WG3 Field experiments for EG_Climet

Net_ FAM workshop Olso.

Catherine Gaffard, John Nash, Alec Bennett

WG3 scope

Goal: Make recommendation on an optimal mix of observations and the spatial structure of the network, depending on the application : high resolution NWP /climate applications ,

Based on results from testbed experiments monitored and coordinated by the working group.

WG3 will try to

- Facilitate the exchange of information and instrumentations for different field experiments in Europe.

What will be available for the action

 a) Localised fully equipped integrated profiling stations like :

- Lindenberg , Cabauw, Palaiseau , Chilbolton

  Advantage of long archive,

  - suited to improve and validate   profiling   retrievals

b) Network of integrated profiling stations with other observing systems

- Helsinki test-bed (Finland)

- Hymex field campaign (France)

- Luami field campaign (Germany)

- Fund test-bed (UK)

  Advantage of 3 dimensional network observations,

  -more suited to data assimilation evaluations.

WG3 wish to co-ordinate with other wg to:

- Test the optimisation of existing networks (ie: ceilometer, GPS) [Wg1&4]

- Test improved retrieval techniques (e.g. integrated profiling techniques) [WG1&4]

- To develop and test options for network configuration and density,[WG2&4]

- Test assimilation: case studies on ability of the model to show detailed features:

   ie front, mesoscale system, evolution of the PBL and impact on the weather forecast

Explore the opportunities to combine existing field experiments in order to**:**

provide suitable data to evaluate NWP model performance [WG2]:

   - Check model mean climatology and variability,

    -(O-B) statistics

   Validate the covariance matrix of background error [all WG].

Provide regional statistics over the European domain for climate

Future Upper air network test_bed (FUND UK Met Office project)

- **Meet User Requirements. (i.e. Higher spatial and temporal resolution) for high resolution model (1km grid) for winds, temperature, humidity, cloud profile**

- **Resolve structures of mesoscale storms on a scale of less than 100 km**

- **Large-scale' project to produce costed options for the future (2010 – 2020)**

Future Upper Air requirements? Needs further discussion with users.

UK Regional NWP requirement	Boundary layer temperature (K)			Lower troposphere temperature (K)			Lower troposphere relative humidity (%)			Horizontal wind component (u,v) (ms^{-1})		
	Min	Brk	Max	Min	Brk	Max	Min	Brk	Max	Min	Brk	Max
Accuracy	1.5		0.5	1.5		0.5	10		5	3		1
Vertical resolution (km)	0.5	.03	.01	2	1	0.1	2	1	0.1	2	1	0.1
Horizontal spacing of network (km)	10	10	1	200	30	3	200	30	3	200	30	3
Time between Observations (h)	3		.16	12	3	0.5	12	3	0.5	12	3	0.5
Delay in delivery to user (h)	3		.08	5		.25	5		.25	5		.25

FUND

- **Dense network needed to be tested around London**

  - **And exploit high time-res 4DVAR**

- **Optimize current network with surface measurements, weather radar and AMDAR**

- **Future network probably a mixture of radiosonde and ground base remote sensing**

- **Ground-based remote will concentrate on the low level troposphere where the Information concentrated and the rapide sampling can captures BL variability and will complement satellite measurement.**

Wind profiler for integration

can provide , in addition to horizontal wind, information on:

- height of significant levels or lid (most of the time)

- Identification of convective boundary layer (when well defined)

- height of cloud top (sometime)

- vertical speed (most of the time)

- height of bright band associated with melting layer (all the time)

- refractive index gradient (possibly)

FUND will test a special design of wind profiler with a narrow vertical beam (4degrees) for better estimation of vertical motion. The exploitation of wind profiler signals to provide more information on the state of the boundary layer is important to the Met Office future operations.
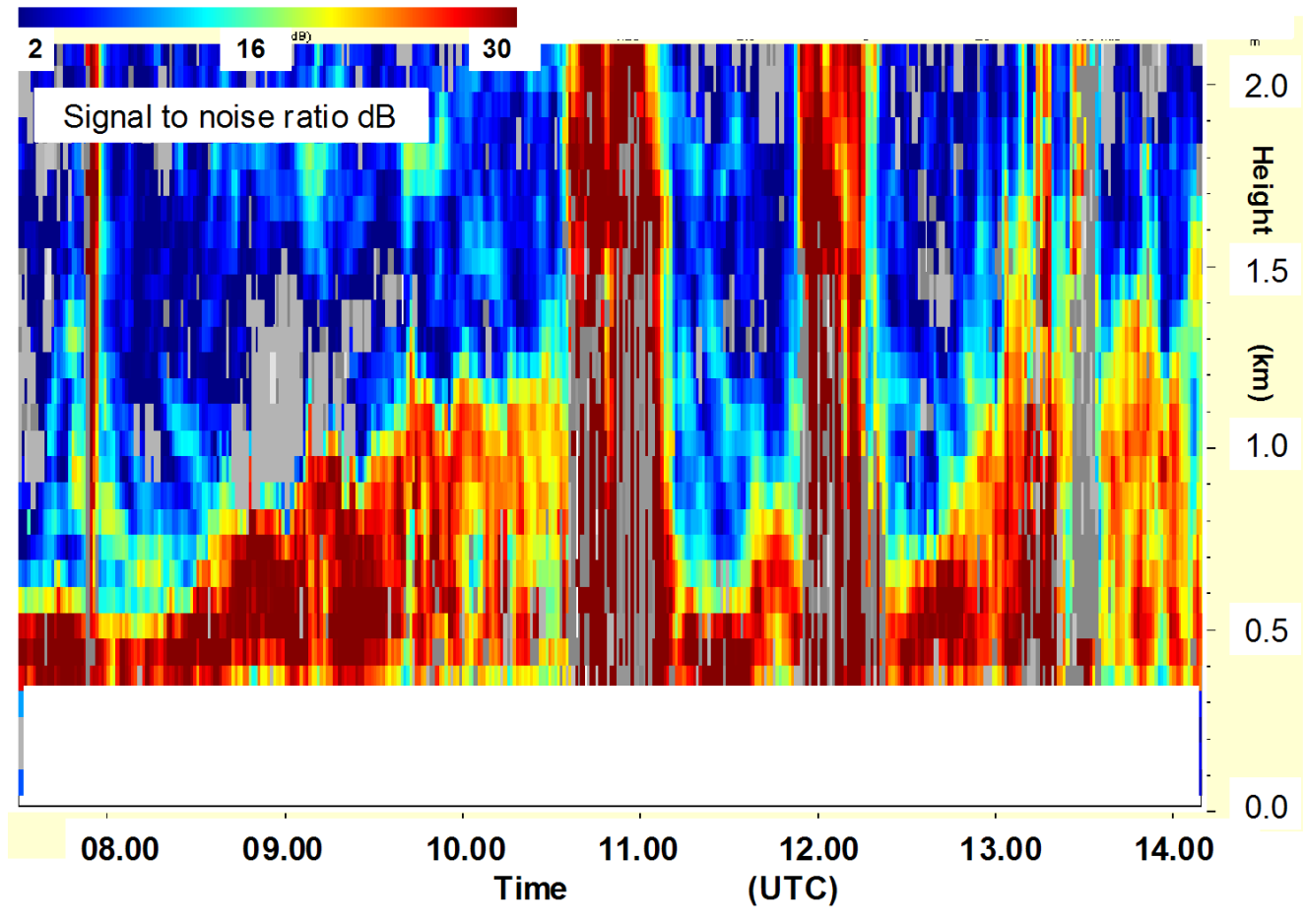
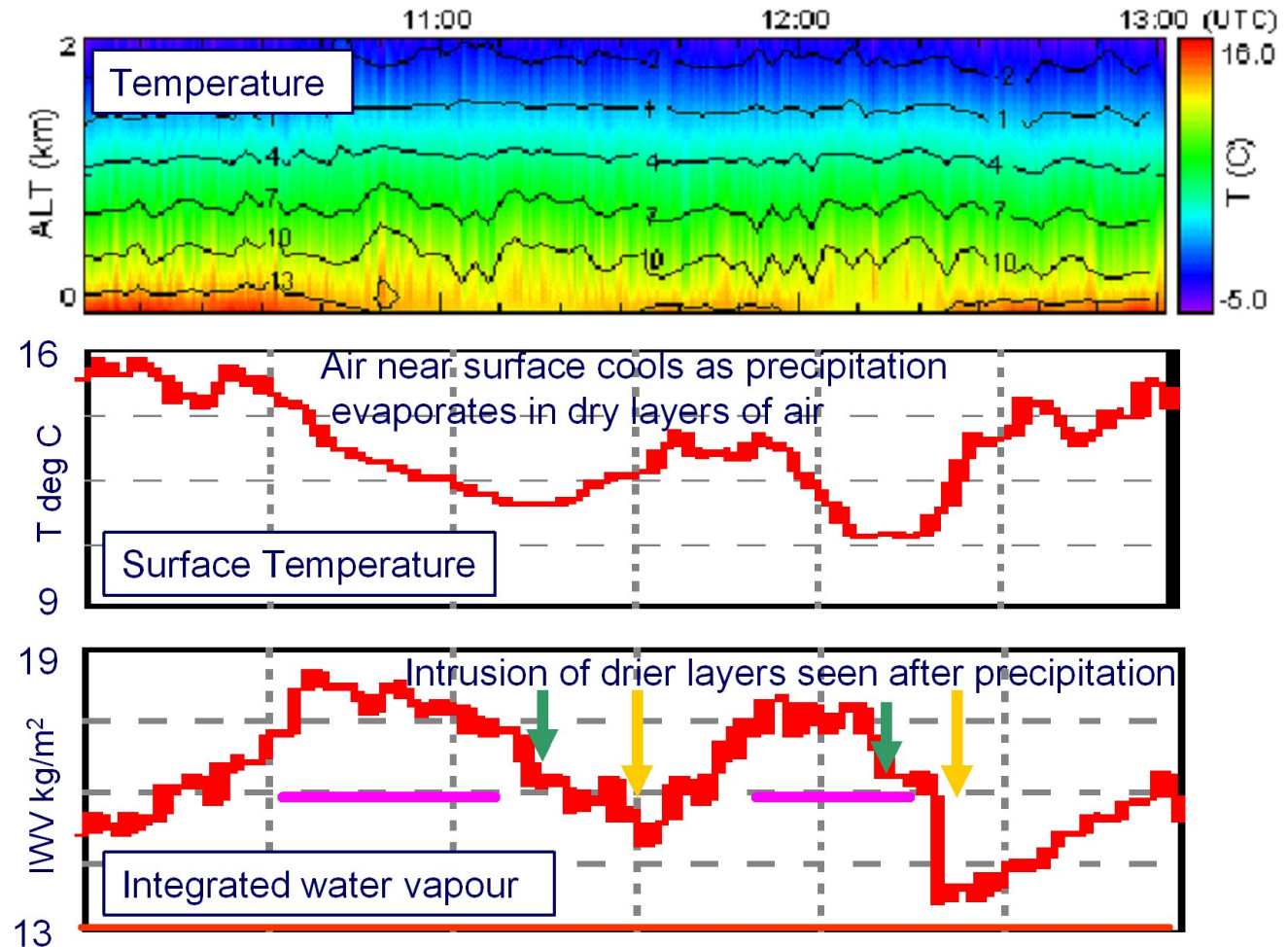# Oscillation of the top of the convective boundary layer. Entrainment?

PCL1300 - WIND PROFILER

Signal to noise

Height km

3

2

1

0

12.00   14.00   16.00

Time UTC
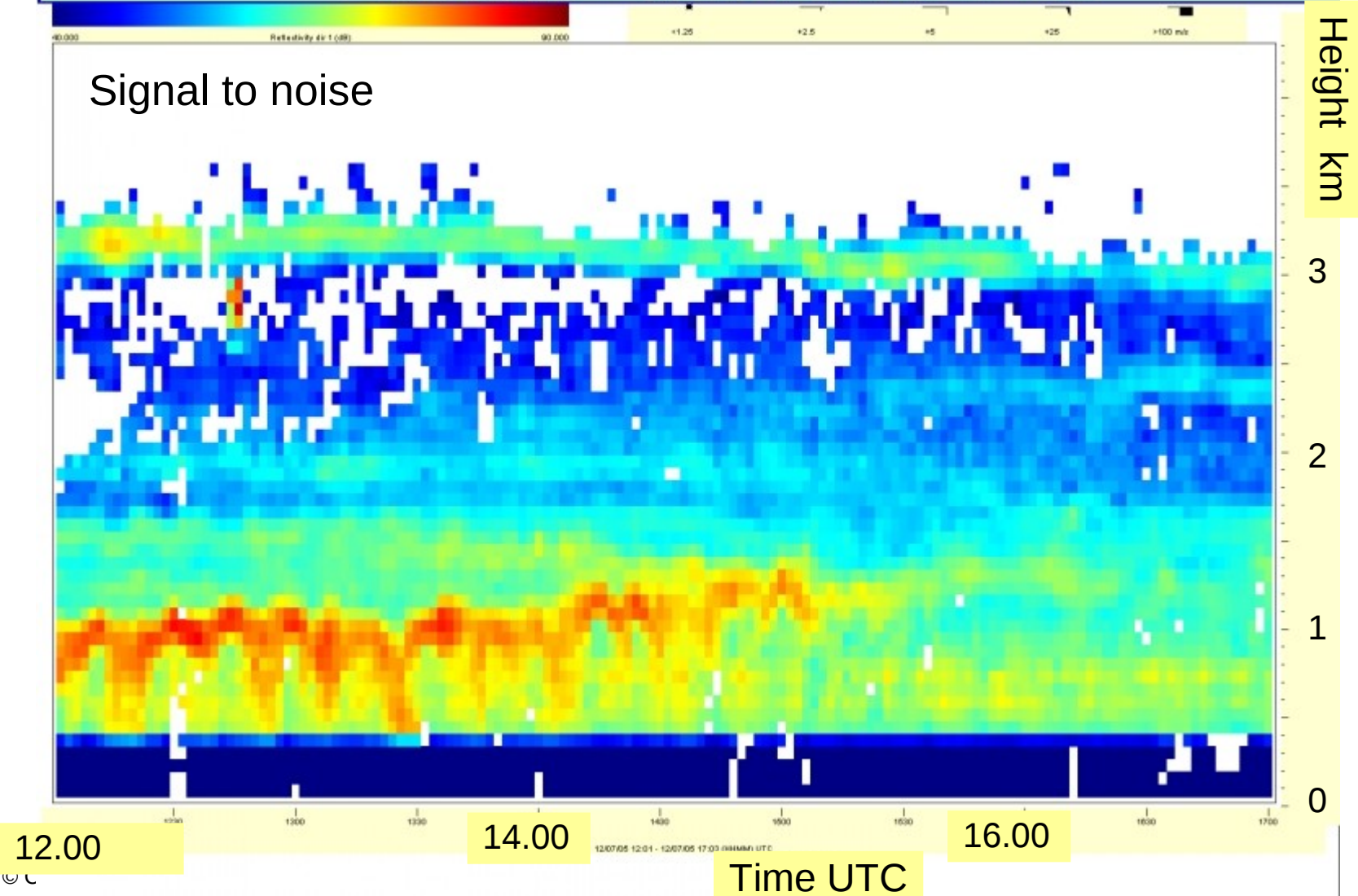
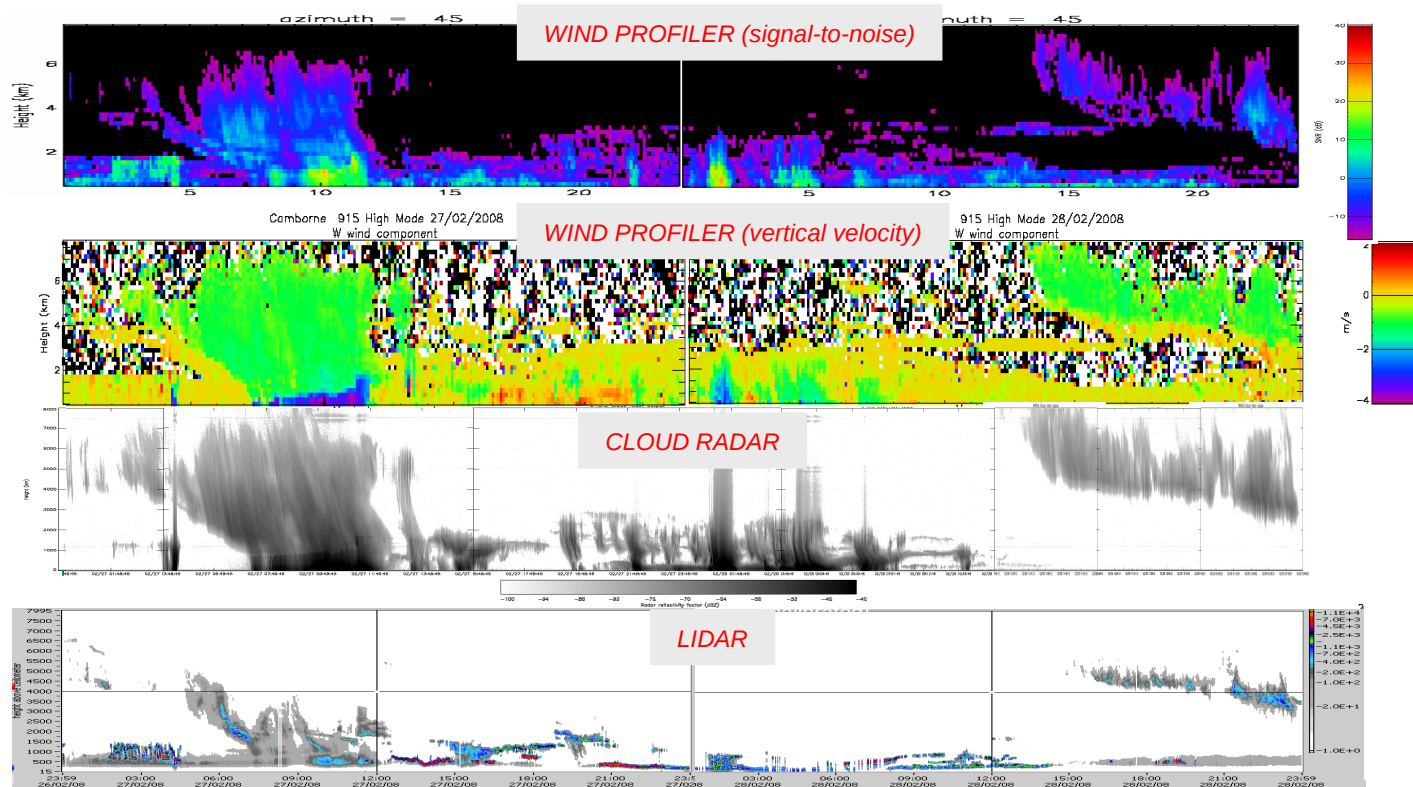# Collapse of the boundary layer due to evaporating cooling.

Collapse of the boundary layer due to evaporating cooling[2] microwave radiometer measurements
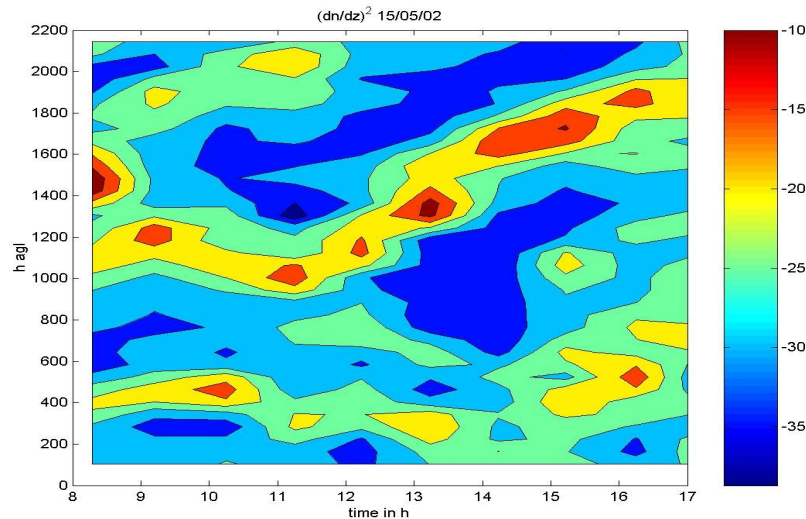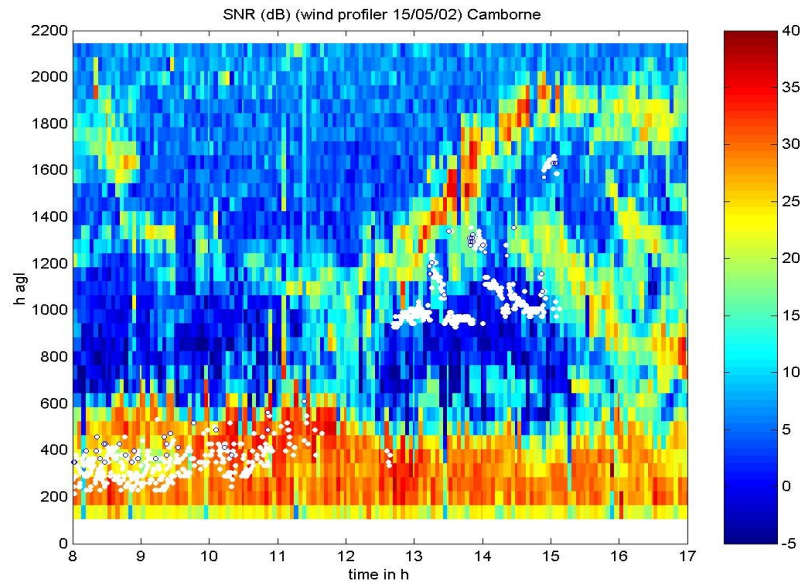
wind profiler,Cloud radar, Lidar

Combined output from Camborne sensors – 27/28 February 2008

**Wind profiler SNR,
+cloud base from ceilometer
(white circle)**

SNR (dB) (wind profiler 15/05/02) Camborne

$(dn/dz)^2$ 15/05/02

**Gradient of the potential
refractive index computed from
the hourly radiosonde profile (dn/
dz)^2**

UK test Bed start: October 2009 finish in 2011....

Integrated profiling site, 2009
Airport with low level aircraft observations
Possible Airport with aircraft observations
Radar VAD
Radiosonde

Chilbolton – planning application in progress

Chilbolton – new wind profiler being delivered this week

Herstmonceux – new radiometer installation

Wattisham – wind profiler will be used in FUND

Questions and answers