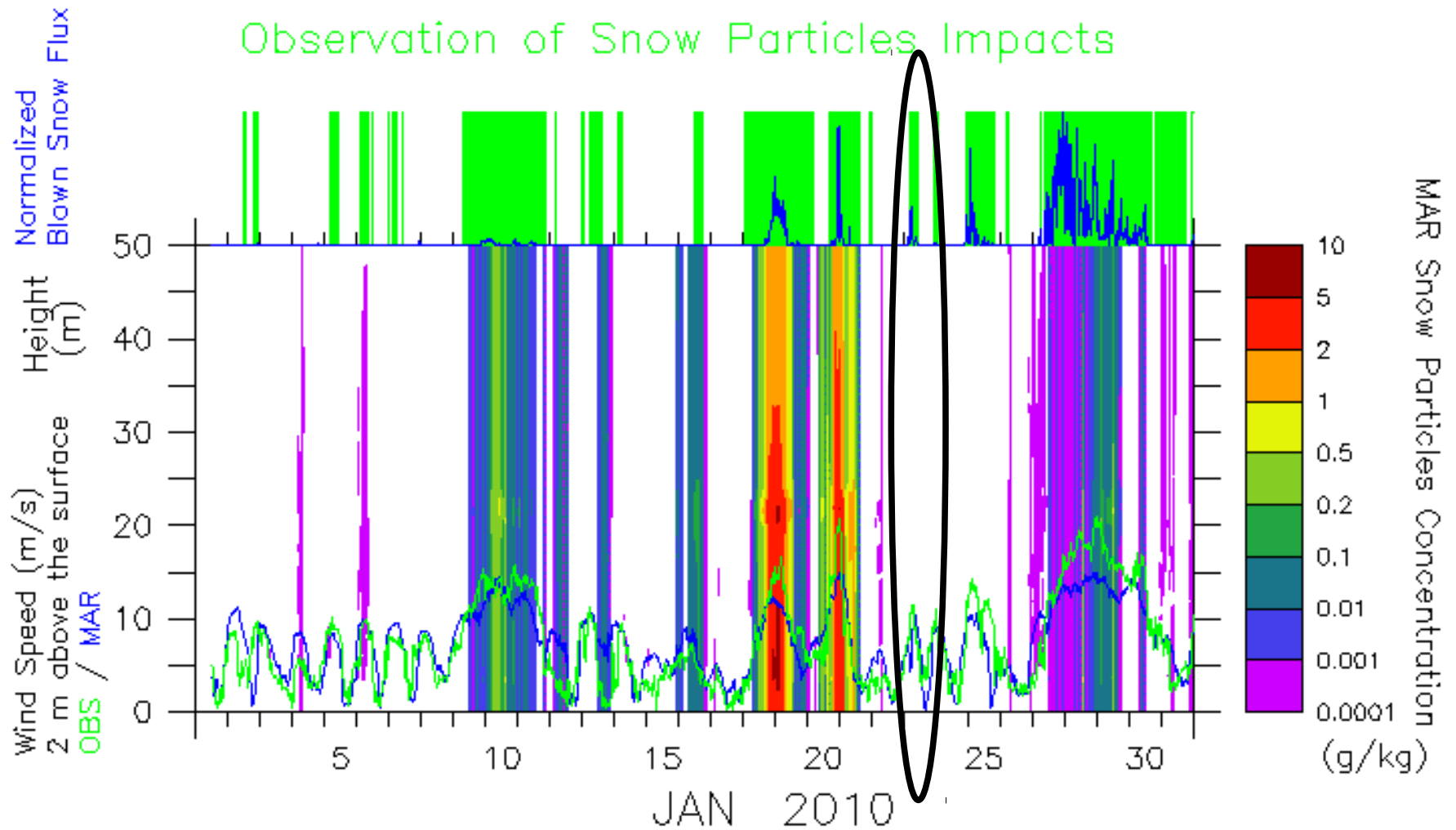
MAR over Adélie Land



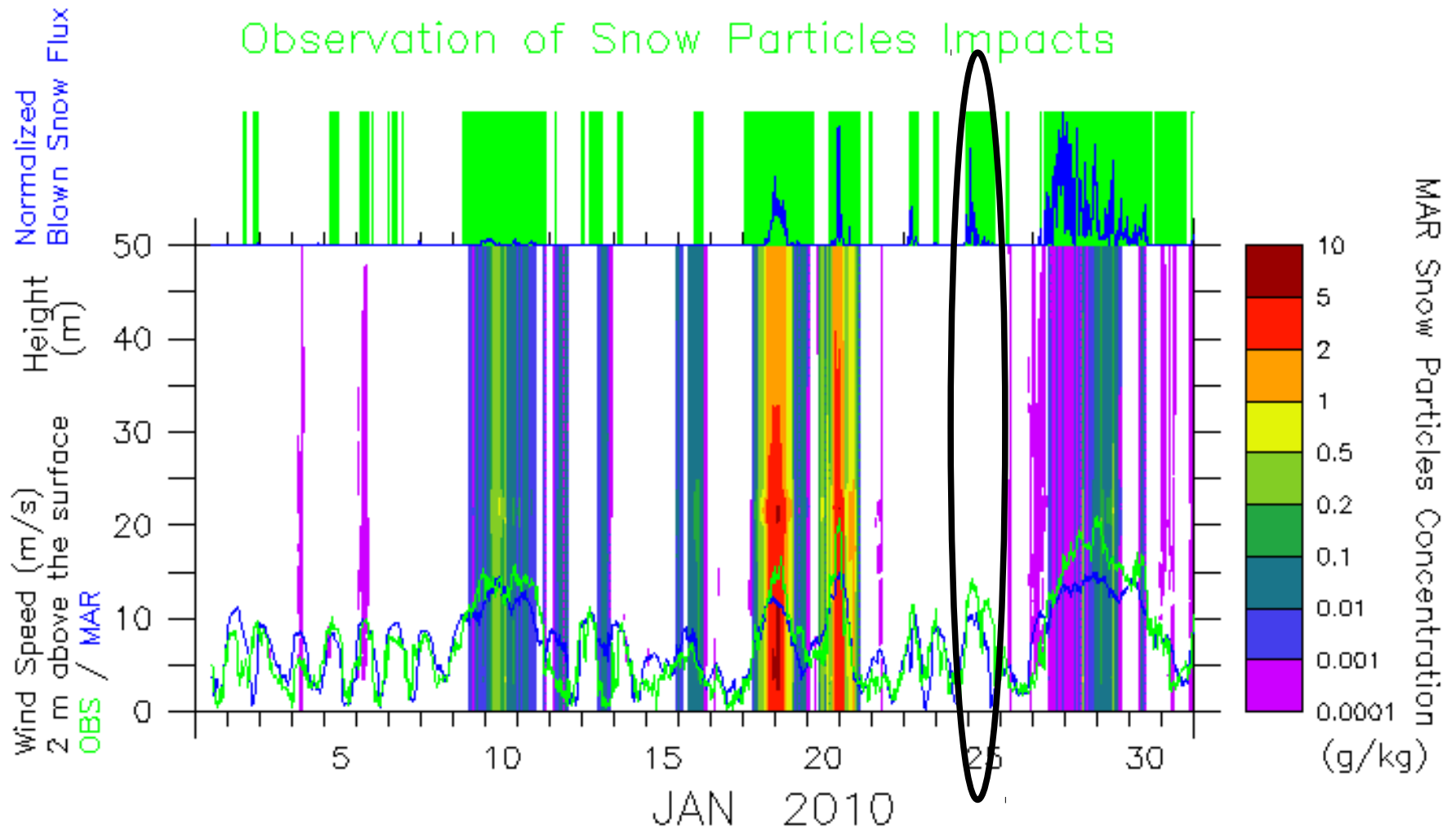
MAR over Adélie Land



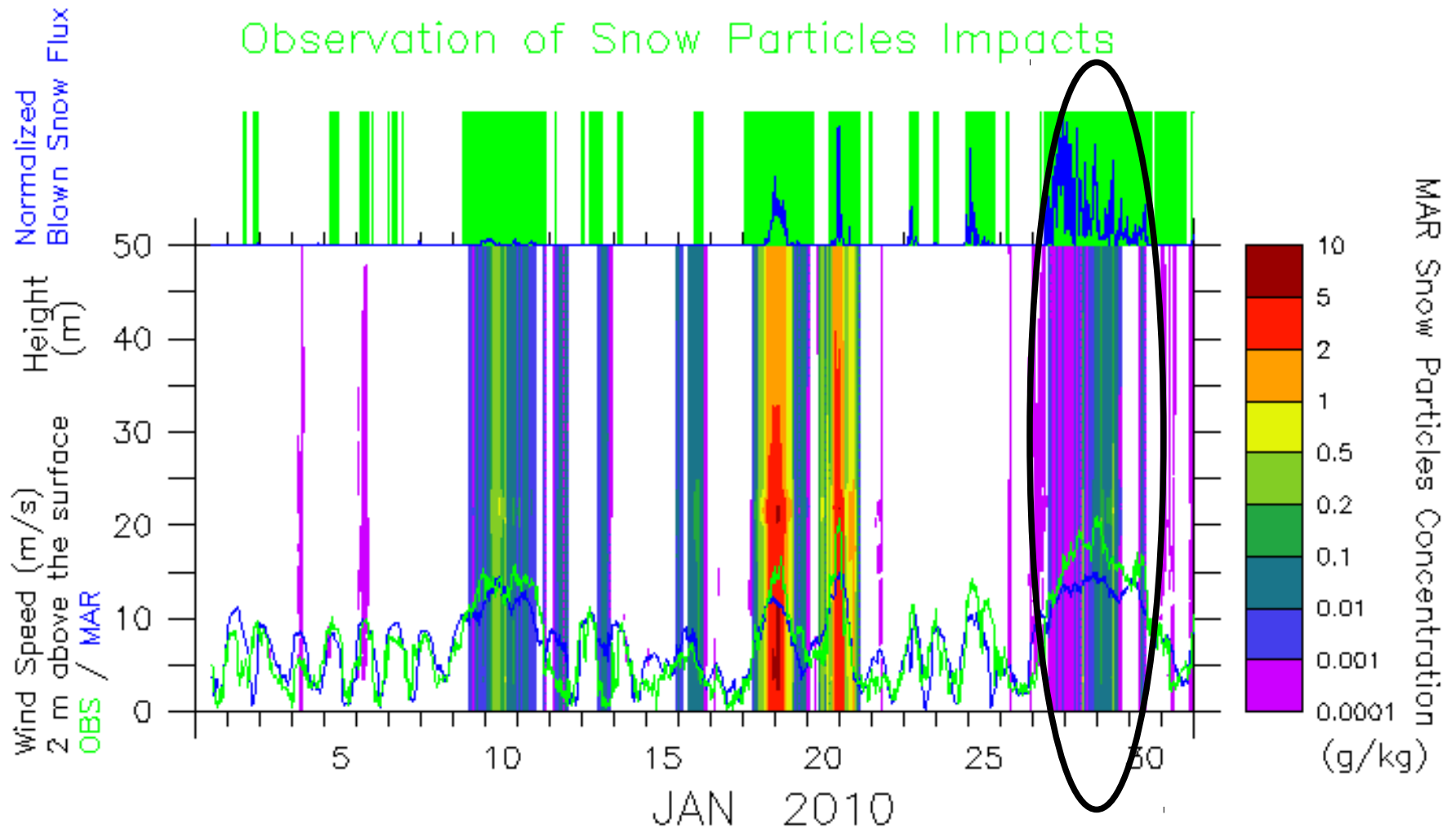
MAR over Adélie Land



MAR over Adélie Land



MAR over Adélie Land



CONCLUSIONS:

Interest for Adélie Land

- strong winds (synoptic/katabatic)
- frequent blowing snow events

Several Coupling Processes

MAR set up in Adélie Land over a small domain

- able to simulate Adélie Land Wind
- able to simulate blowing snow events,
in agreement with the observations
(blowing snow flux is a different story)

