

# A very short note on radiation comparisons in Sodankylä



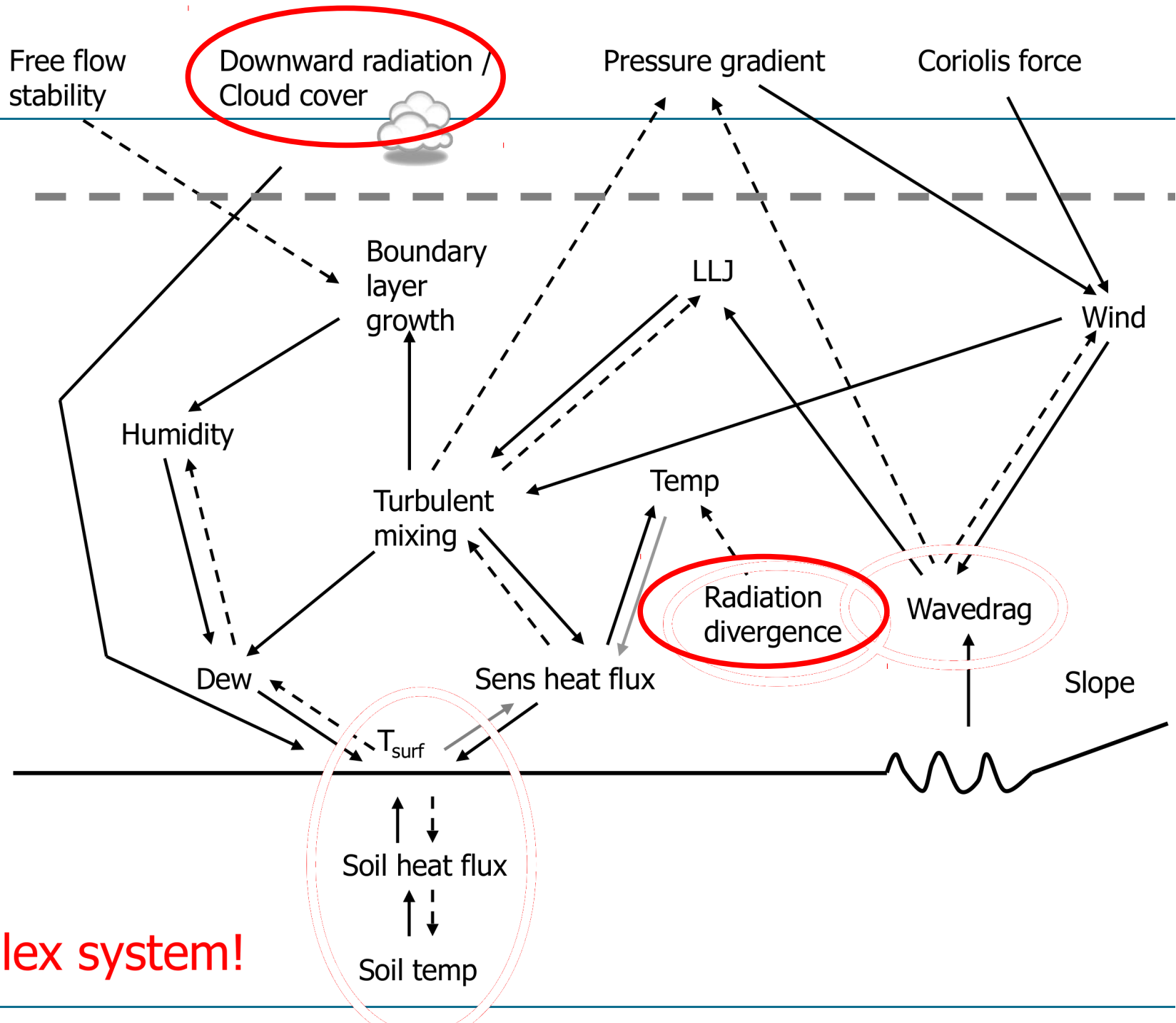
[laura.rontu@fmi.fi](mailto:laura.rontu@fmi.fi)



Parameterization of Stable Boundary Layer in Numerical Weather Prediction Models

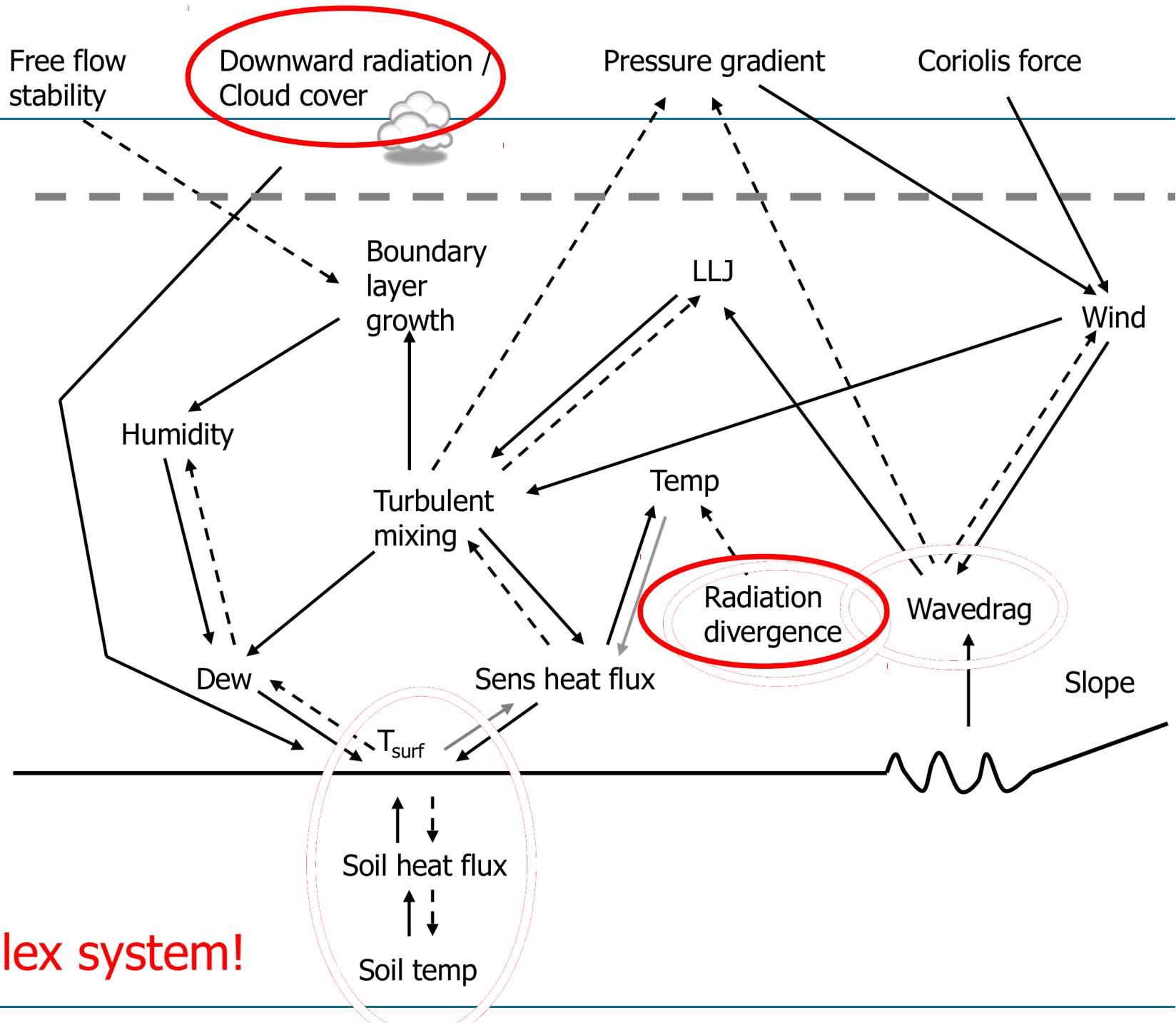
Finnish Meteorological Institute, Helsinki, December 3 - 5 2012

# Ex.drivers



It is a complex system!

# Ex.drivers



It is a complex system!

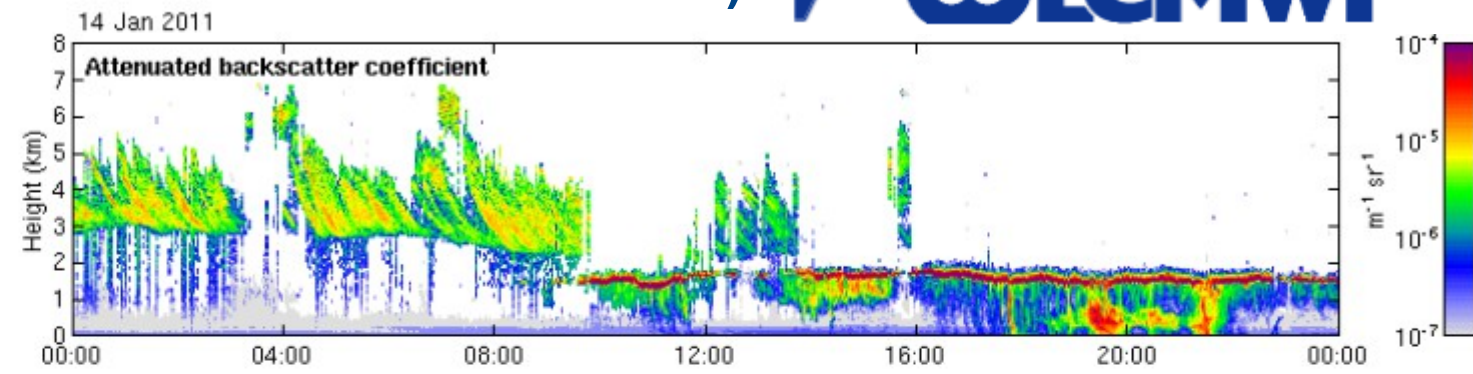


# Observations of mixed-phase cloud

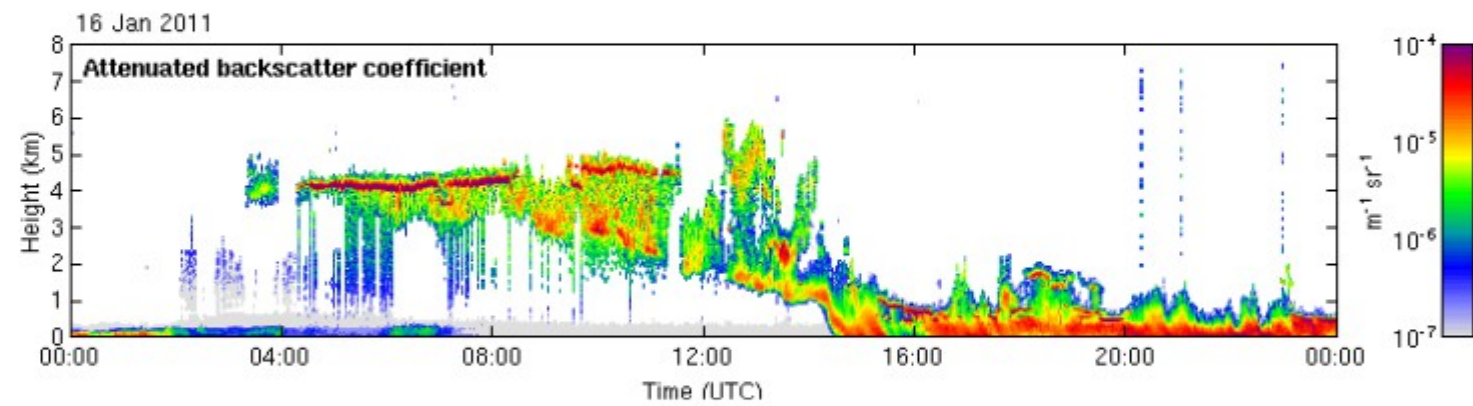
Sodankylä - northern Finland (67N, 28 E) Erik Andersson et al. 30.5.2011



14 Jan 2011  
Ice cloud and SLW layer at 2km, ice falling out



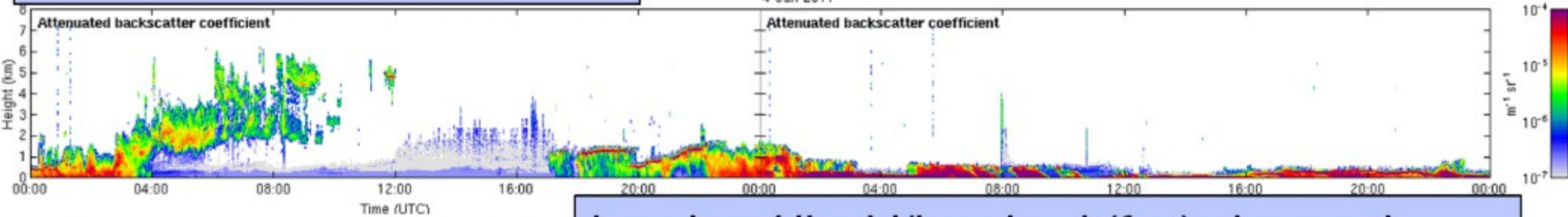
16 Jan 2011  
SLW layer at 4km, ice falling out



4 Jan 2011 case study



4 Jan 2011



Low-level liquid/ice cloud (fog) observed

T2m in w

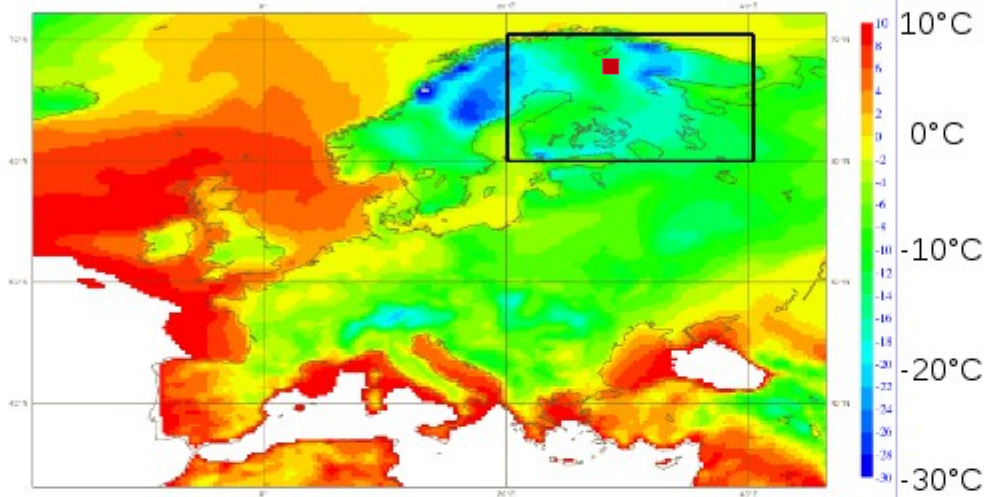


# Cold T2m bias in weakly forced mixed-phase

(Example T2m snapshot from 00Z 4th Jan 2011)

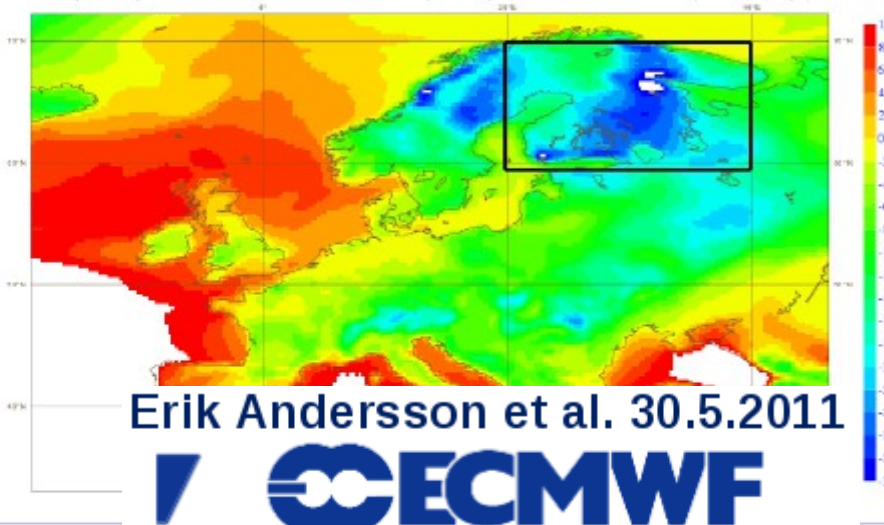
## 36r3 Diag mixed phase

Saturday 1 January 2011 12UTC ECMWF Forecast 1-60 VT; Tuesday 4 January 2011 00UTC Surface: 2 metre temperature (Exp: 1hr )



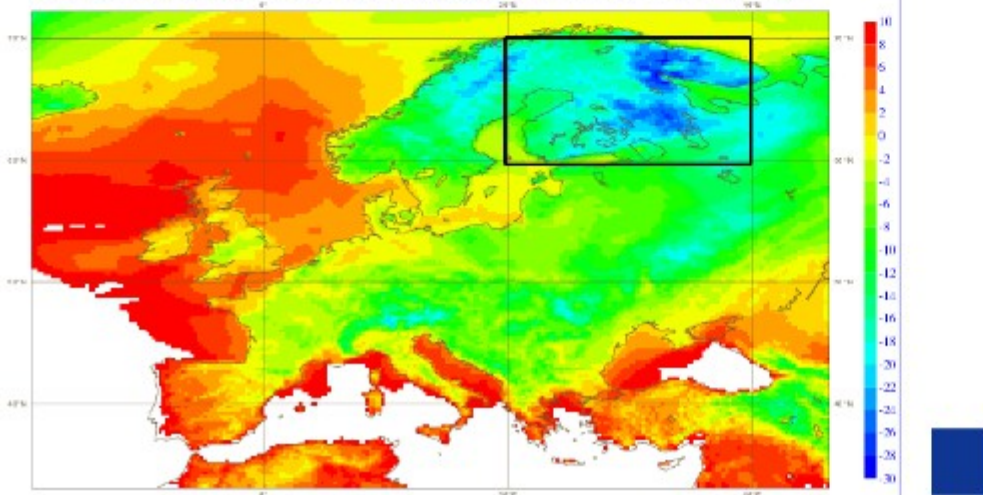
## 37r1 Prog mixed phase

Saturday 1 January 2011 12UTC ECMWF Forecast 1-60 VT; Tuesday 4 January 2011 00UTC Surface: 2 metre temperature (Exp: 1hr )



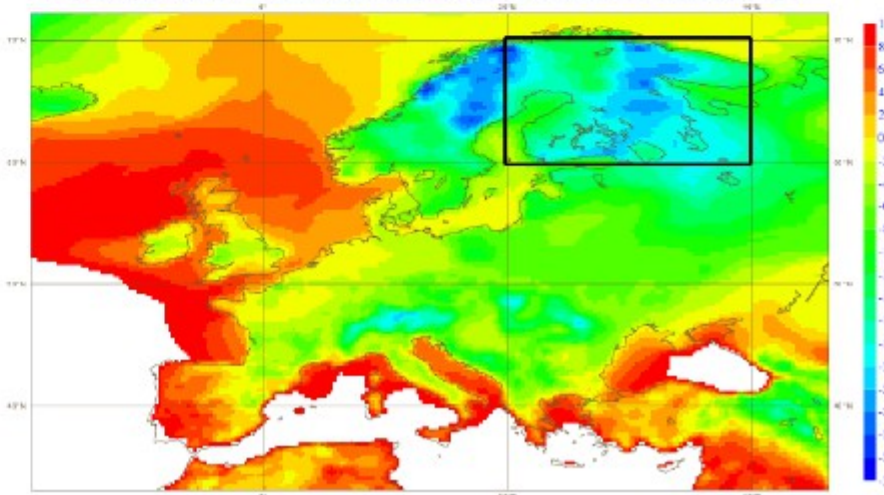
## Analysis

Tuesday 4 January 2011 00UTC ECMWF Forecast 1-60 VT; Tuesday 4 January 2011 00UTC Surface: 2 metre temperature (Exp: 001 )



## New mixed phase

Saturday 1 January 2011 12UTC ECMWF Forecast 1-60 VT; Tuesday 4 January 2011 00UTC Surface: 2 metre temperature (Exp: 1hr )







**SURFACE RADIATION FLUXES  
ARE MEASURED  
IN SEVERAL LOCATIONS OF  
SODANKYLÄ OBSERVATORY**

**SW DOWN LW UP**

**LW DOWN SW UP**



# SODANKYLÄ SW DOWN and LW UP ARE INCLUDED IN THE HIRLAM MAST VERIFICATION OF SEVERAL MODELS AGAINST OBSERVATIONS - real-time daily time series and monthly statistics

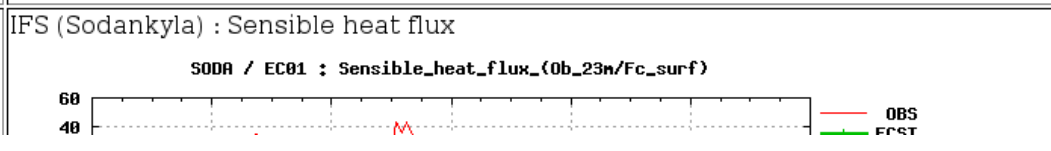
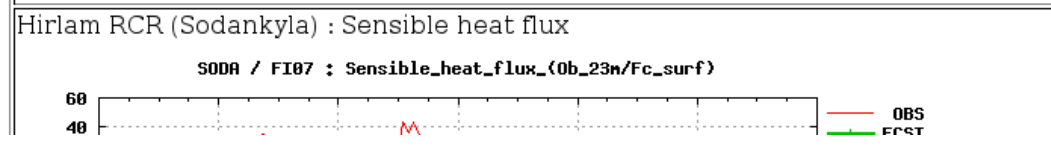
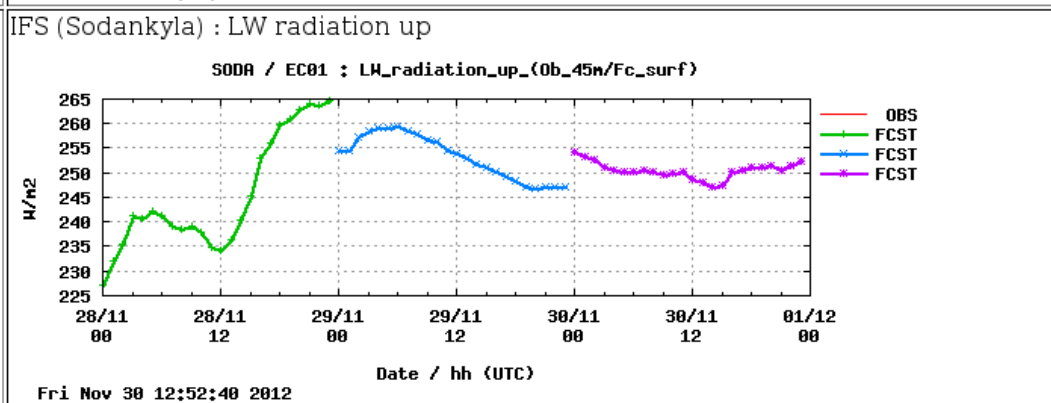
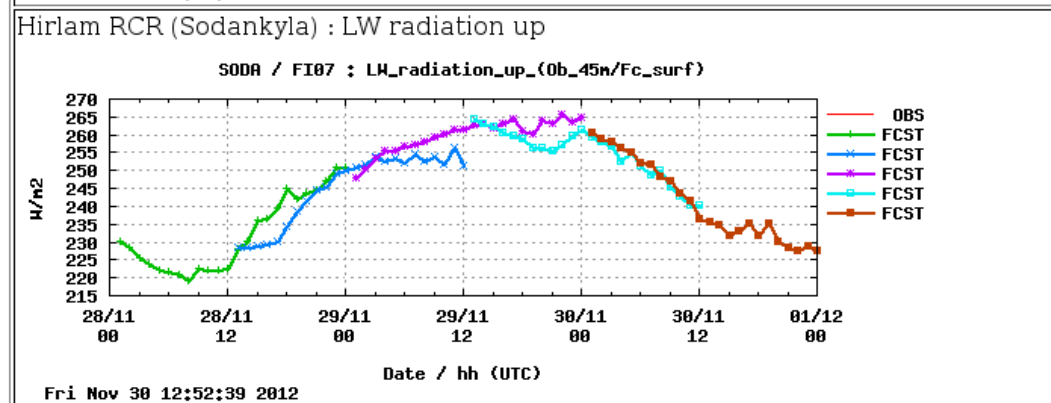
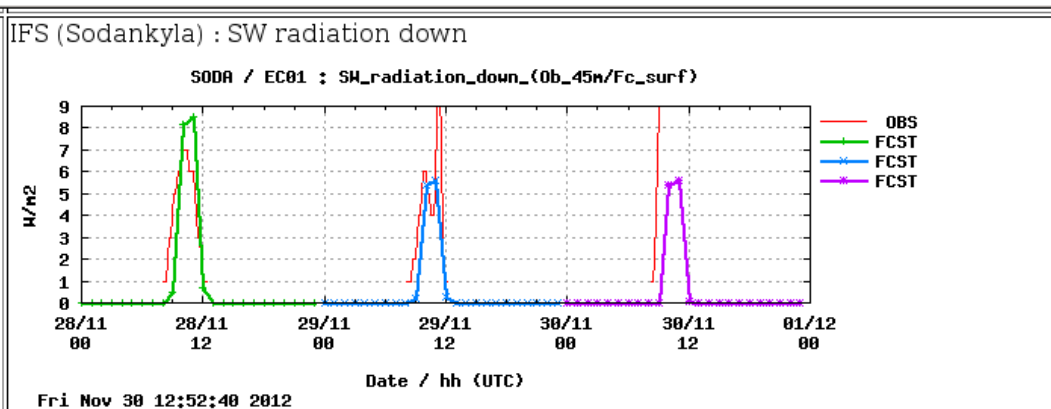
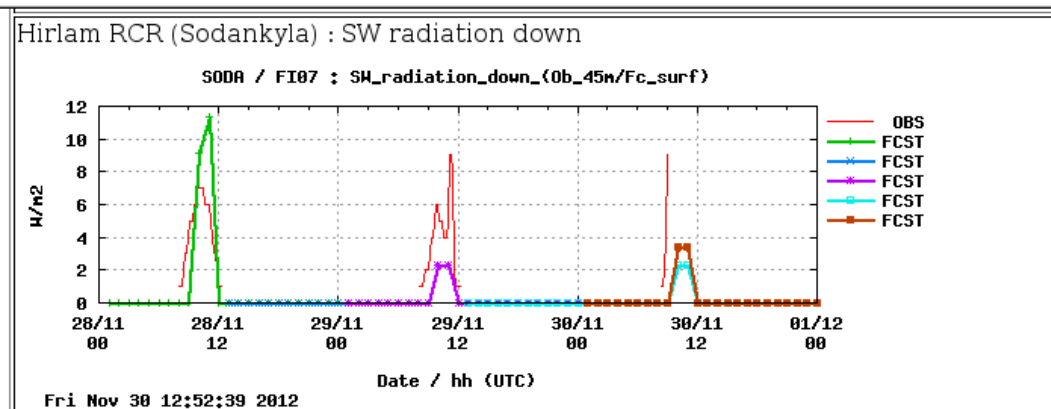
## Hirlam mast verification

Hirlam RCR  
Sodankyla

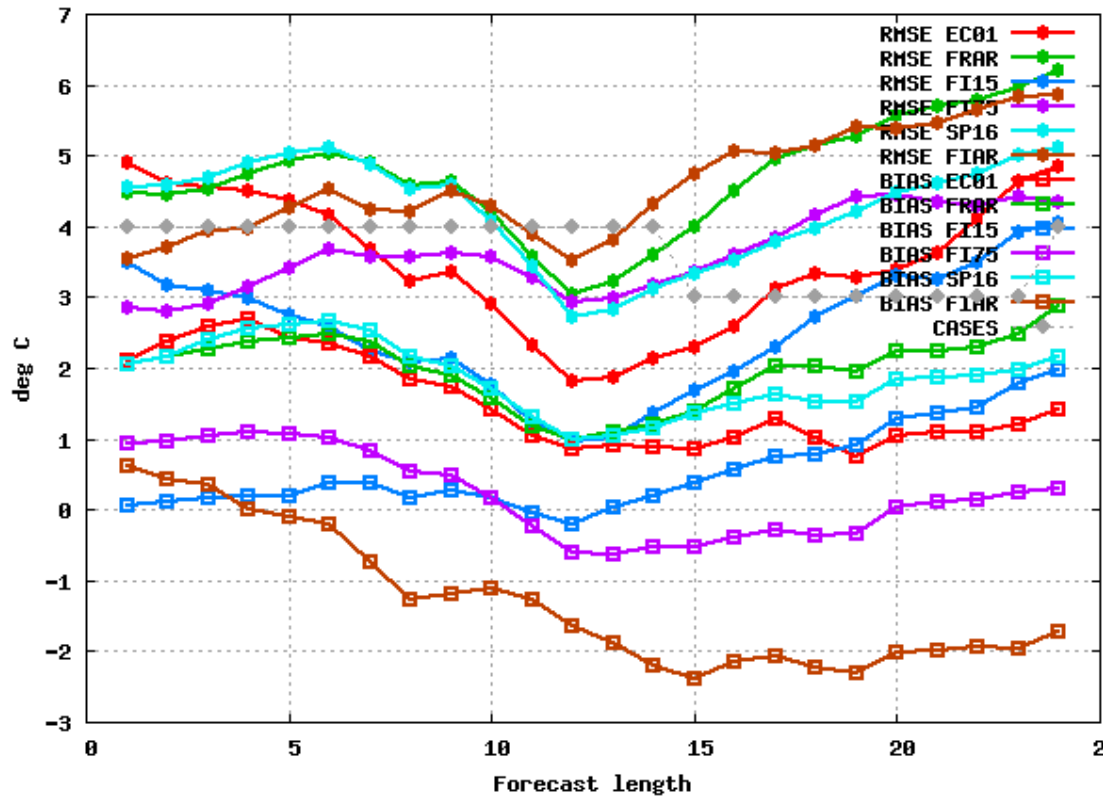
<< MODEL >>  
<< MAST >>

## Monthly comparison statistics

IFS  
Sodankyla

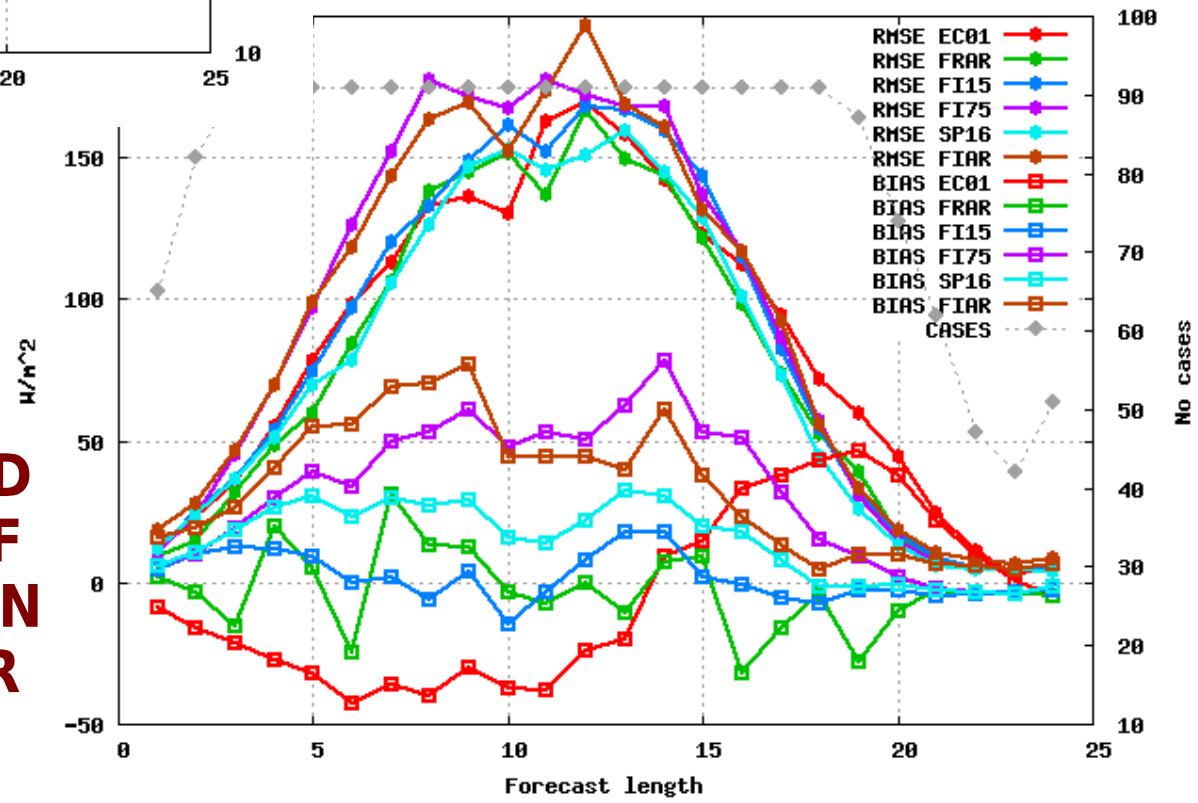


Selection: ALL using 1 stations  
 Period: 201101  
 Temperature Hours: {00}



**MONTHLY STATISTICS OF ALL COMPARED VARIABLES ARE CALCULATED**

Selection: ALL using 1 stations  
 Period: 20110601-20110831  
 Global radiation Hours: {00}



**BIAS AND RMSE OF LW UP JANUARY 2011**

**BIAS AND RMSE OF SW DOWN SUMMER 2011**



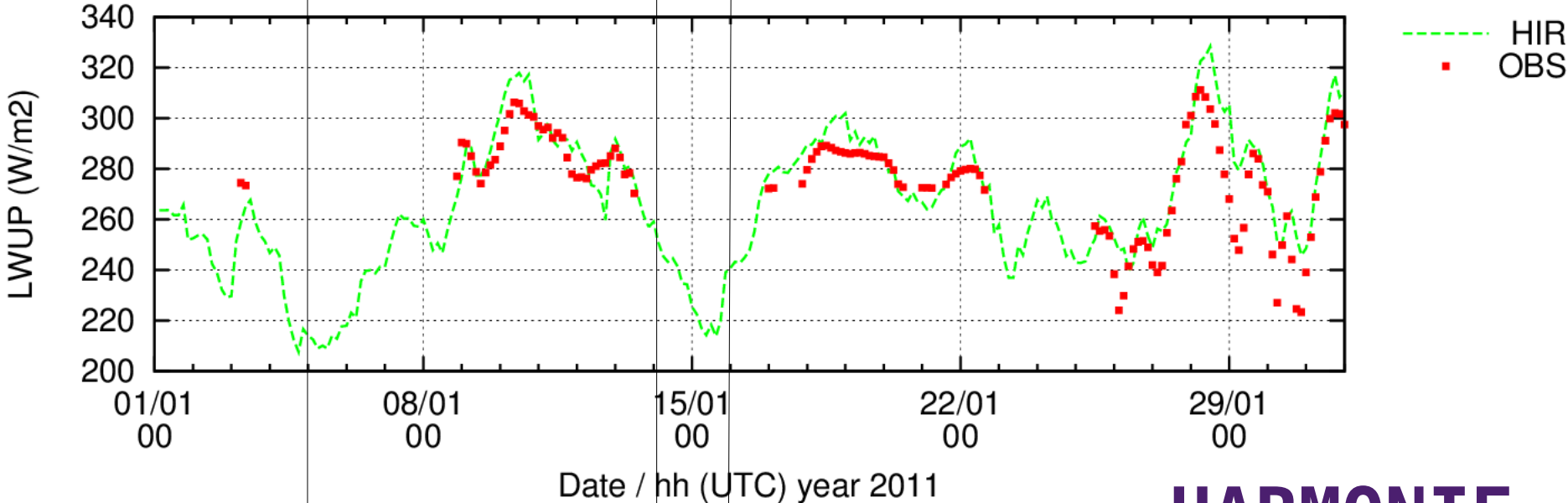
# Problems of the operational comparison

Raw unchecked observations  
Only LWUP and SWDN

More observations are available  
via [litdb.fmi.fi](http://litdb.fmi.fi)

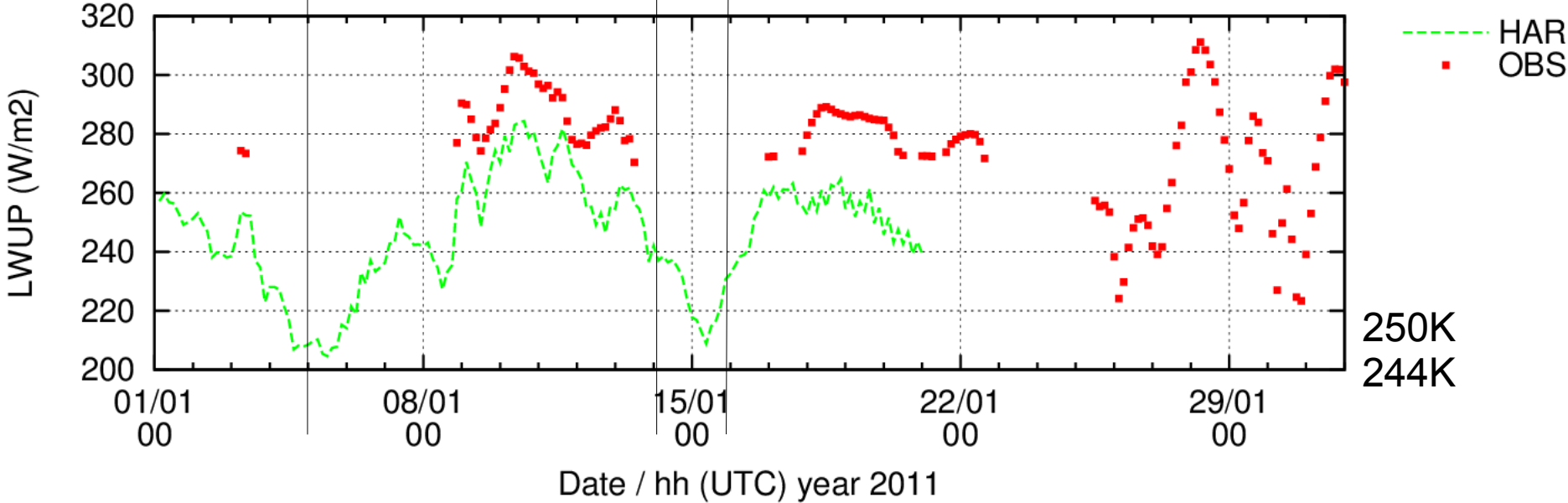
# HIRLAM

Station Sodankyla surface LWUP



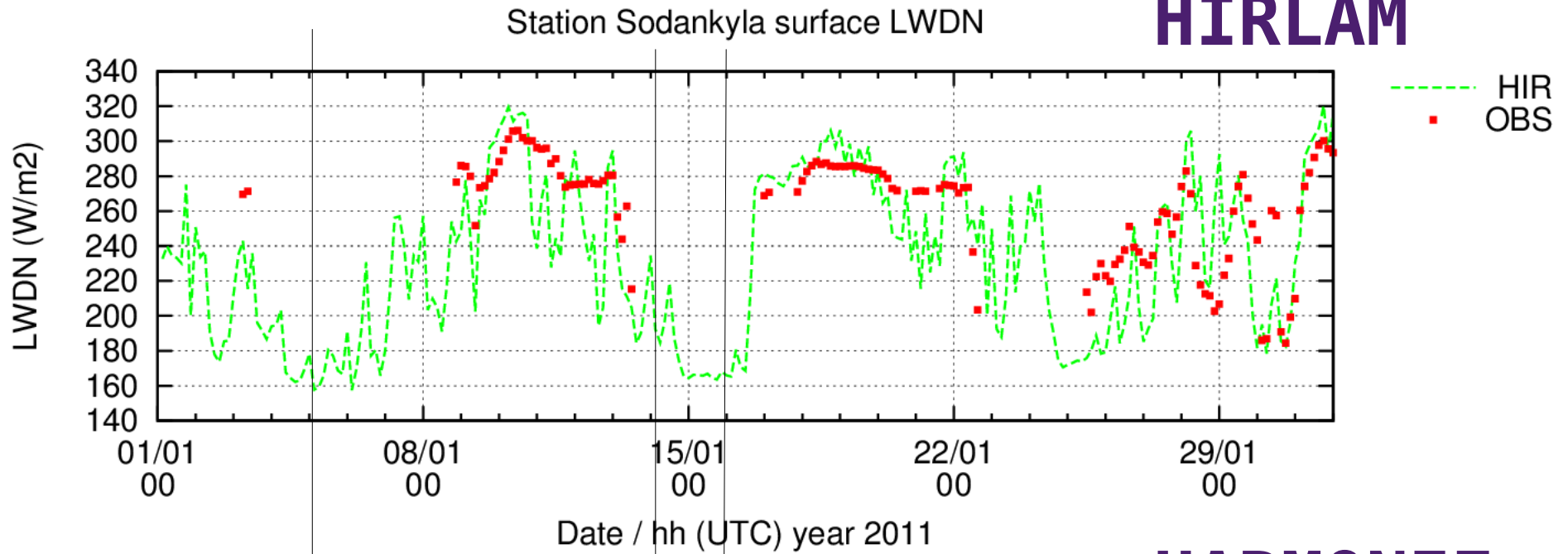
# HARMONIE -AROME

Station Sodankyla surface LWUP

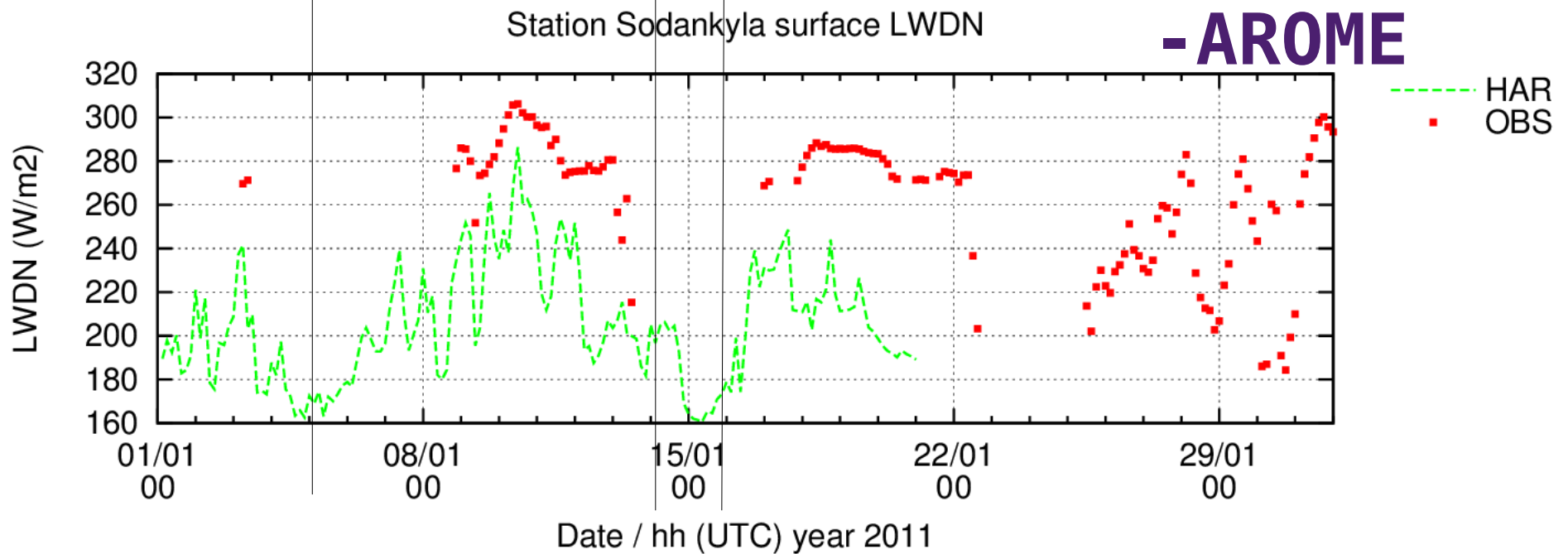


250K  
244K

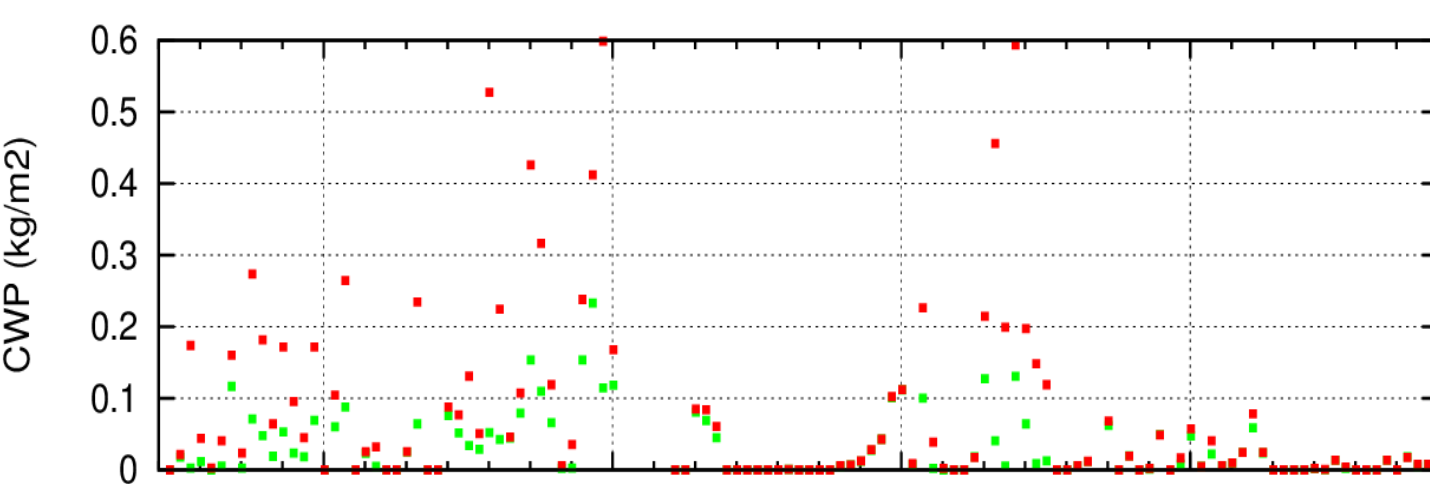
# HIRLAM



# HARMONIE -AROME

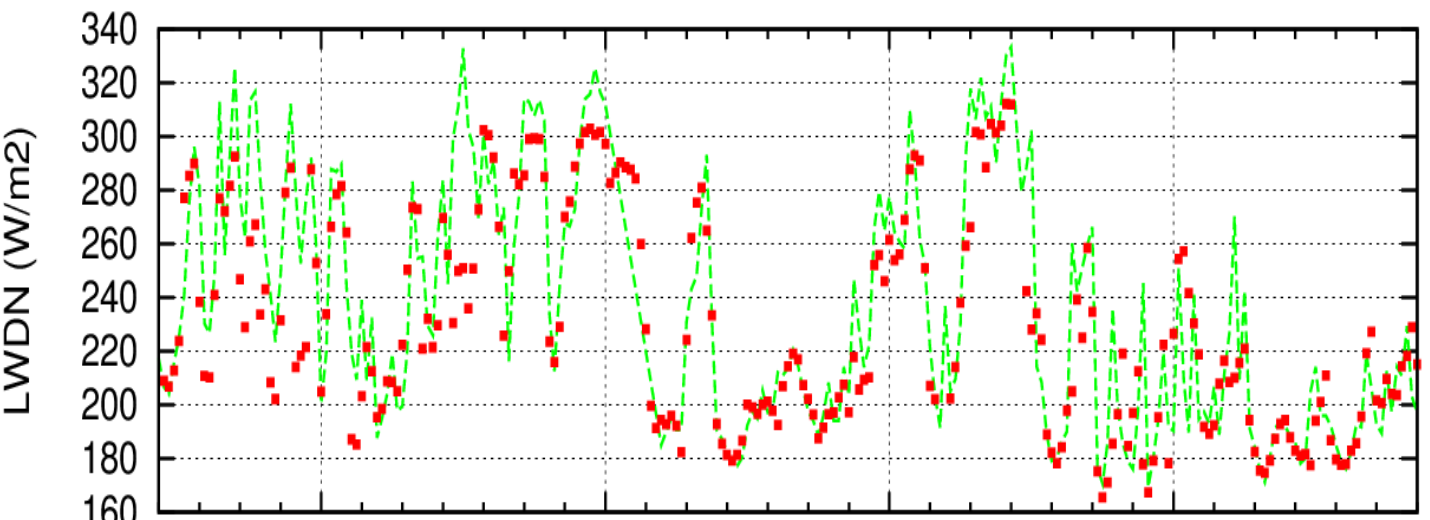






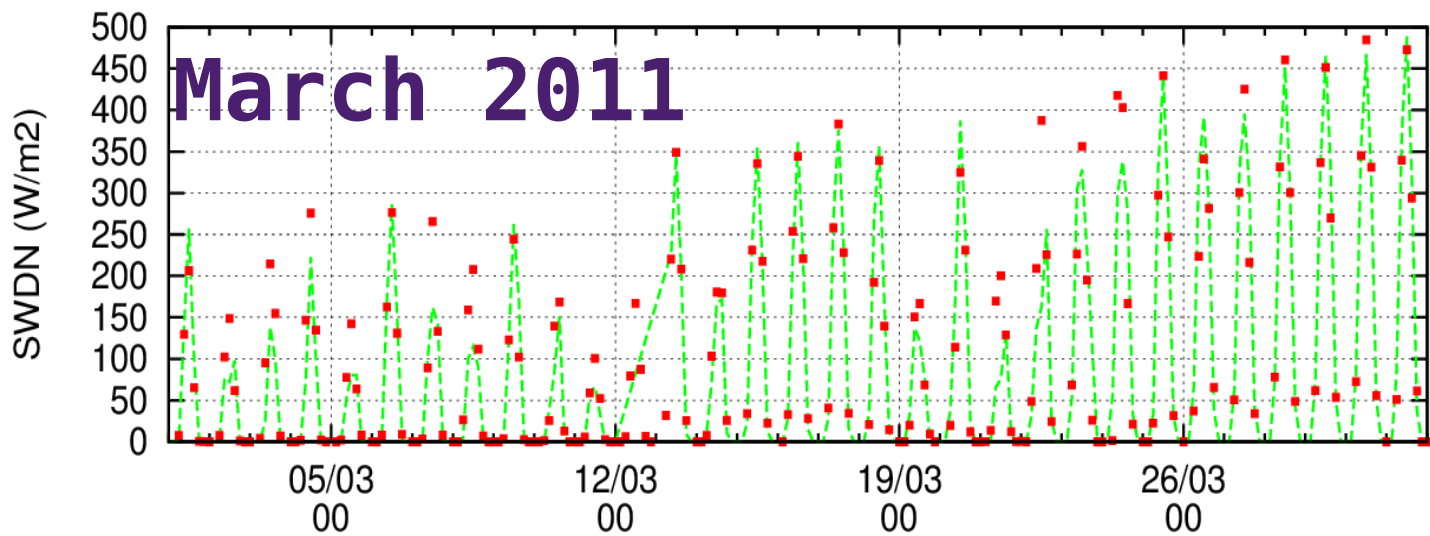
■ CI  
■ CW

**HIRLAM  
cloud:  
CIP, CWP**




--- HIR  
■ OBS

**HIRLAM  
v.s. obs  
LWDN**



--- HIR  
■ OBS

**HIRLAM  
v.s. obs  
SWDN**

The background of the slide shows three tall, lattice-structured communication towers standing against a sky with soft, colorful clouds from a sunset or sunrise. The towers are connected by thin cables. The bottom of the image shows a dark silhouette of a forest.

**More studies are  
possible and  
needed!**

**THANK YOU!**