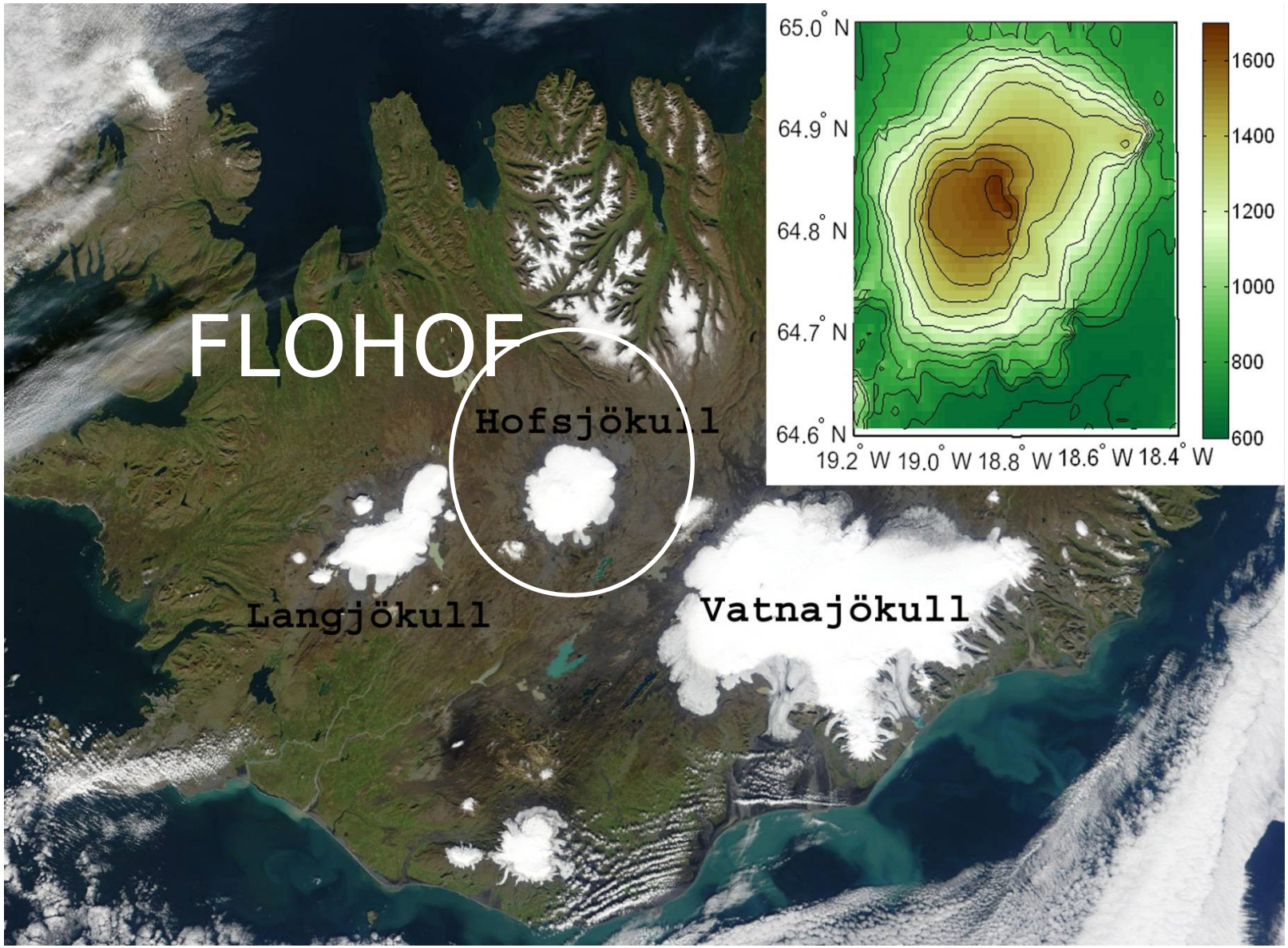
Major recent field experiments in Icela

LOHOF – Flow over and around Hofsjokull glacier (summer 2007
IOSO I (summer 2009)
IOSO II (summer 2011)
KUR I,II,III,IV (Transportable network of 40 raingauges)
IABLA (Gufuskalar 413m mast 2008-2009 and to be permanent)

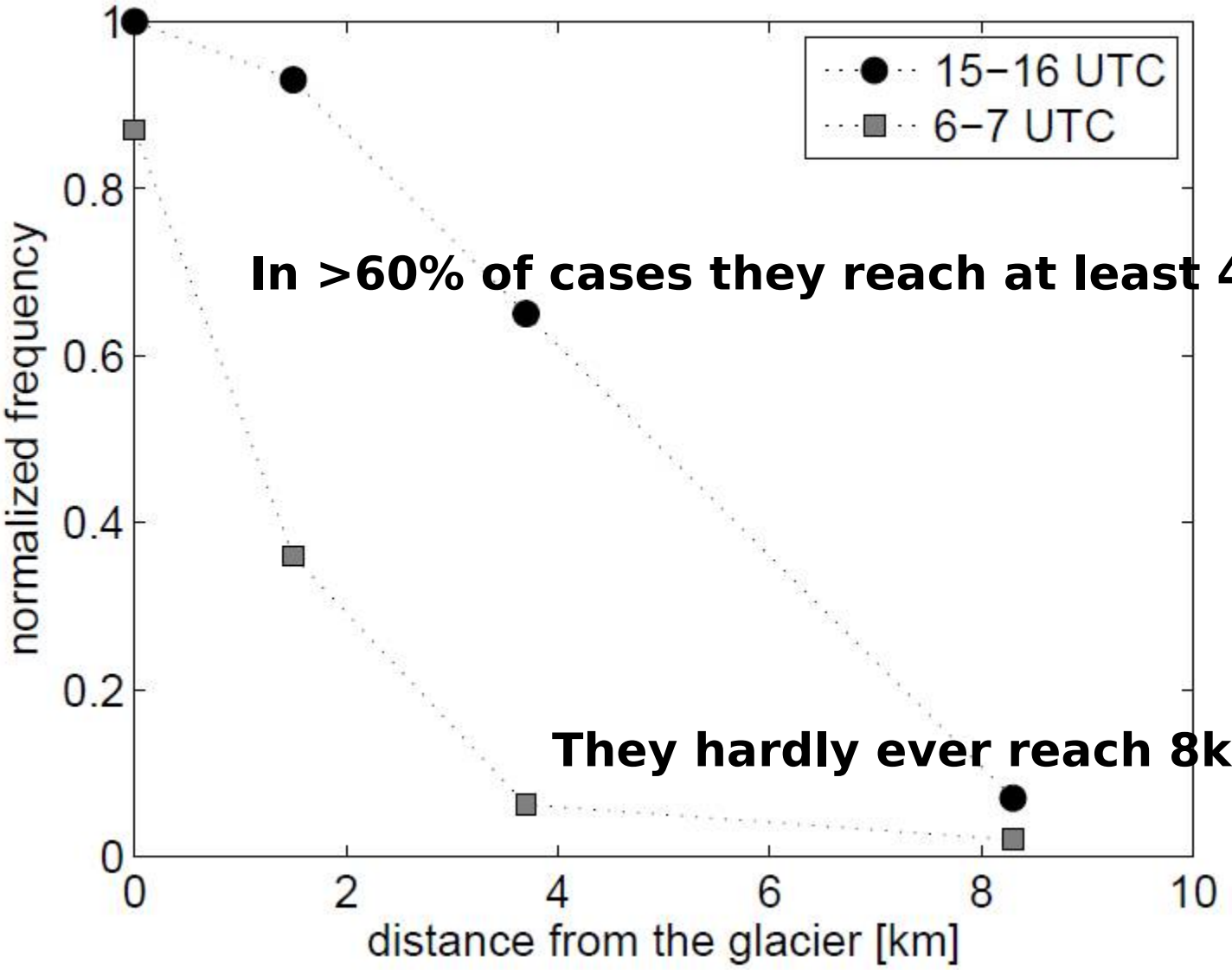
xpensive campaigns with manned aircrafts:
REENEX/THORPEX IPY (2008)
FDEX (2007)

ot planned experiments:
yjafjallajökull eruption (2010)
rímsvötn eruption (2011)

ermanent network:
bout 250 AWS, 30 manned weather stations
Radiosonde stations
radars (1 mobile) and 1 lidar

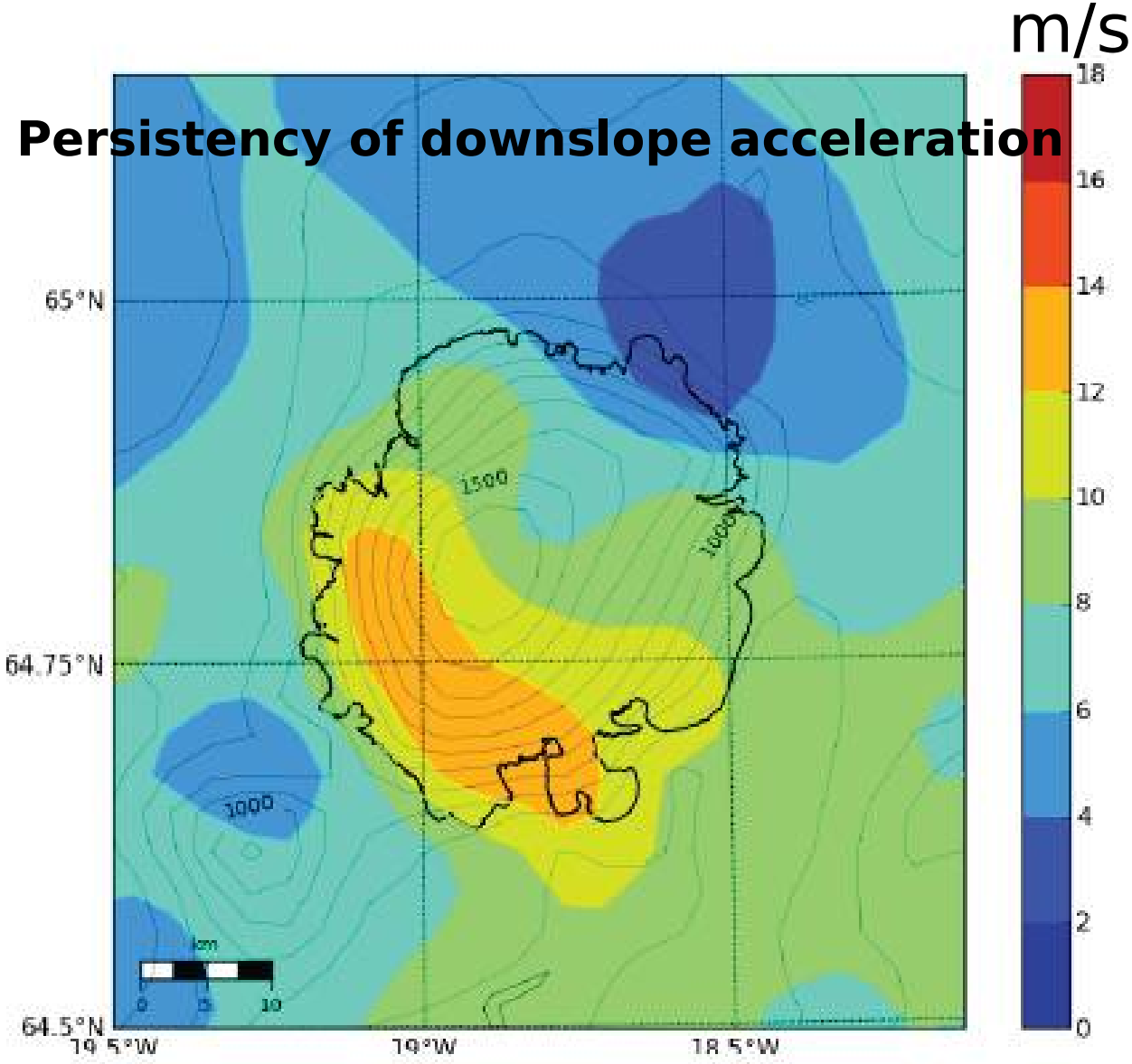

FLOHOF
Hofsjökull
Langjökull
Vatnajökull
65.0° N
64.9° N
64.8° N
64.7° N
64.6° N
19.2° W
19.0° W
18.8° W
18.6° W
18.4° W
1600
1400
1200
1000
800
600

rsistency of katabatic winds at daytime in sum

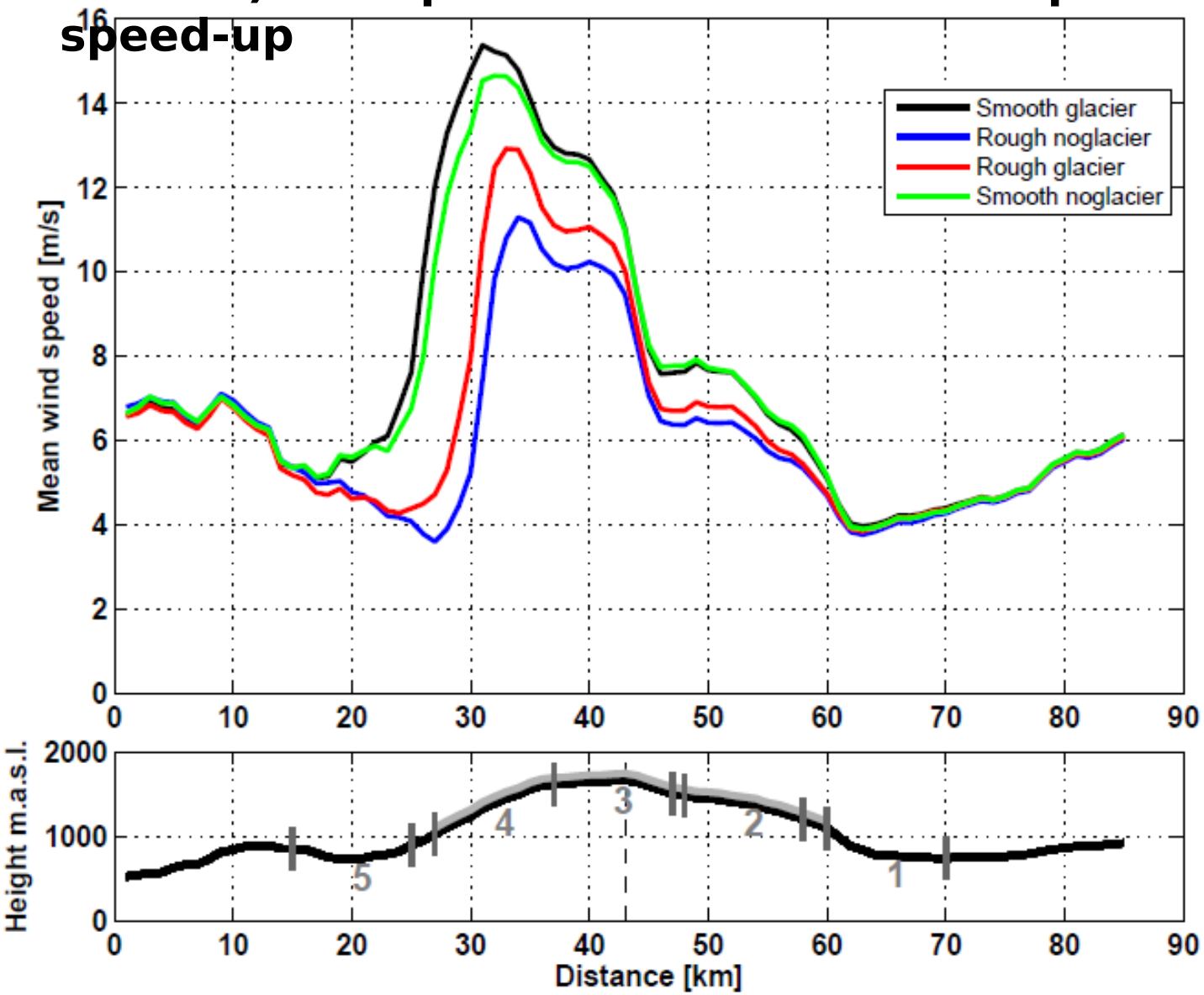


Reuder et al. 2010

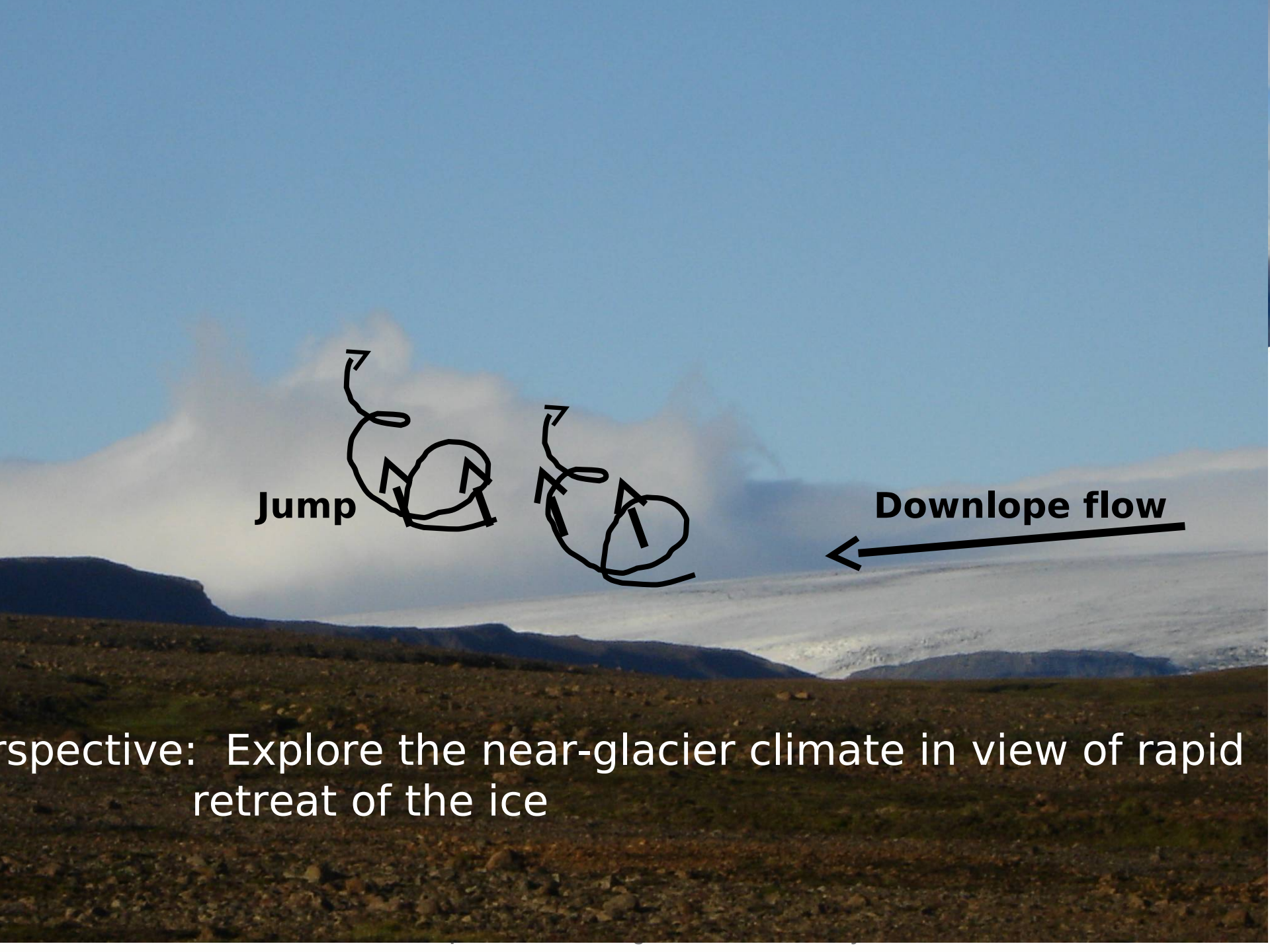
Persistency of downslope acceleration



The low roughness of the ice (not the cold surface) is responsible for the downslope speed-up

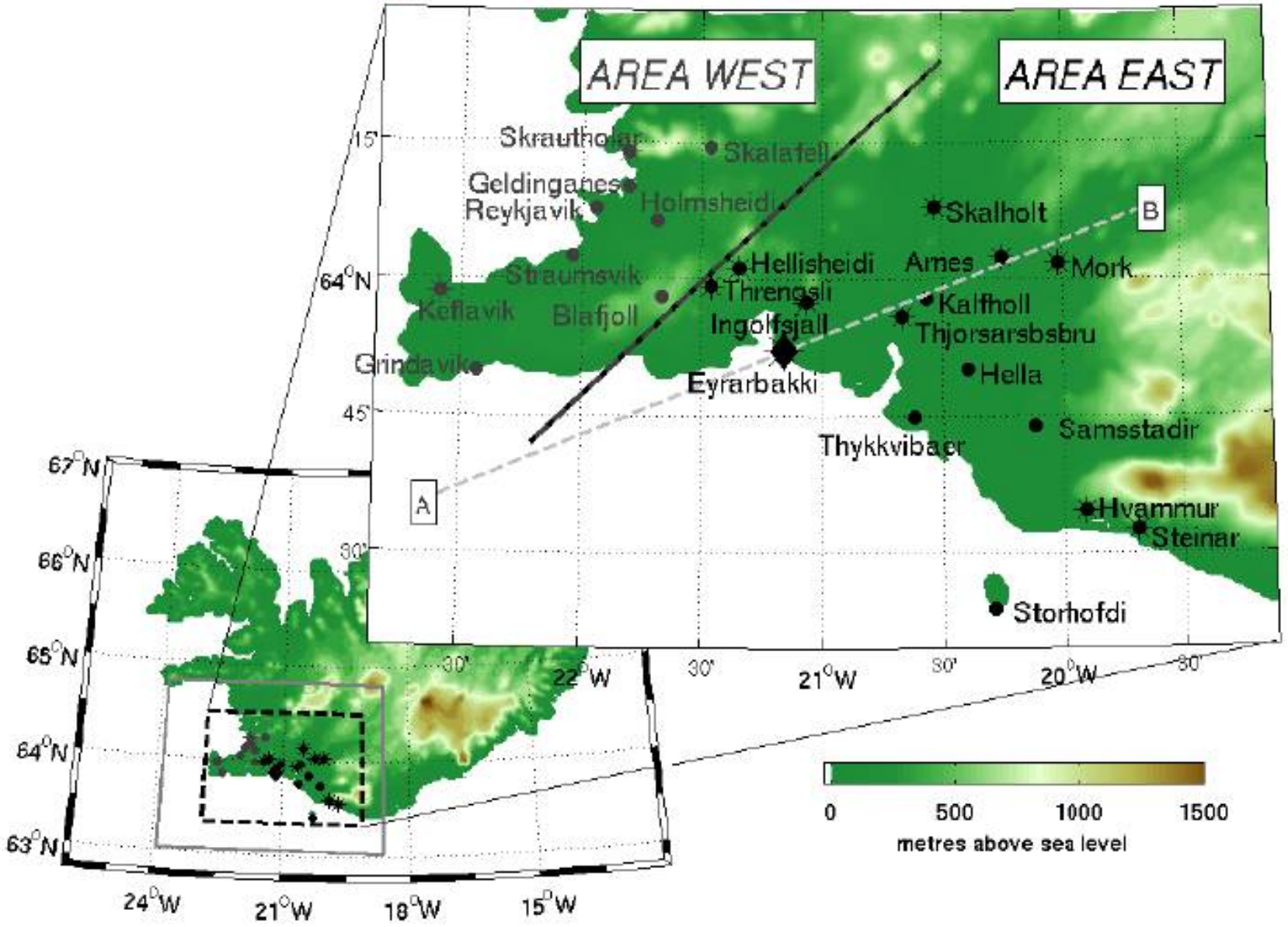


Jonassen, Olafsson & Agustsson QJRM, in revisi



rspective: Explore the near-glacier climate in view of rapid retreat of the ice

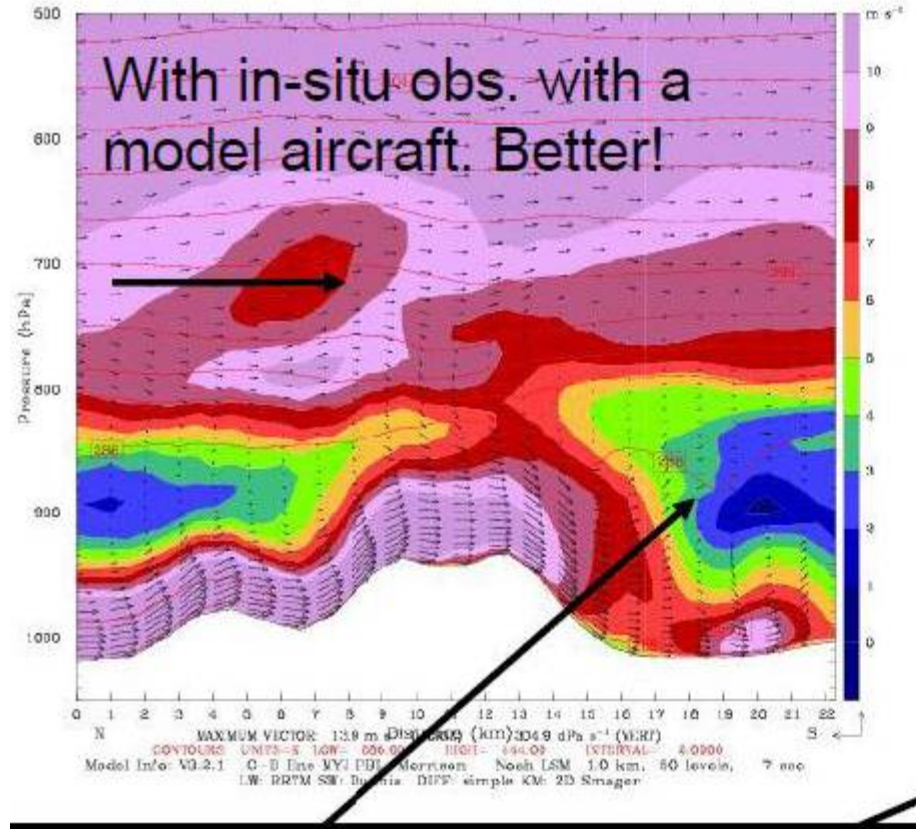
The MOSO experment 2009 and 2011

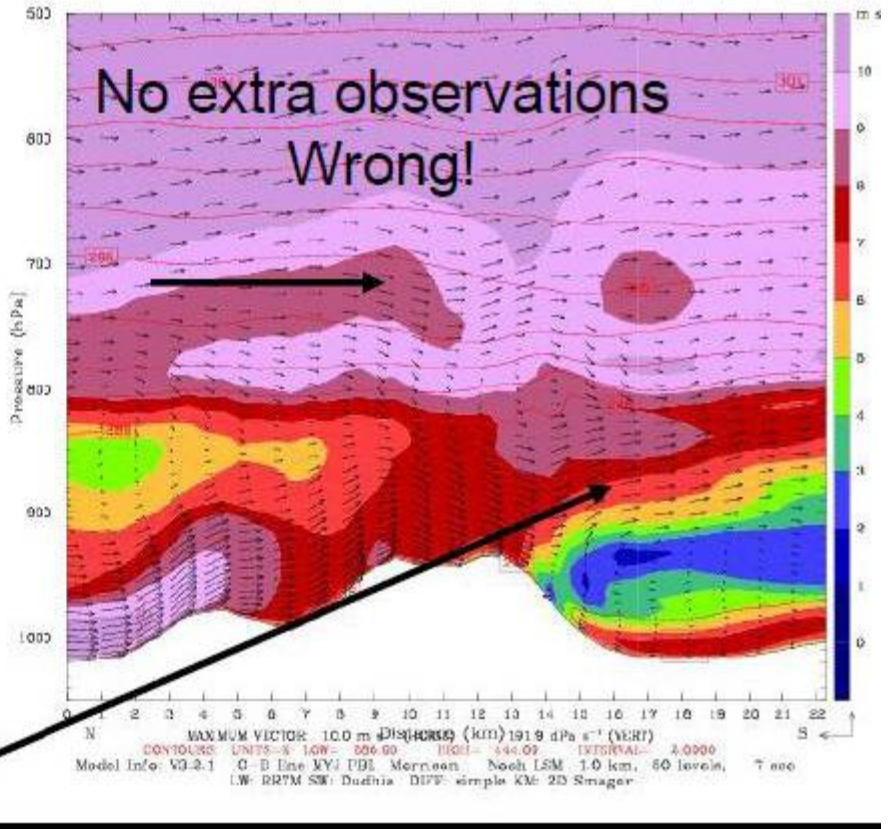


MOSO I and II: Orography, synoptic- and thermally induced flow

del aircraft – a recoverable radiosonde

Simulated flow in section across mountain





A major difference in flow pattern extending far above mountain top level

23 km

Wind speed, ranging from 0 to 12 m/s

Agustsson et al. (in prep)

Diurnal evolution of the thickness of the sea breeze layer at Eyrarbakki at the south coast of Iceland (upper and lower limits of the transition zone) on 20 July 2009.

- California (Banta, 1995);
  UK (Steel et al., 2013);
  The Netherlands (Tijm et al. 1999) etc. etc.

Max thickness only 400 m!

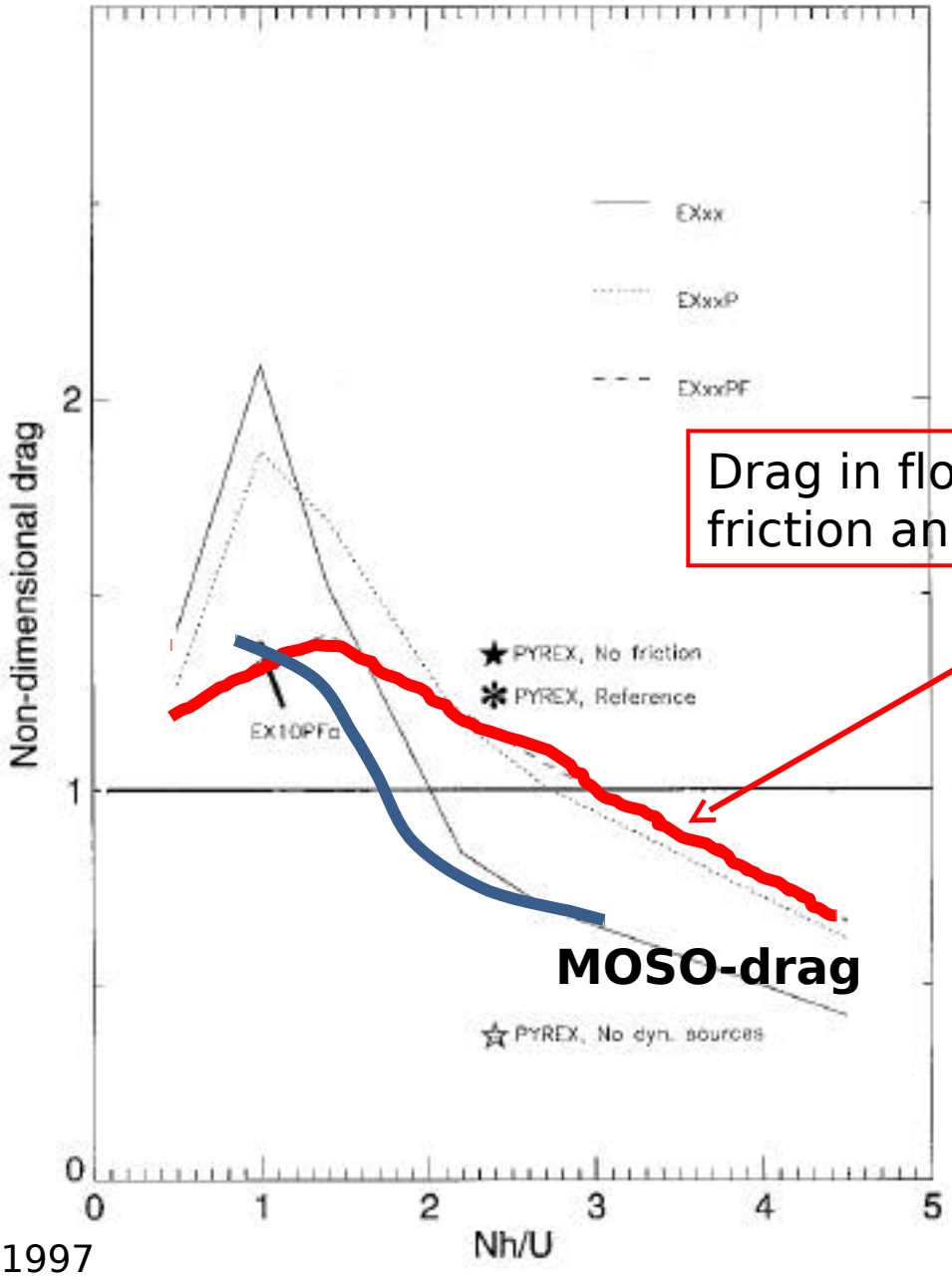
- Morning Californian Sea-Breeze (Banta,19

Thickness (m)

Upper limit

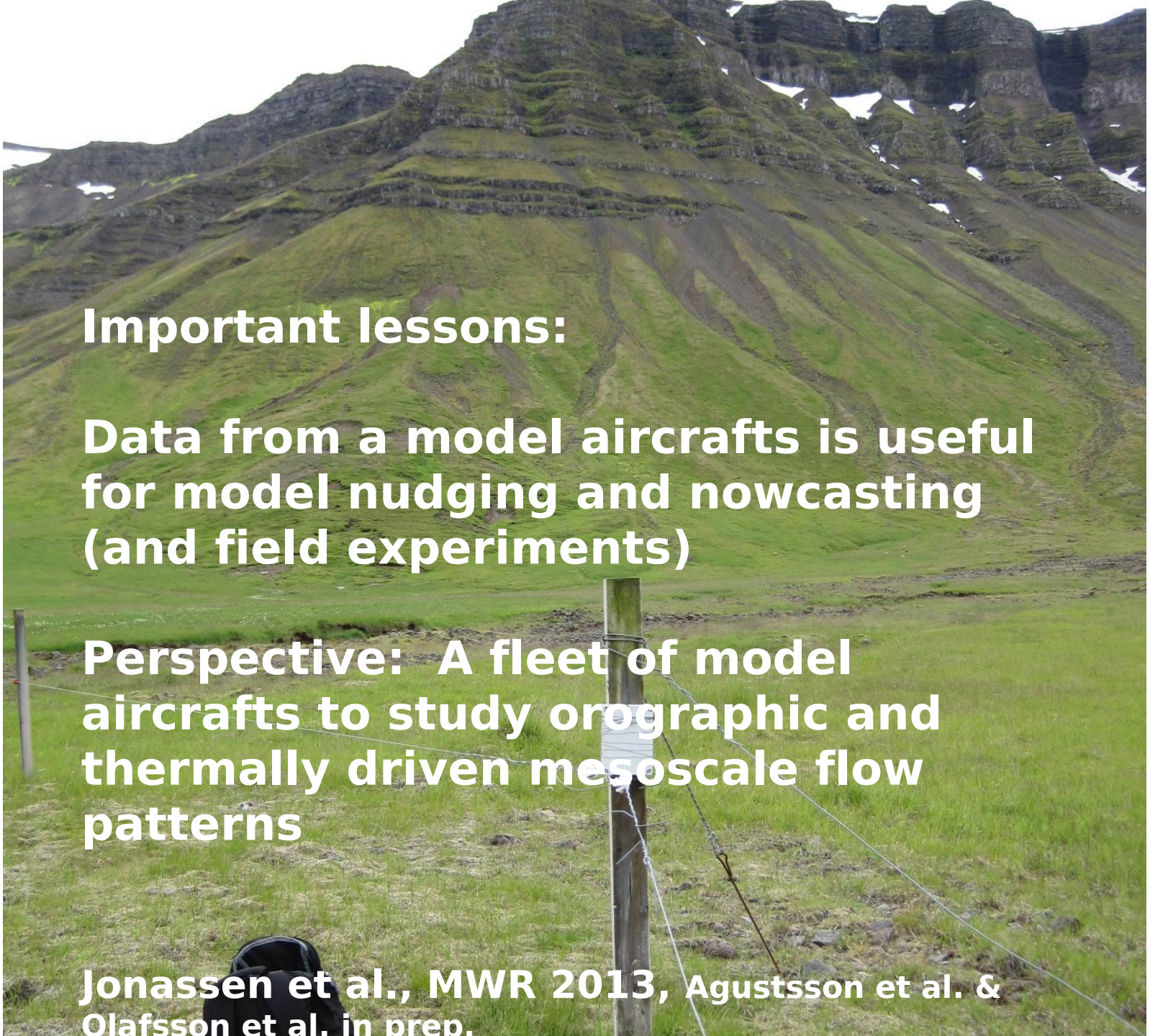
Lower limit

hours (UTC) (local noon is at 13.20 UTC)



Drag in flow with surface friction and Coriolis force

Ólafsson & Bougeult, 1997



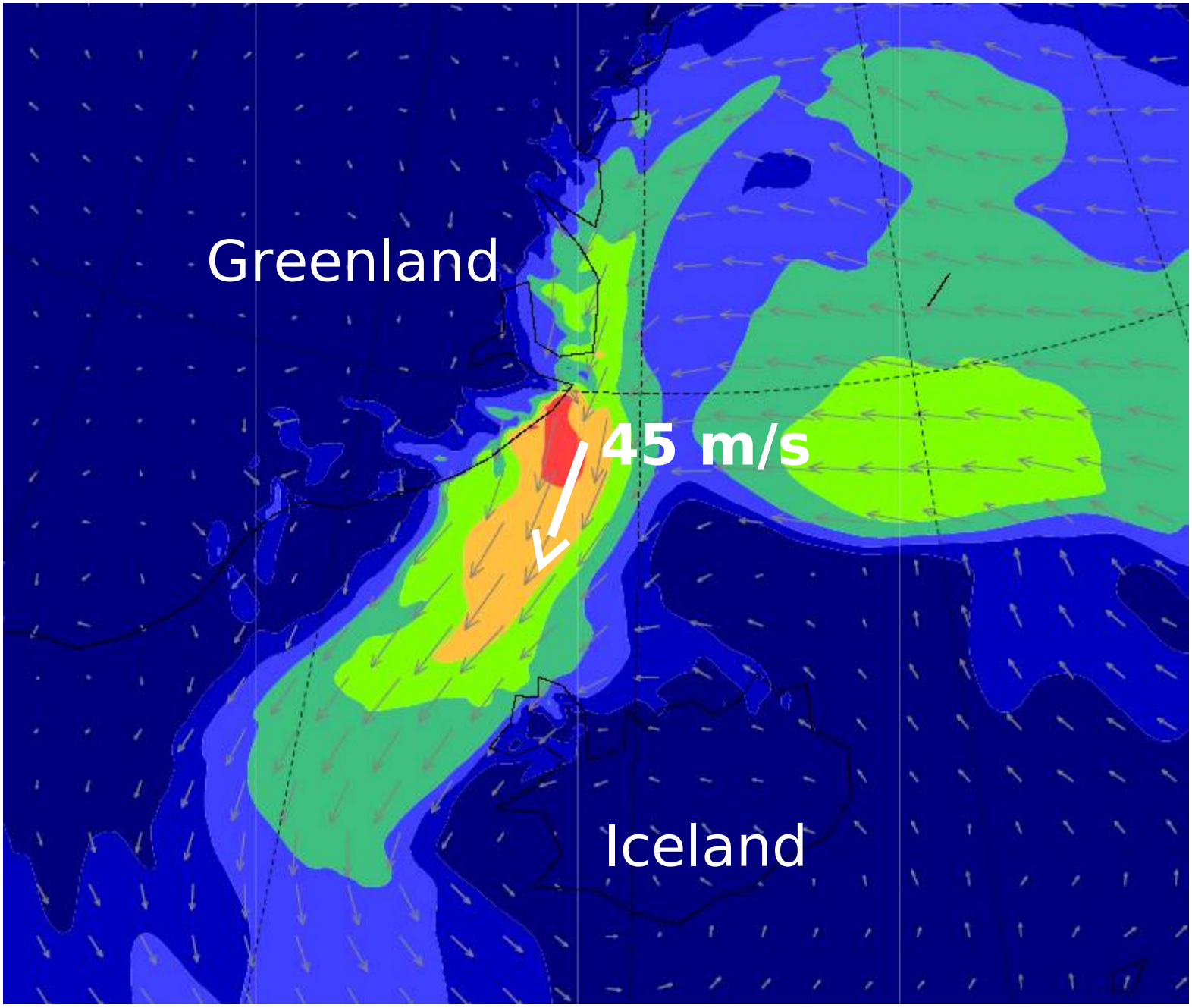
Important lessons:

Data from a model aircrafts is useful for model nudging and nowcasting (and field experiments)

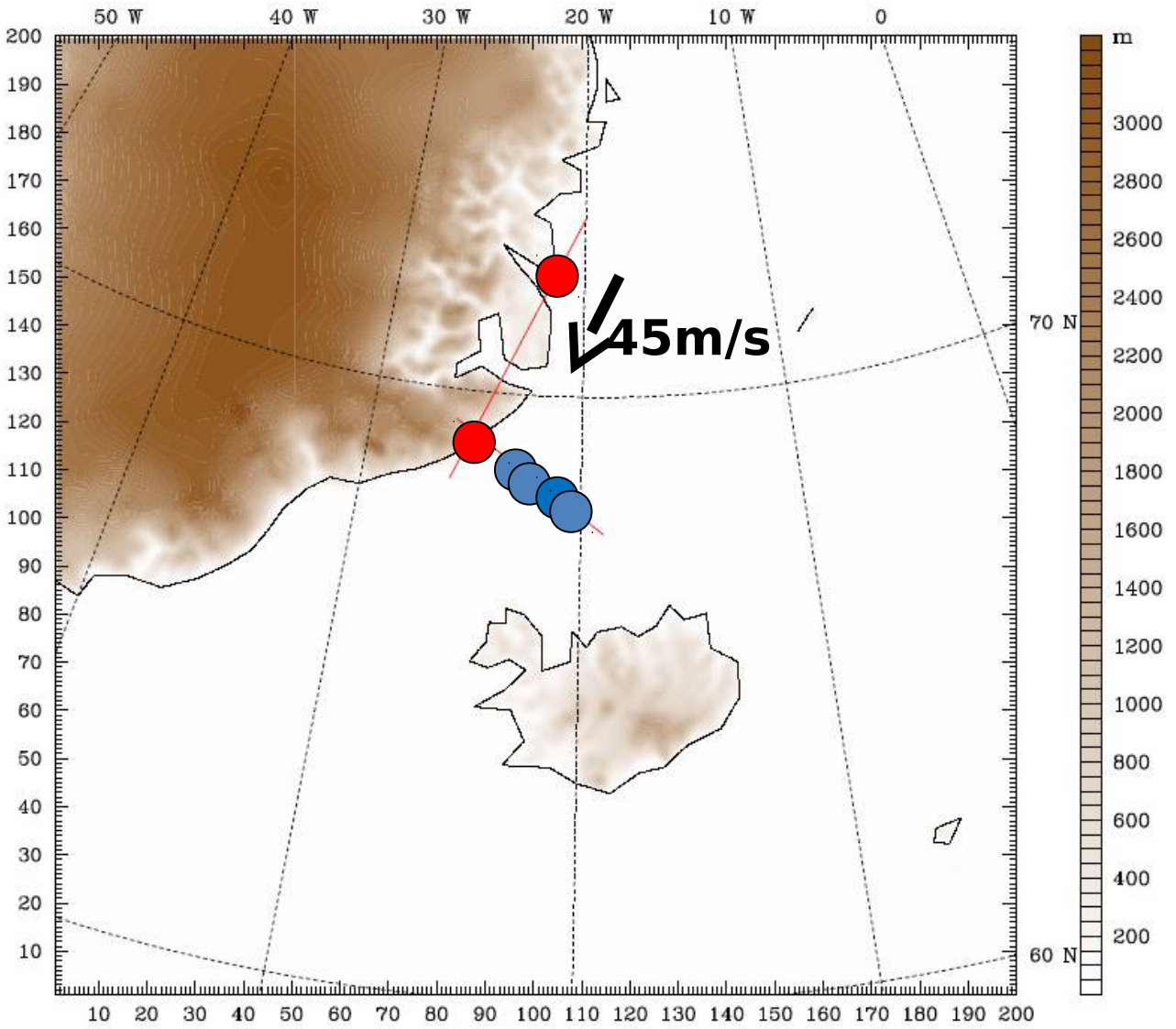
Perspective: A fleet of model aircrafts to study orographic and thermally driven mesoscale flow patterns

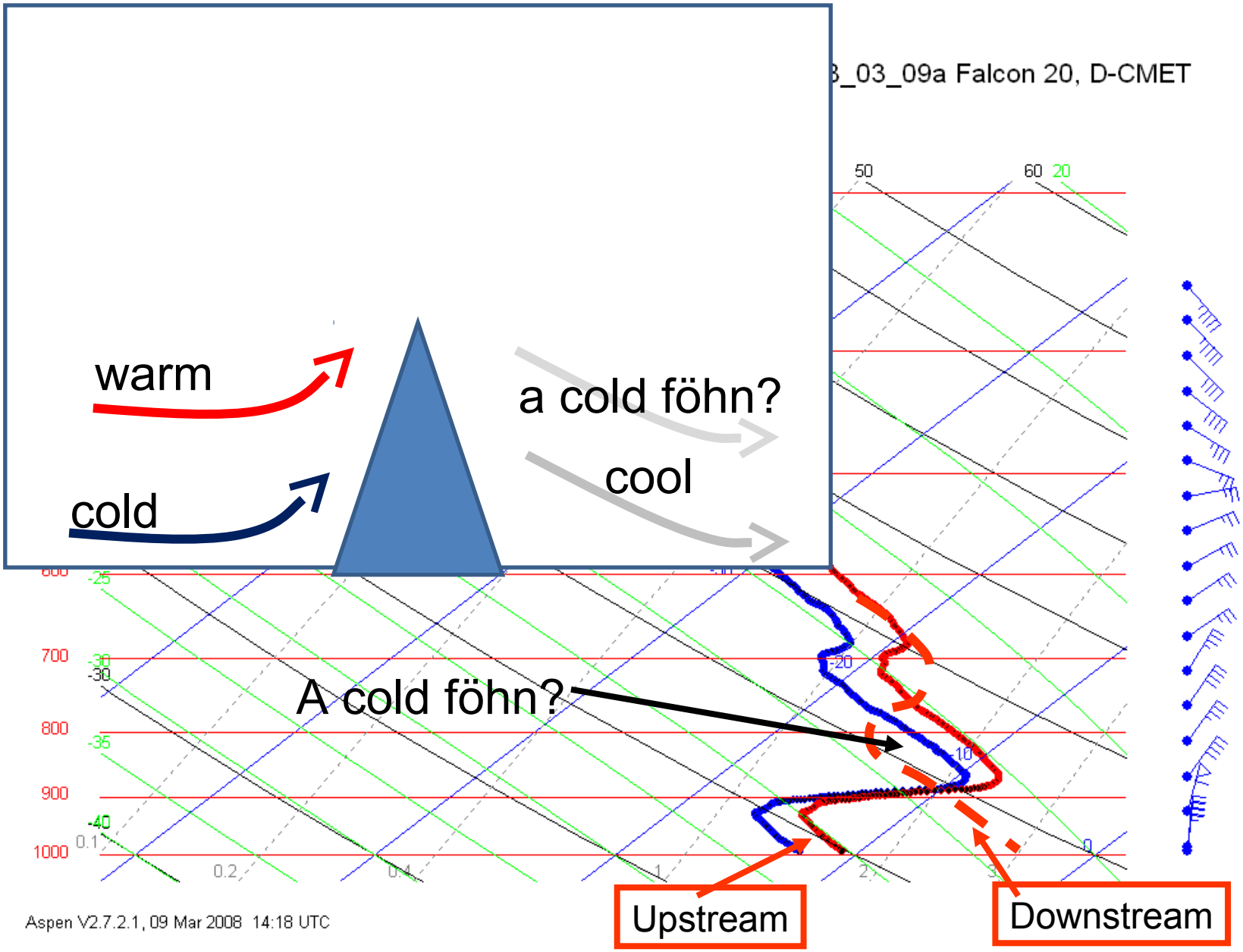
Jonassen et al., MWR 2013, Agustsson et al. & Olafsson et al. in prep.

GFDEX 2007
GREENEX/IPY THORPEX 2008


Greenland
45 m/s
Iceland

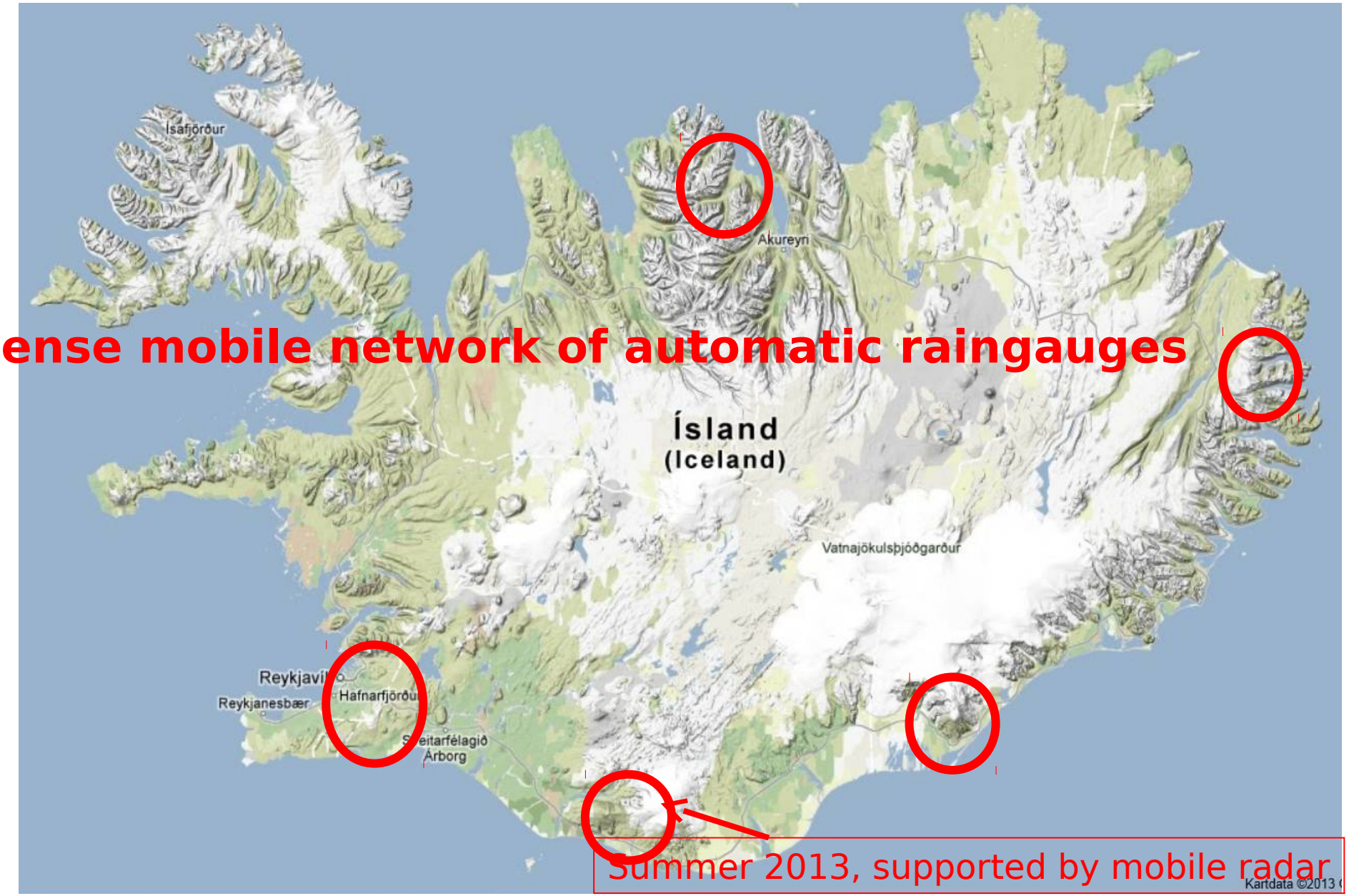
GREENEX / IPY THORPEX



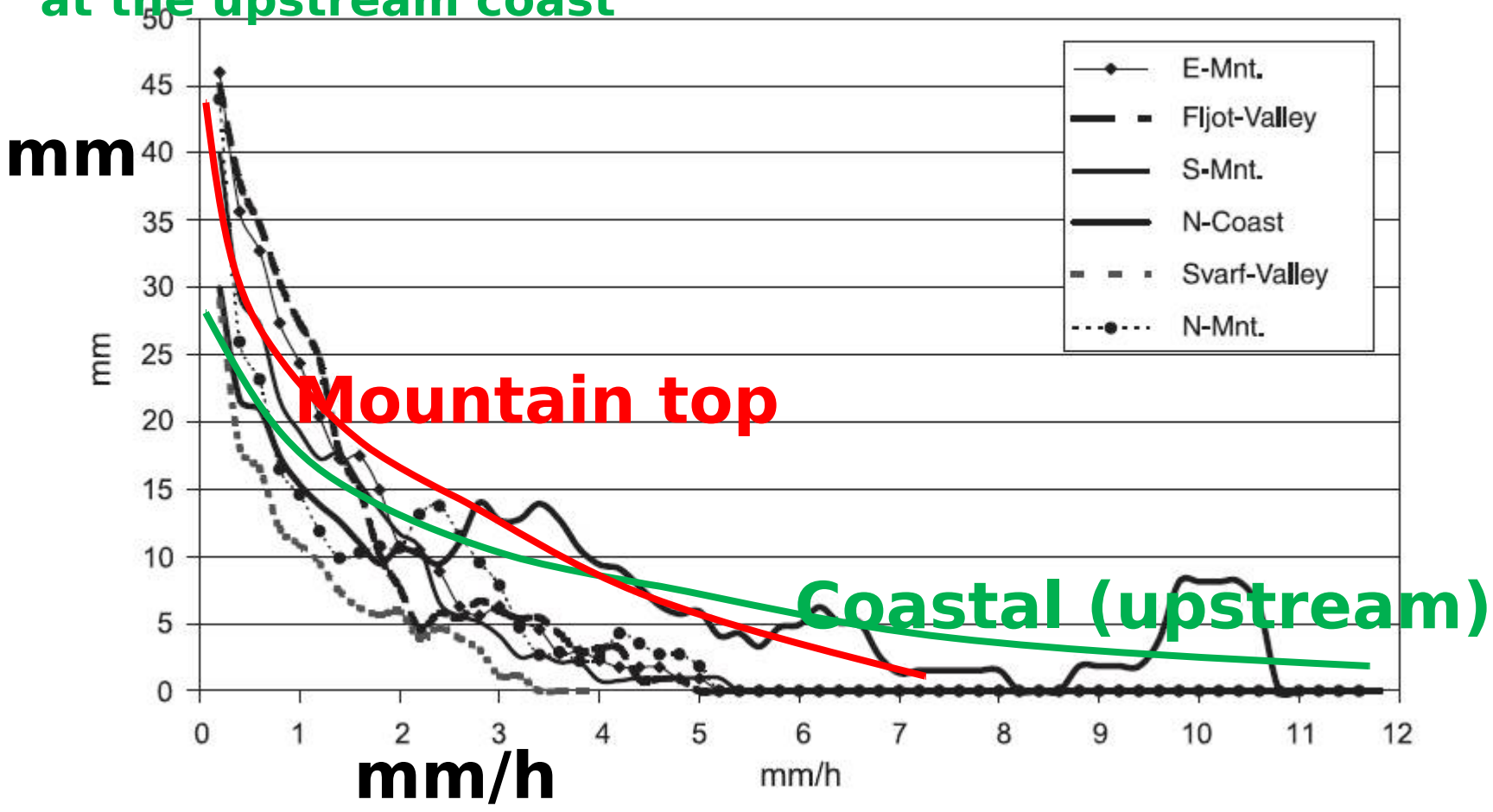

_03_09a Falcon 20, D-CMET
warm
cold
a cold föhn?
cool
A cold föhn?
Upstream
Downstream
Aspen V2.7.2.1, 09 Mar 2008 14:18 UTC

Perspectives

- How will the Greenland/Iceland jets change in a future climate with less sea-ice?
- How will a new wind climate affect the sea?
- How will changing surface characteristics on land change the mesoscale circulations


Ísafjörður
Akureyri
Dense mobile network of automatic raingauges
Ísland
(Iceland)
Vatnajökulsþjóðgarður
Reykjavi
Reykjanesbær
Hafnarfjörðu
Sveitarfélagið
Árborg
Summer 2013, supported by mobile radar
Kartdata ©2013

Total precipitation at mountain top = Total precipitation at the upstream coast

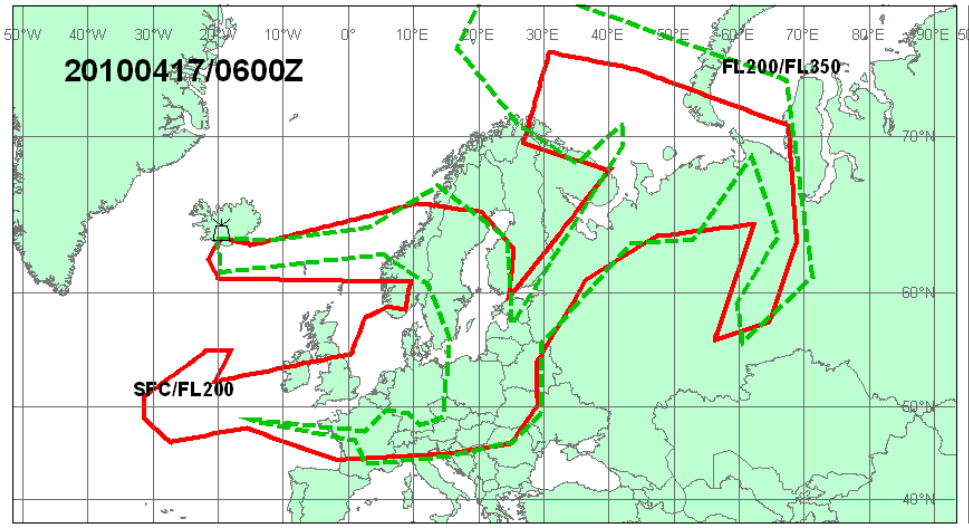


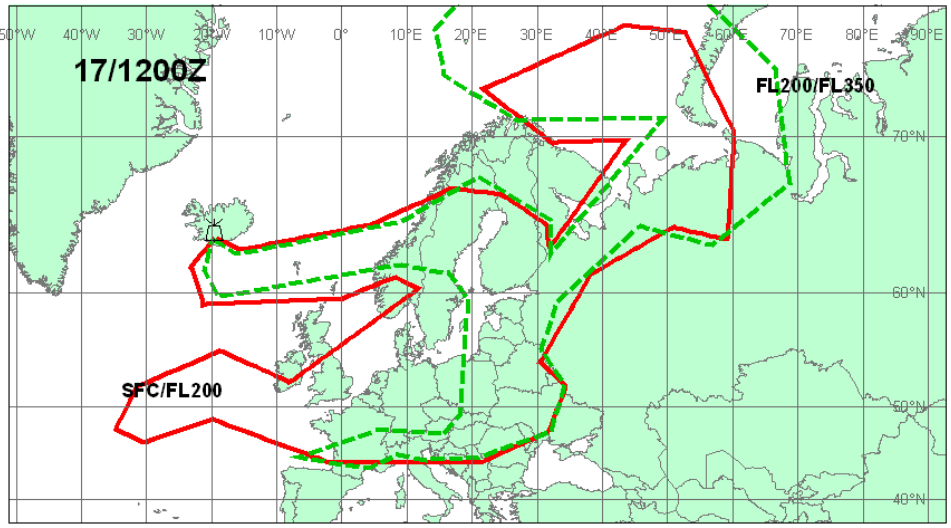
Brynjolfsson & Olafsson, 2009

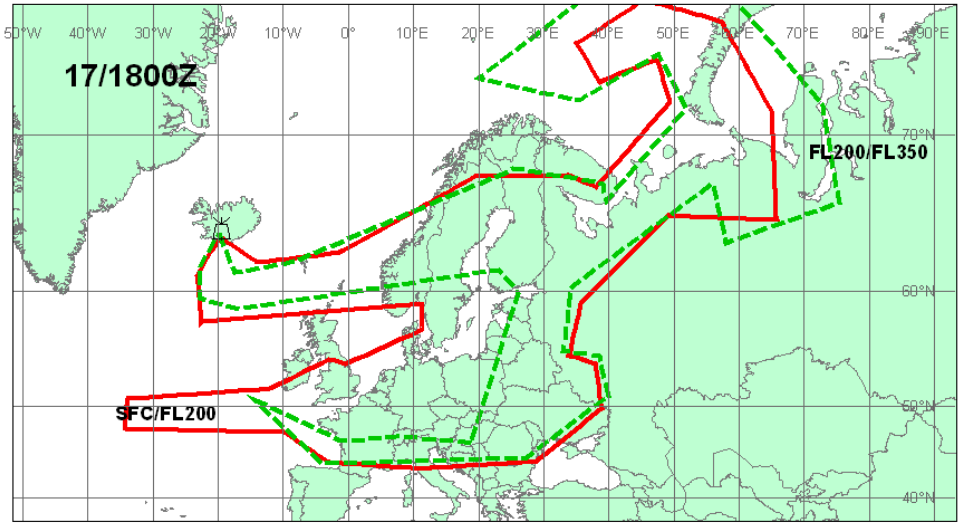
Not planned field experiments:

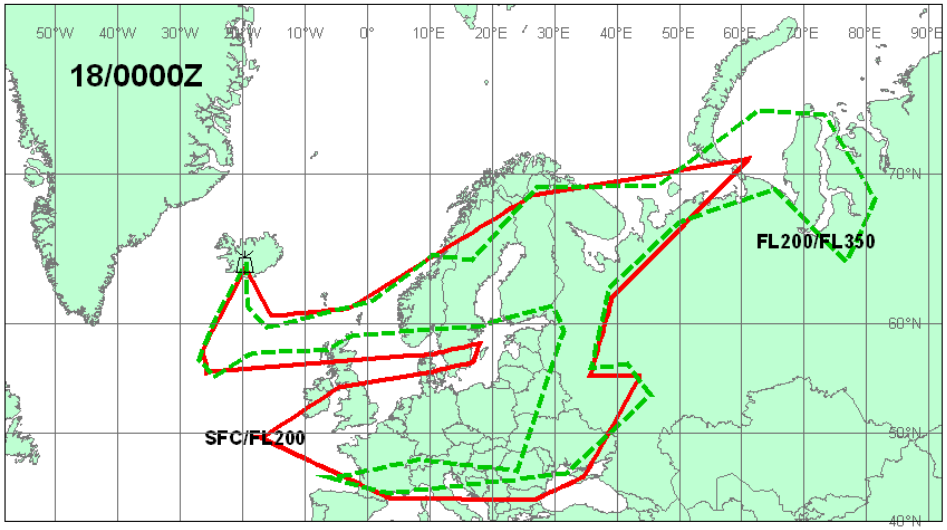
Eyjafjallajökull 2010
Grímsvötn 2011

The Mt. Eyjafjallajökull ash plume on 1 May 2010. (Photo: Bernadett Weinzierl)









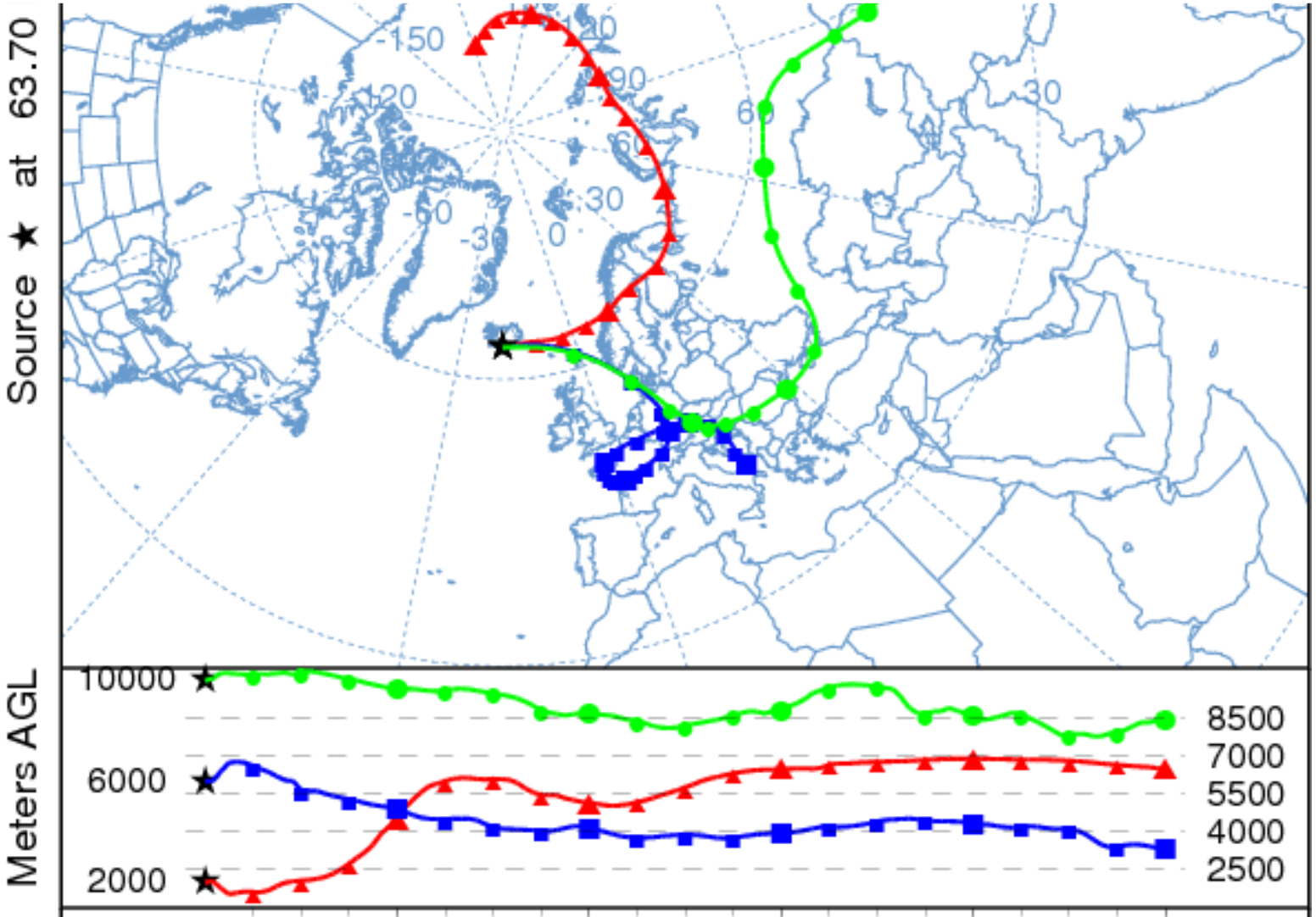
VA ADVISORY
DTG: 20100417/0600Z
VAAC: LONDON
VOLCANO:
EYJAFJALLAJOKULL
PSN: N6338 W01937
AREA: ICELAND

SUMMIT ELEV: 1666M
ADVISORY NR: 2010/013
INFO SOURCE: ICELAND MET OFFICE
AVIATION COLOUR CODE: RED
ERUPTION DETAILS: SIGNIFICANT ERUPTION
CONTINUING, CONSTANT, REACHING FL280.
ASH TYPE 58% Si02

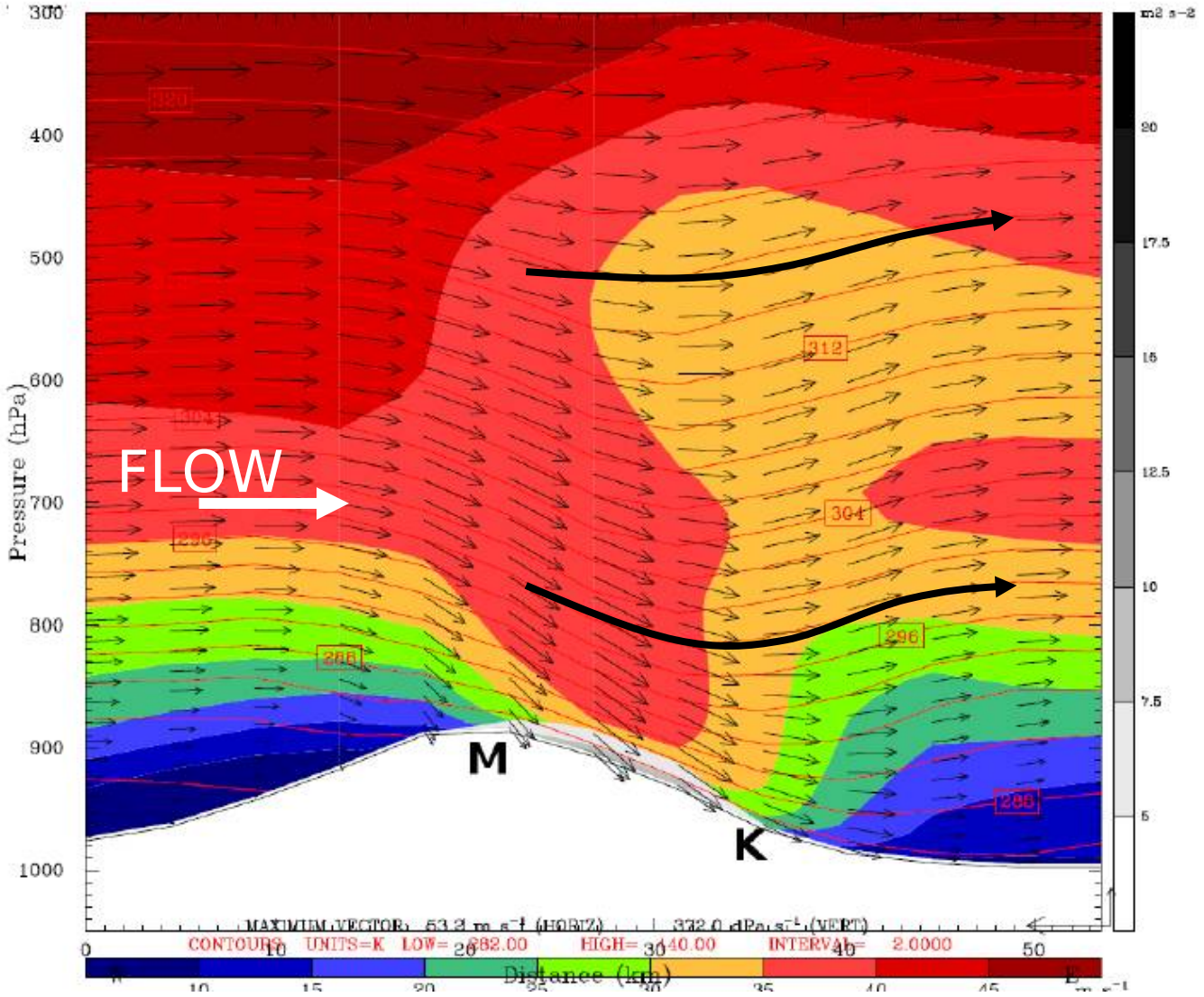
RMK: NO SIGNIFICANT ASH RISK ABOVE FL350
NXT ADVISORY: 20100417/1200Z

An air parcel starting at 2 km goes to Siberia

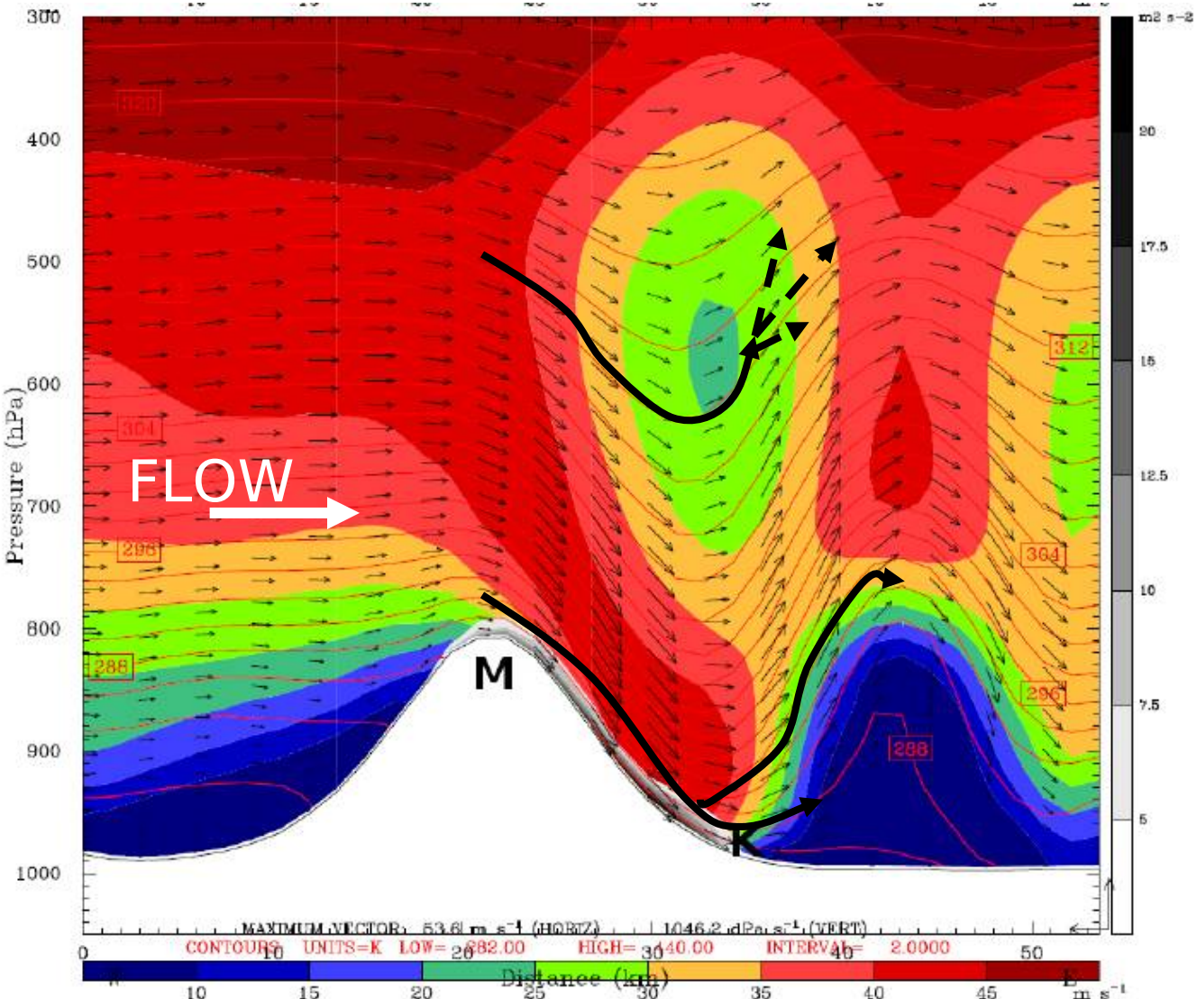
An air parcel starting at 6 km goes to Slovenia (after having travelled through every single ICAM country



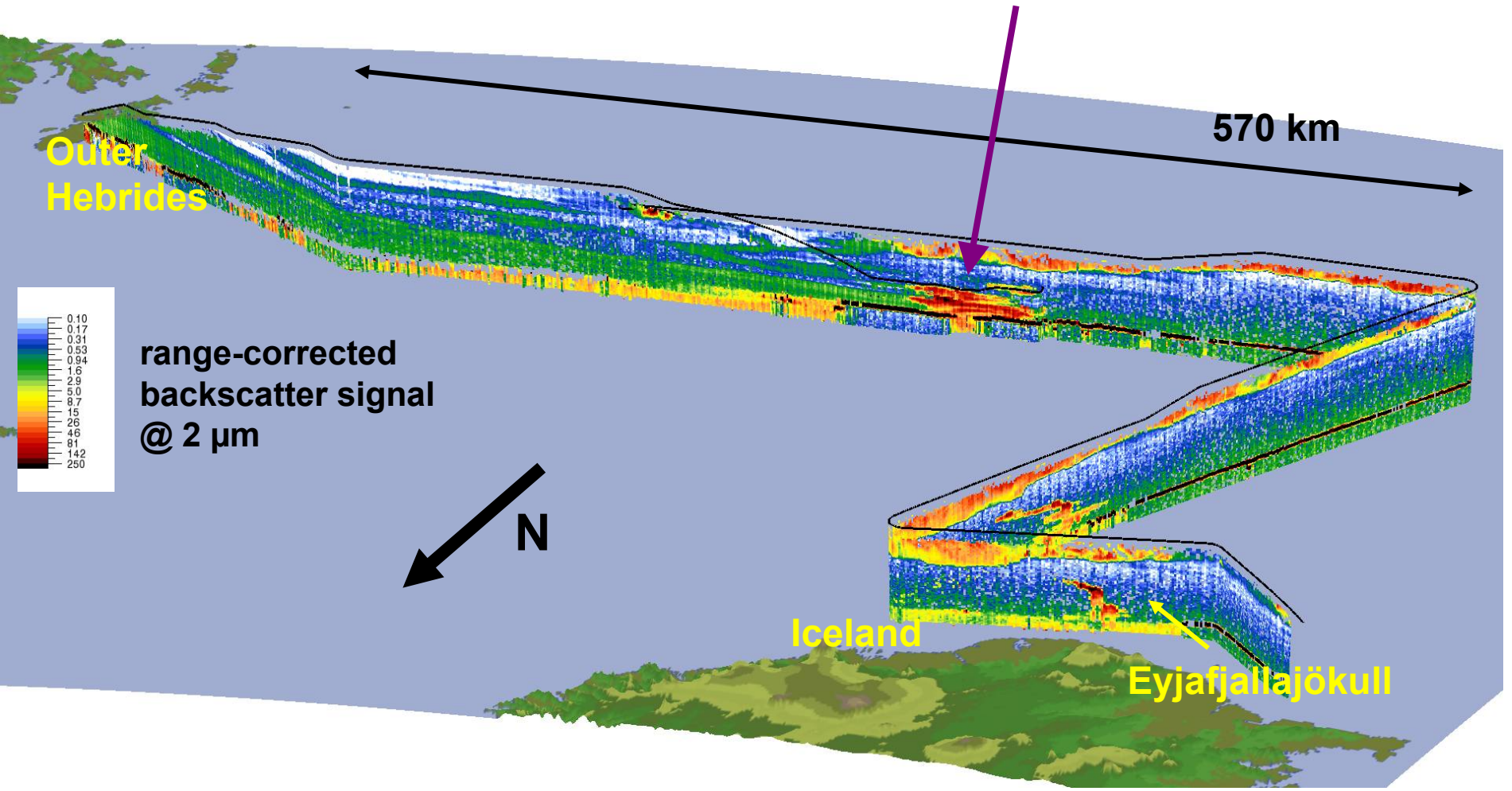
Numerical simulation (model) with horizontal resolution of 9 km



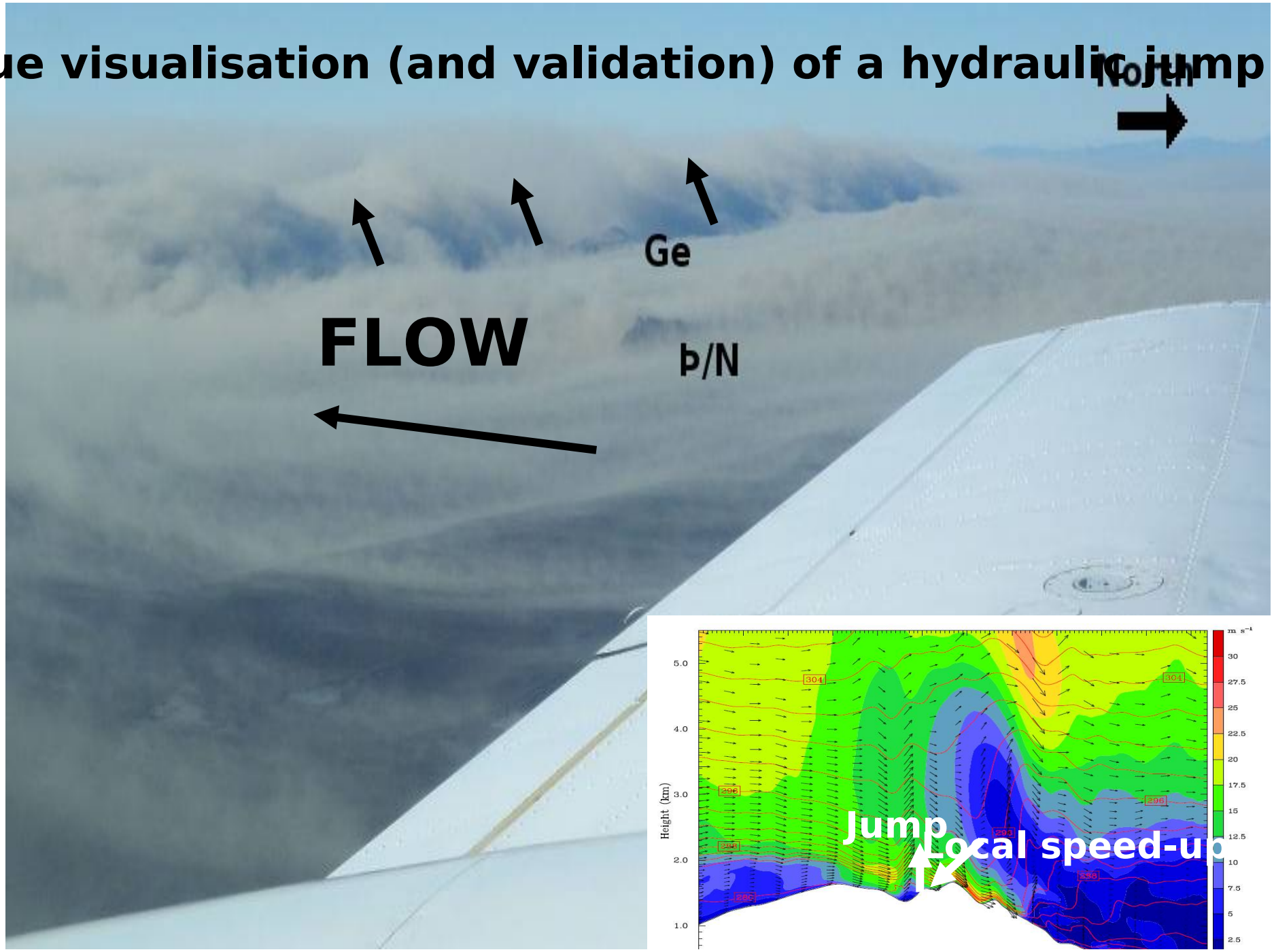
Numerical simulation (model) with horizontal resolution of 3 km

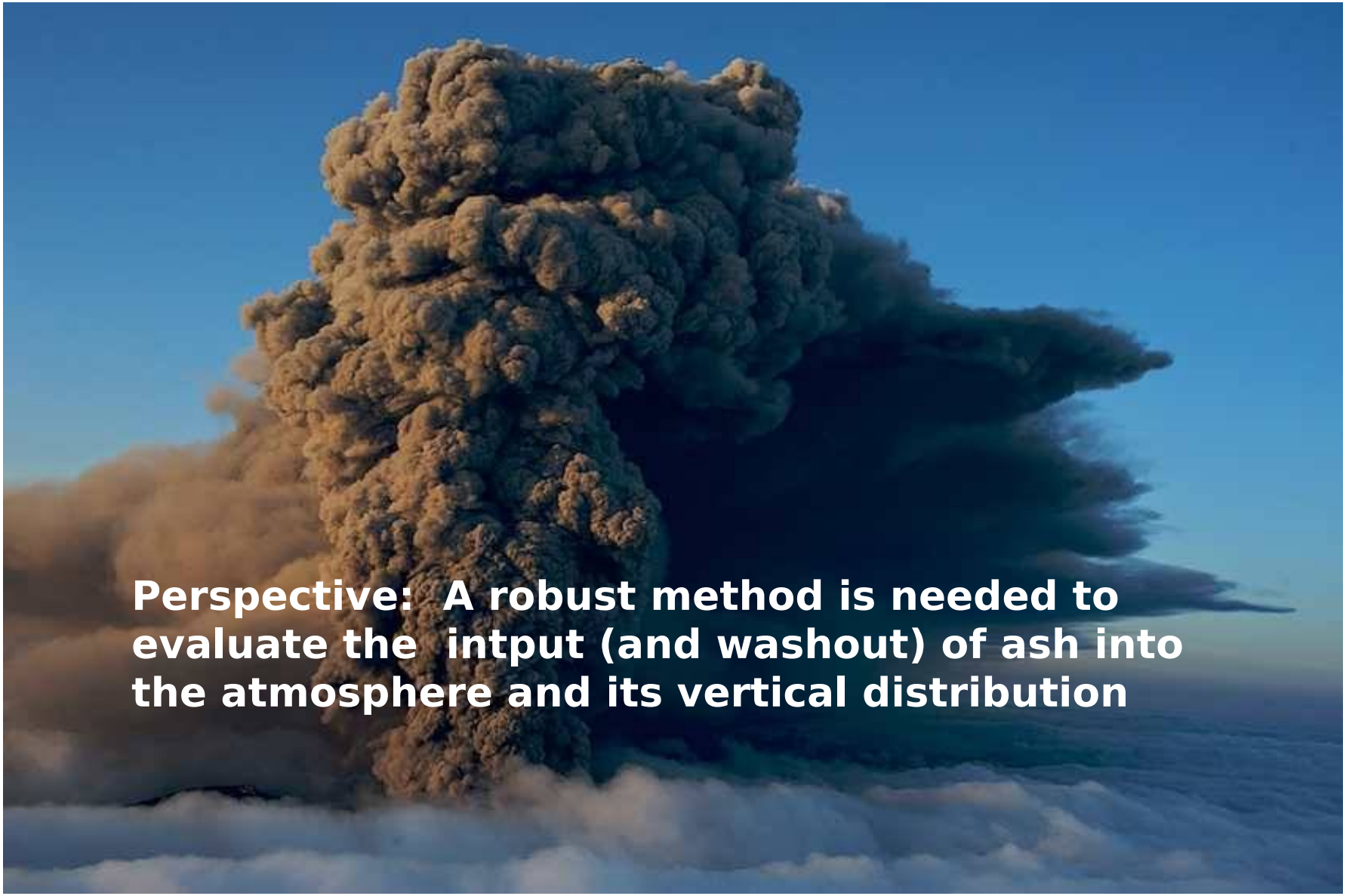


Data on spatial distribution of ash (DLR)



ue visualisation (and validation) of a hydraulic jump




Perspective: A robust method is needed to evaluate the intput (and washout) of ash into the atmosphere and its vertical distribution

High- temporal resolution wind data
Flux data from Gufuskalar mast (412m)
Precipitation data
DO YOU WANT TO COLLABORATE?


THANK YOU
ICAM 2005 (Zadar)


1992
afjallajökull 2010 (Baldur Sveinsson)
2010