

**WORLD METEOROLOGICAL ORGANIZATION**

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**Joint Meeting of  
CBS Expert Team on Surface-based  
Remotely-Sensed Observations  
(First Session)  
*and*  
CIMO Expert Team on Remote Sensing  
Upper-air Technology and Techniques  
(Second Session)**

**Geneva, Switzerland, 23-27 November 2009**

CBS-CIMO Remote Sensing/  
Doc. 6(4)

(18.XI.2009)

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ITEM: 6

Original: ENGLISH ONLY

**DEVELOP GUIDANCE AND METHODOLOGY FOR SURFACE BASED REMOTE SENSING  
MONITORING**

**Report from Switzerland**

*(Submitted by Dominique RUFFIEUX)*

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**Summary and Purpose of Document**

The document presents a brief overview of the methods used for surface-based remote sensor monitoring in Switzerland.

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***ACTION PROPOSED***

The meeting will be invited to develop the methodology and standard guidance material that can be used for the monitoring of surface-based remote sensor systems.



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

Swiss Confederation

Federal Department of Home Affairs FDHA  
**Federal Office of Meteorology and Climatology MeteoSwiss**

# **Ground-based remote sensing – MeteoSwiss network, QC/QA, maintenance, and statistics**

Dominique Ruffieux

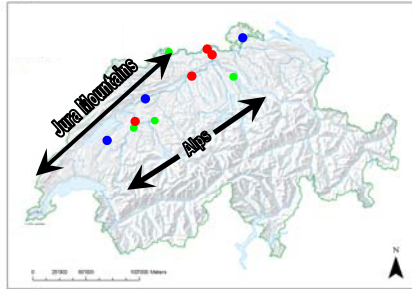


# CN-MET network

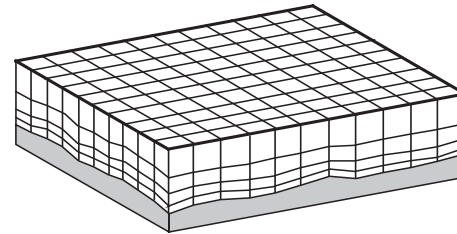


# Solution : CN-MET

Measurement network



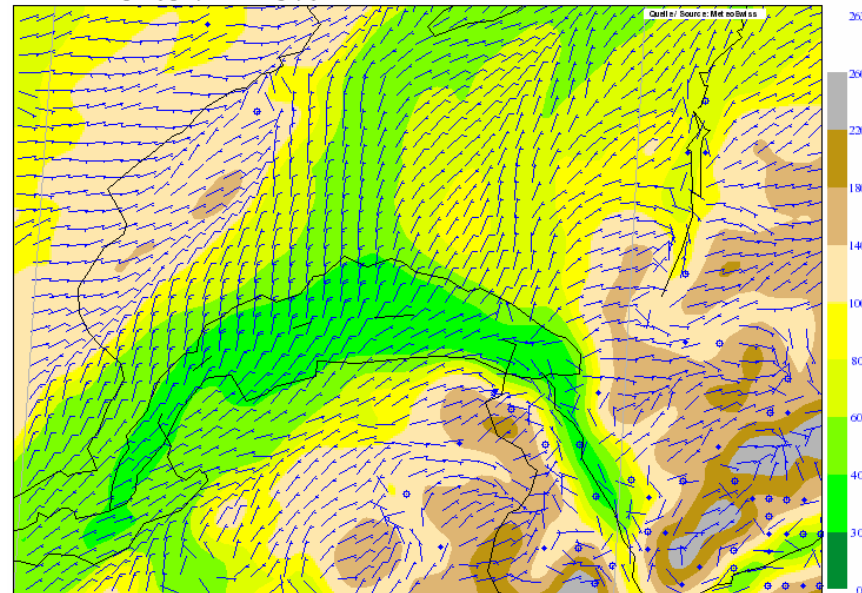
NWP model



**+**  
assimilation

High resolution 4-dimensional view of the meteorology over the Swiss plateau

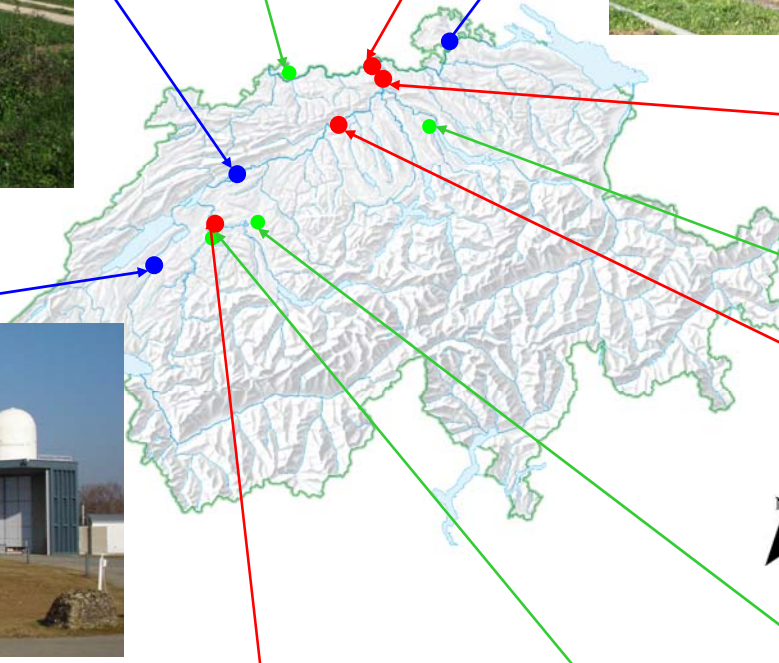
COSMO-2 Analysis for: **Wed 14 Oct 2009 06 UTC** Version: **opr 2km (871)**  
10m WMO wind flag every grid point and Orography Run: **14.10.2009 06UTC+0h**



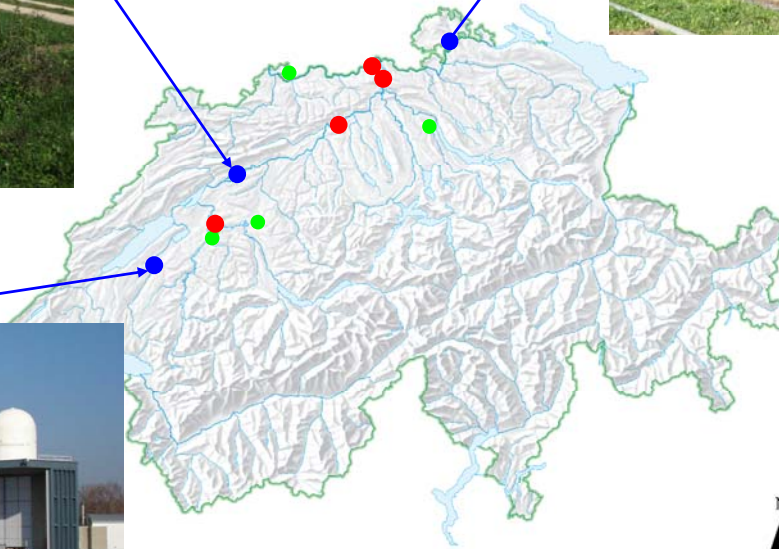
→ Clients

**=**  
verification and  
comparison and  
redundancy

# A dedicated network



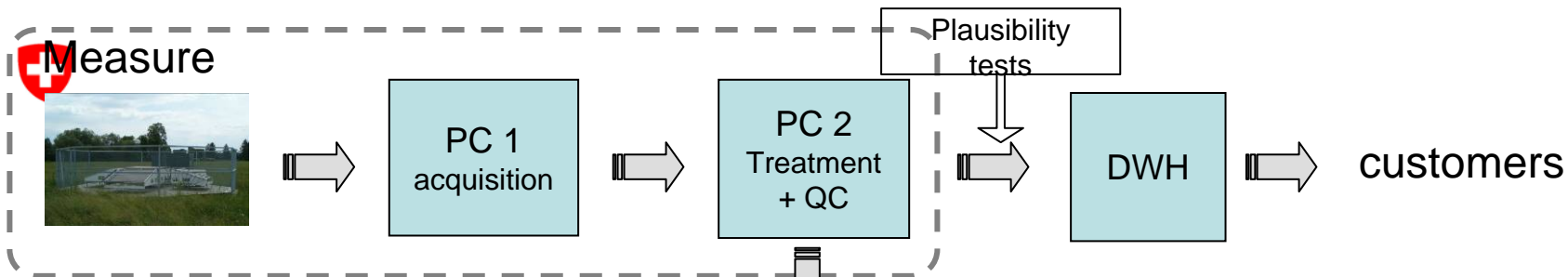
# A dedicated network



- Temperature profiles
- Water vapor profiles
- Wind speed and direction profiles

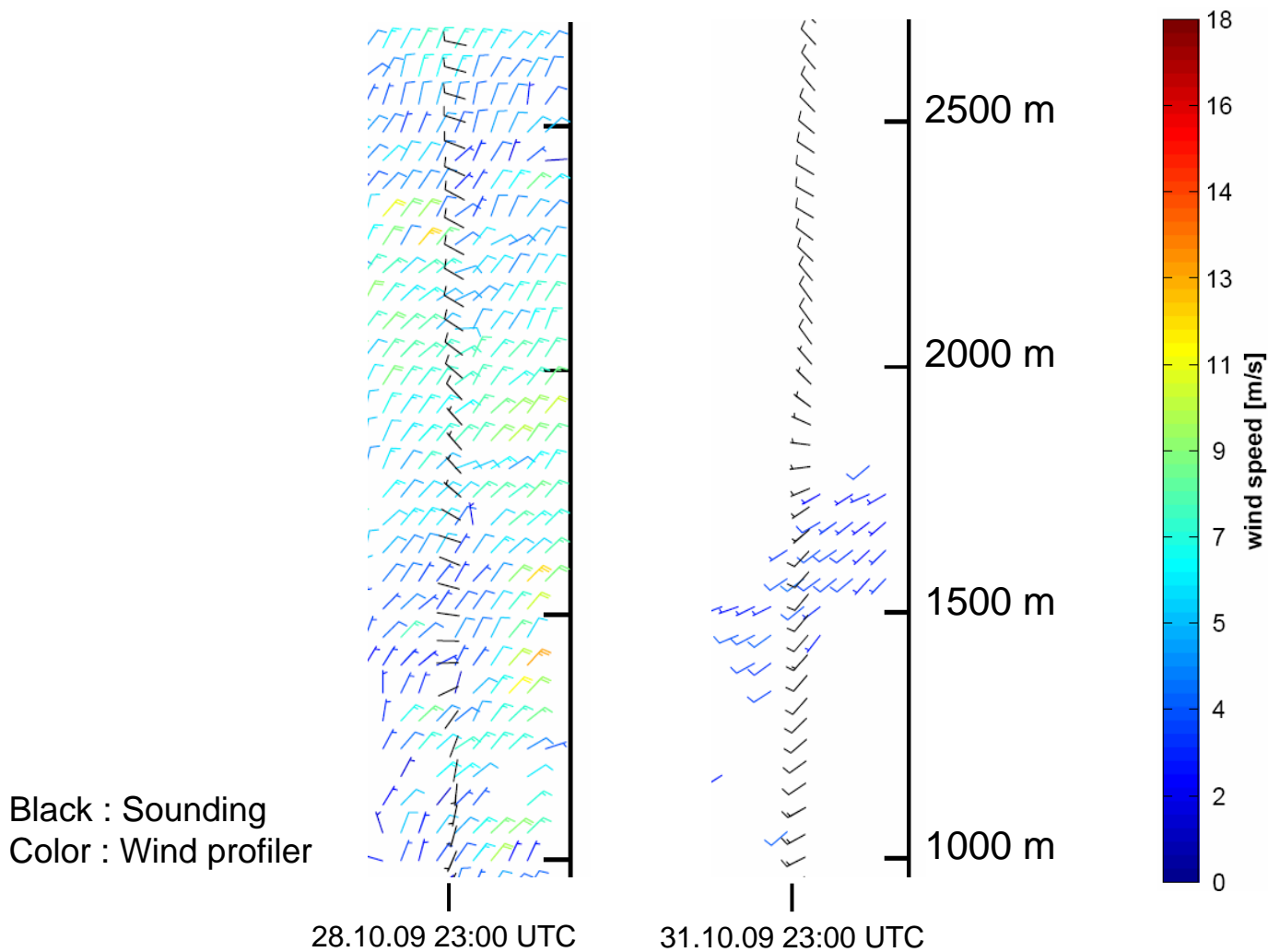


# QC/QA



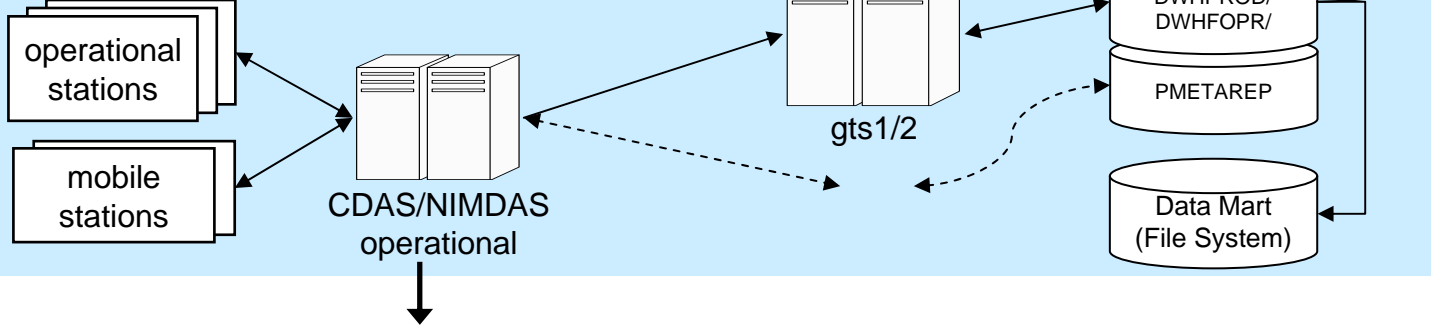
Without QC

With QC





# Operational chain ZUE



Internal & external customers

- NWP models
- Data centres
- Forecasters
- ....

The screenshot shows the 'SwissMetNet console' window. The main area is a map of Switzerland with numerous meteorological station locations marked by colored dots and labeled with codes such as SHAW1, BEZ1, WYF2, etc. The window title is 'MetConsole - [WESTAB\_MapDisplay]'. At the top right, it shows 'Alarm ID: #122' and 'Description: O.O.Communications fault'. Below the map, there are several tabs: 'MeteoData', 'MapDisplay', 'HouseKeeping', 'MeteoTrend1', 'MeteoTrend2', 'MeteoTrend3', 'HouseKeepTrend', and 'MiscTrend'. In the bottom right corner, there is a notification bubble that says 'Installing device driver software'. The system tray at the bottom right shows the time as 3:05 PM.

## SwissMetNet console

Daily check (week days)



# Maintenance



Concept Maintenance CN-MET includes:

- Preventive maintenance and care by the CN-Met upper-air network technician on a **monthly basis**
- Preventive maintenance and care by the instrument suppliers on a **yearly basis**, as part of the 3<sup>rd</sup> level support agreement
- Corrective maintenance in case of **failure of components**
- Instrument life cycle management (**ILC**)
- **Spare parts** management
  
- **Documentation**



Marque	Degrewind	Marque	Radiomètre micro-ondes
Type	PCL-1300	Type	Radiometer Physics GmbH
Désignation	Radar à vent	Désignation	RPG TEMPRO & HATPRO
Manufacture	Degreane-Horizon	Manufacture	Meckenheim, Germany
Emplacement	PAY - Payeme	Emplacement	PAY - Payeme
	GRE - Granges		GRE - Granges
	SHA - Schaffhouse		SHA - Schaffhouse

	Périodicité journalière											
	07 00	08 00	09 00	10 00	11 00	12 00	13 00	14 00	15 00	16 00	17 00	18 00
OPERATIONS DE MONITORING A DISTANCE CN-MET												
Opération de télécontrôle sur METCONSOLE			SAP							SAP		
Contacts téléphonique avec surveillance locale en cas de défaillance												

	Périodicité annuelle											
	jan	fév	mar	avr	mai	juin	juil	août	sep	oct	nov	déc
OPERATIONS DE MAINTENANCE CN-MET												
Executer l'inspection techniques mensuelle selon check-list	S/G/P	S/G/P	S/G/P	S/G/P	S/G/P	S/G/P	S/G/P	S/G/P	S/G/P	S/G/P	S/G/P	S/G/P
Calibration sur site bi-annuelle			PAY	GRE	SHA				PAY	GRE	SHA	
Commande d'azote liquide sur site												
Grande révision sur site annuelle			PAY				SHA				GRE	

**Outillage technique**

Valise d'outillage électronique et électro-mécanique  
 Valise de visseries  
 Set de calibrages  
 Equipements de nettoyages (pattes, ciseaux, alcool)

**Outillage de diagnostics :**

Peak Power analyser / Hewlett Packard 8991A  
 Signal generator HF / Rohde & Schwarz SMT03 SMB4  
 FFT analyser Hewlett-Packard 35660A  
 Attenuator 40 dB / Alcatel 16-4475  
 Spectrum analyser Adantes R3316A (9kHz - 2.6GHz)  
 Oscilloscope / Tektronics 2445 (bandwidth = 150MHz)  
 Multimeter Fluke 77 VDC - VAC  
 Network analyser / Hewlett-Packard 8753B et 85046A

**Documentations techniques Degreane chez MCH**

DEGREWIND PCL 1300 - TECHNICAL HANDBOOK	T303000C	Janvier 2003
DEGREWIND PCL 1300 - MAINTENANCE MANUAL	T302037A	Juillet 2002
WIND PROFILER PCL 1300 - USER MANUAL ACQUISITION COMPUTER	T973108J	Mai 2007
DEGREWIND PCL 1300 - PROCESSING COMPUTER	T398050J	Mai 2007
DEGREWIND PCL 1300 - HARDWARE MAINTENANCE MANUAL	T305103B	Sept 2006
WIND PROFILER PCL 1300 - USER MANUAL ACQUISITION COMPUTER	T973108I	Nov 2006
DEGREWIND PCL 1300 - PROCESSING COMPUTER	T398050I	Nov 2006





# Statistics

- Internal statistics (comparisons with radiosoundings)
- **EUMETNET – WINPROF statistics (wind profilers + weather radar winds)**  
[http://www.metoffice.gov.uk/science/creating/working\\_together/index.html#/index.html](http://www.metoffice.gov.uk/science/creating/working_together/index.html#/index.html) (username : metscience password : sc1ence)
- EUMETNET – EUCOS statistics  
<http://www.dwd.de/eucos> (password protected)

# Current European Wind Profiler Network

Network of weather radar winds

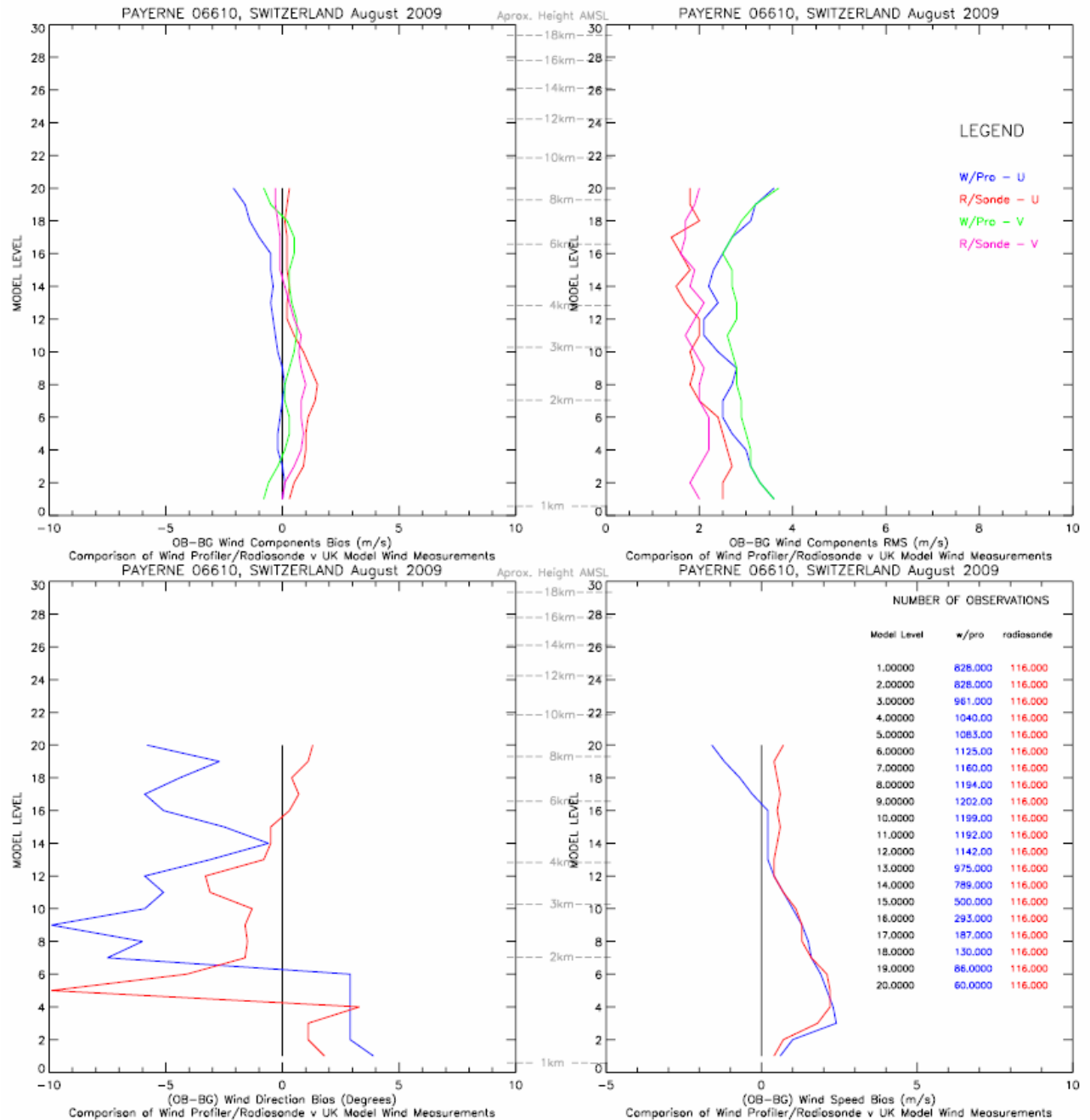
## Network of windprofilers

Markers on the map below to view wind profiler site information. Use the zoom side bar on the left





# Comparison with UK-Met model, August 2009







# Statistics

- Internal statistics (comparisons with radiosoundings)
- EUMETNET – WINPROF statistics (wind profilers + weather radar winds)  
[http://www.metoffice.gov.uk/science/creating/working\\_together/index.html#/index.html](http://www.metoffice.gov.uk/science/creating/working_together/index.html#/index.html) (username : metscience password : sc1ence)
- **EUMETNET – EUCOS statistics**  
<http://www.dwd.de/eucos> (password protected)





## Comparison results of E-WINPROF observations against NWP

currently used model: COSMO-EU (DWD)

Parameter	Day
WIND count	Number of wind observations compared against NWP
WIND mvd	Wind Mean Vector Difference (m/s)
WIND rmsvd	RMSE of Wind Mean Vector Difference (m/s) > 5.0 m/s > 8.0 m/s
WIND speed bias	Bias of wind speed (m/s)
WIND speed rmse	RMSE of wind speed (m/s)
WIND dir bias	Bias of wind direction (°)
WIND dir rmse	RMSE of wind direction (°)
u bias	Bias of u component (m/s)
u rmse	RMSE of u component (m/s)
v bias	Bias of v component (m/s)
v rmse	RMSE of v component (m/s)



Day #

Monthly average

Station ID

06610

Payerne

06620

Grenchen

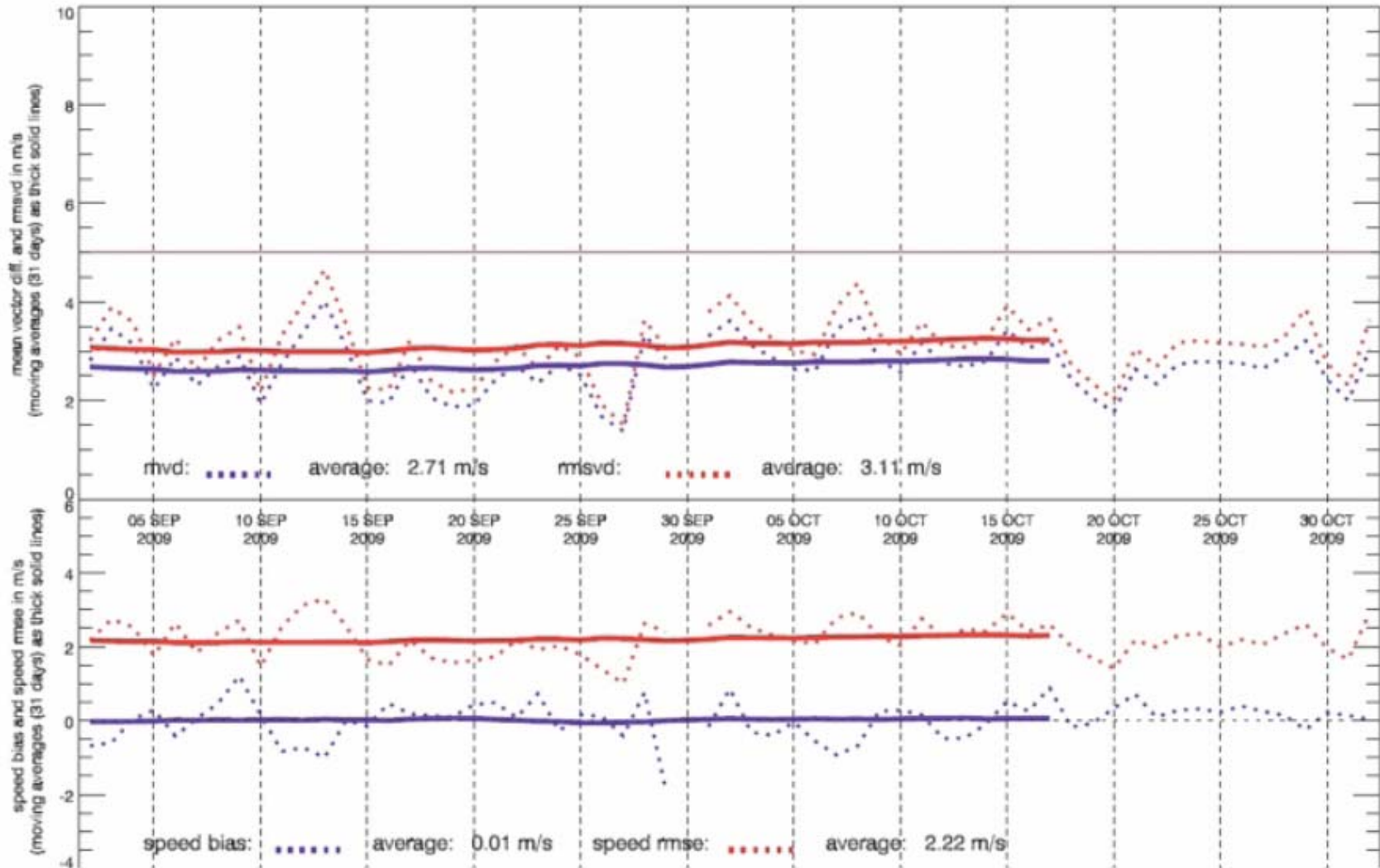
06632

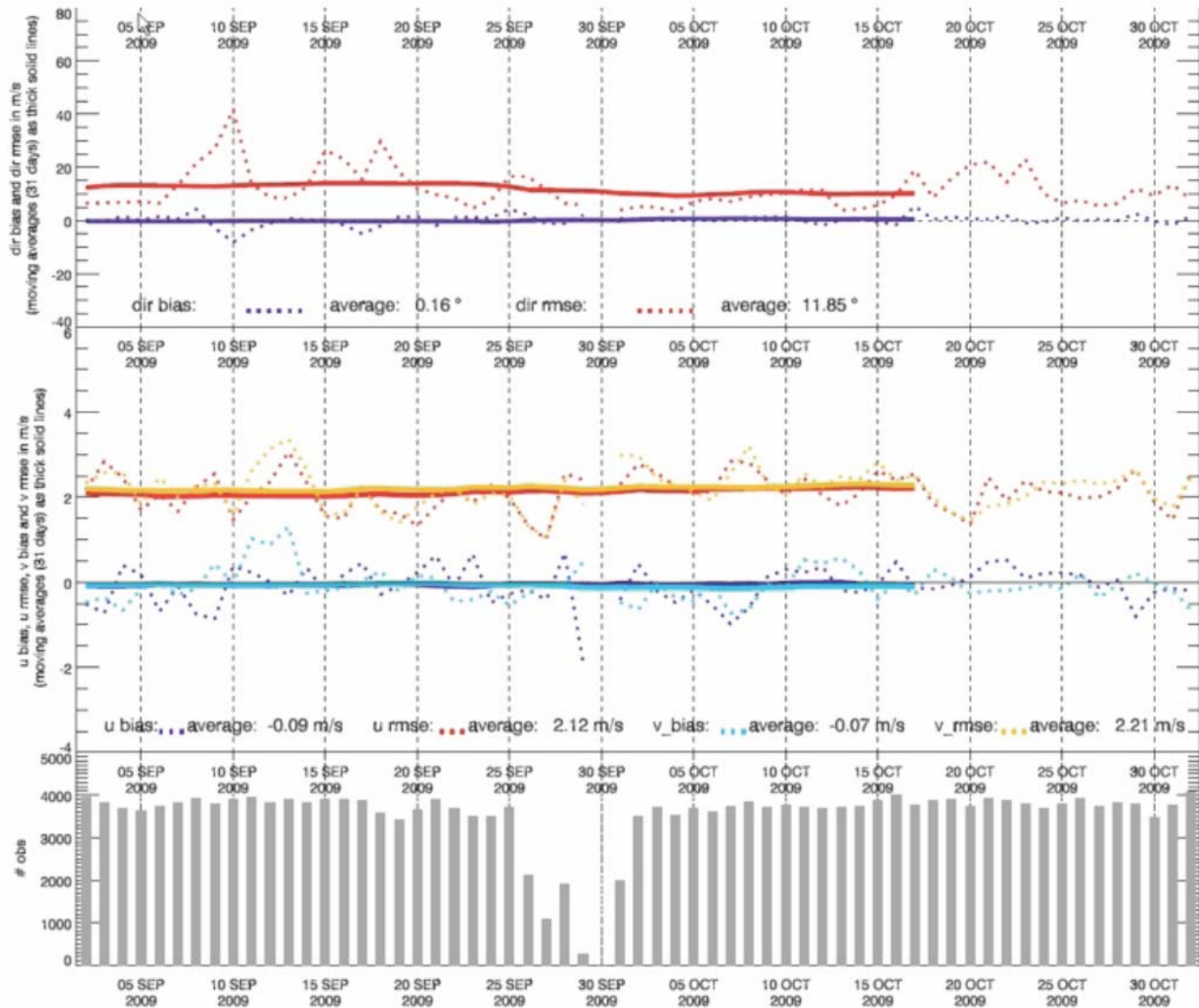
Schaffhausen

07112

Day #	3.9	3.0	2.2	3.5
0.0	-0.7	-0.5	-0.8	0.1
2.3	3.1	3.0	1.8	2.3
1,063	800	1,167	1,431	1,240
3.2	2.8	4.3	3.1	2.7
3.6	3.1	4.9	3.5	3.0
-0.3	-0.2	-0.8	0.0	-0.7
2.5	2.0	3.3	2.4	2.2
0.3	-0.6	-1.6	-1.3	-1.1
11.1	10.3	10.8	10.2	7.0
-0.5	-0.1	-0.9	-0.3	-0.7
2.5	1.8	3.1	2.3	2.2
-0.3	0.0	0.1	1.0	0.0
2.6	2.4	3.7	2.6	2.1
854	913	1,153	1,590	1,476
2.9	2.5	4.3	2.9	3.5
3.2	2.8	4.9	3.2	3.9
0.0	-0.3	-1.2	-0.3	-0.5
2.2	1.9	3.6	2.4	3.0
-1.1	1.5	1.8	-2.4	0.9
9.0	9.9	13.3	10.5	9.7
0.0	-0.1	-0.8	-0.4	-0.3
2.2	1.9	3.5	2.3	3.1
0.2	-0.4	-0.9	0.1	-0.7
2.2	2.0	3.3	2.1	2.3
1,010	958	1,184	1,547	1,313
3.4	3.5	5.2	4.0	3.9
3.9	4.0	5.9	4.5	4.3
-0.4	-0.9	-0.9	-0.3	-0.3
2.8	2.8	4.1	2.6	3.0
-2.1	-3.9	-4.0	-6.3	-3.8
10.8	13.8	13.3	14.5	9.3
-0.6	-1.4	-1.8	-0.9	-0.8
2.7	2.9	4.1	2.6	2.9
0.3	0.3	0.8	1.9	1.1
2.7	2.6	4.2	3.6	3.2
898	964	860	662	880
3.9	4.8	5.1	4.6	4.6
4.3	5.5	5.8	5.1	5.2
-0.1	-0.1	0.9	2.0	0.7
3.0	3.6	4.3	3.8	3.4
3.6	3.2	0.9	1.3	2.6
8.7	9.2	7.7	9.5	6.7
0.4	0.7	1.0	2.0	1.3

timeseries of daily mean **wind profiler** OBS-MOD differences  
as obtained in COSMO-EU model domain:  
**wind profiler: 10266**

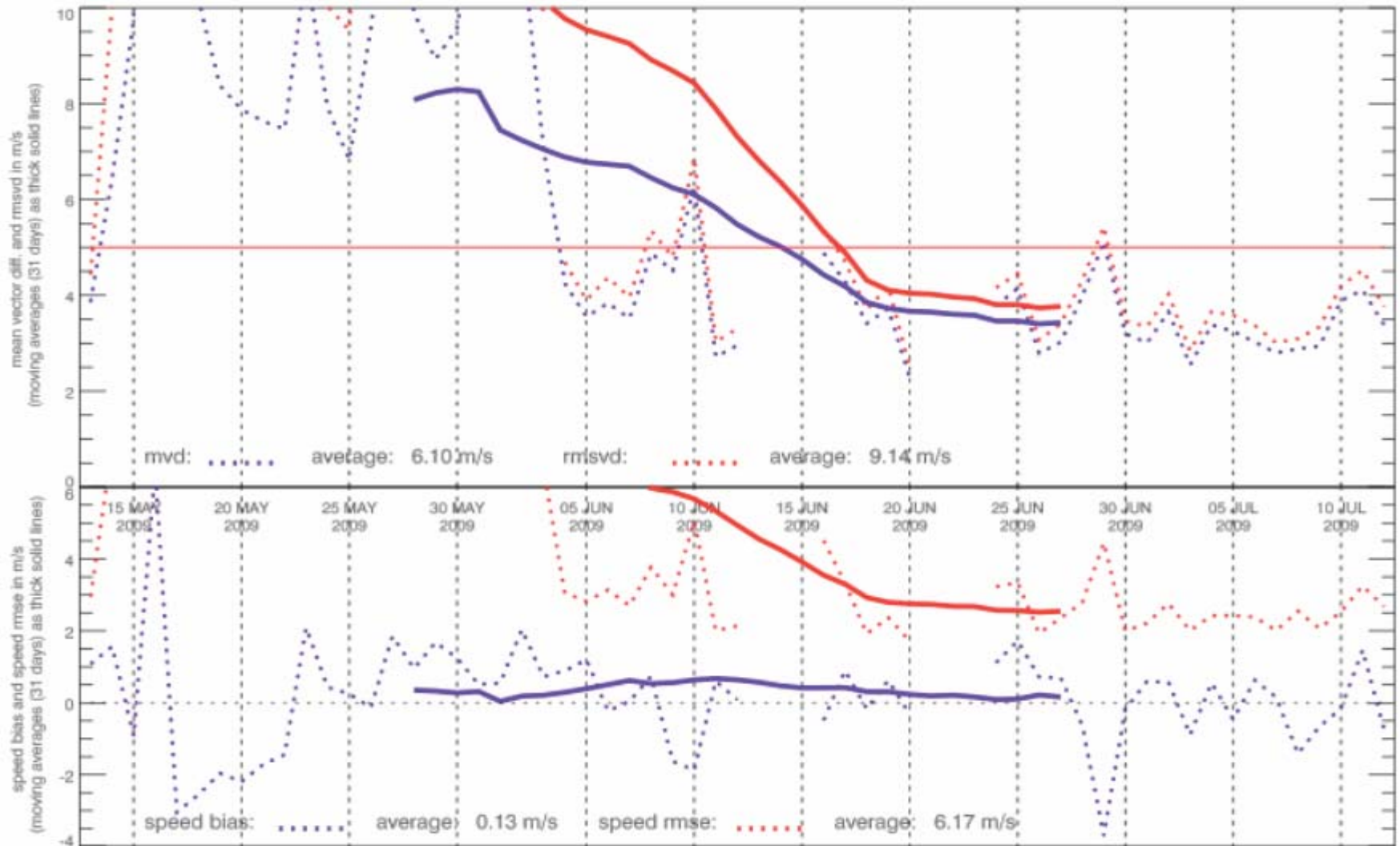




# June 03 - Change of QC (according to comment in configuration file)

## June 16 - final modifications

### Windprofiler 08031





# Summary

- Ground-based remote sensing systems are powerful but are
    - complex systems (signal processing),
    - subject to hardware failures,
    - subject to contamination,
    - difficult to « calibrate ».
- ➔ There is a need for local knowhow.
- ➔ There is a need for international collaboration (central hub).