



The 2009-2010 Concordiasi field campaign at Dome C

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The 2009-2010 Concordiasi field campaign at Dome C

1° - Monitor and maintain devices of previous years program :

IPEV program « Concordiasi » (2006-2009)

2° - Upgrade the existing system:

IPEV program « Concordiasi » (2006-2009)

- Deploy automatic weather stations at 25 km N and S of Dome C

3° - Conduct new experiments :

IPEV program « CALVA » (2009-2012)

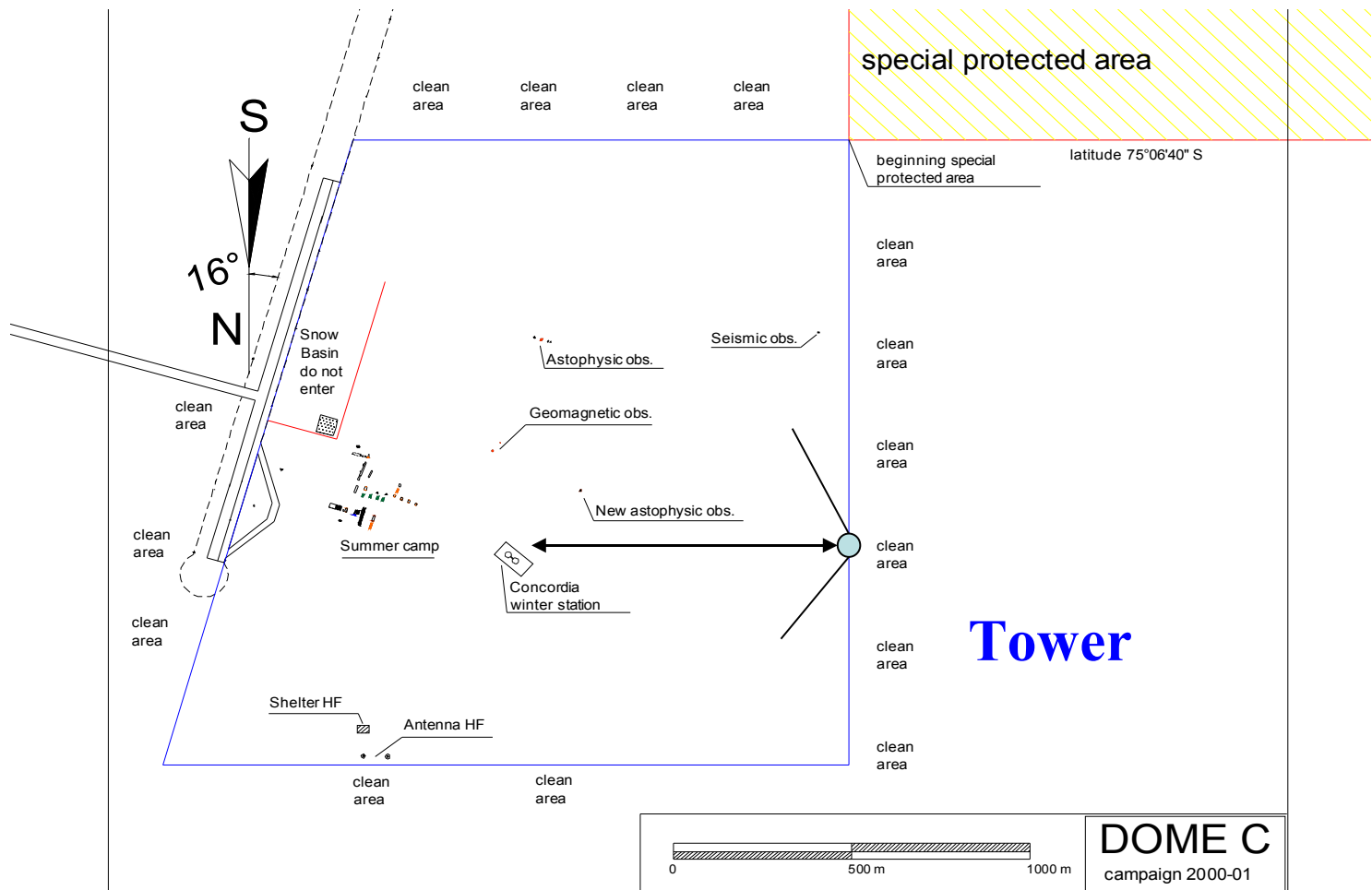
- Measure the skin surface temperature of the snow

- Atmospheric profiles of the boundary layer with tethered kites and balloons

The 2009-2010 Concordiasi field campaign at Dome C

1° - Monitor and maintain devices of previous years program :

2 sites : the « **American tower** » and the **shelter** (« Hélène ») near the tower



The 2009-2010 Concordiasi field campaign at Dome C

1° - Monitor and maintain devices of previous years program :



Tower and shelter



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1° - Monitor and maintain devices of previous years program :

a) The tower :

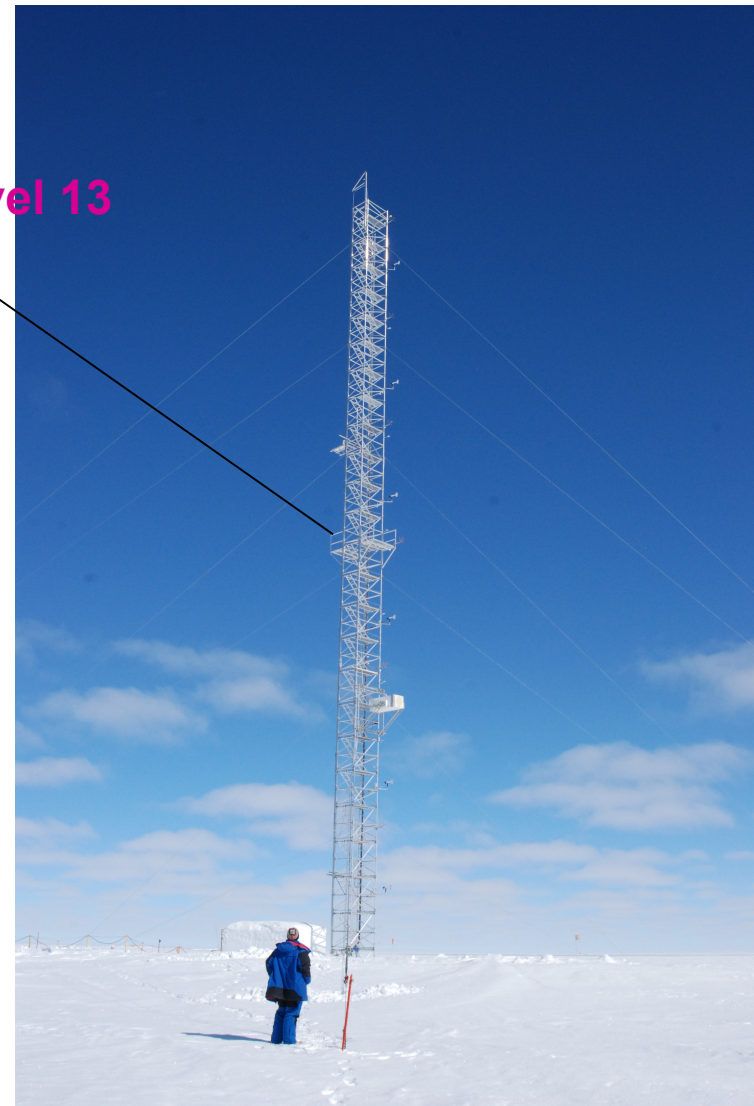


The « American tower » – 45 m high

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30 m high before 2007



45 m high after 2007

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The view from the tower – The clean snow surface area

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1° - Monitor and maintain devices of previous years program :



Since 2007, 6 levels of :

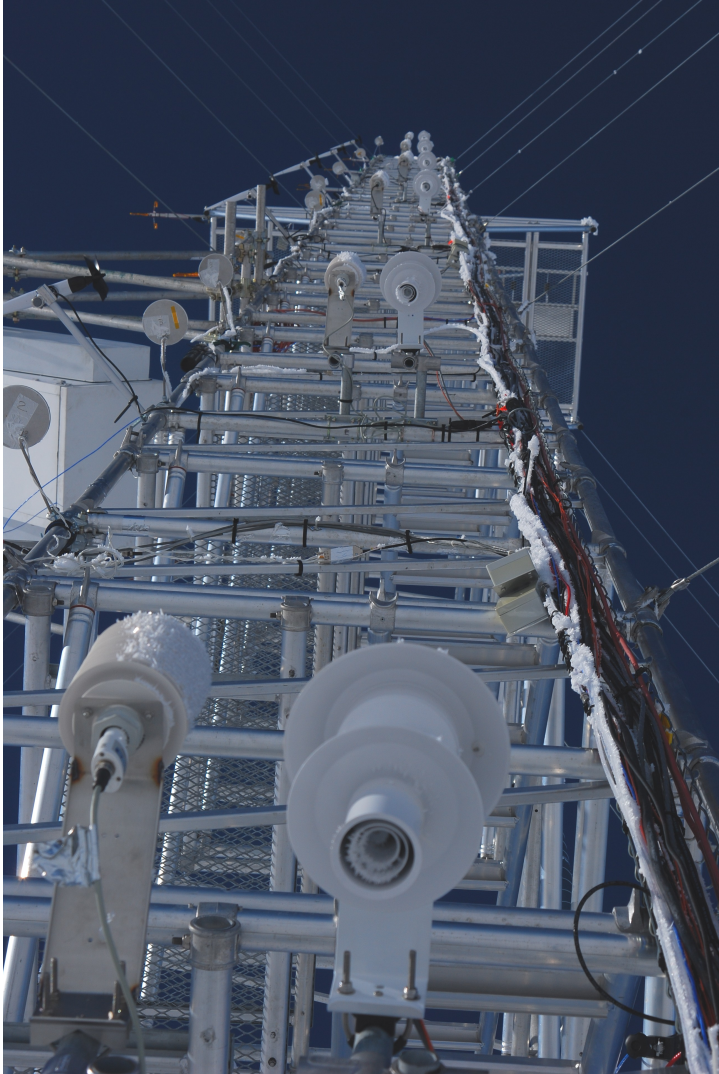
- Wind direction and speed (Young 05103)
- Temperature and humidity (HMP45 and HMP155)
- Sonic anemometers (in collaboration with LUAN)

10 s interval record – Average every 30 mn
Ethernet connection

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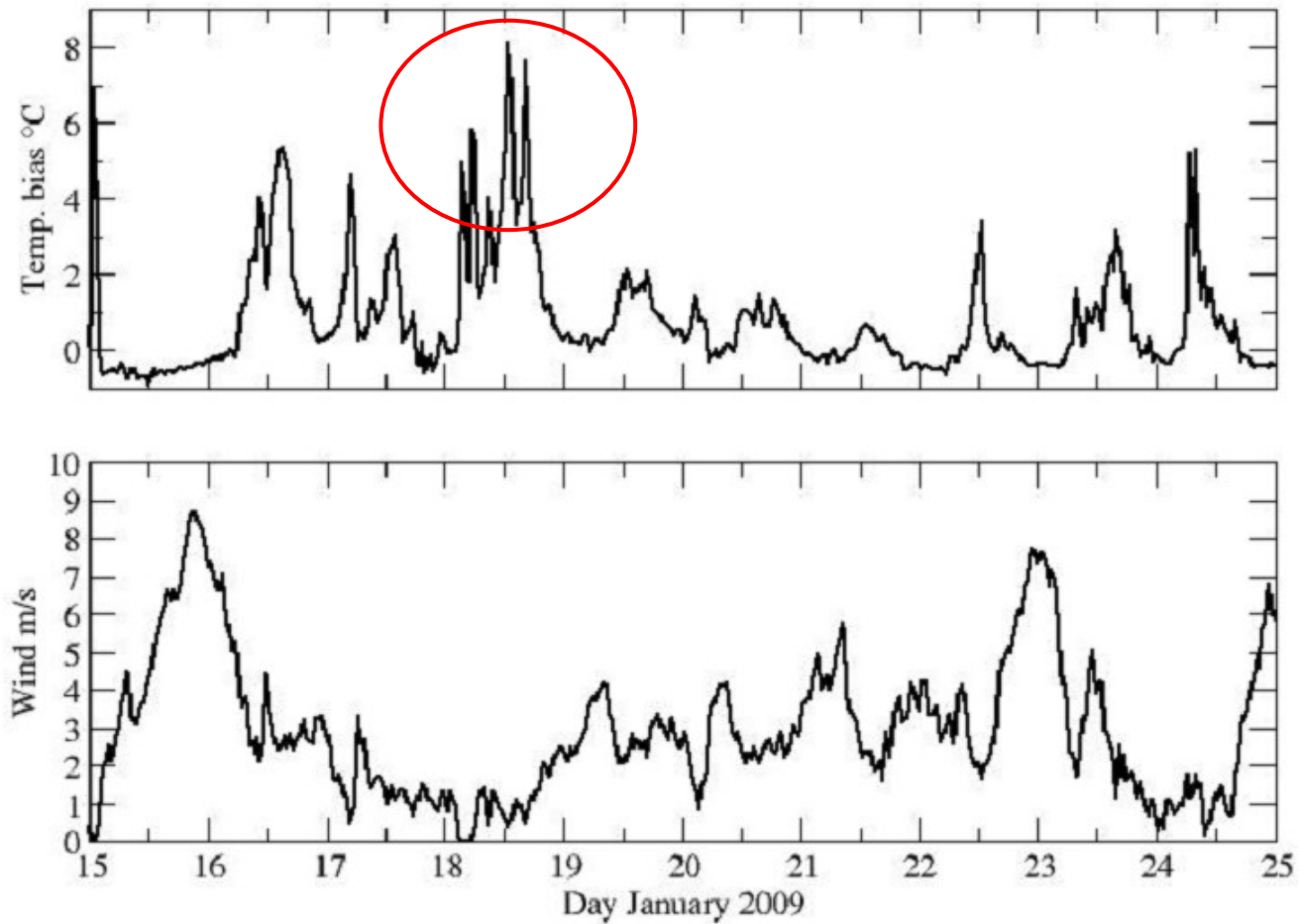
Since 2008, 6 levels of :

- Wind direction and speed (Young 05103)
- Temperature and humidity (HMP155)
- Sonic anemometers
- **Ventilated** temperature (PT100)





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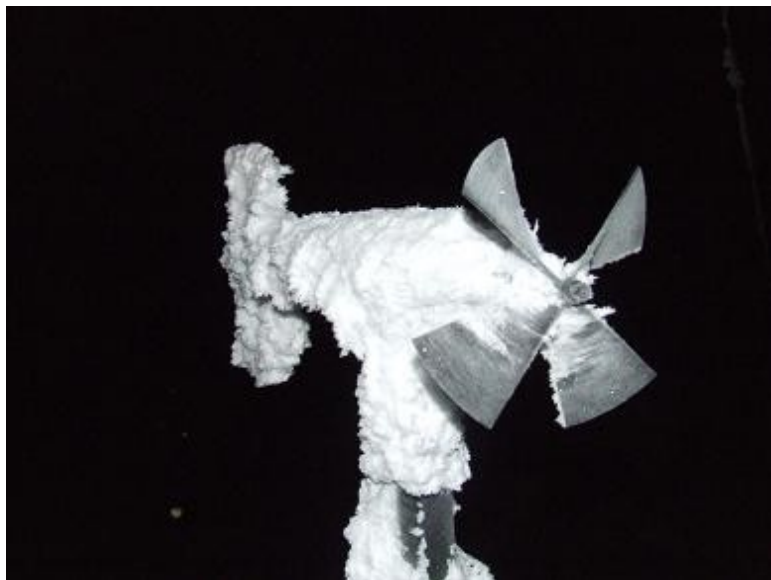


A difference of 8°C in temperature at noon in low wind conditions !

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The major problem at DC : the cold!!!

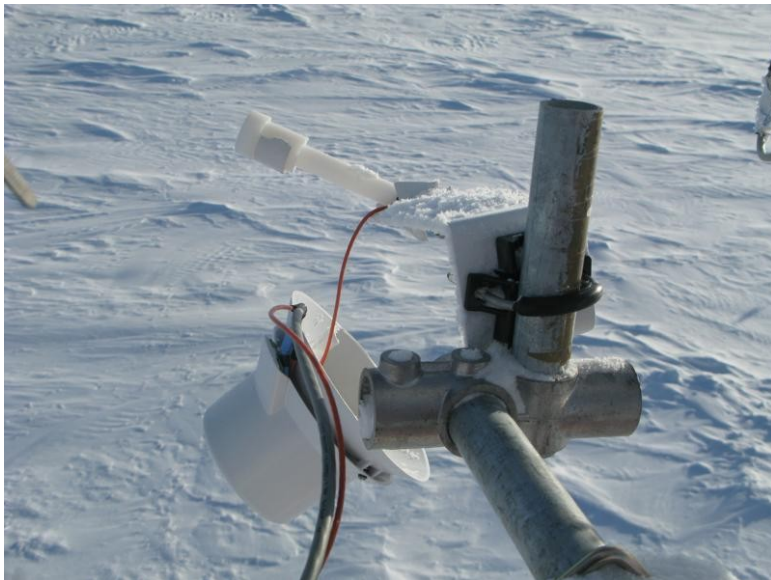
- change grease
- change cables
- replace instruments !
(ex: HMP45 vs HMP155)



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Another problem at DC : who knows?

In 2009-2010 : 5 levels broken....
and repaired



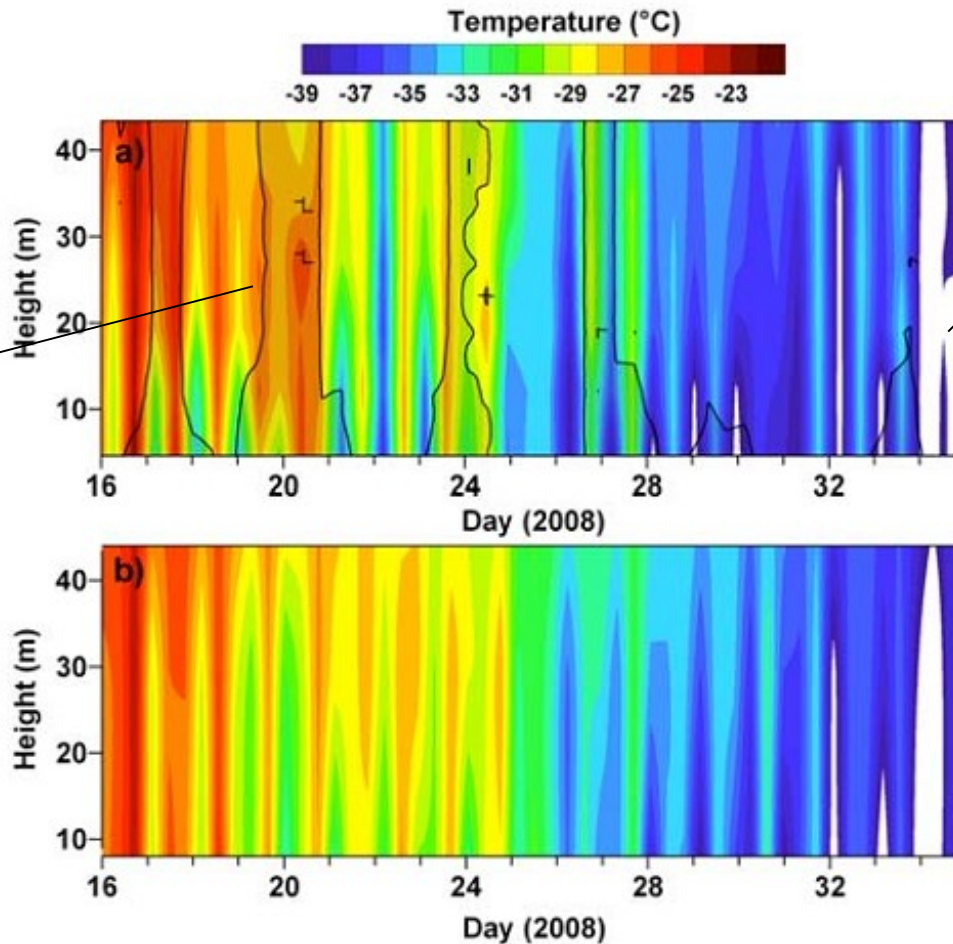


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Results :

Low wind :

Temperatures biased by solar radiation



Temperatures lower than -40°C

16th Jan to 4th Feb 2008 – T° (HMP45) not ventilated and ECMWF analyses

Cooling trend with ECMWF : OK

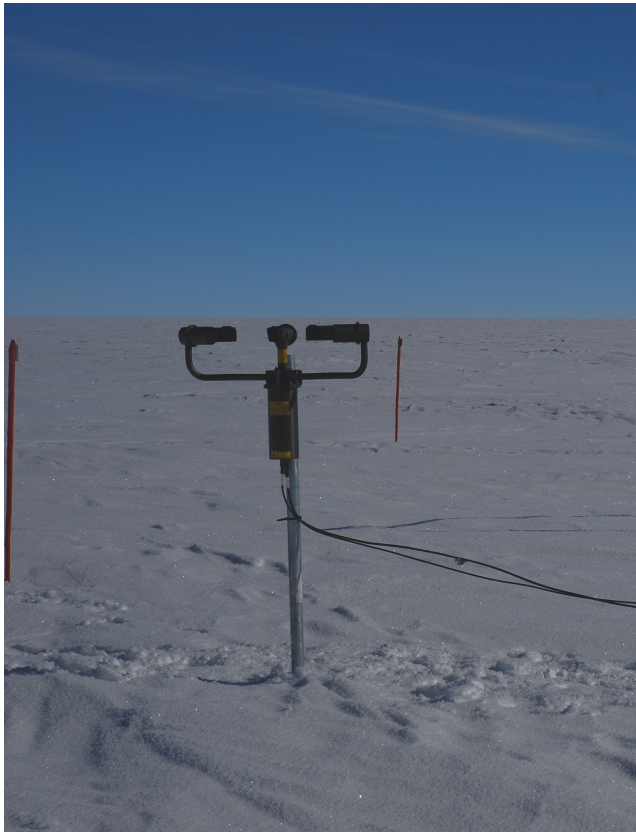
Day to day variability with ECMWF : not respected

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1° - Monitor and maintain devices of previous years program :

b) the shelter :

Spectro-nivometer (BIRAL)



In 2009-2010 : position changed

Difficulties : interpretation, wind drift, calibration

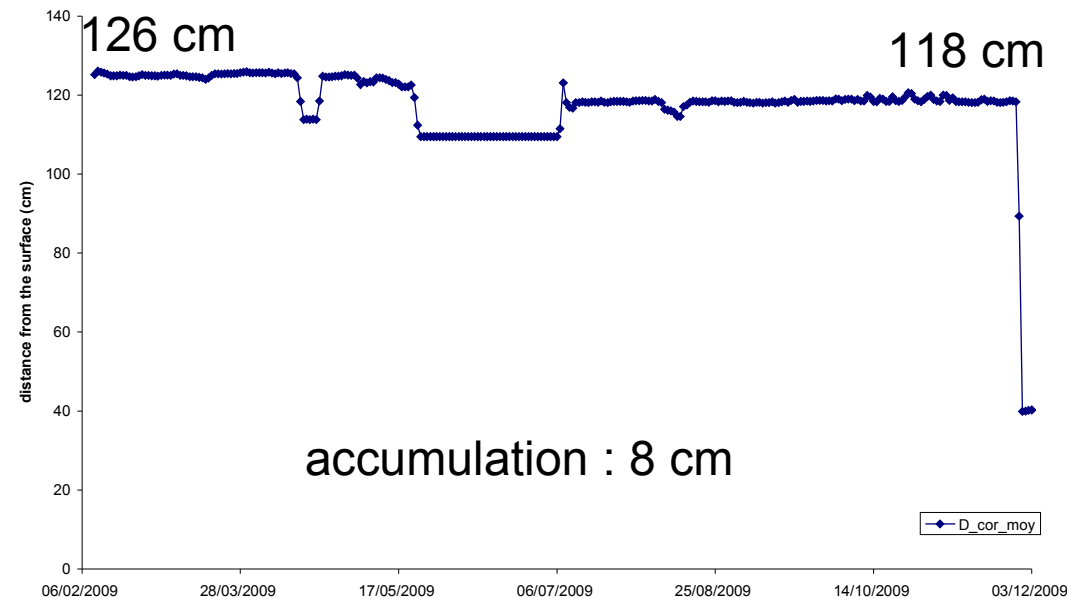
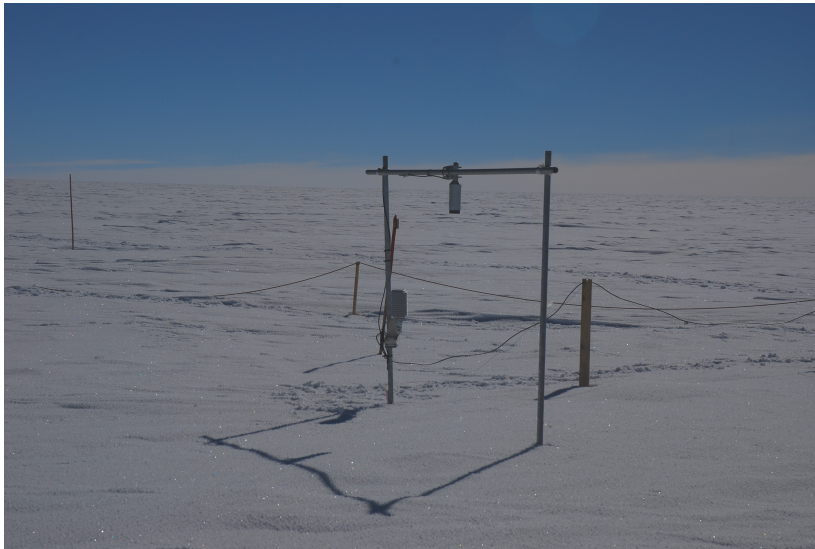
Problems : power supply!!!!

The 2009-2010 Concordiasi field campaign at Dome C

1° - Monitor and maintain devices of previous years program :

b) the shelter :

Snow accumulation variation (SR50 gauge + stakes)



Difficulties : interpretation, temperature correction, wind drift

Problems : power supply!!!!



The 2009-2010 Concordiasi field campaign at Dome C

1° - Monitor and maintain devices of previous years program :

Each year :

- Repair, adapt or replace instruments
(adaptation to the cold, power supply.....)
- Calibrate instruments
- Download data
- Check the data
- Procedure for sending data
- Special training for the winter over staff

- Support RMO staff to launch CONCORDIASI radiosondes
in 2008-2009 and 2009-2010

2° - Complete the existing system:

Deploy 2 automatic weather stations at 25 km North and South of DC :

to sample meteorological gradients across the dome

Wind speed and direction

Temperature at 2 levels (not ventilated)

Relative Humidity

Snow accumulation gauge

Solar panels and batteries

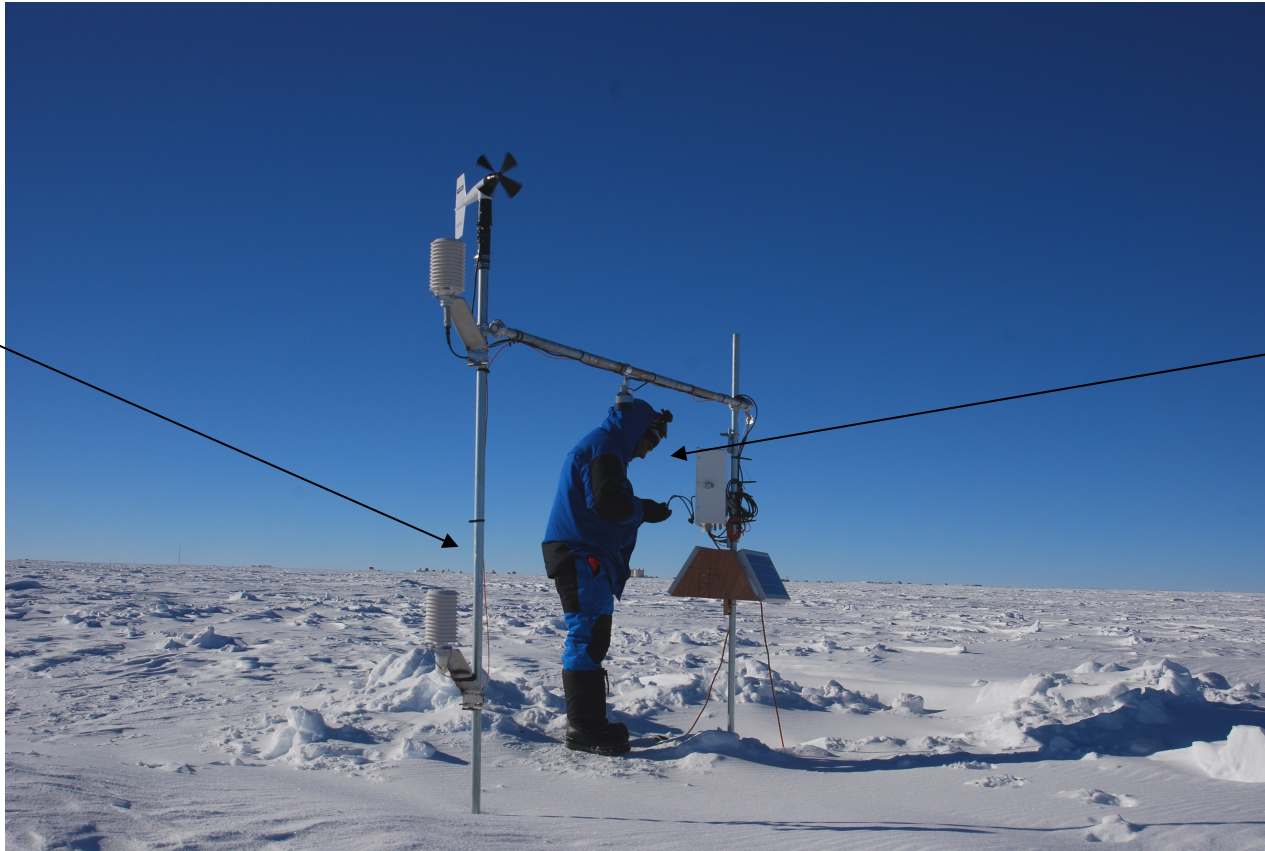
No data sent

In addition :

accumulation measurement (50 stakes for each network) and density profiles

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Concordia



Christophe

One of this station was in test during winter 2008-2009, at 3 km of DC

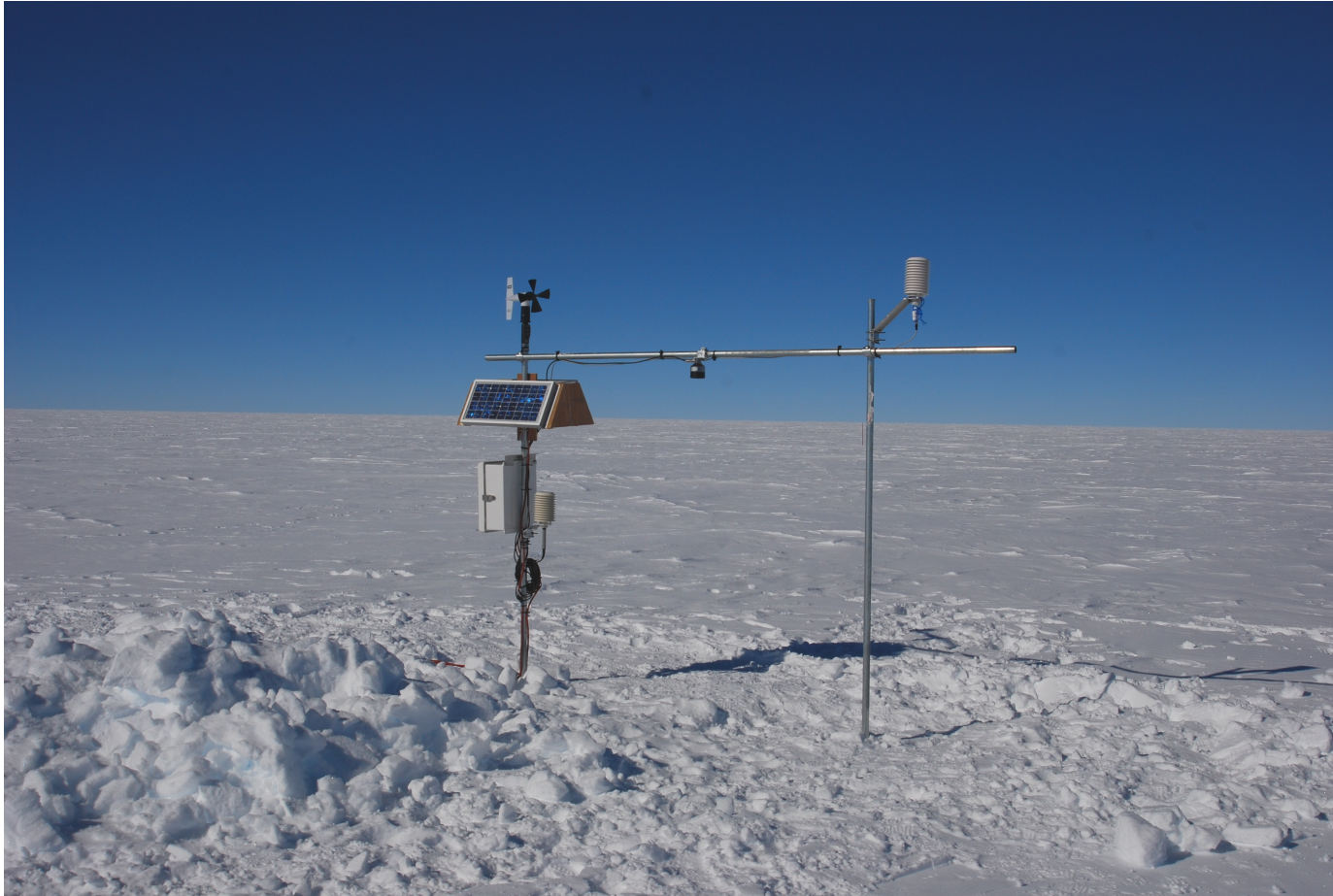
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Why not before 2009-2010 ?

The presence of an adapted vehicle this summer season

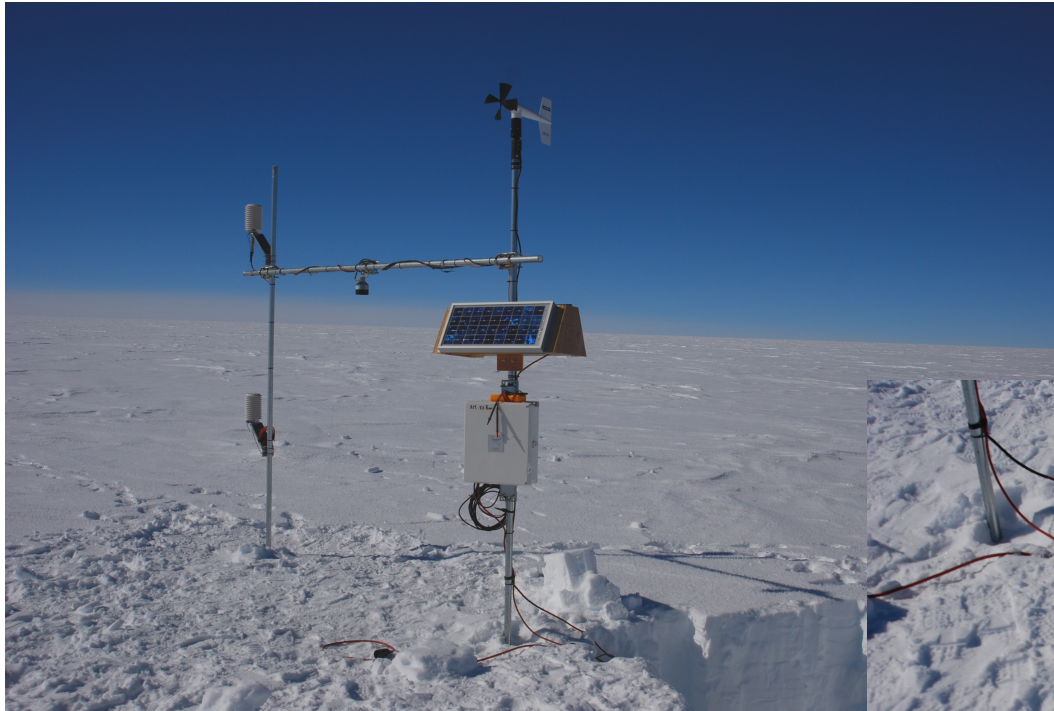
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Weather station at 25 km South



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Weather station at 25 km North



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Accumulation measurements at DC since 2006 : GLACIOCLIM Observatory

50 stakes – 1km * 1km cross

	25 km North	25 km South
Jan 2007- Jan 2008	8,2 cm	7,5 cm
Jan 2008 - Jan 2009	7,4 cm	9 cm
Jan 2009 - Jan 2010	9,4 cm	6,3 cm
Mean density	0,33	0,34

3° - Conduct new experiments :

A) To measure the skin surface temperature of the snow

IR Radiometer (IR120)

Thermal isolated box

Set up on platform 13 (24 m high)

Looking towards the « clean snow surface area »

In agreement with IASI angles and time

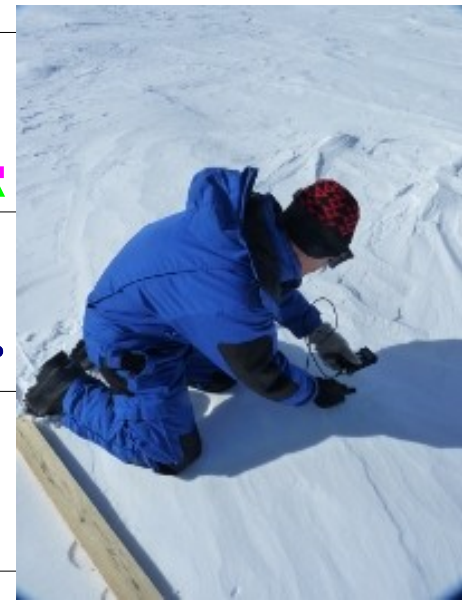
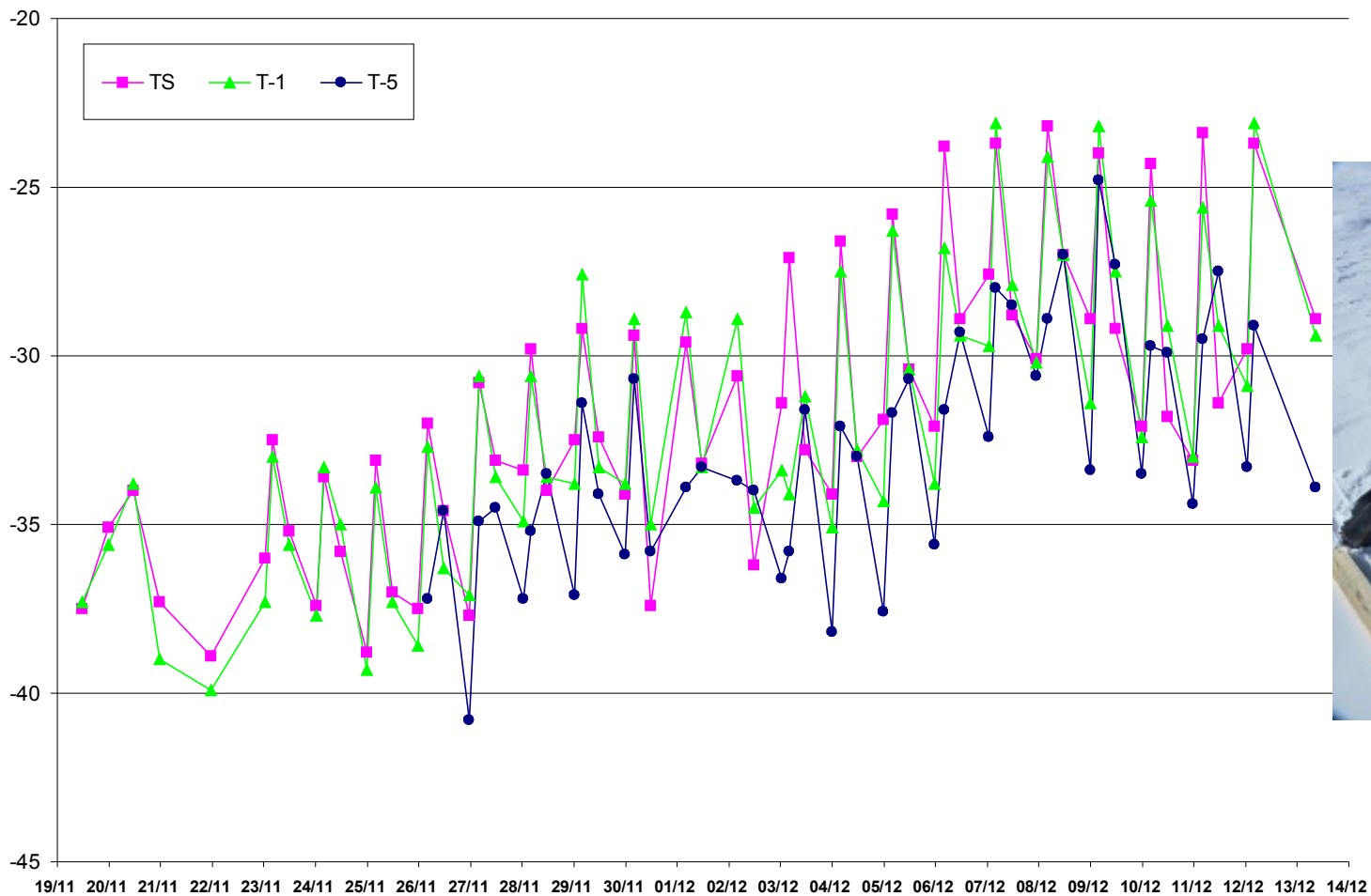
Calibration, with wet snow

Compare to manual snow surface temperature

21st to 29th January 2010

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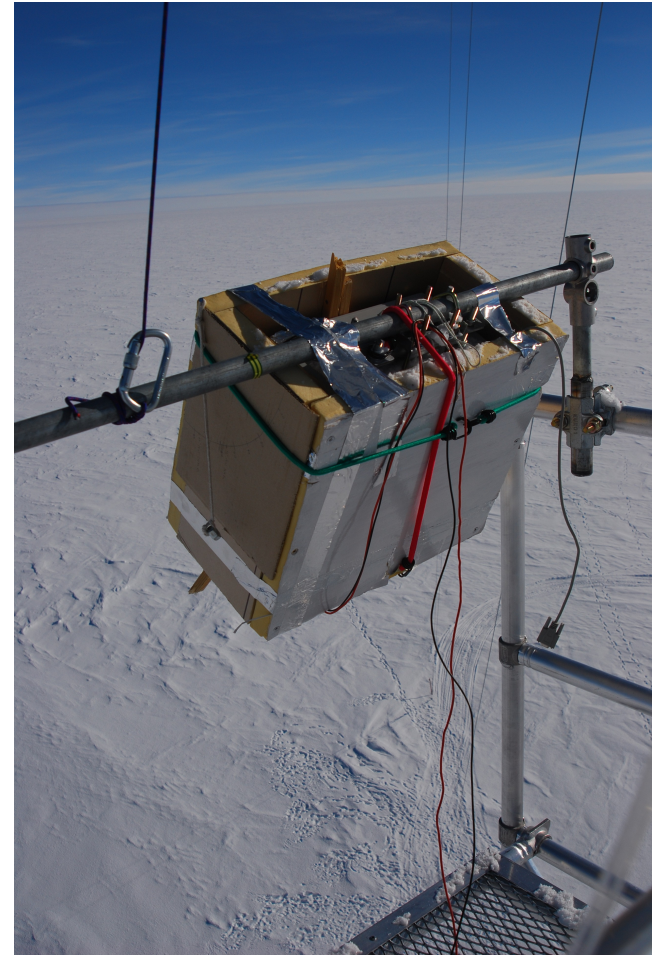
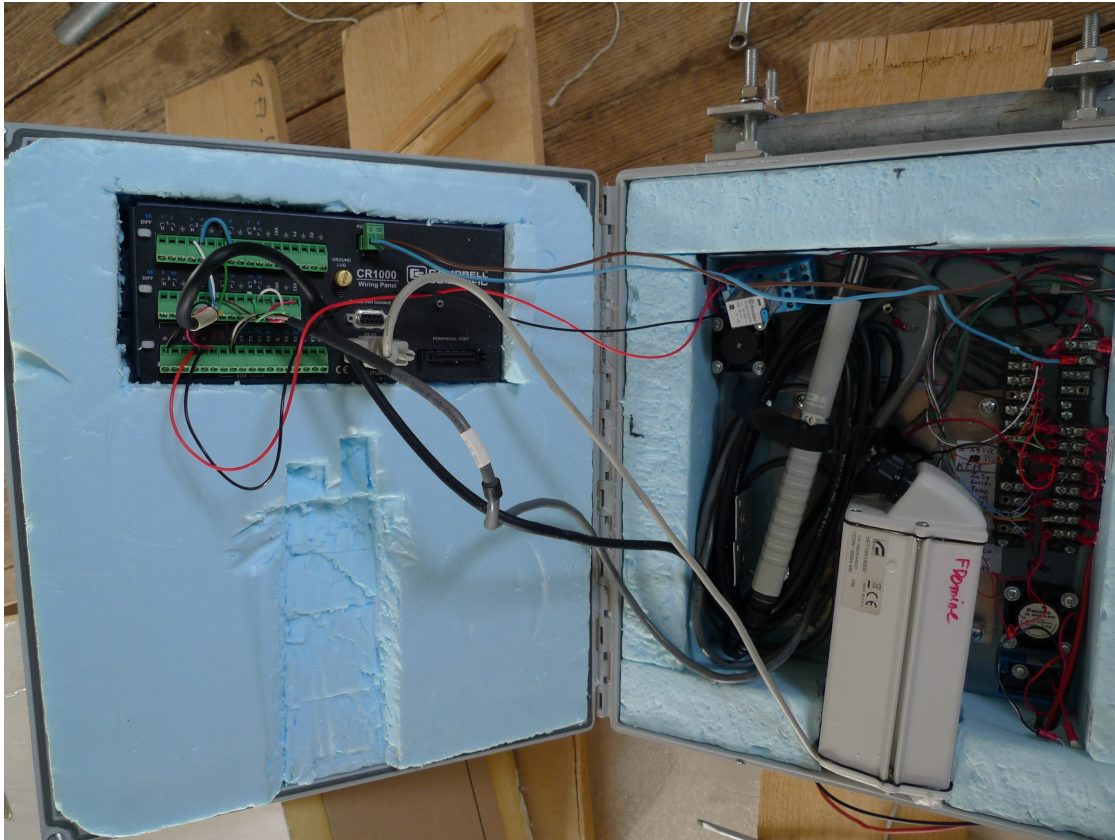
The manual T° measurement





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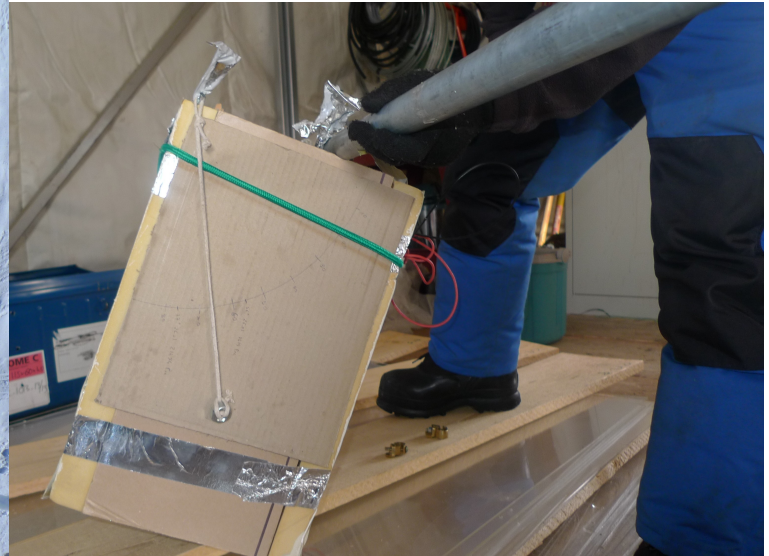
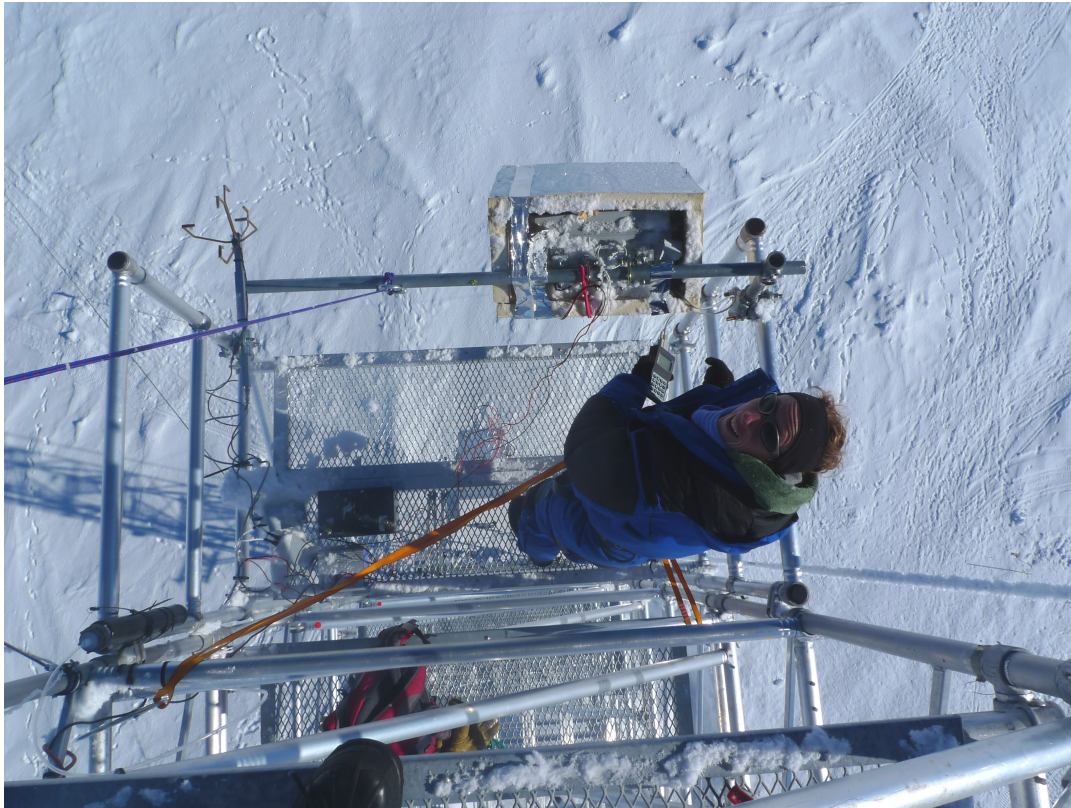
The IR Radiometer



With the very much appreciated help of **Eric Brun** !



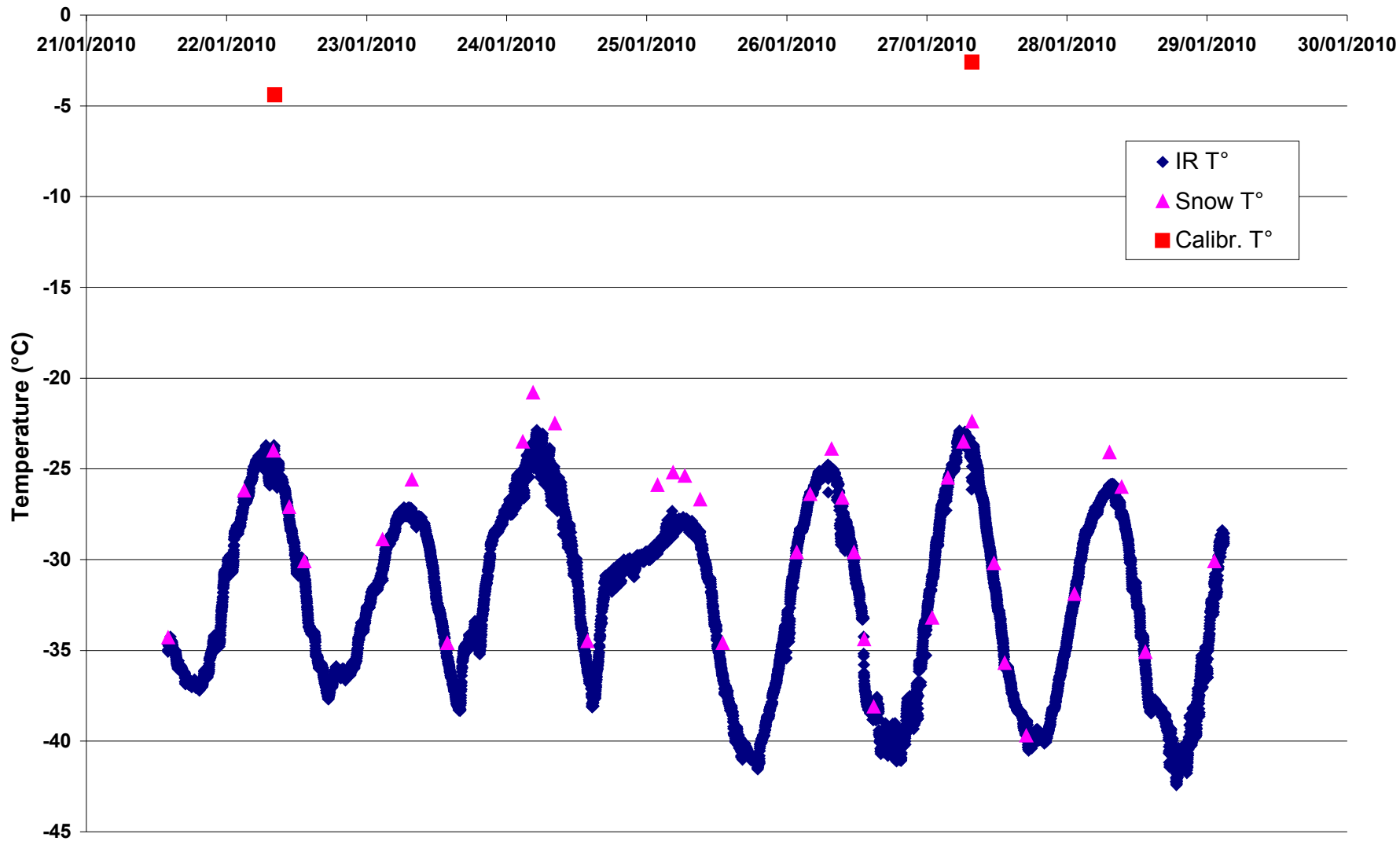
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And his very **ingenious** system to measure angles!



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IASI overpasses :

Day	Local time	Elevation angle	Atmosph. cond
26 Jan 2010	6h34 am	75°	100% sunny
26 Jan 2010	8h14 am	57°	100% sunny
26 Jan 2010	9h54 pm	48°	Low cirrus SW
27 Jan 2010	7h54 am	67°	Low cirrus W
28 Jan 2010	0h54 am	56°	Light fog
28 Jan 2010	5h53 am	60°	Light cirrus
28 Jan 2010	10h53 pm	73°	Light cirrus

Problems:

Angles lower than 25°

The « clean area »

Atmospheric conditions over a so short period



The 2009-2010 Concordiasi field campaign at Dome C

Difficulties :

Many!!!

Metallic structure not ready

Temperature inside the isolated box not well regulated

Calibration with wet snow : heavy box to bring on the tower

Measurement in 2010-11?

Yes if the instrument is suitable !!!

(metallic structure, black body, regulated temperature....)

Problem :

Man power...!

3° - Conduct new experiments :

B) To launch tethered kites and balloons

Monitor the boundary layer over a few hundred meters

PTU sounds (RS)

Winch set up near the tower

25 launches between end of December and 20th of January

The highest launch : 1100 m above the surface!

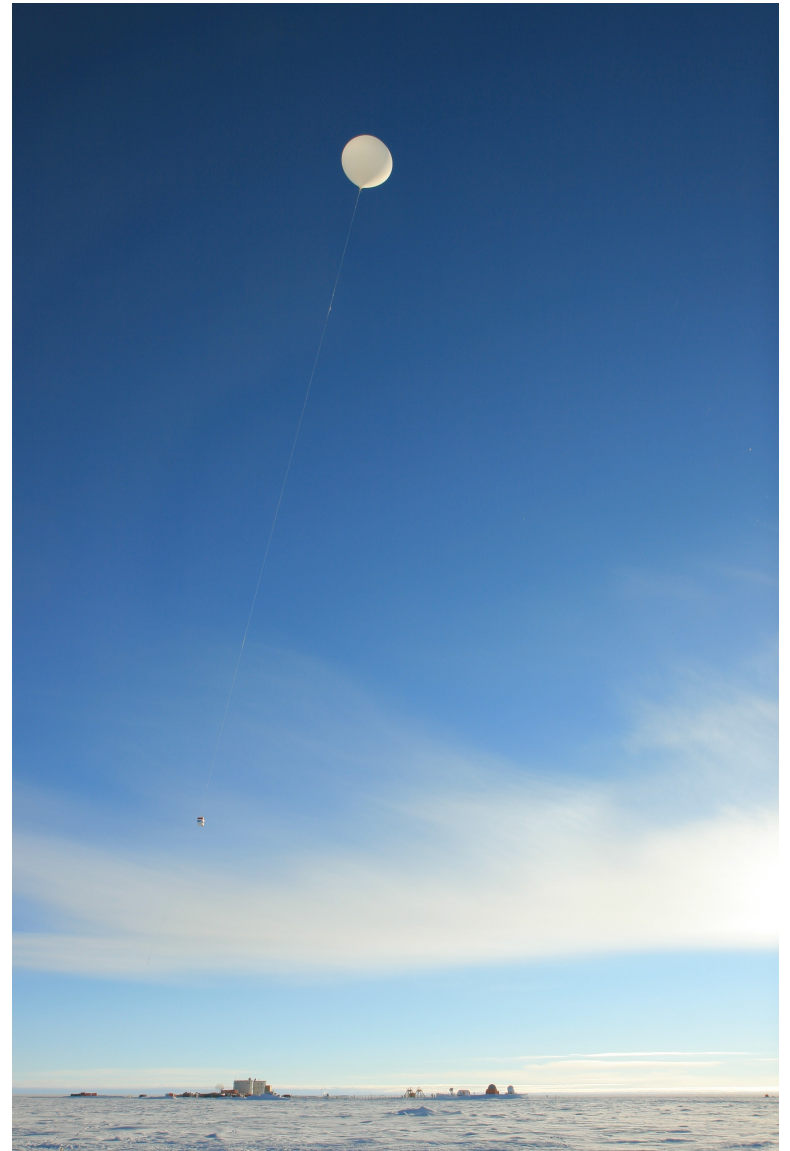
***Most of the launches were done
with Bruno Jourdain (LGGE) and Marie Dumont (LGGE/MF)***

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Flying balloons :



Near the American tower



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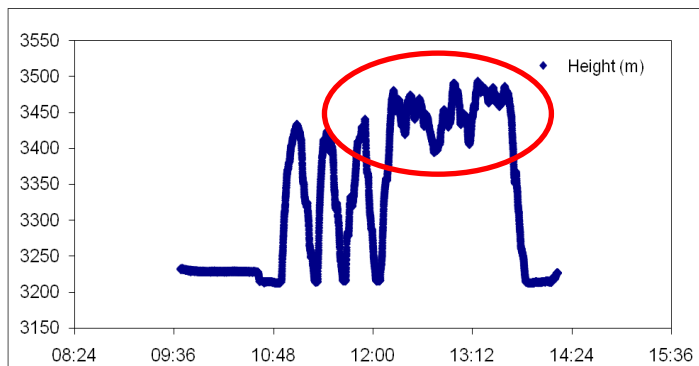
Flying kites :



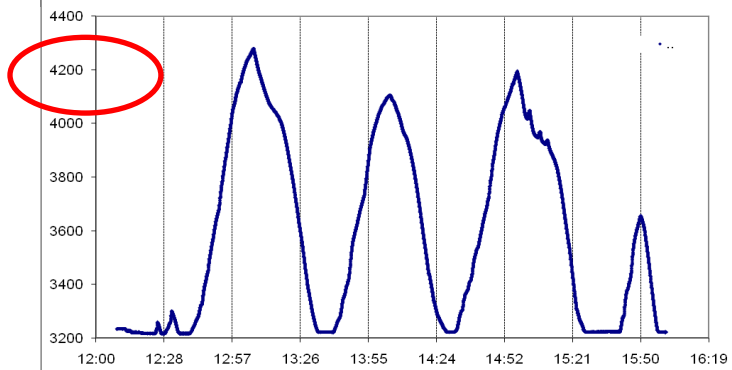
Hard to stabilize

Problem if the wind is too low!

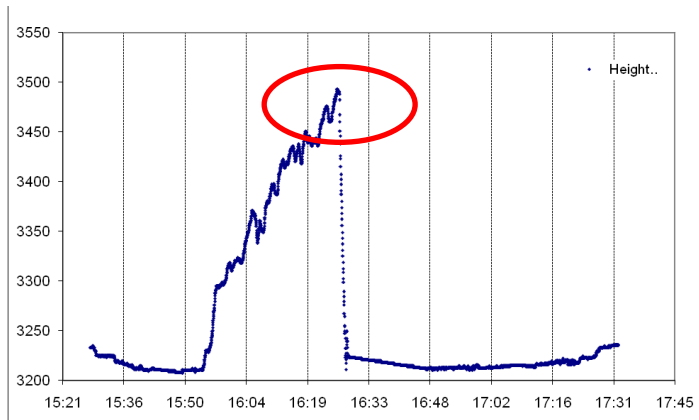
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28 Dec 2009



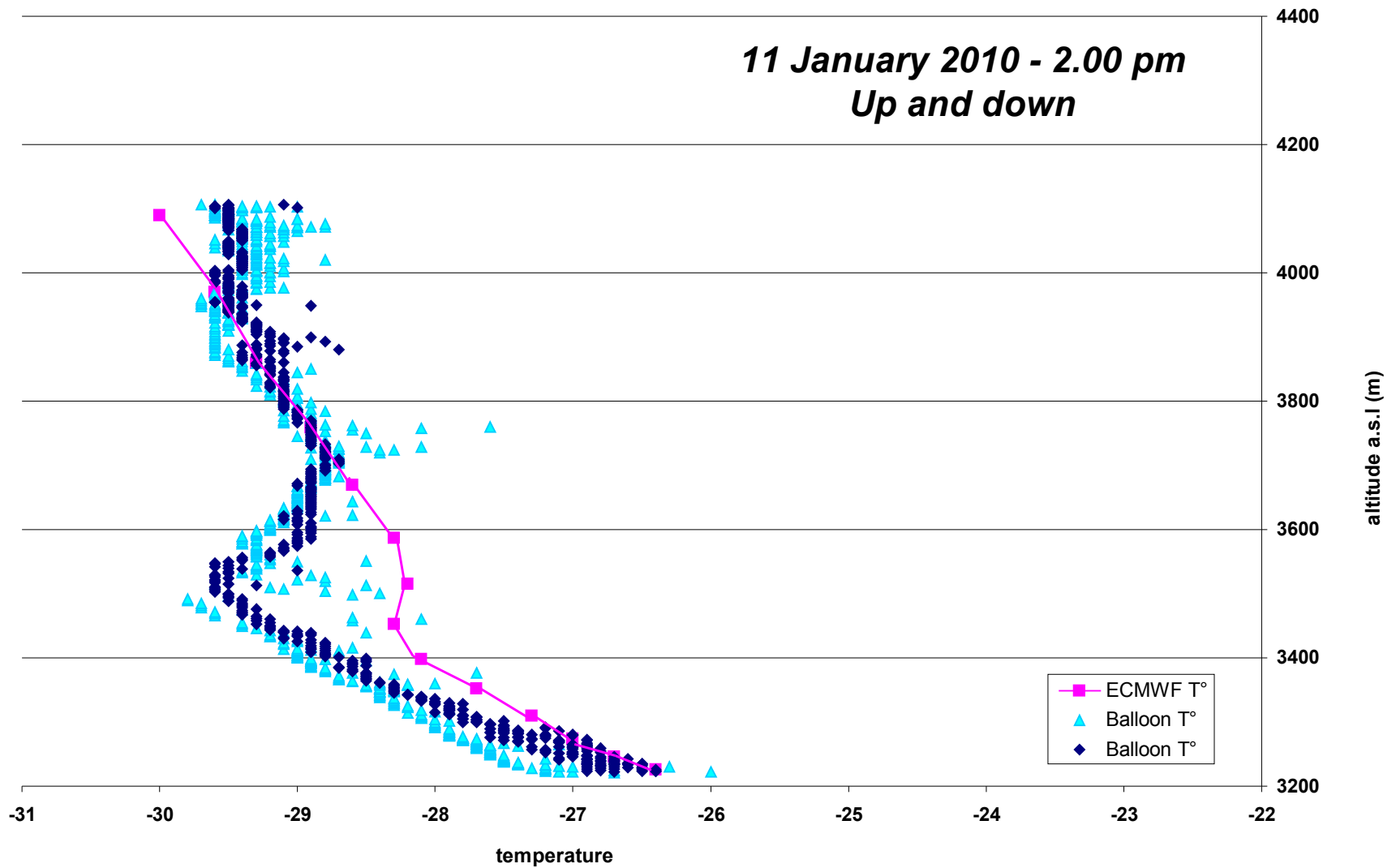
11 Jan 2010



14 Jan 2010



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The 2009-2010 Concordiasi field campaign at Dome C

In conclusion :

A great season!!!

The existing device works well in spite of hazards!

Launch of tethered balloons : to be continued

Launch of tethered kites : to be improved

The surface temperature measurement : to be adapted...!

**Very efficient technical and logistical help at Dome C
(IPEV and PNRA)**

