

Laseyer Rotor - Dynamics and Climatology follow-up studies

Student Paper

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Laseyer Rotor - Dynamics and Climatology follow-up studies

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January 2010

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1 Wind, temperature and precipitation for Wasserauen and Ebenalp

The following plots show wind direction, wind velocity, temperature and precipitation in Wasserauen as well as wind direction, wind velocity and potential temperature on Ebenalp for selected Laseyer Events between 1998 and 2009.

1 Wind, temperature and precipitation for Wasserauen and Ebenalp

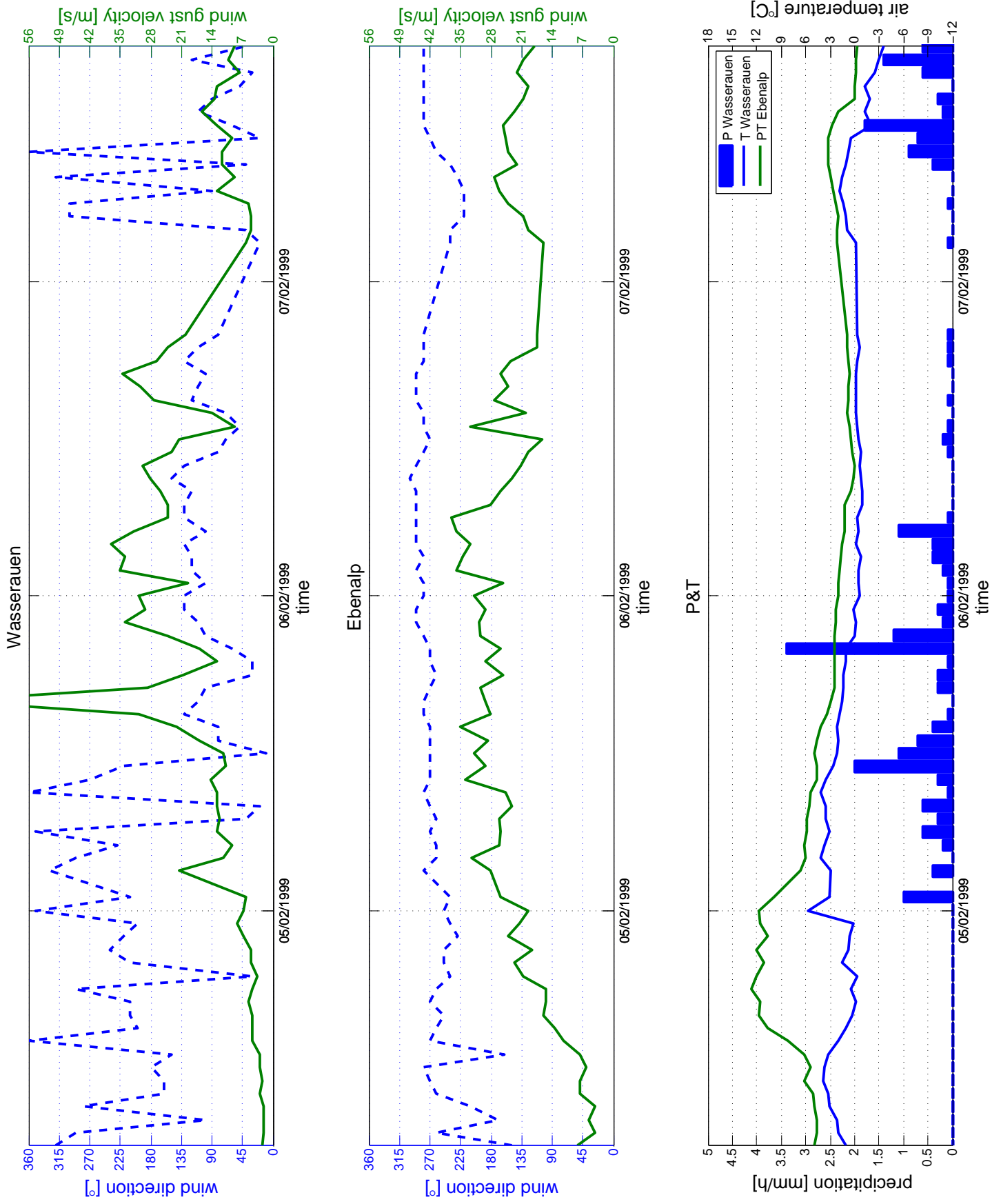


Figure 1.1

1 Wind, temperature and precipitation for Wasserauen and Ebenalp

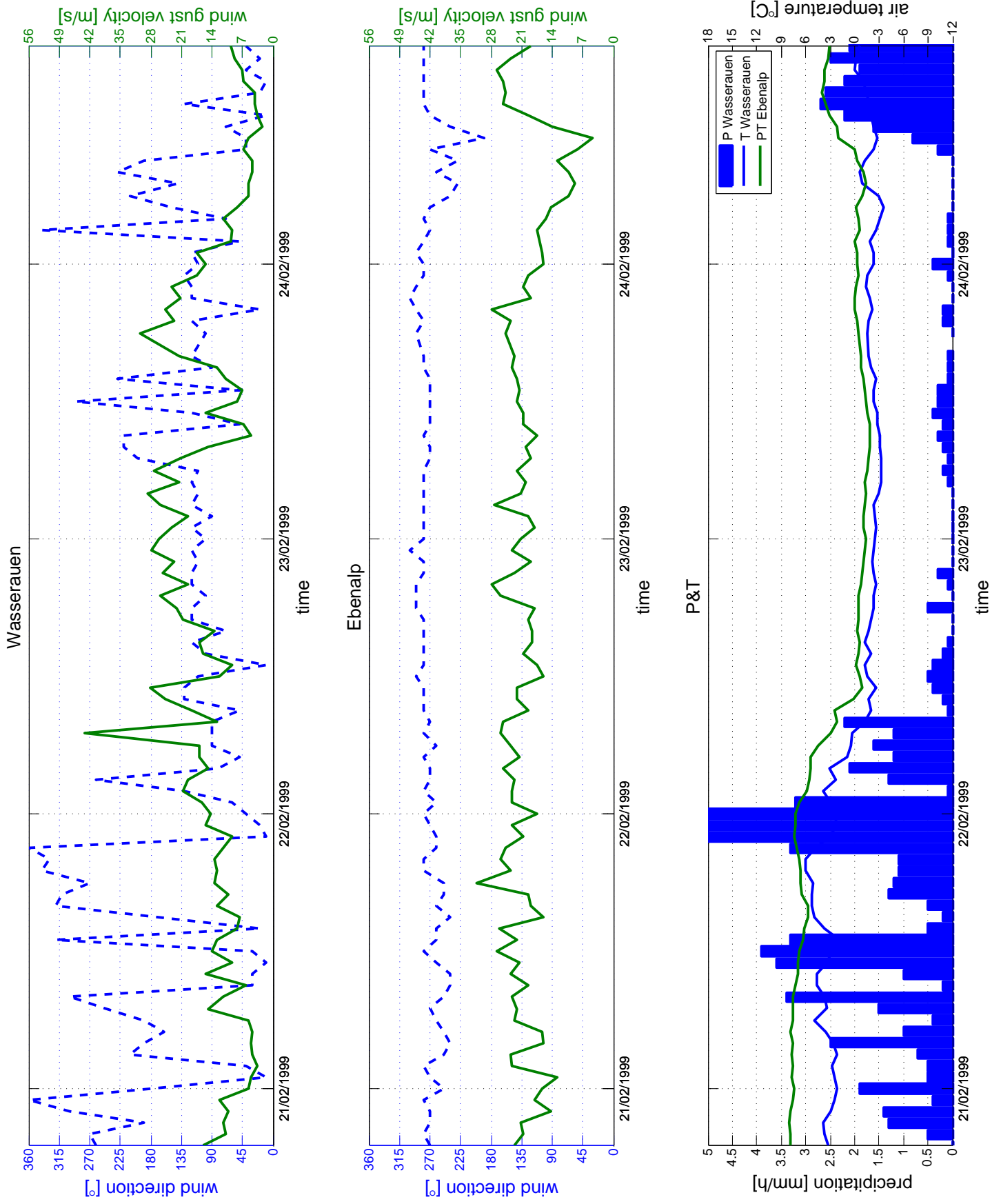


Figure 1.2

1 Wind, temperature and precipitation for Wasserauen and Ebenalp

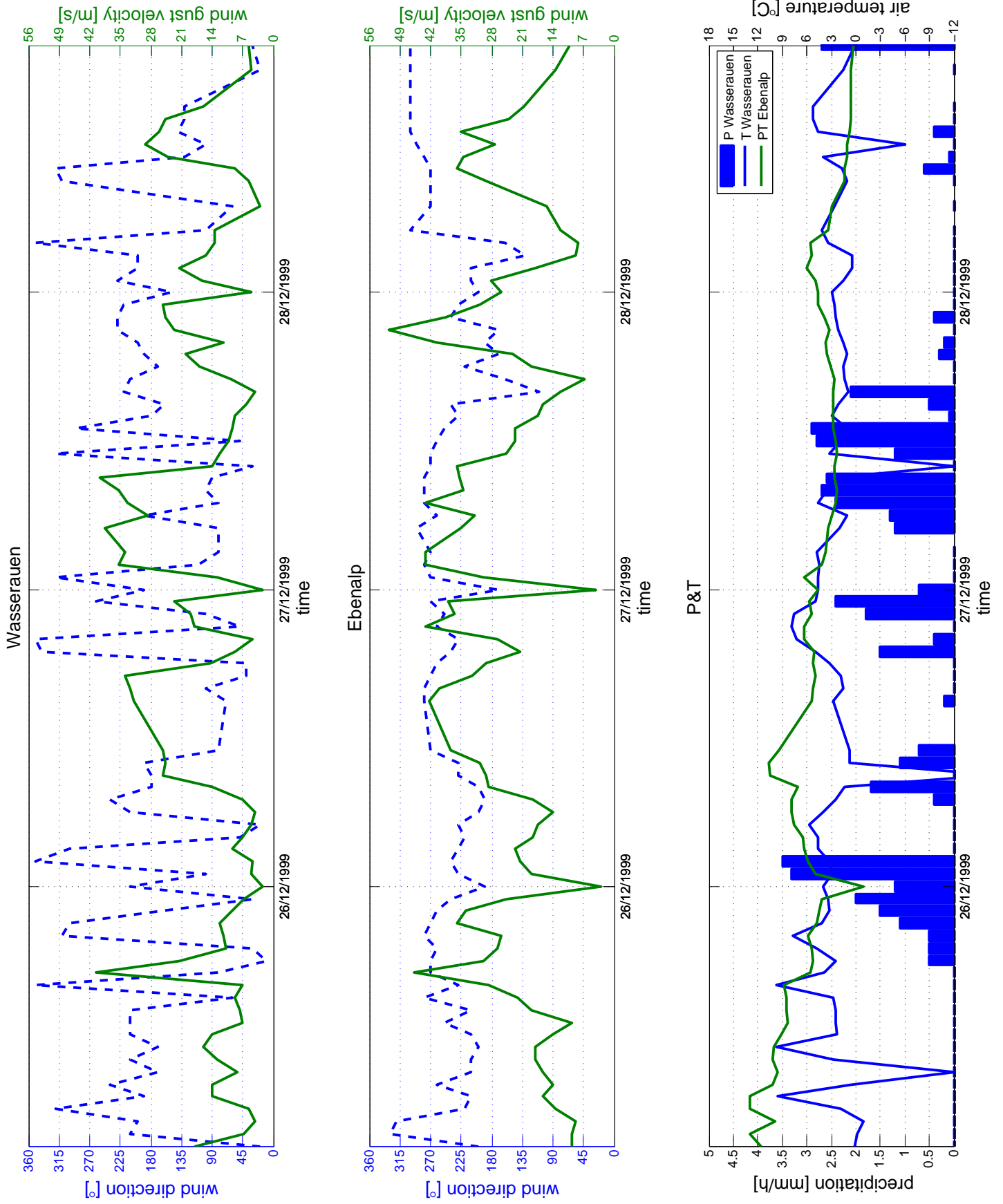


Figure 1.3

1 Wind, temperature and precipitation for Wasserauen and Ebenalp

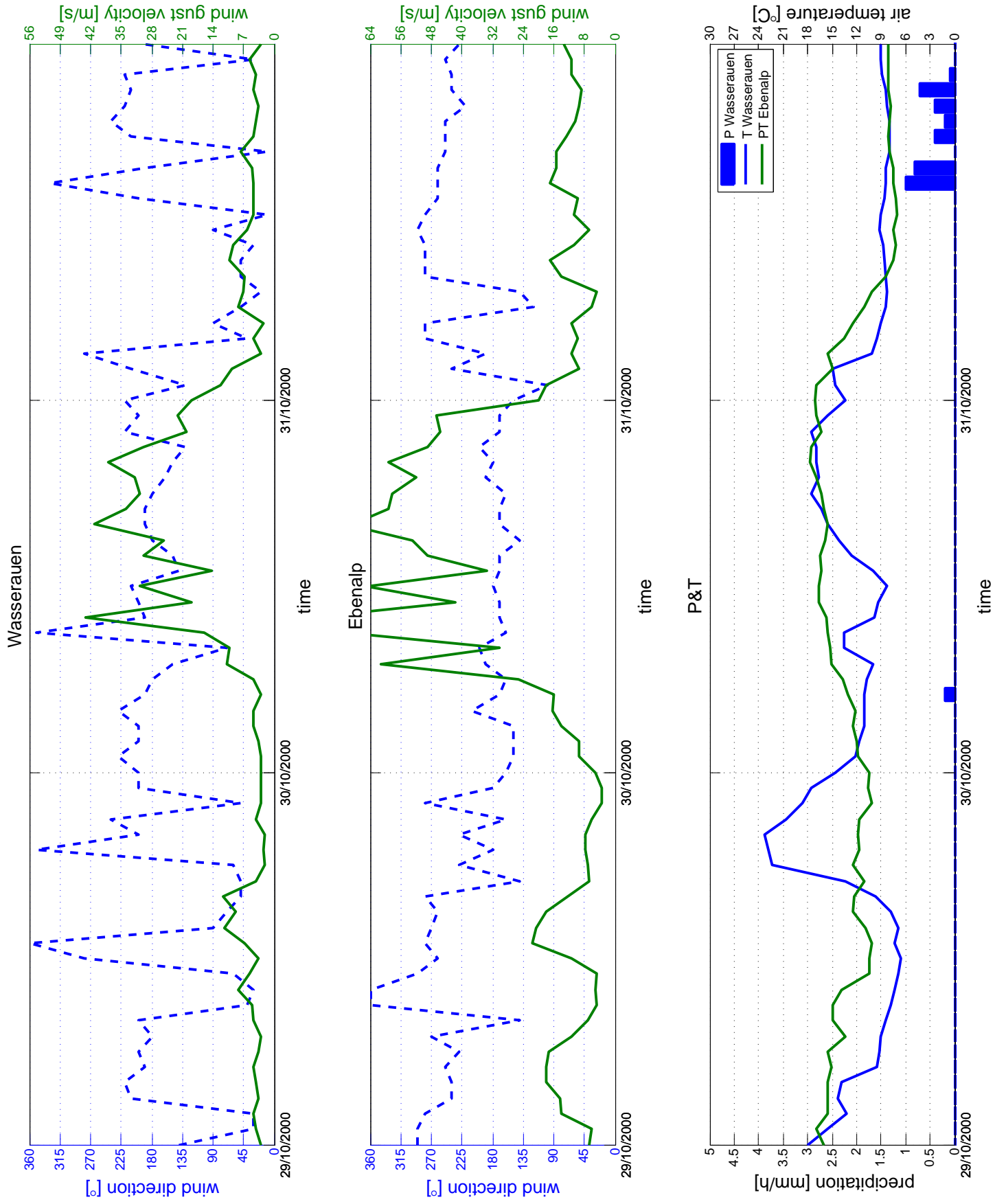


Figure 1.4

1 Wind, temperature and precipitation for Wasserauen and Ebenalp

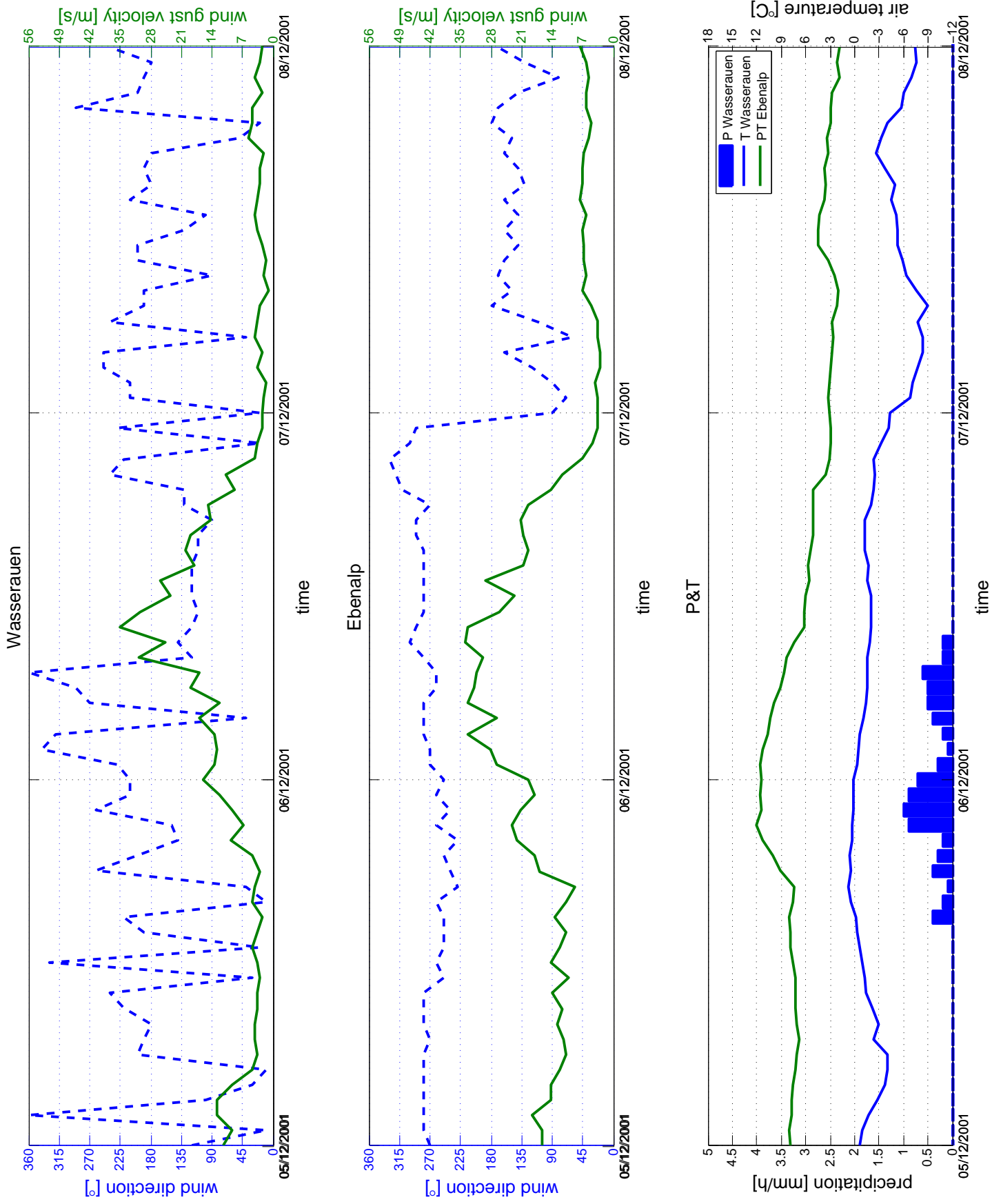


Figure 1.5

1 Wind, temperature and precipitation for Wasserauen and Ebenalp

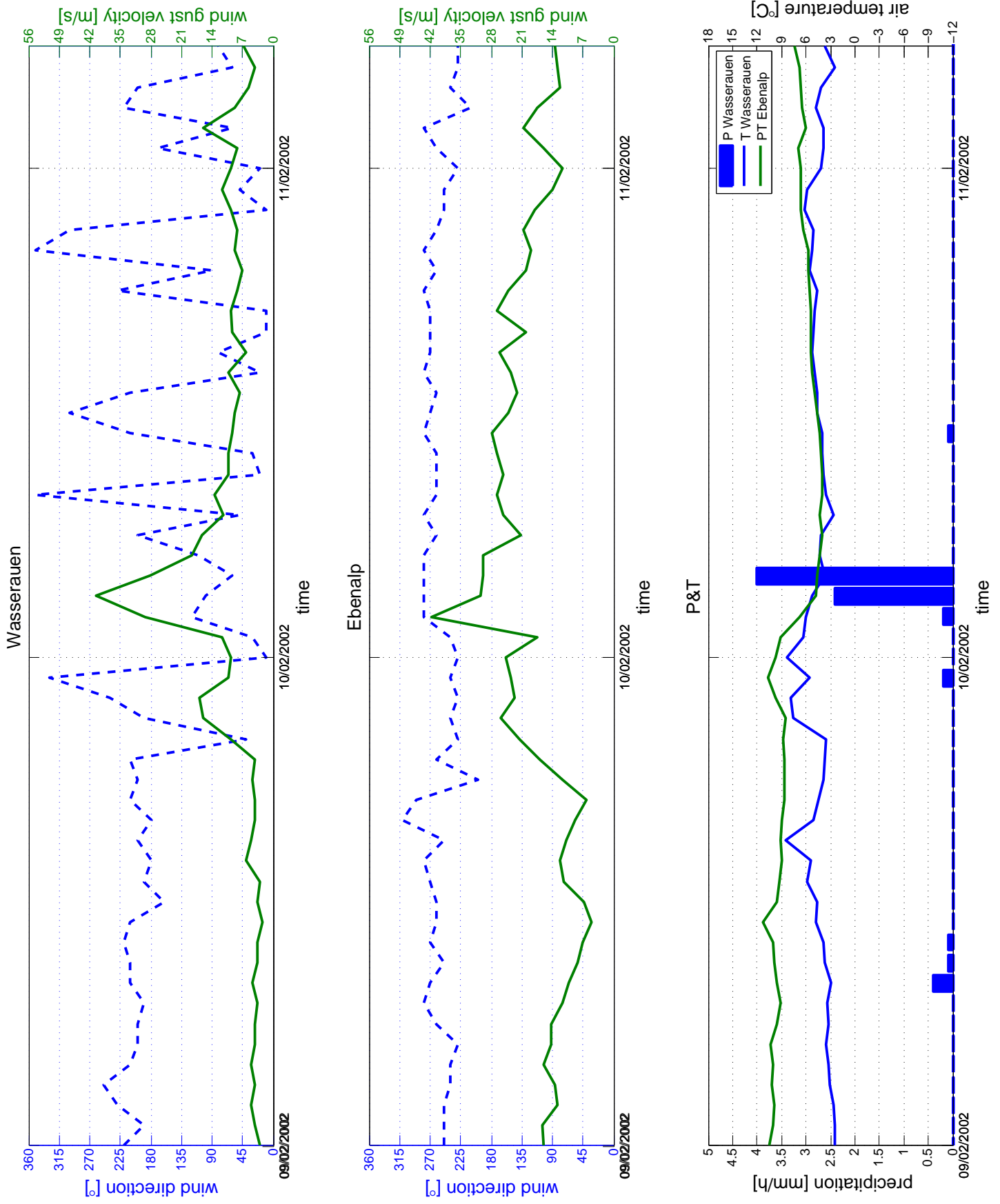


Figure 1.6

1 Wind, temperature and precipitation for Wasserauen and Ebenalp

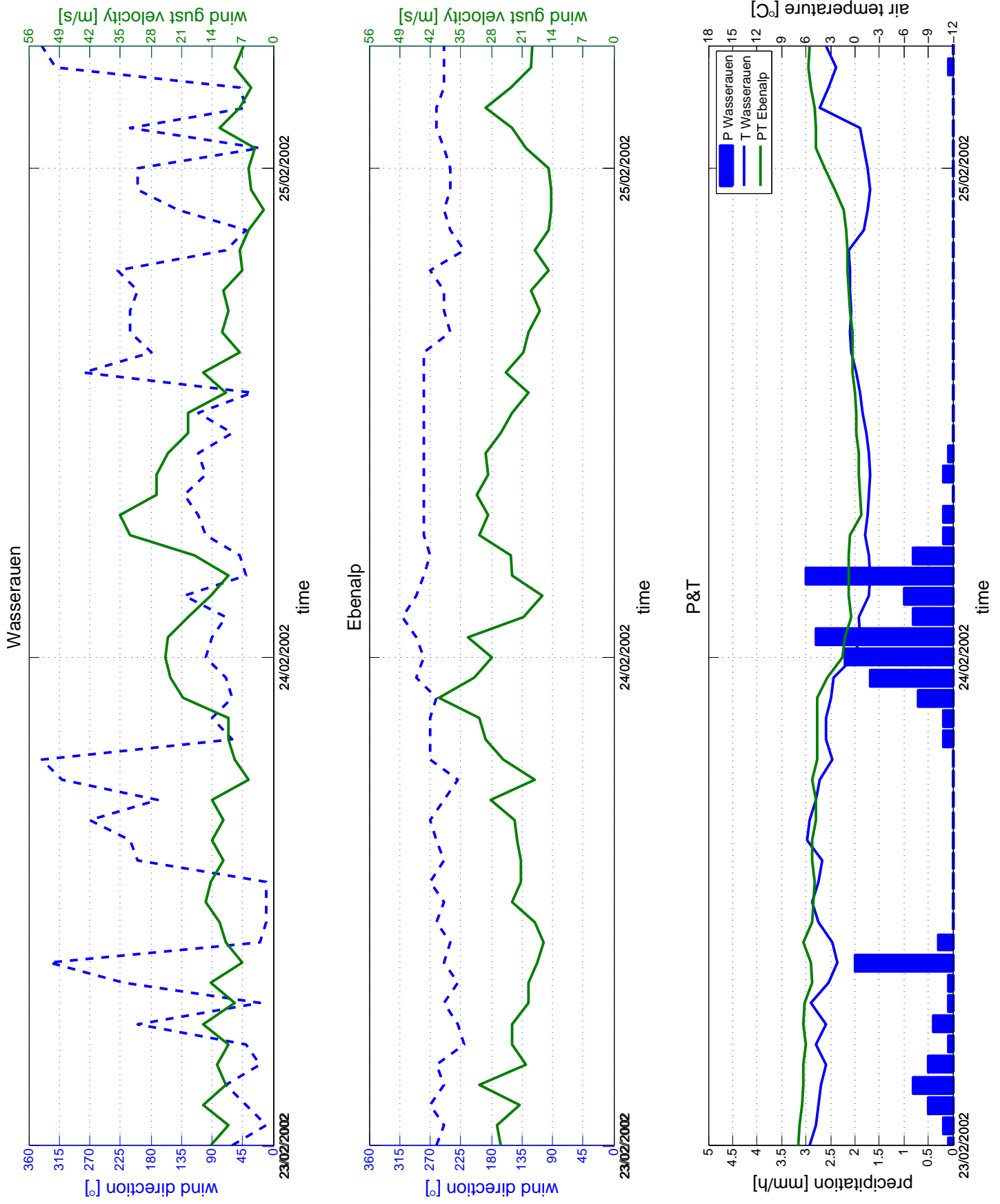


Figure 1.7

1 Wind, temperature and precipitation for Wasserauen and Ebenalp

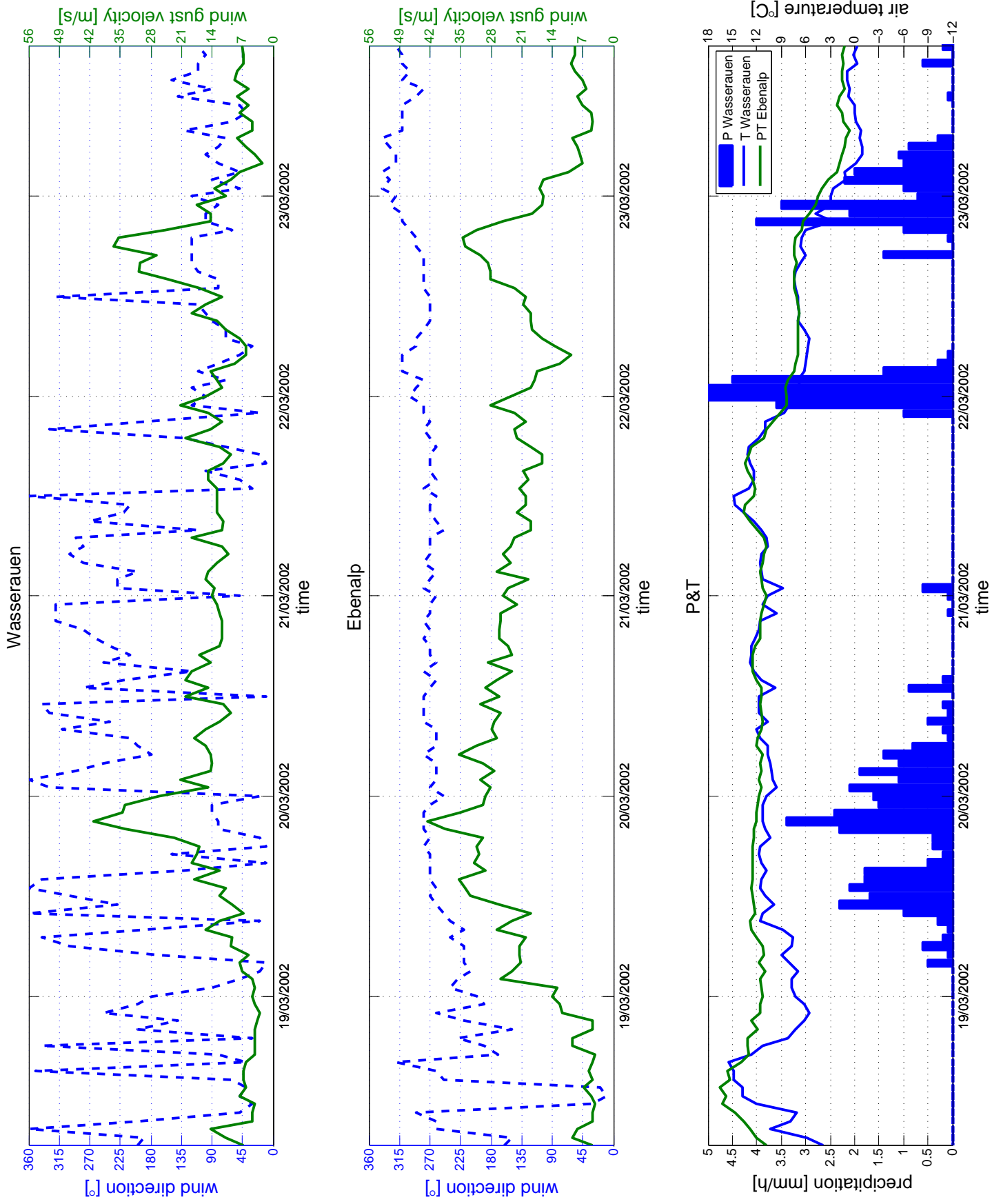


Figure 1.8

1 Wind, temperature and precipitation for Wasserauen and Ebenalp

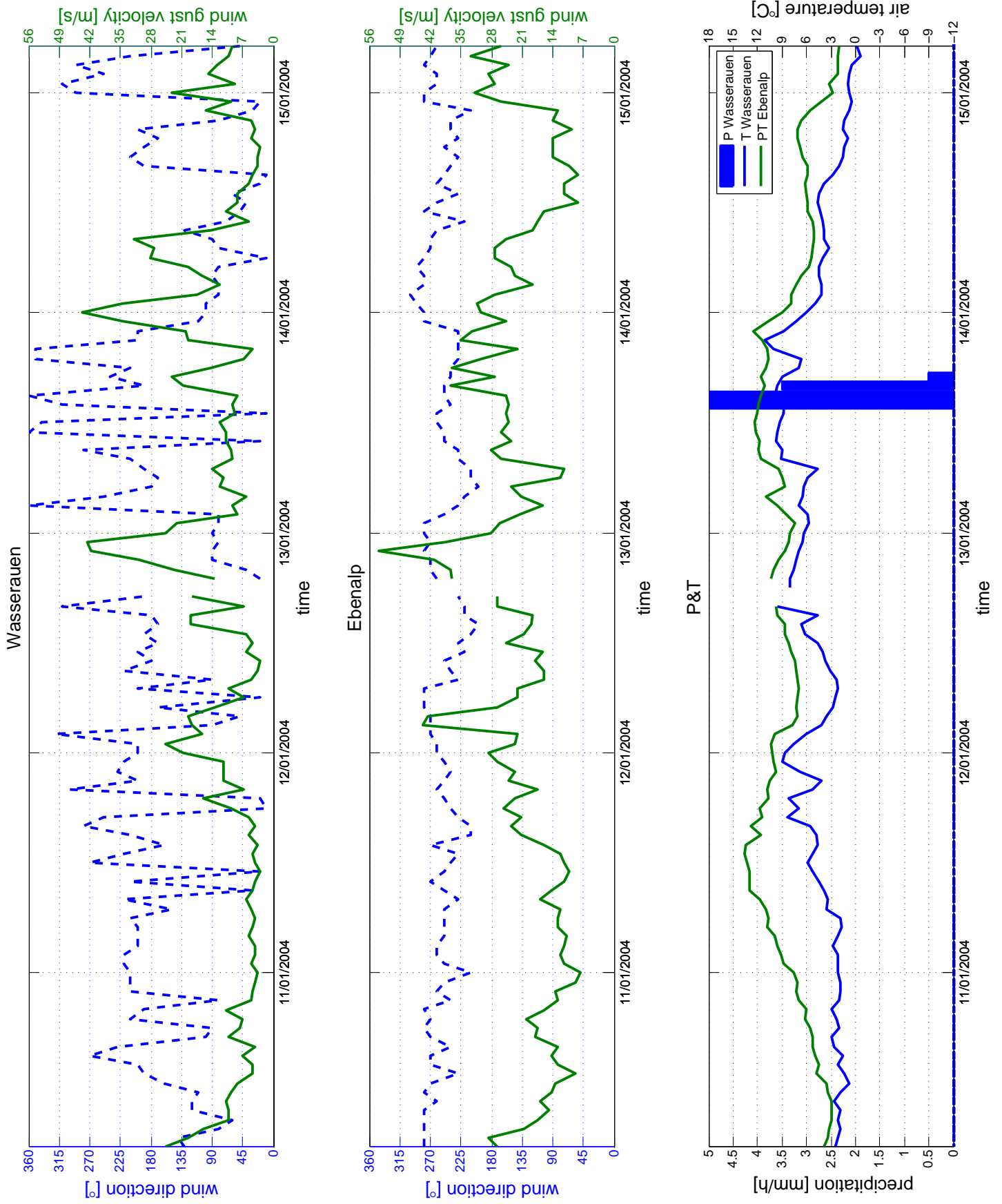


Figure 1.9

1 Wind, temperature and precipitation for Wasserauen and Ebenalp

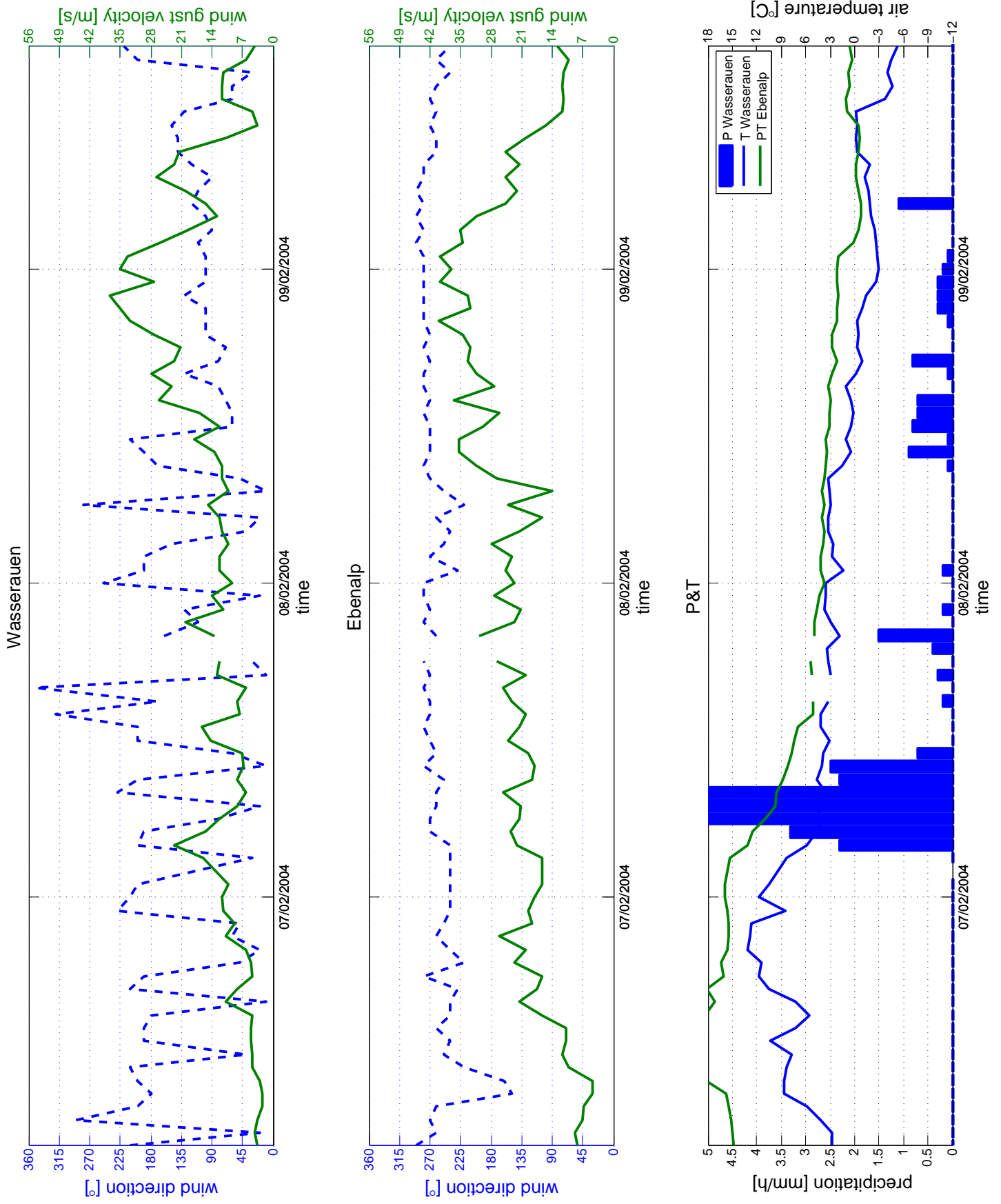


Figure 1.10

1 Wind, temperature and precipitation for Wasserauen and Ebenalp

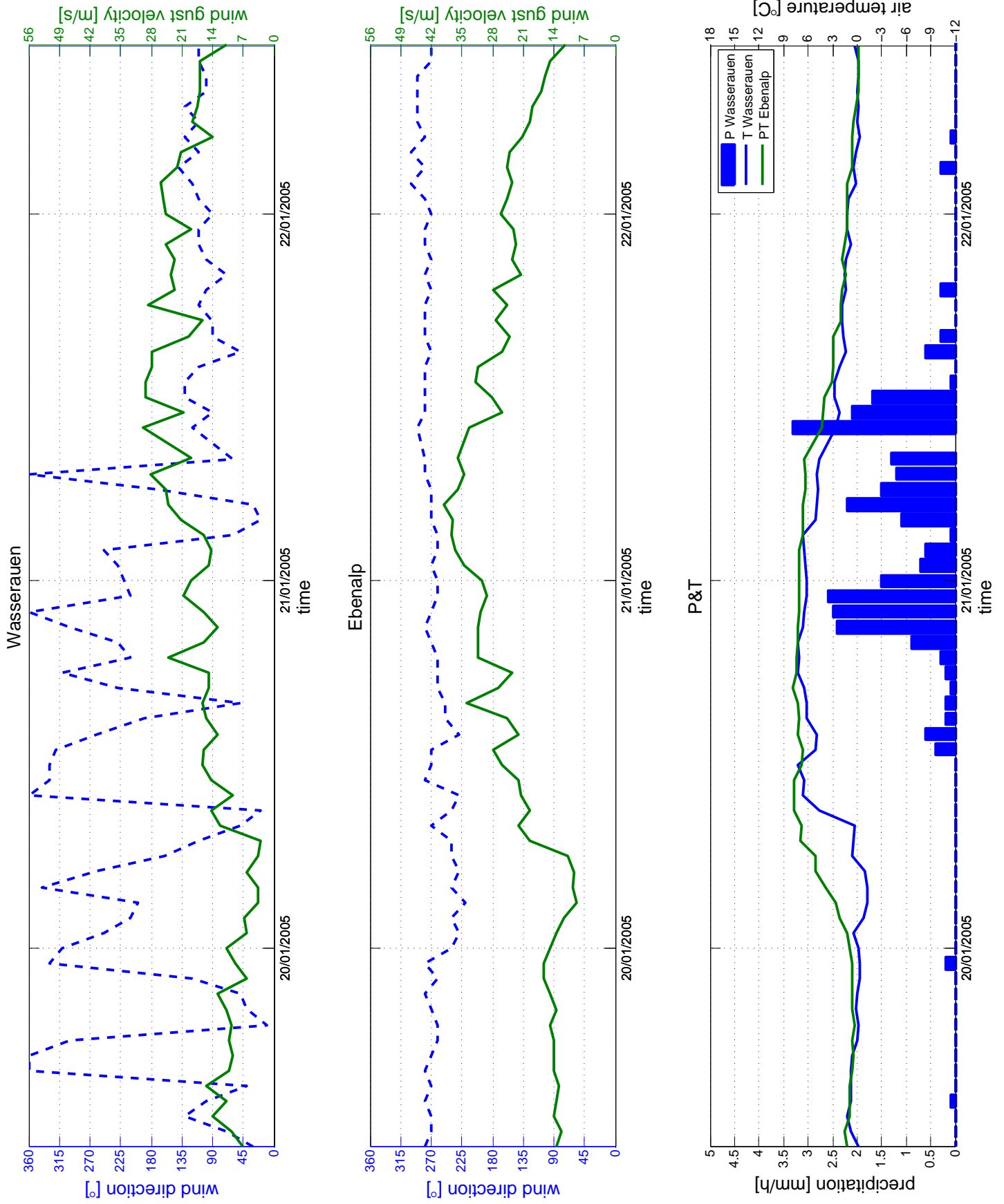


Figure 1.11

1 Wind, temperature and precipitation for Wasserauen and Ebenalp

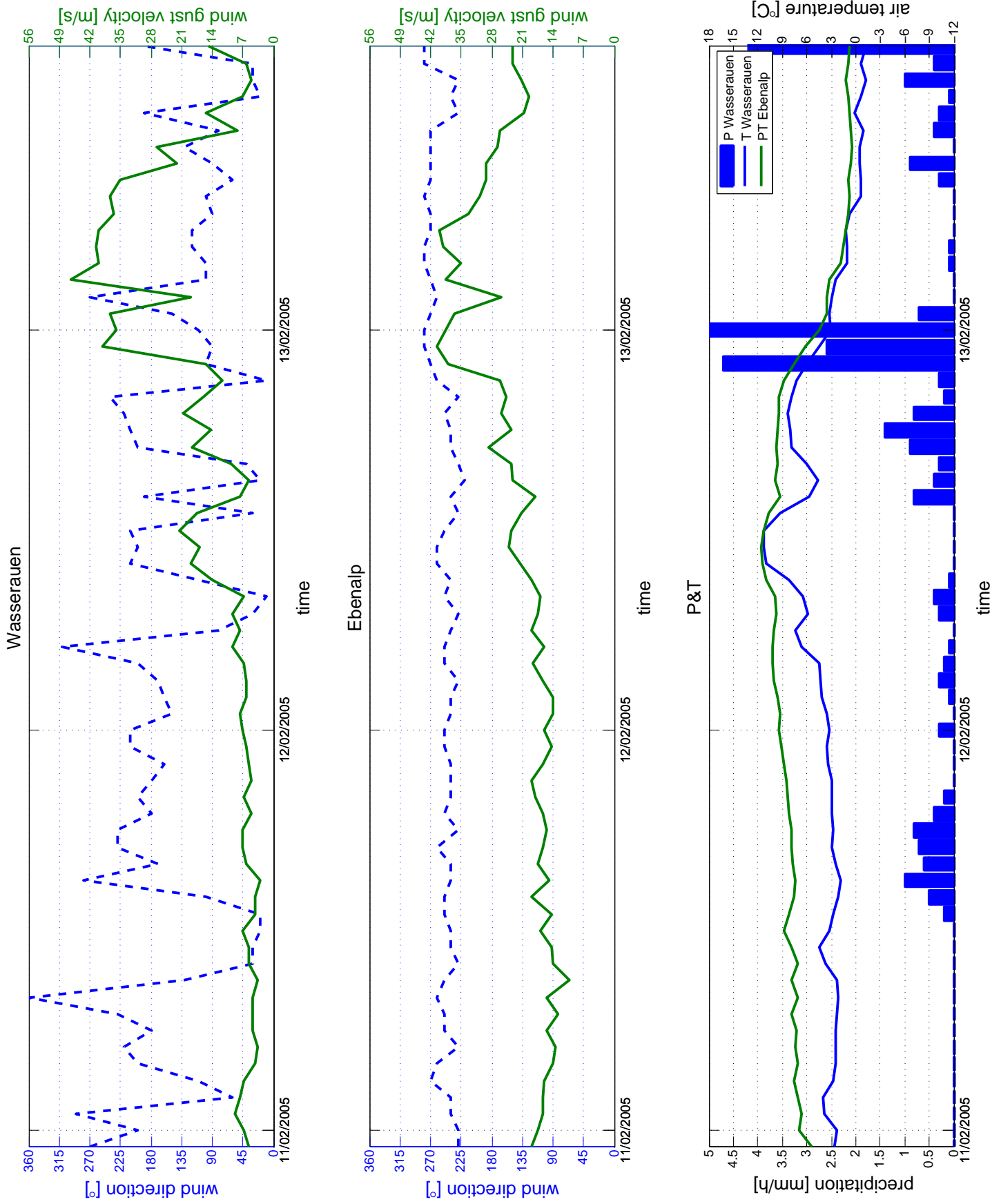


Figure 1.12

1 Wind, temperature and precipitation for Wasserauen and Ebenalp

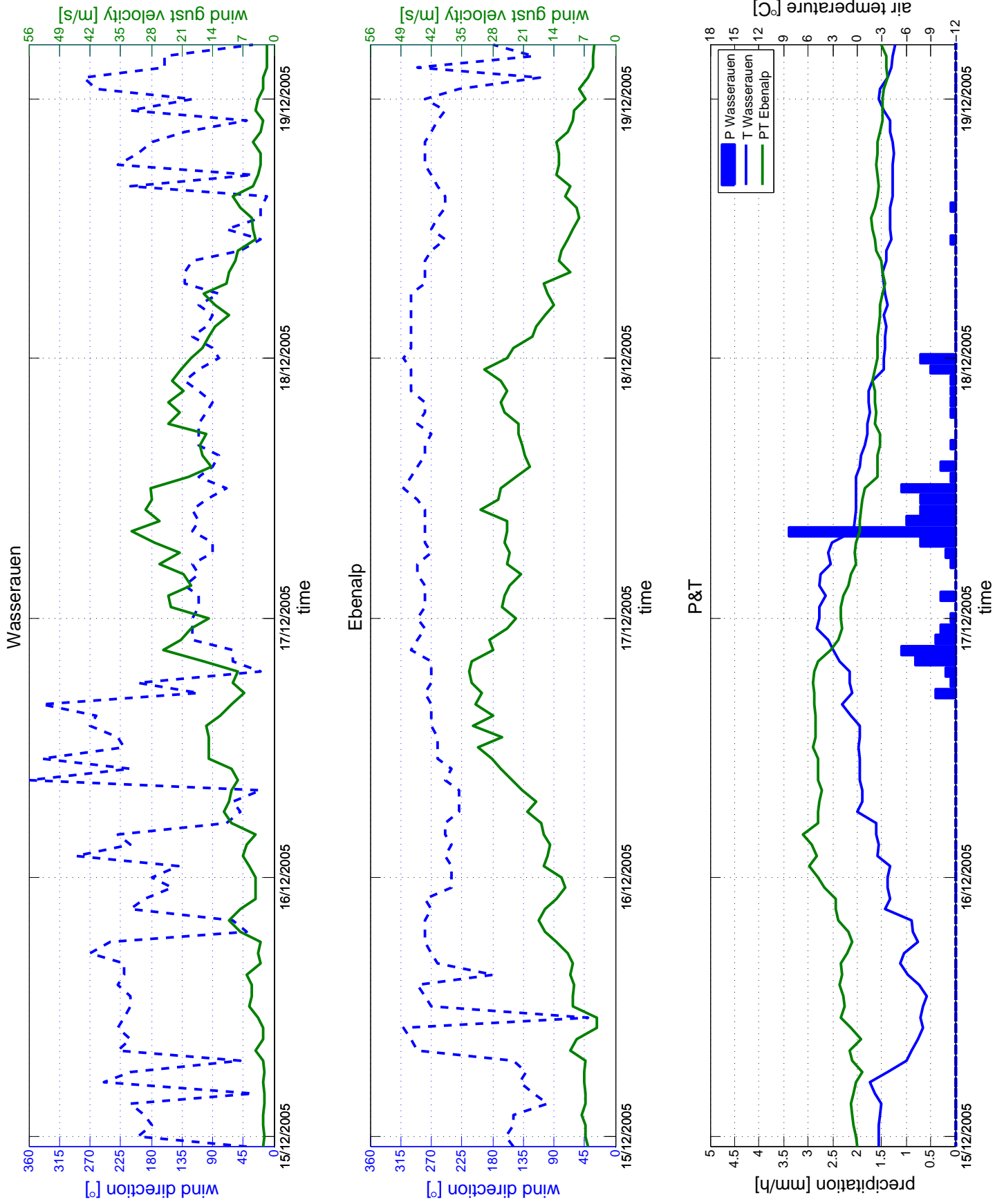


Figure 1.13

1 Wind, temperature and precipitation for Wasserauen and Ebenalp

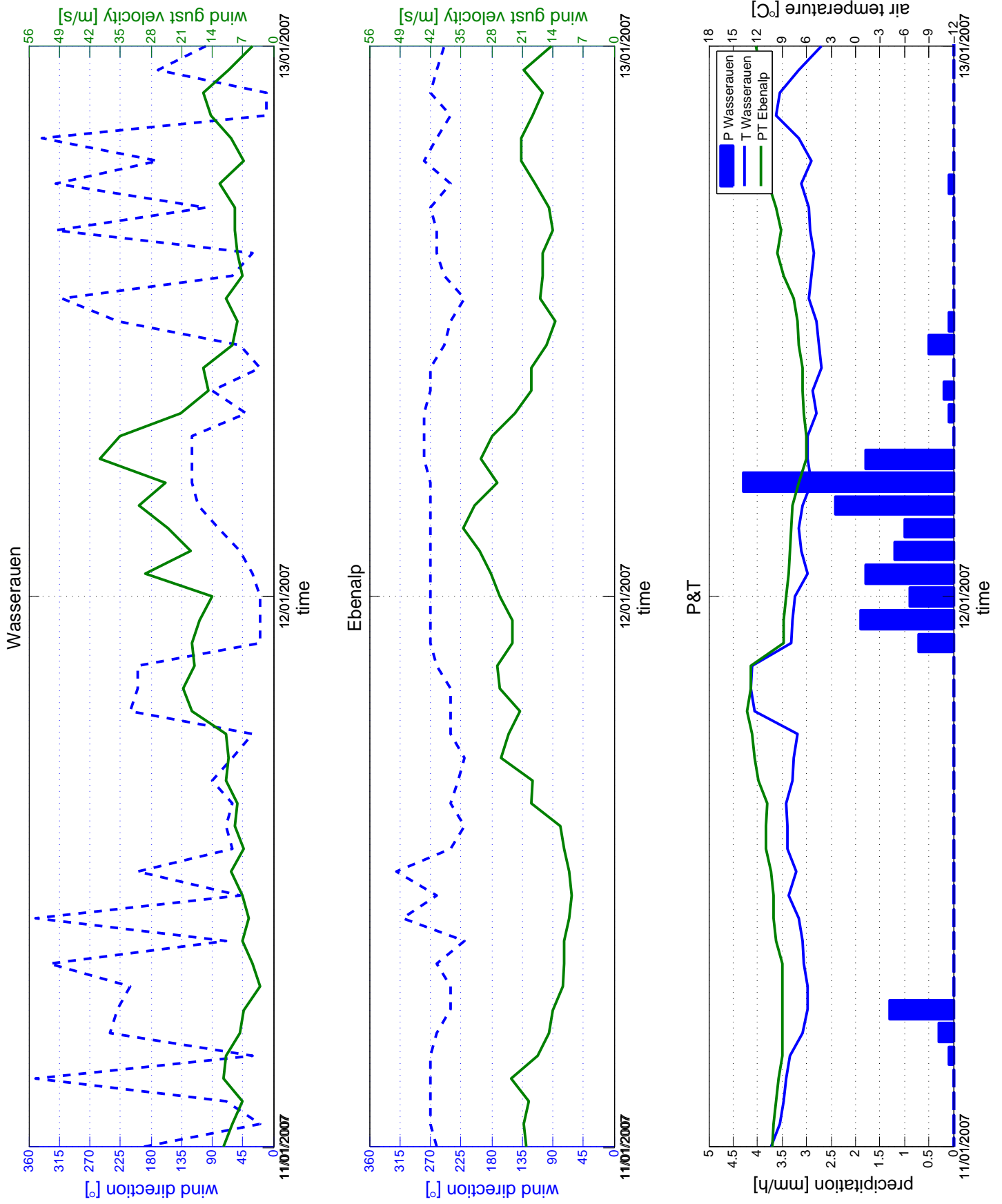


Figure 1.14

1 Wind, temperature and precipitation for Wasserauen and Ebenalp

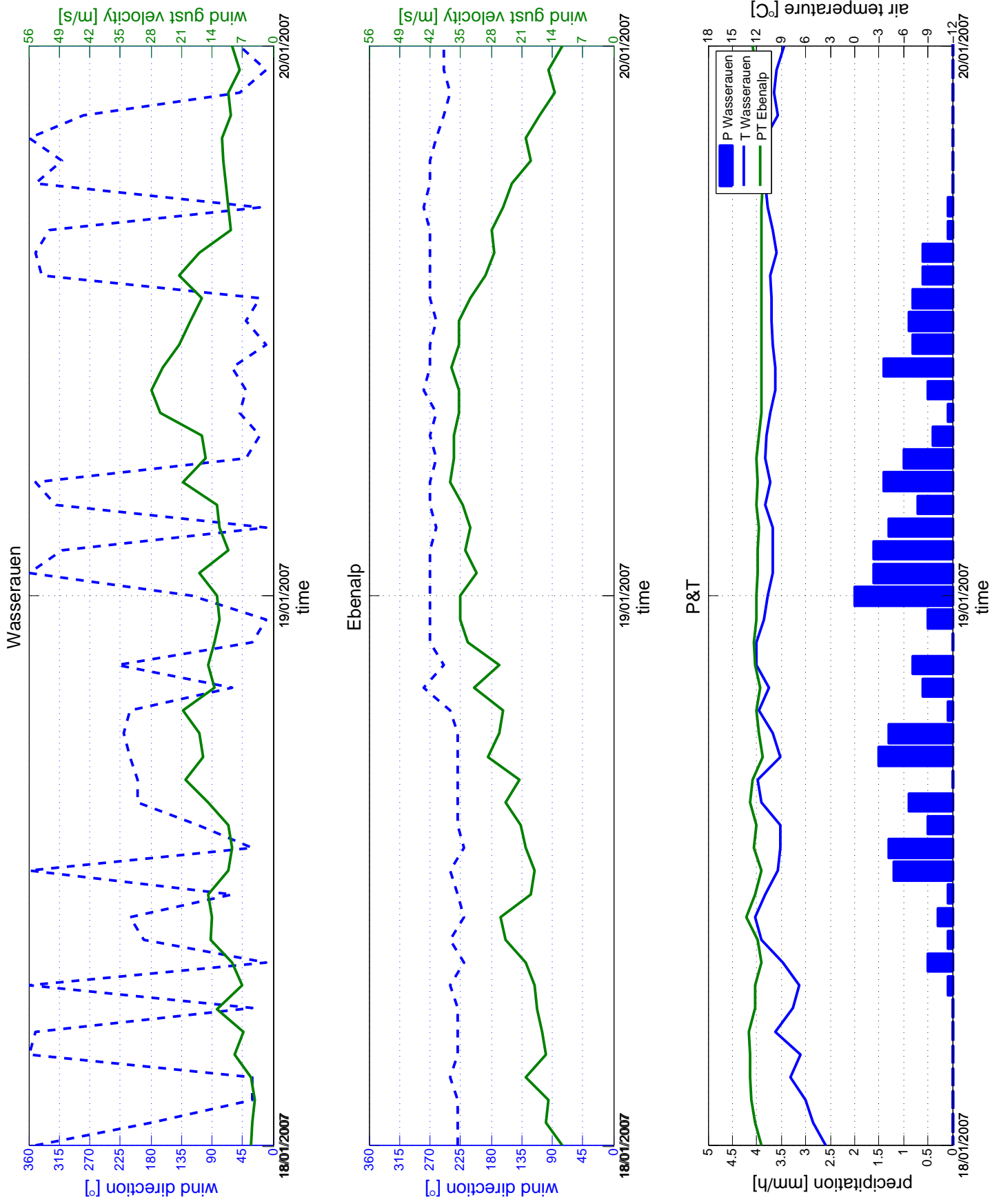


Figure 1.15

1 Wind, temperature and precipitation for Wasserauen and Ebenalp

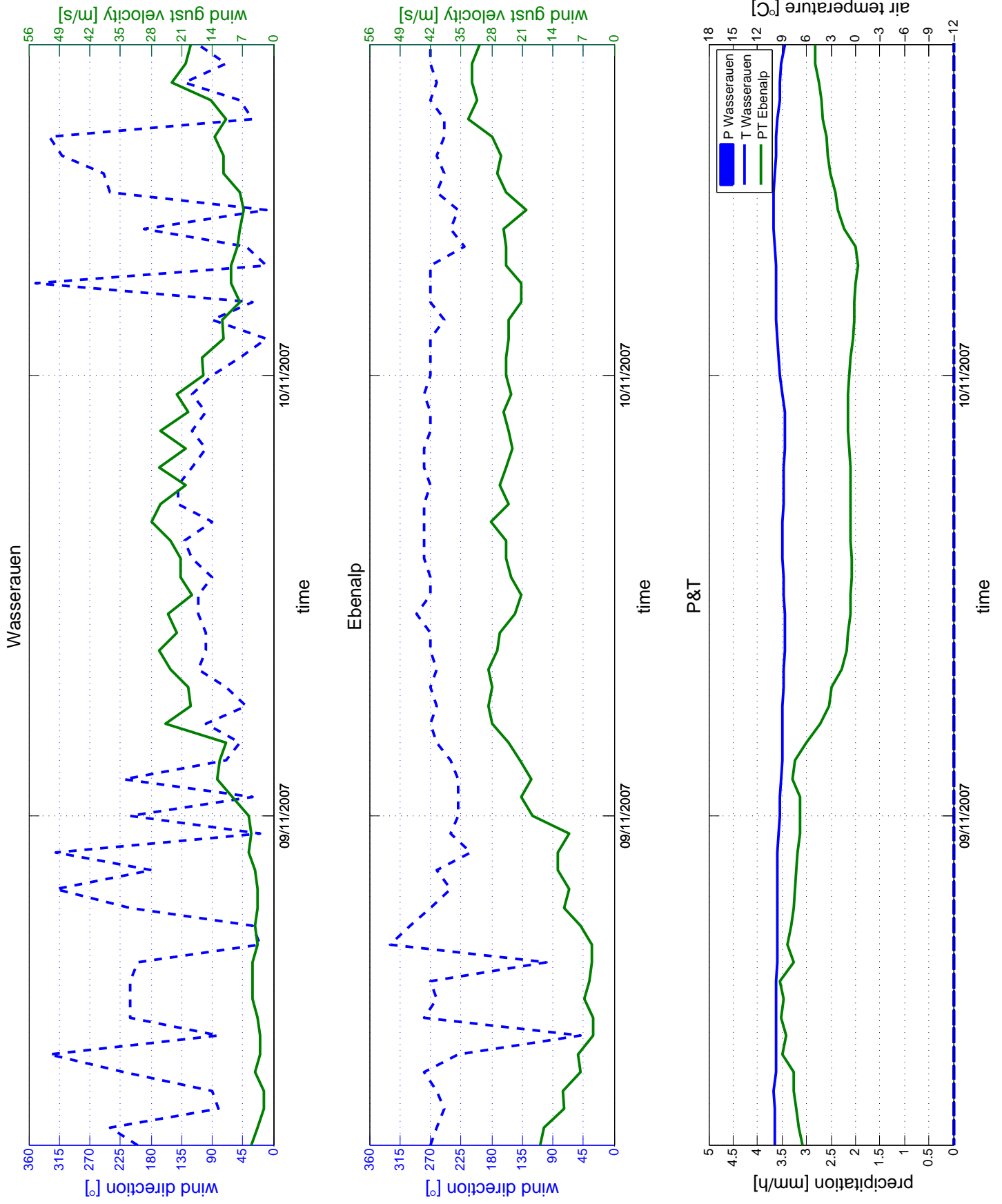


Figure 1.16

1 Wind, temperature and precipitation for Wasserauen and Ebenalp

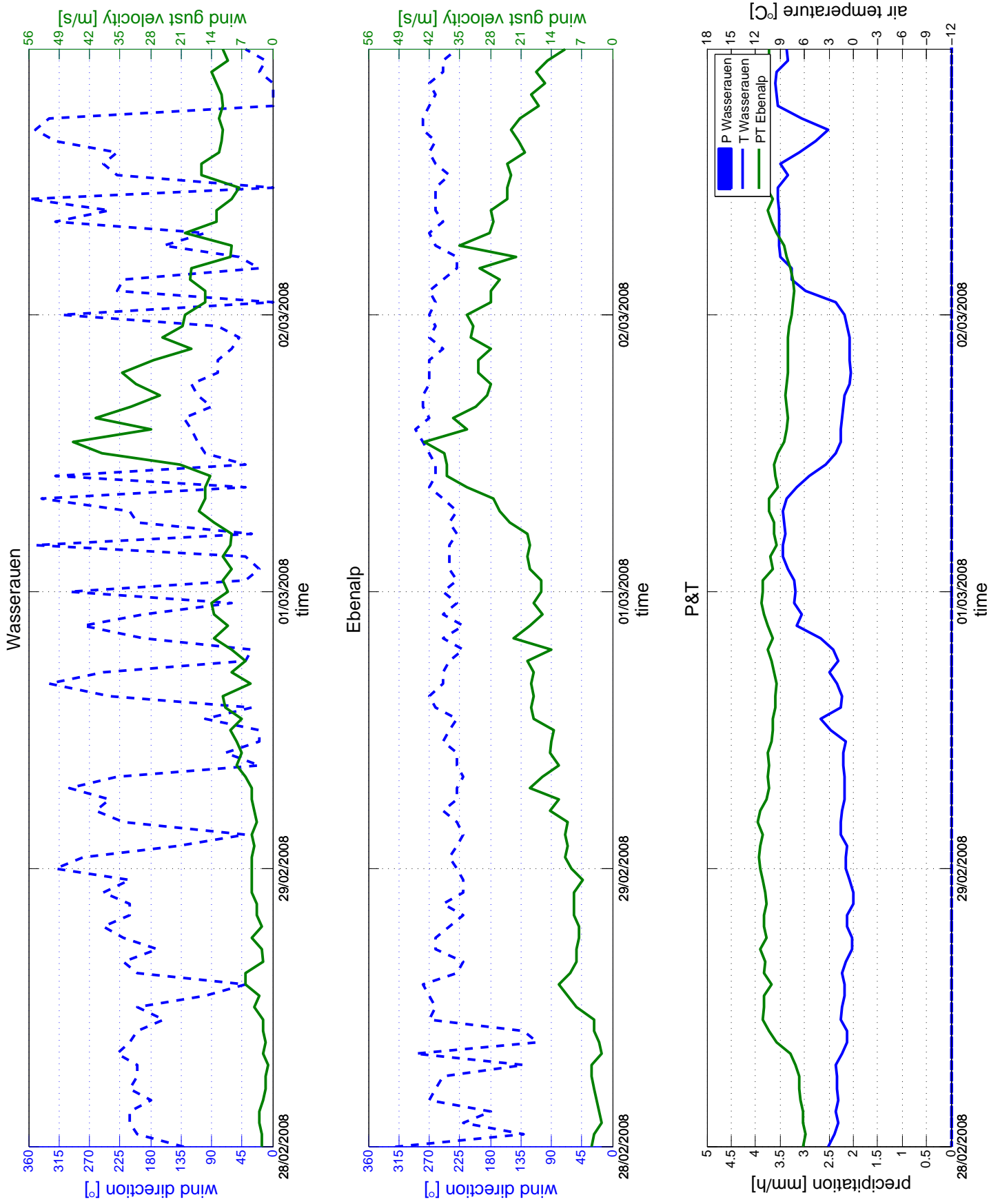


Figure 1.17

1 Wind, temperature and precipitation for Wasserauen and Ebenalp

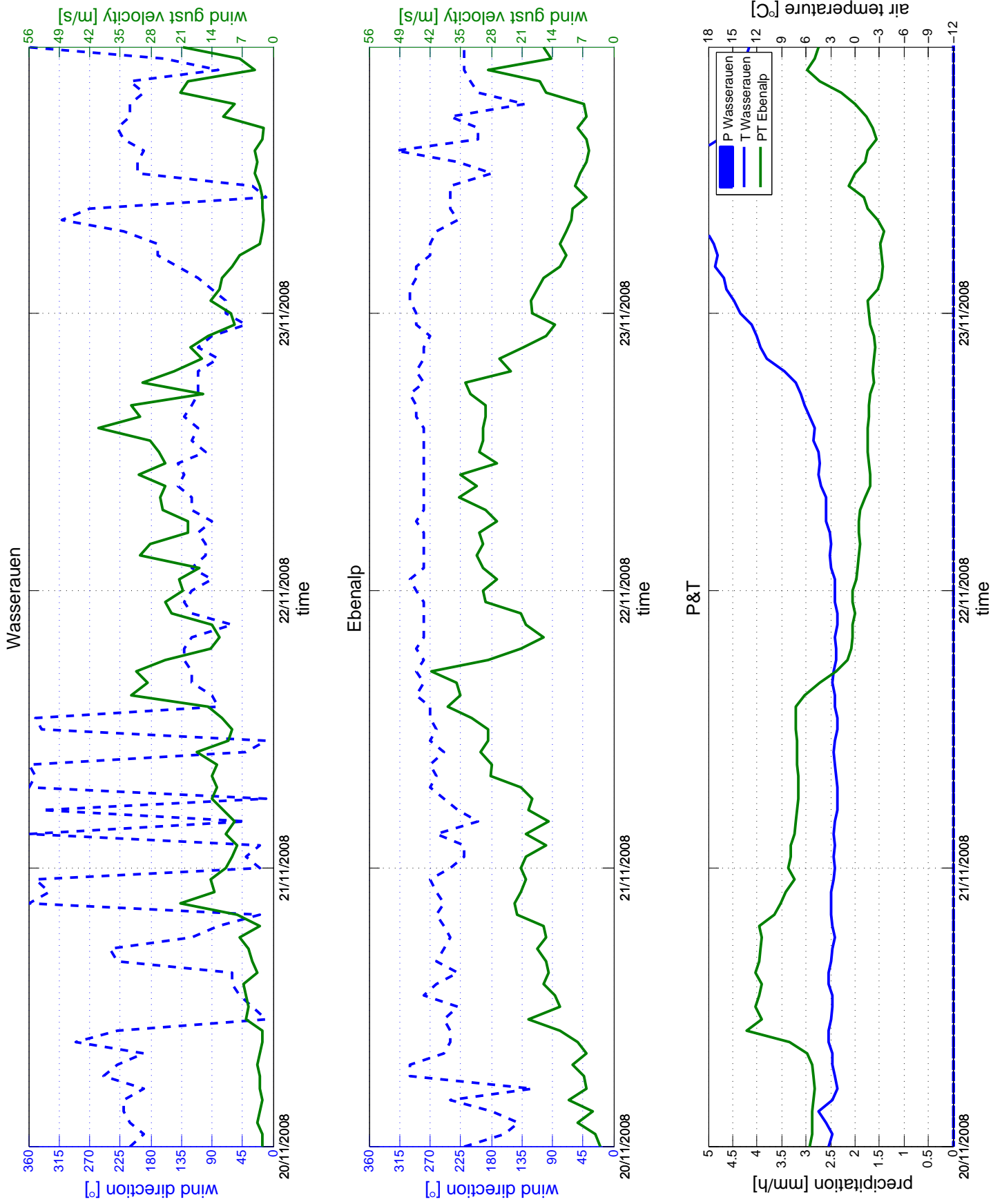


Figure 1.18

1 Wind, temperature and precipitation for Wasserauen and Ebenalp

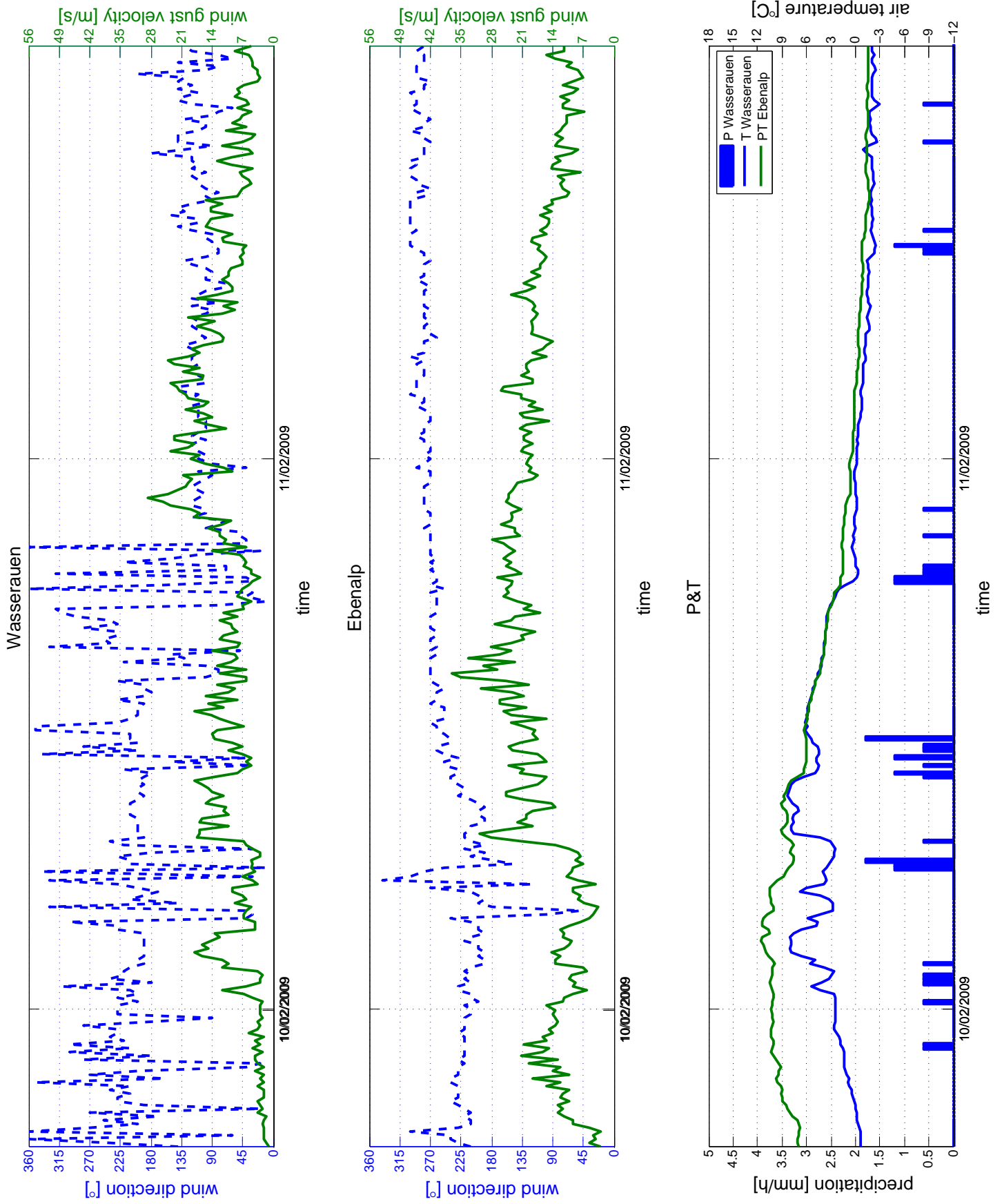


Figure 1.19

2 Weather charts for selected events

2.1 Laseyer Event 07/02/2004

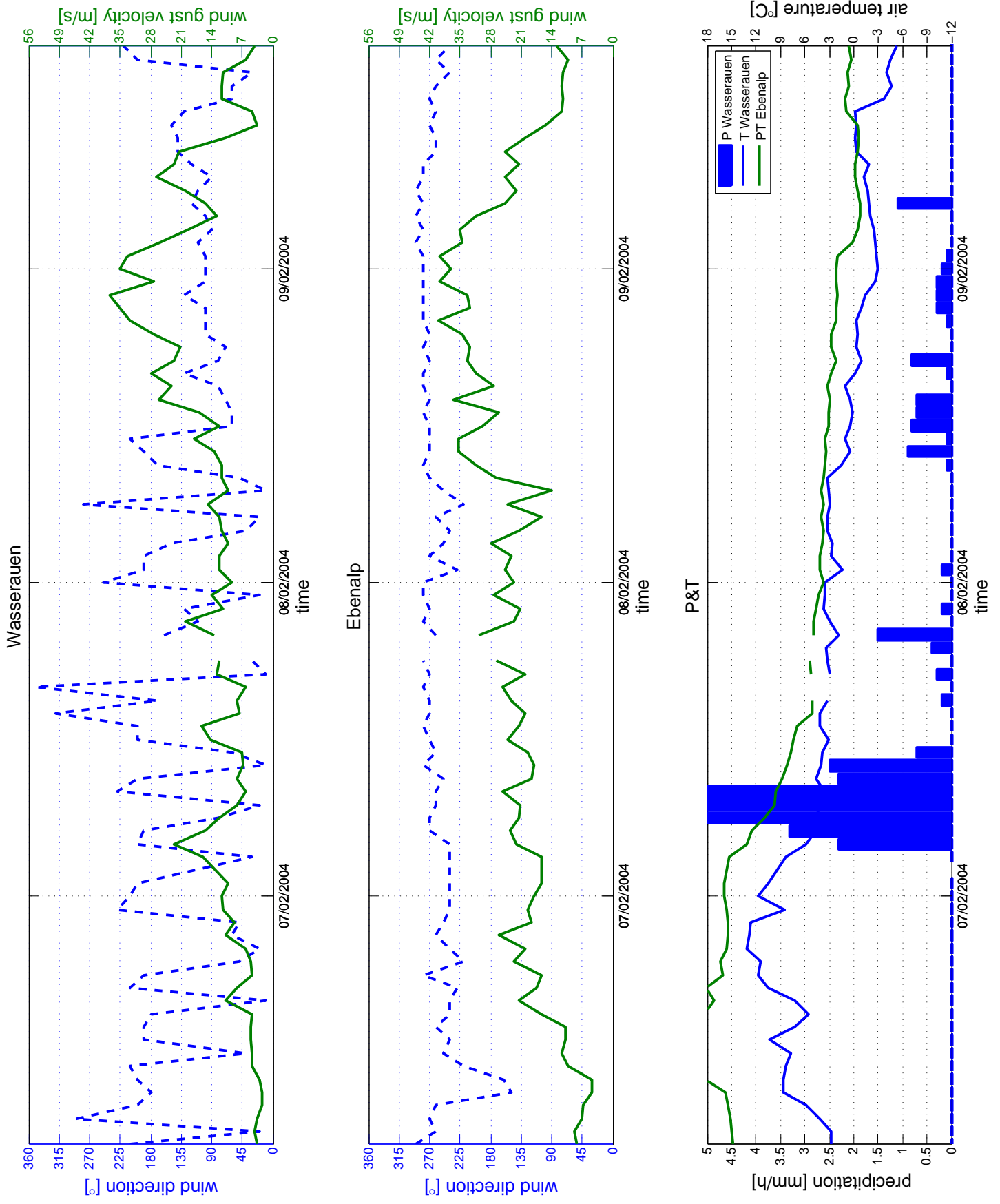
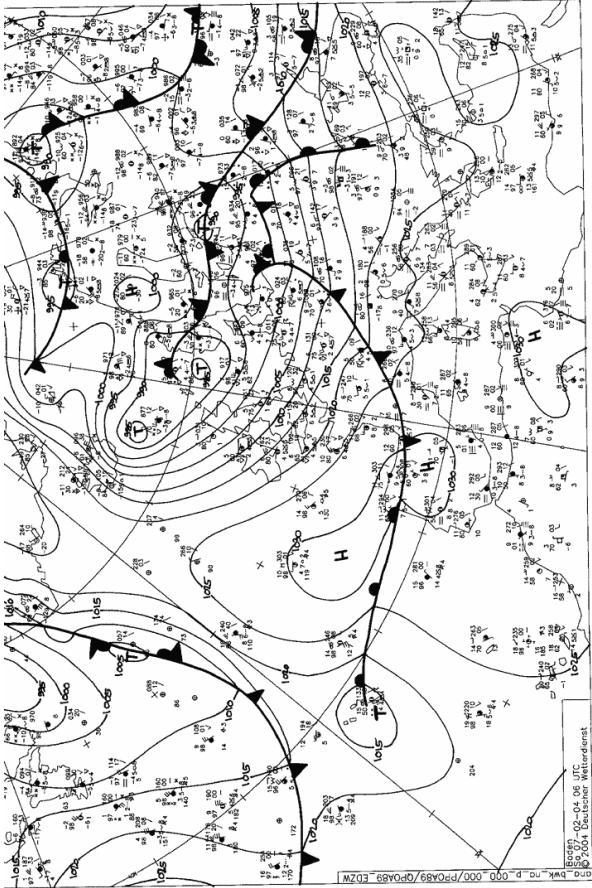
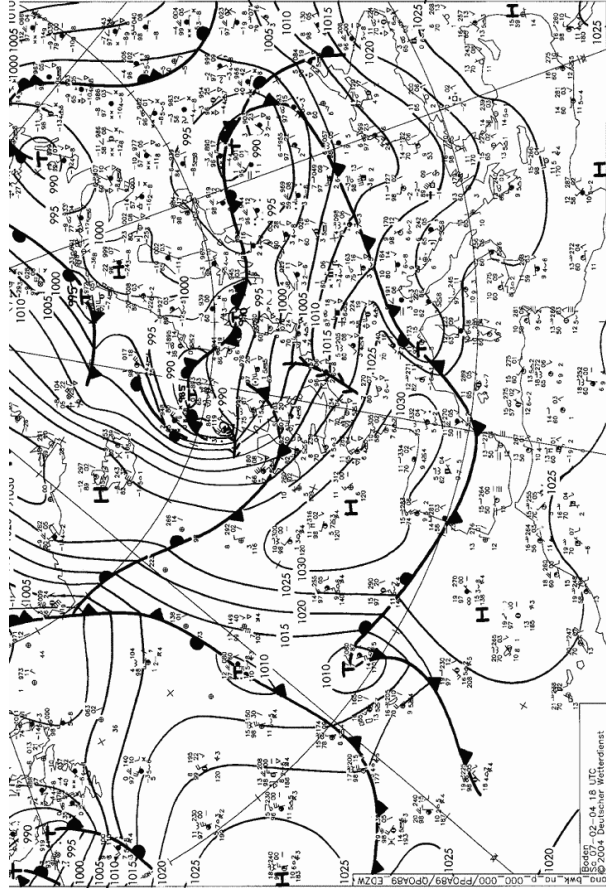


Figure 2.1

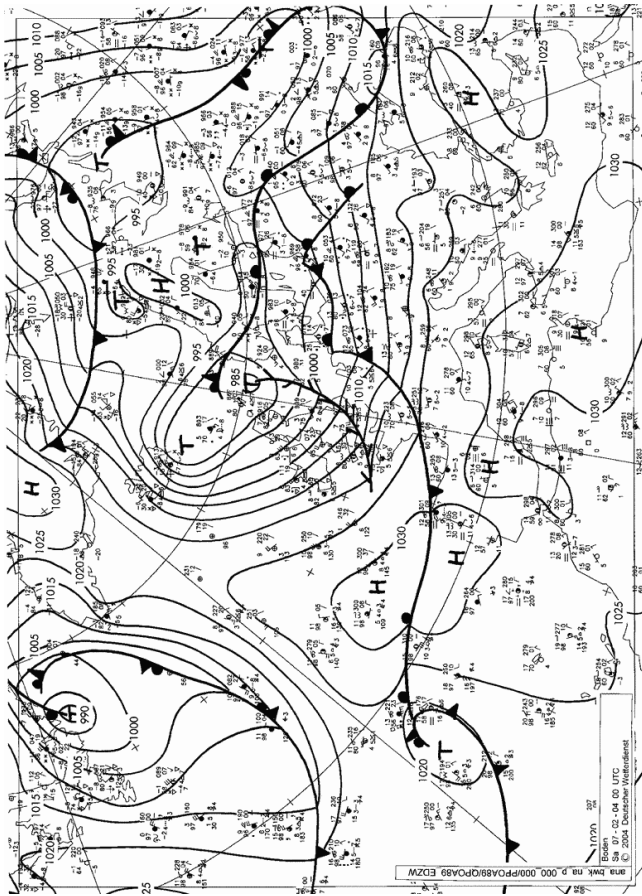
2 Weather charts for selected events



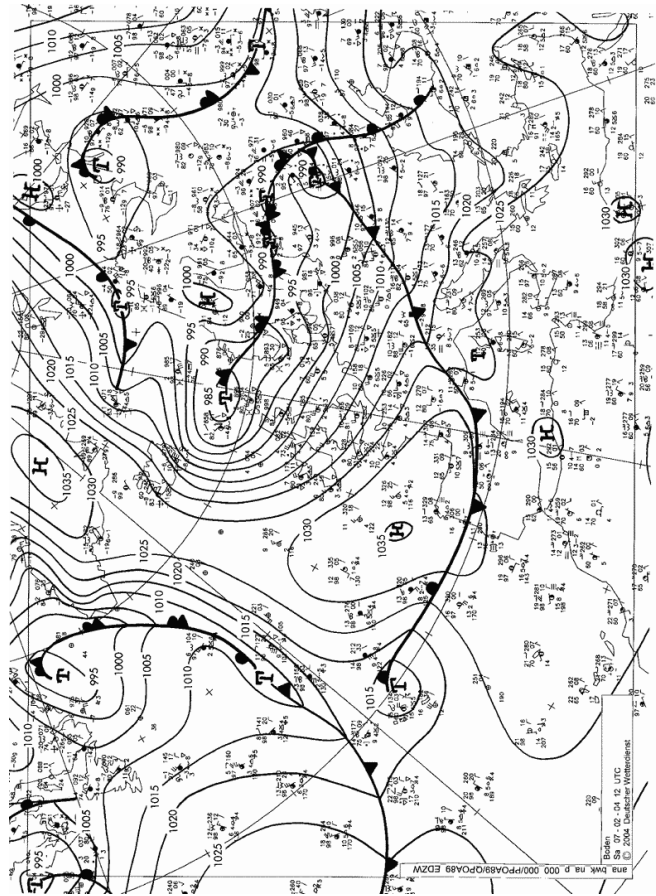
<http://www.wetter3.de>



<http://www.wetter3.de>



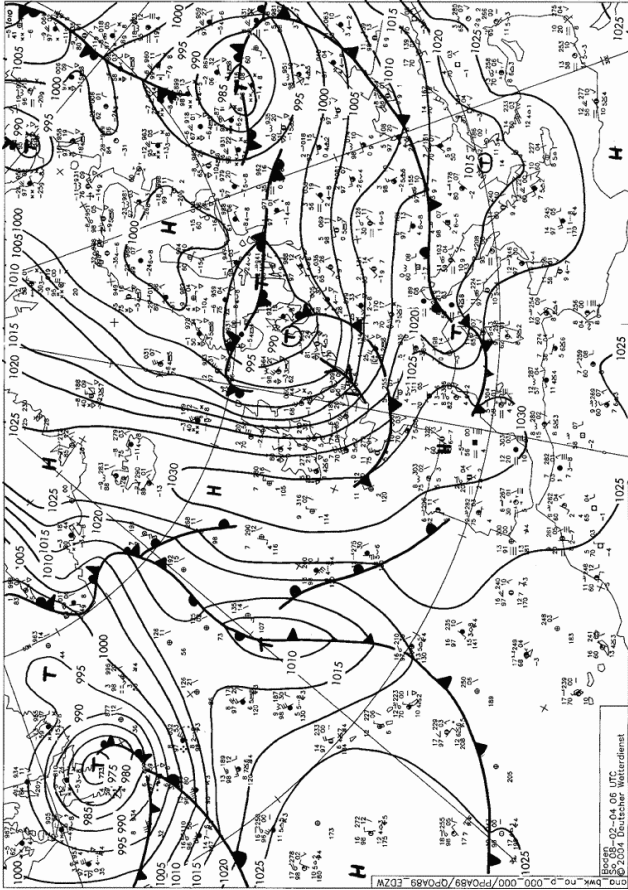
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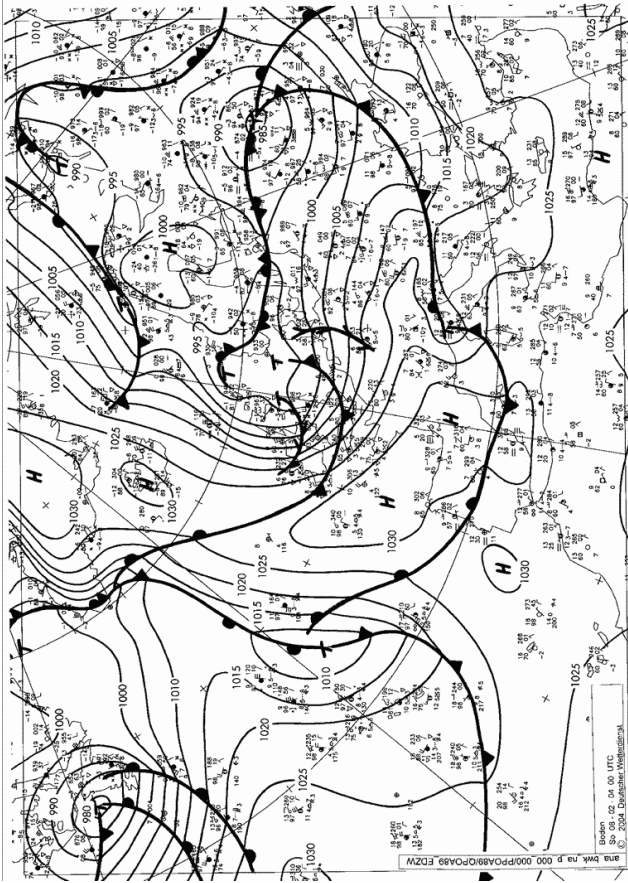
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Figure 2.2

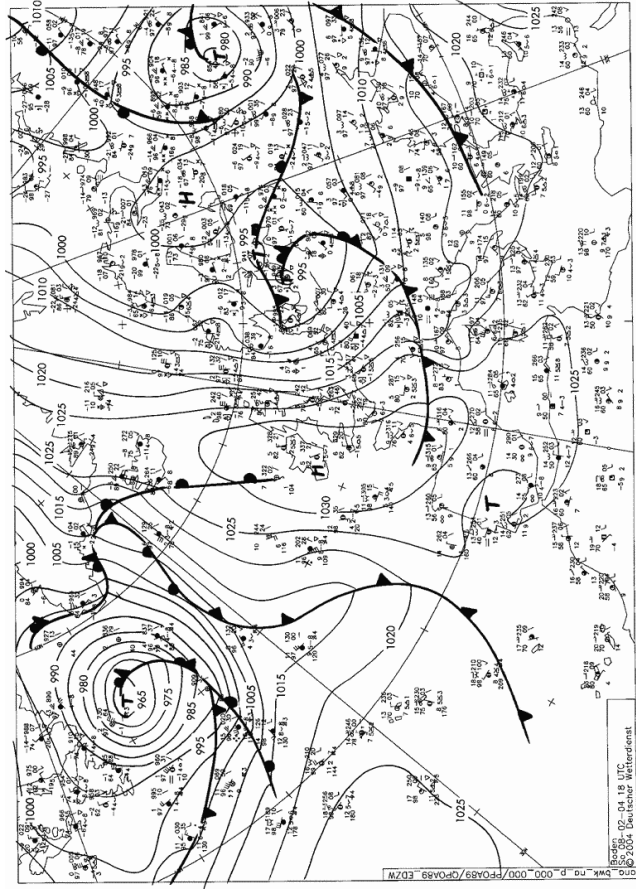
2 Weather charts for selected events



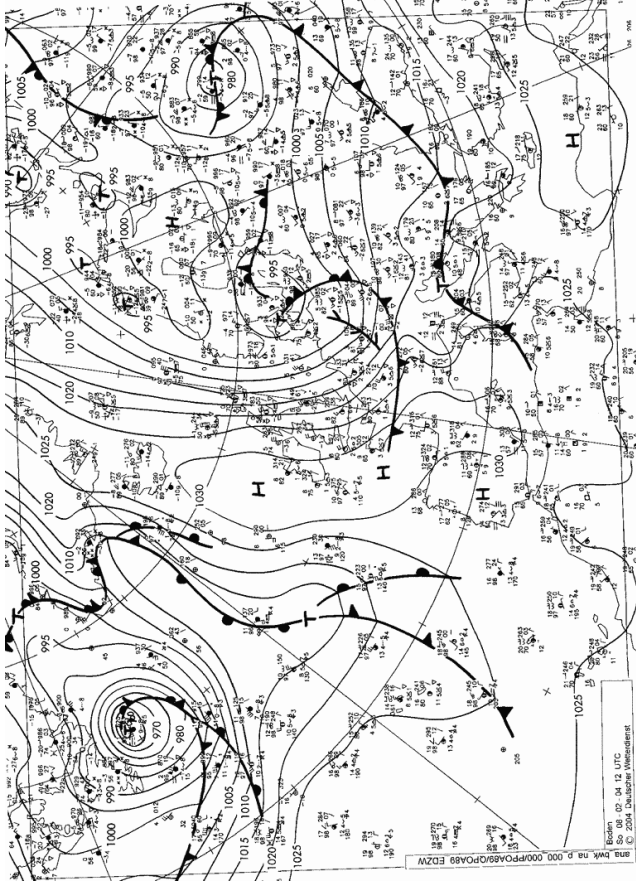
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<http://www.wetter3.de>



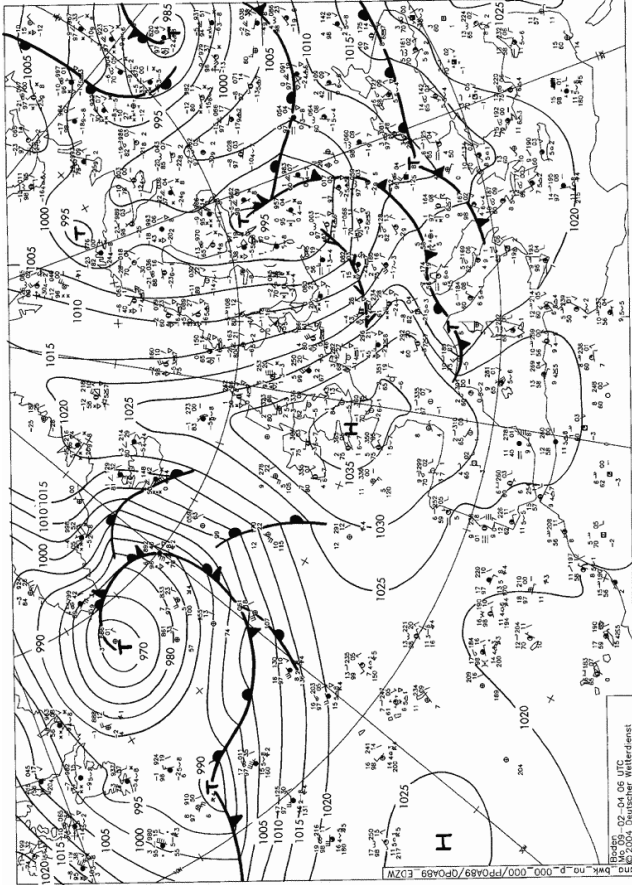
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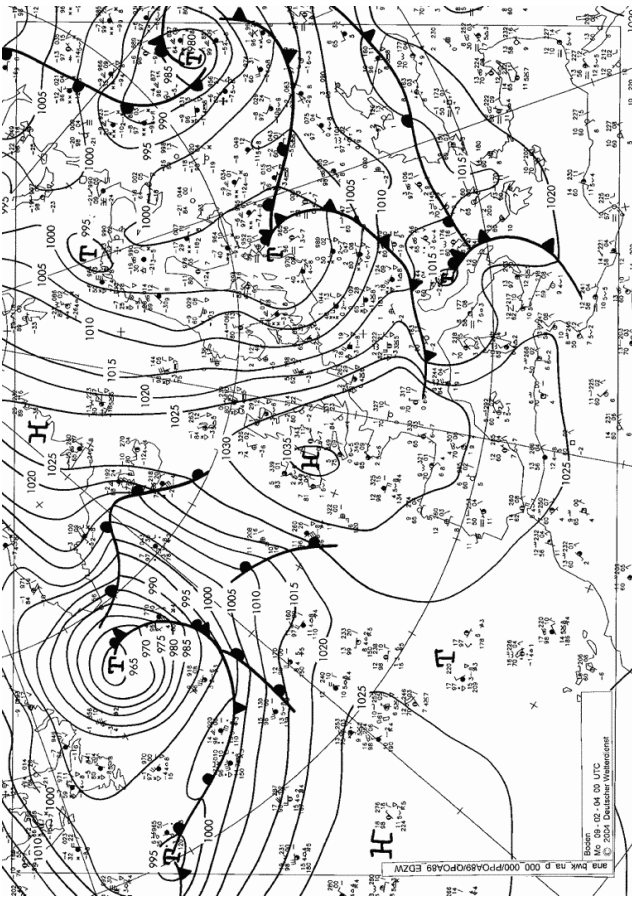
<http://www.wetter3.de>

Figure 2.3

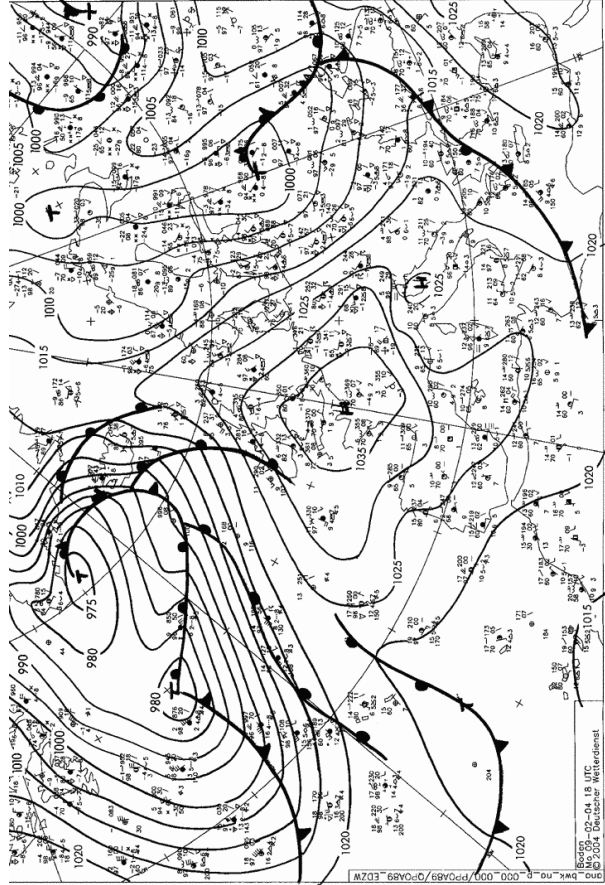
2 Weather charts for selected events



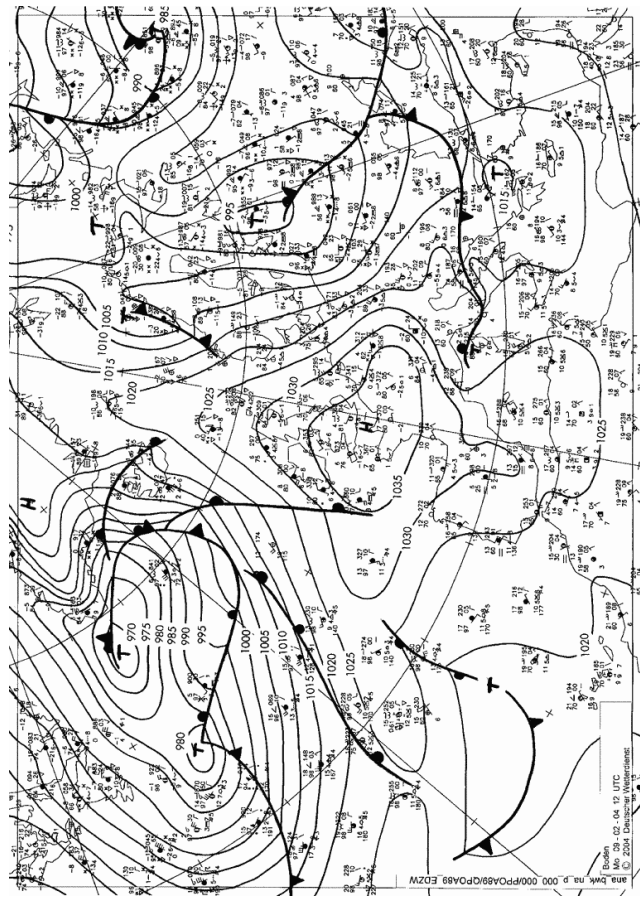
<http://www.wetter3.de>



<http://www.wetter3.de>



<http://www.wetter3.de>



<http://www.wetter3.de>

Figure 2.4

2.2 Laseyer Event 12/02/2005

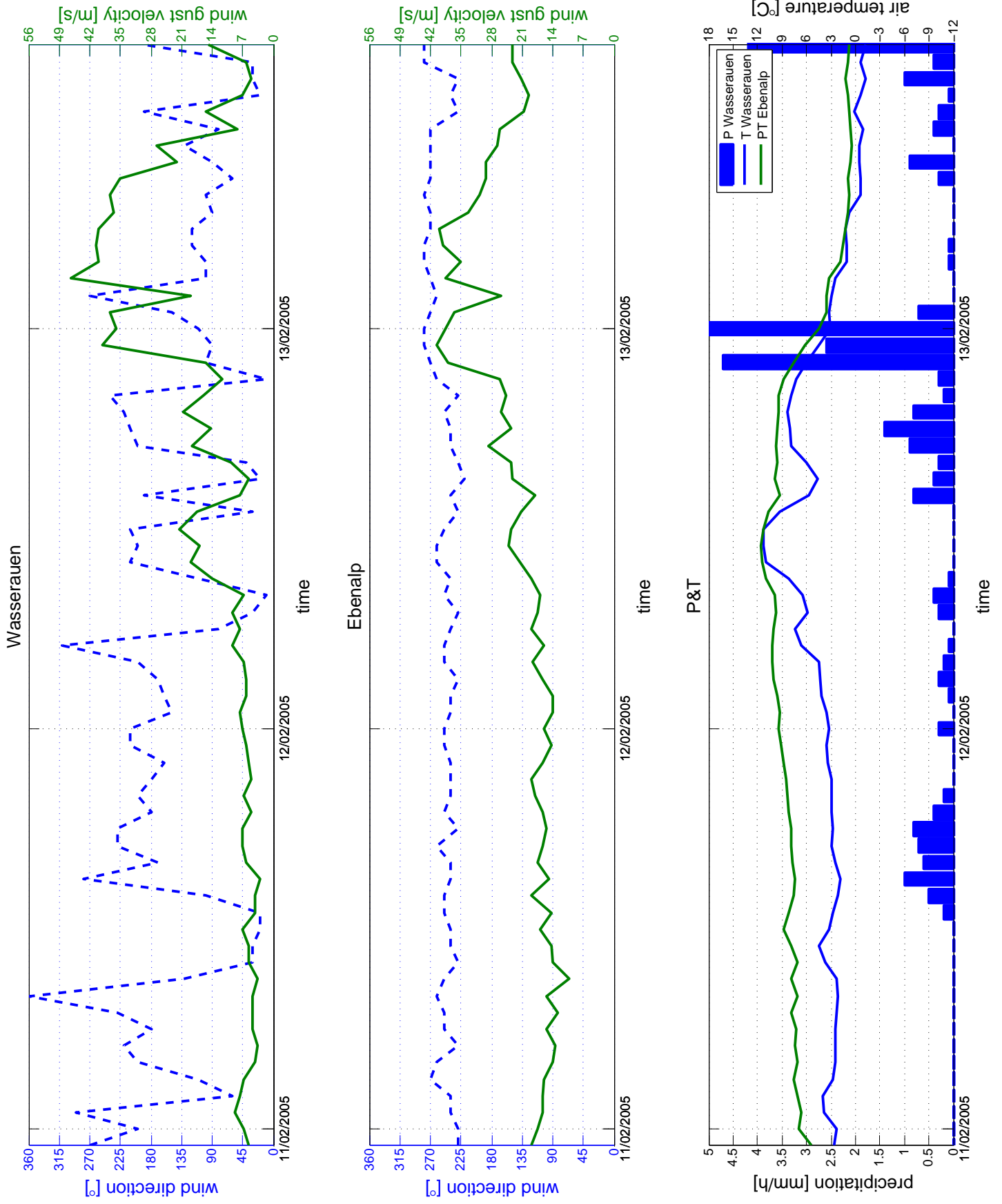


Figure 2.5

2 Weather charts for selected events

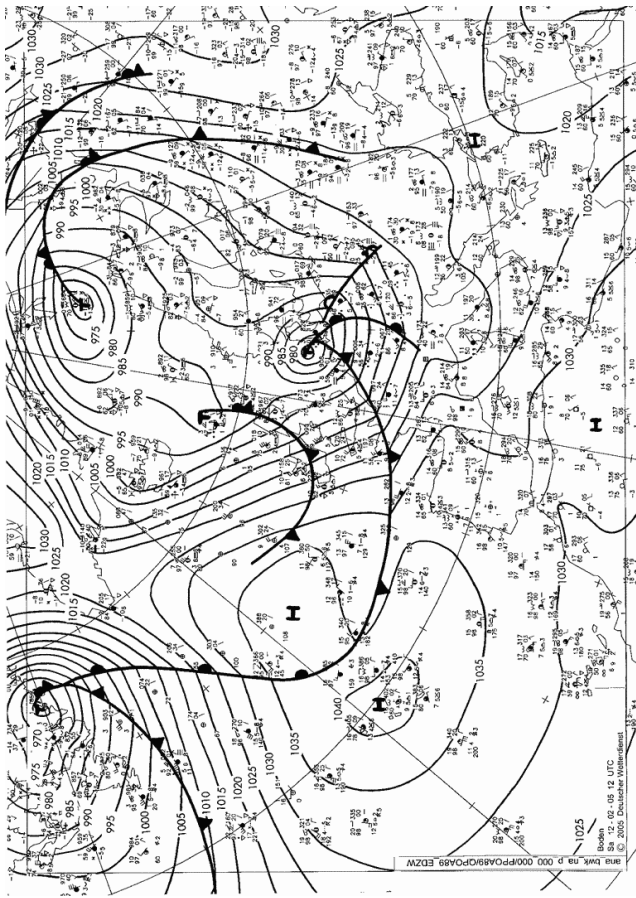
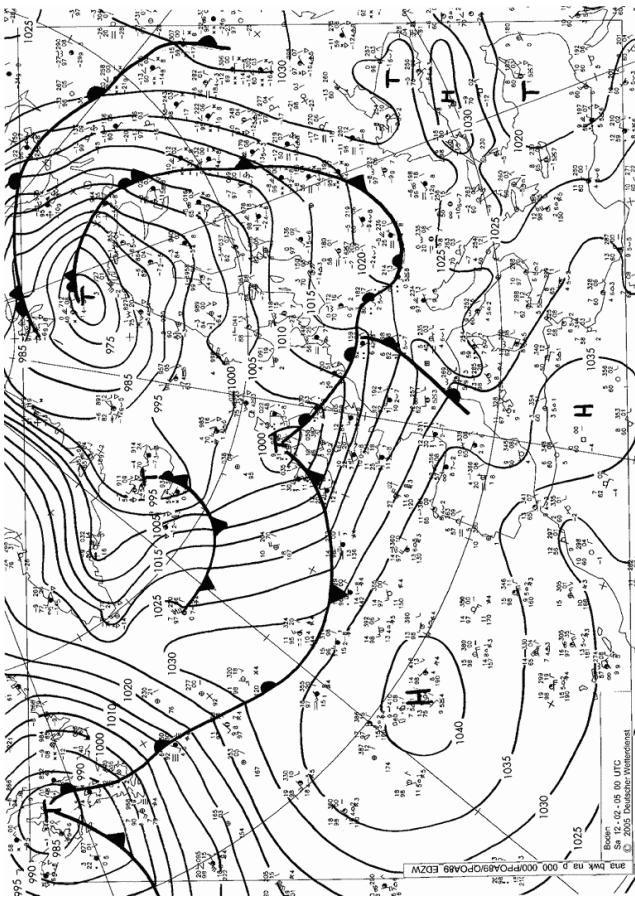
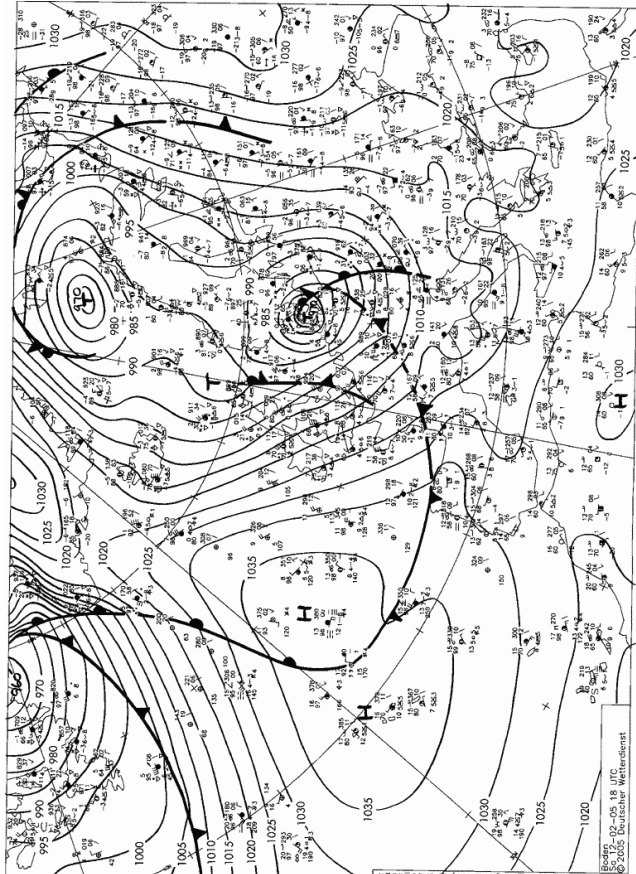
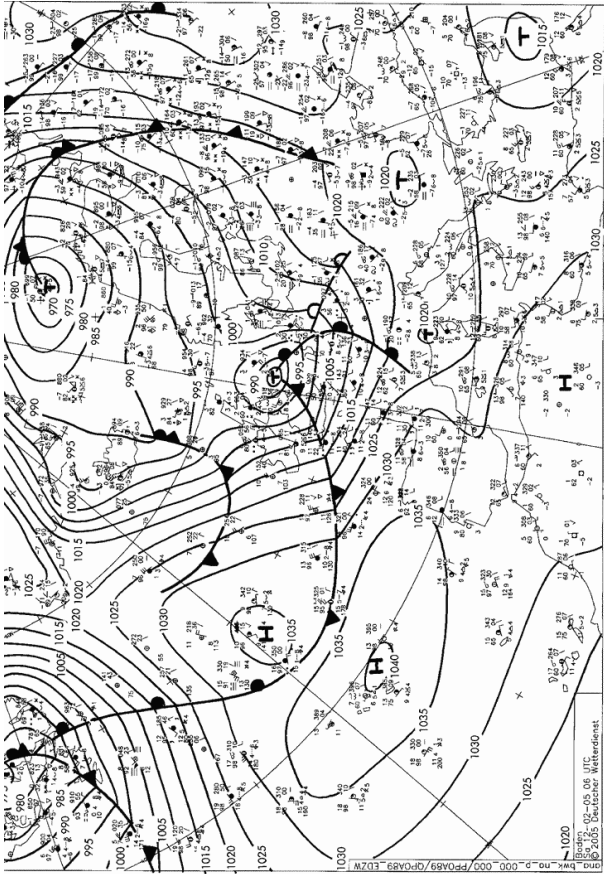
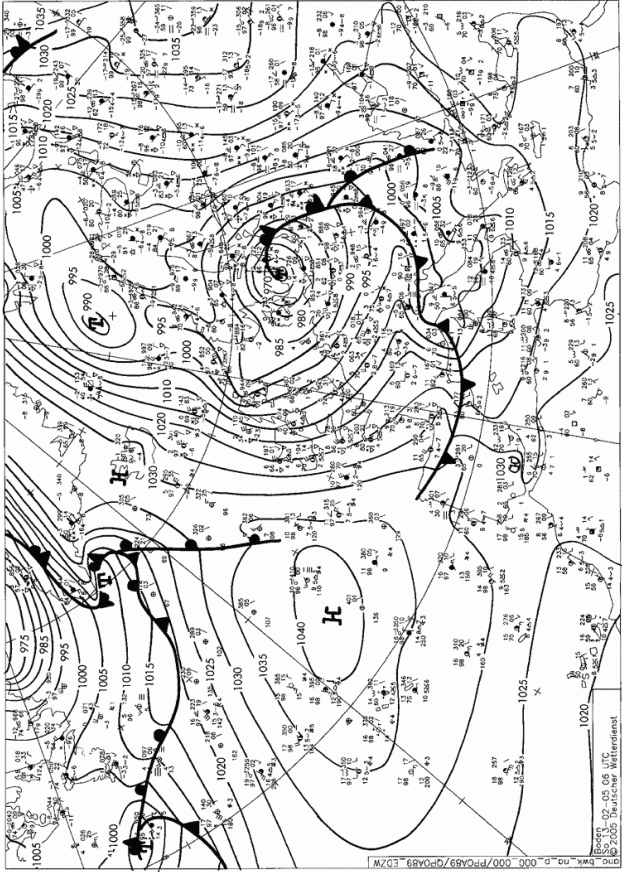
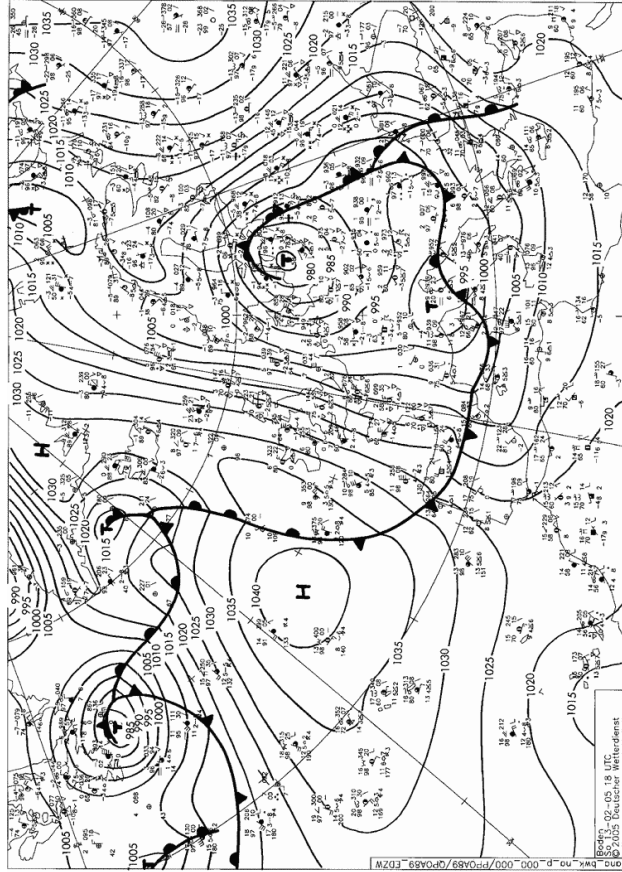


Figure 2.6

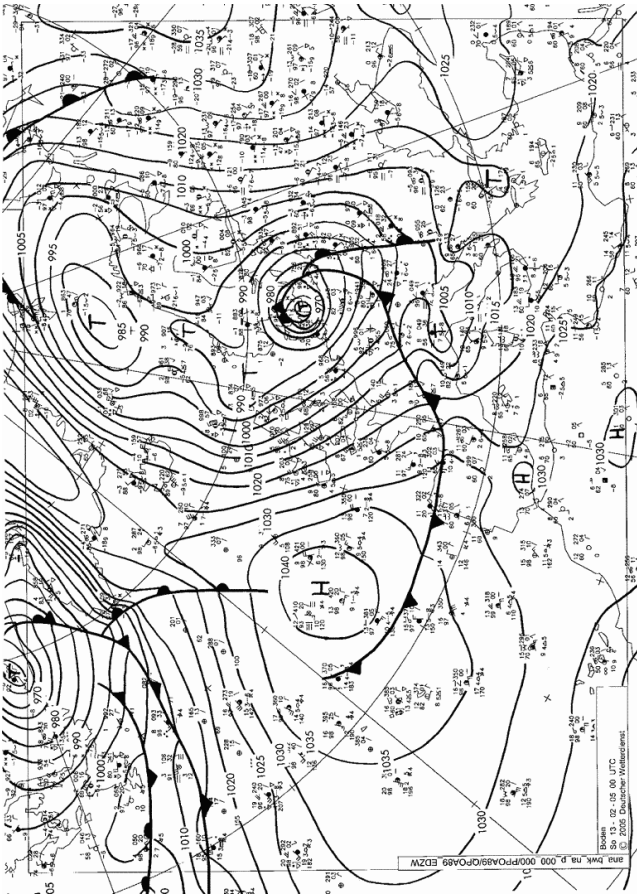
2 Weather charts for selected events



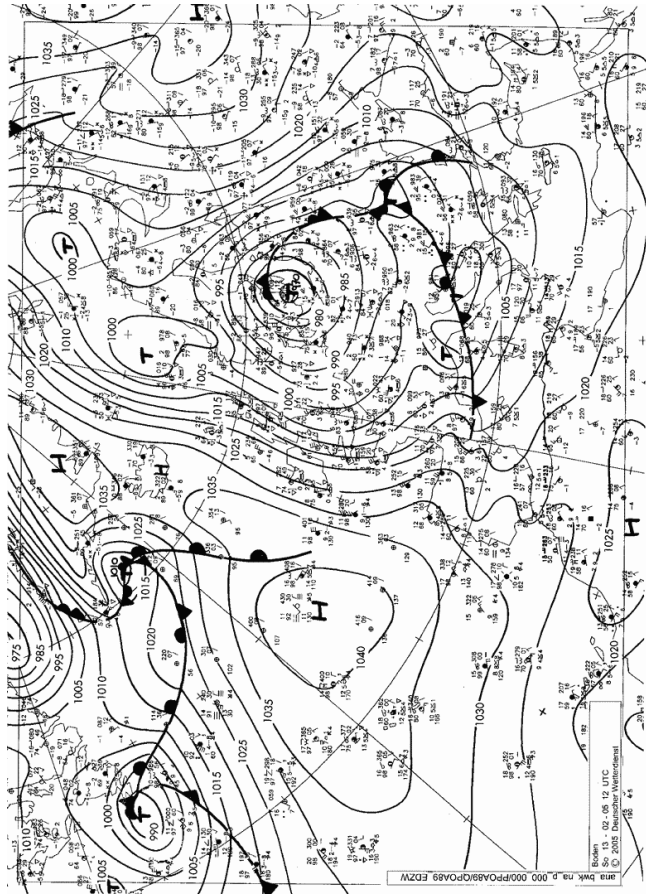
<http://www.wetter3.de>



<http://www.wetter3.de>



<http://www.wetter3.de>



<http://www.wetter3.de>

Figure 2.7

2.3 Laseyer Event 11/01/2007

2 Weather charts for selected events

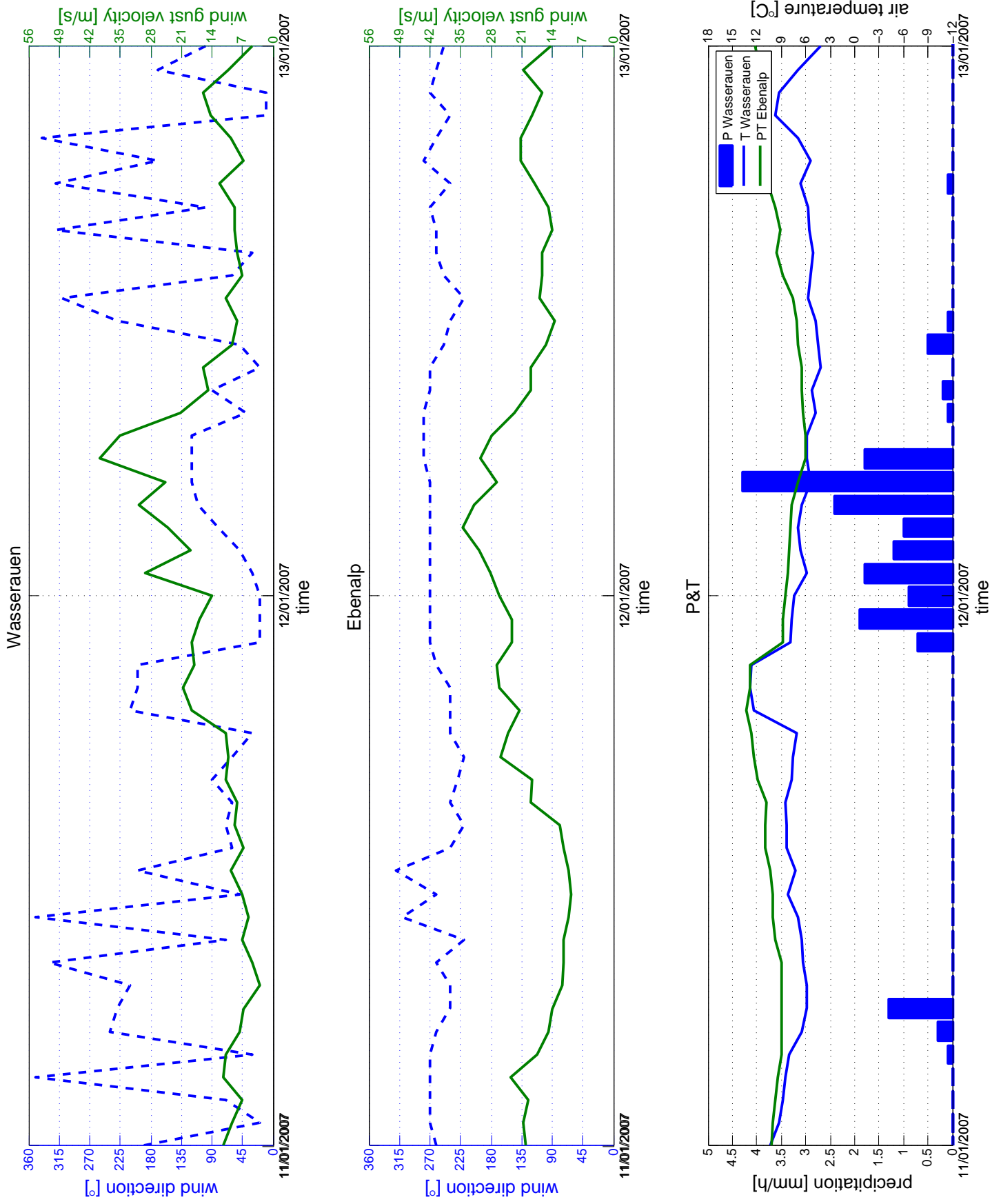
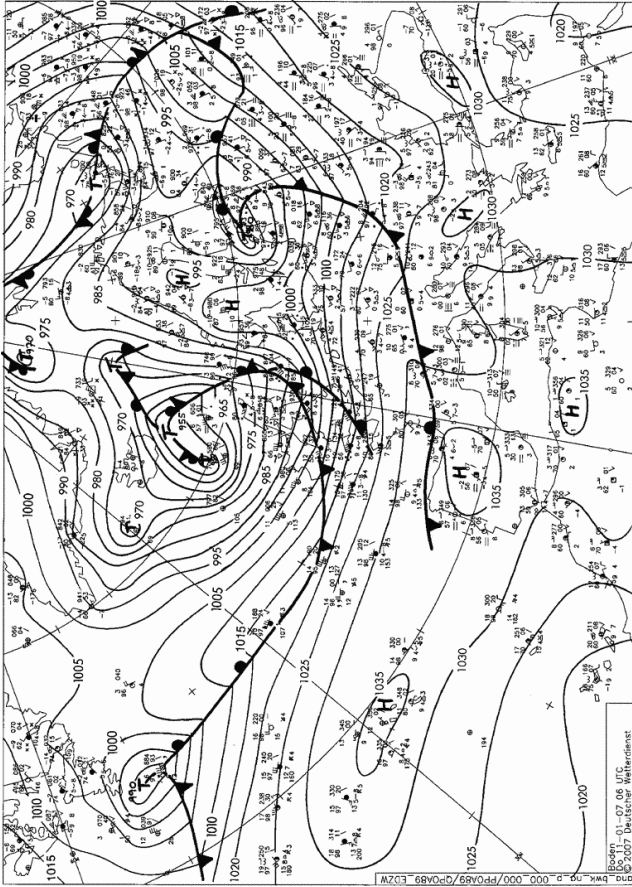
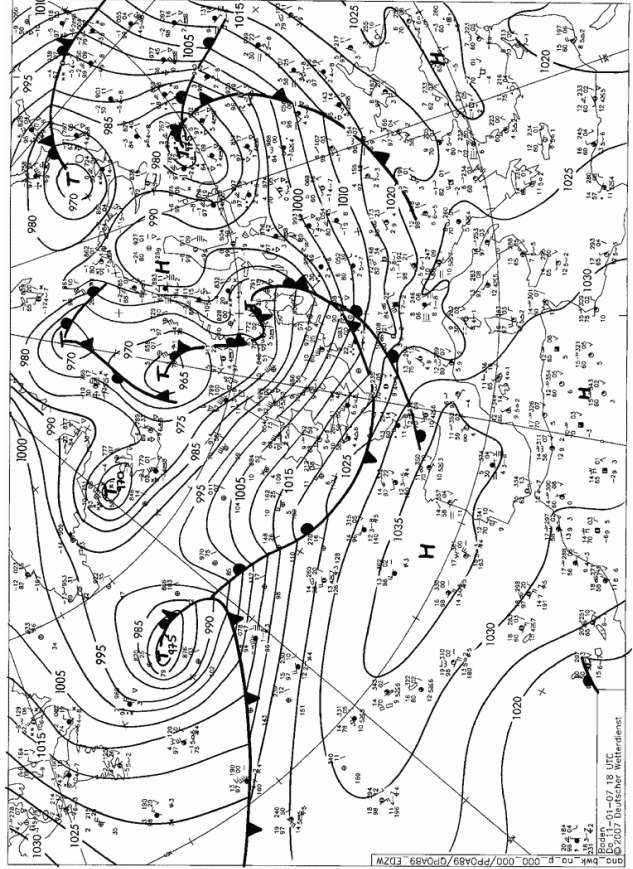


Figure 2.8

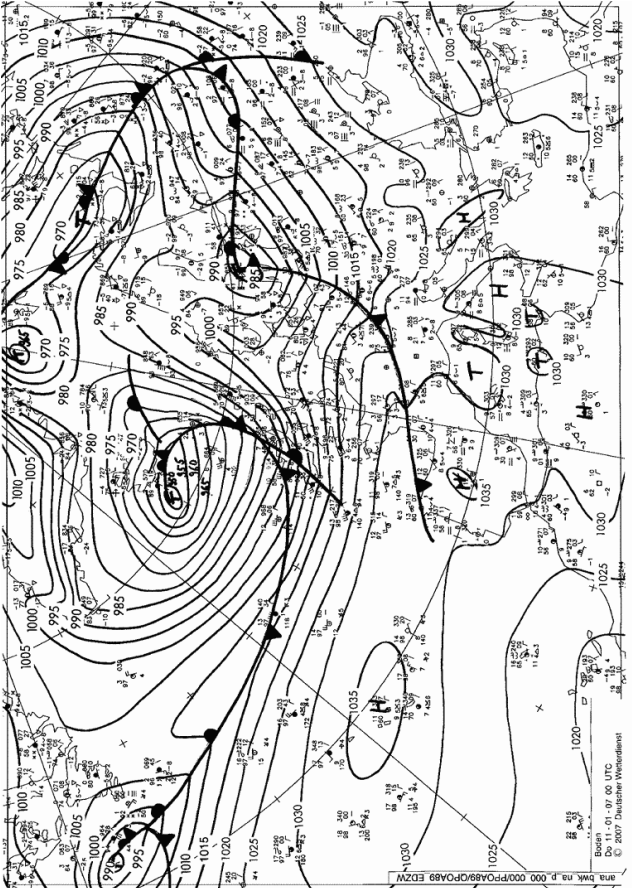
2 Weather charts for selected events



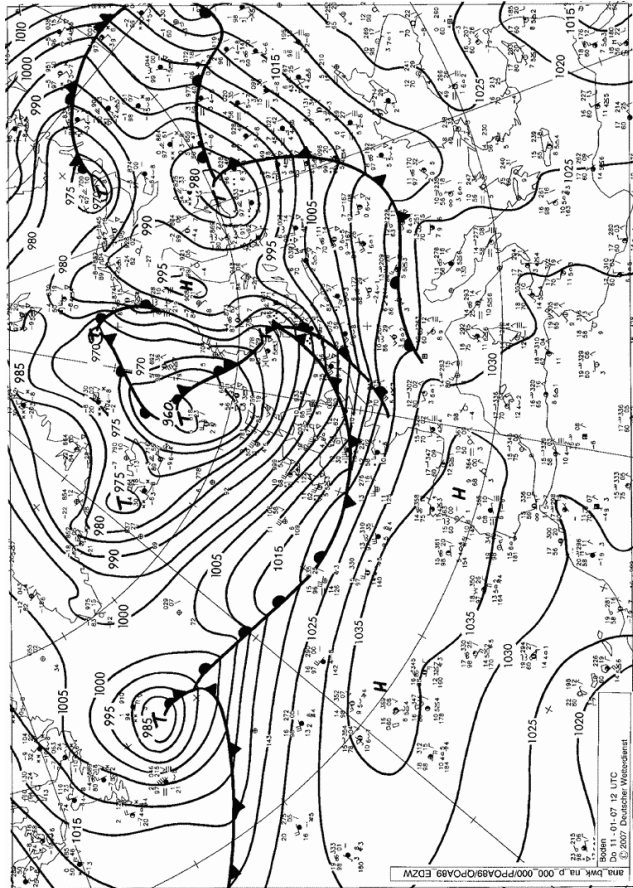
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<http://www.wetter3.de>



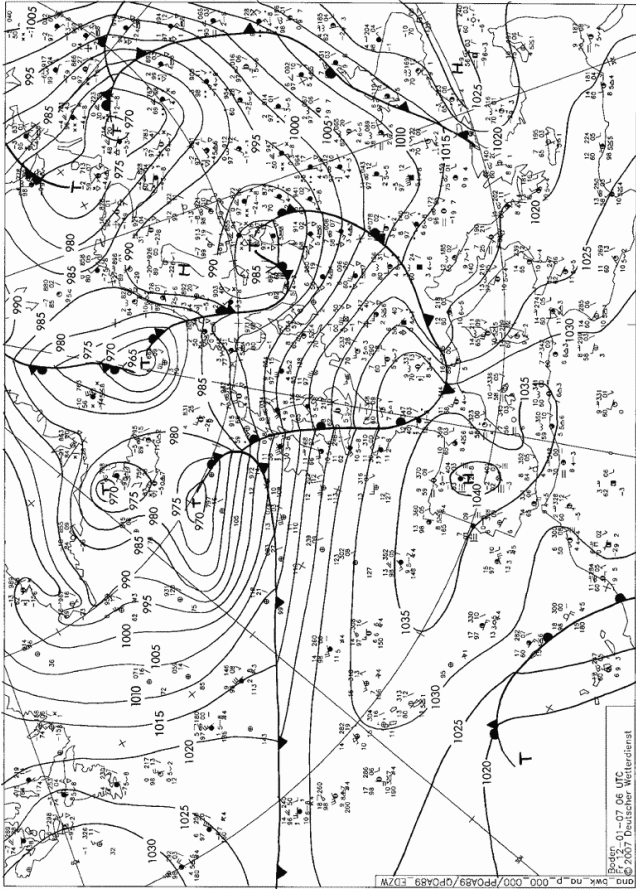
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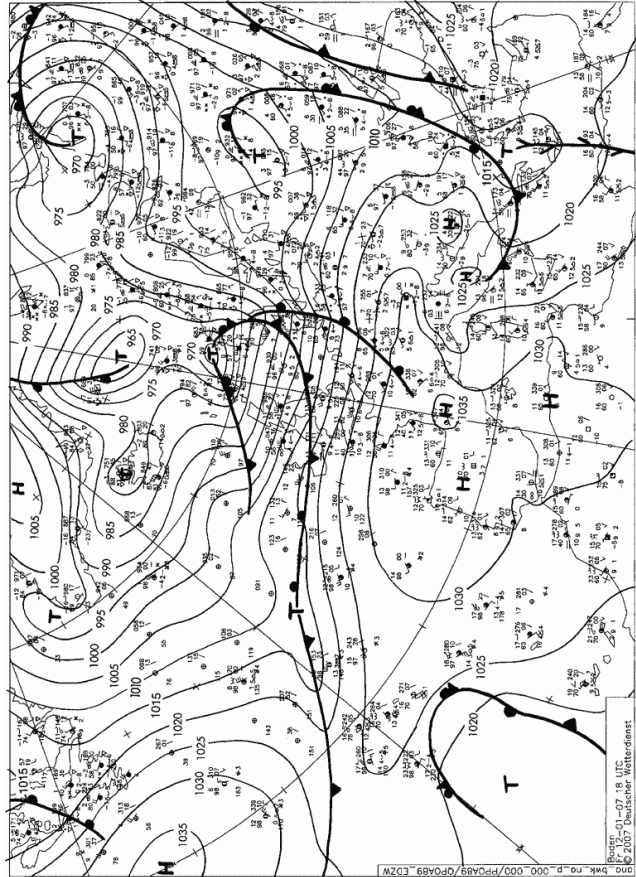
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Figure 2.9

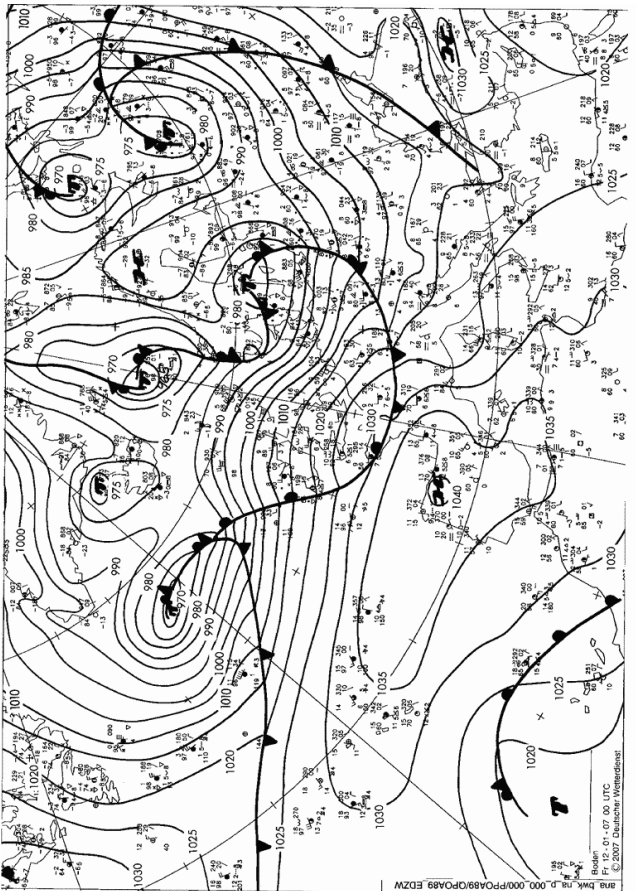
2 Weather charts for selected events



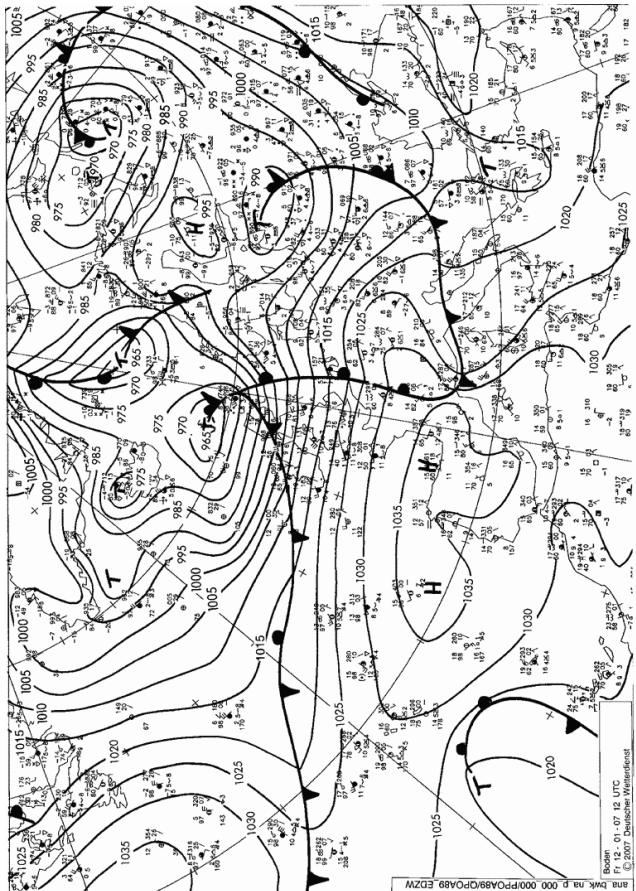
<http://www.wetter3.de>



<http://www.wetter3.de>



<http://www.wetter3.de>



<http://www.wetter3.de>

Figure 2.10

2.4 Laseyer Event 01/03/2008

2 Weather charts for selected events

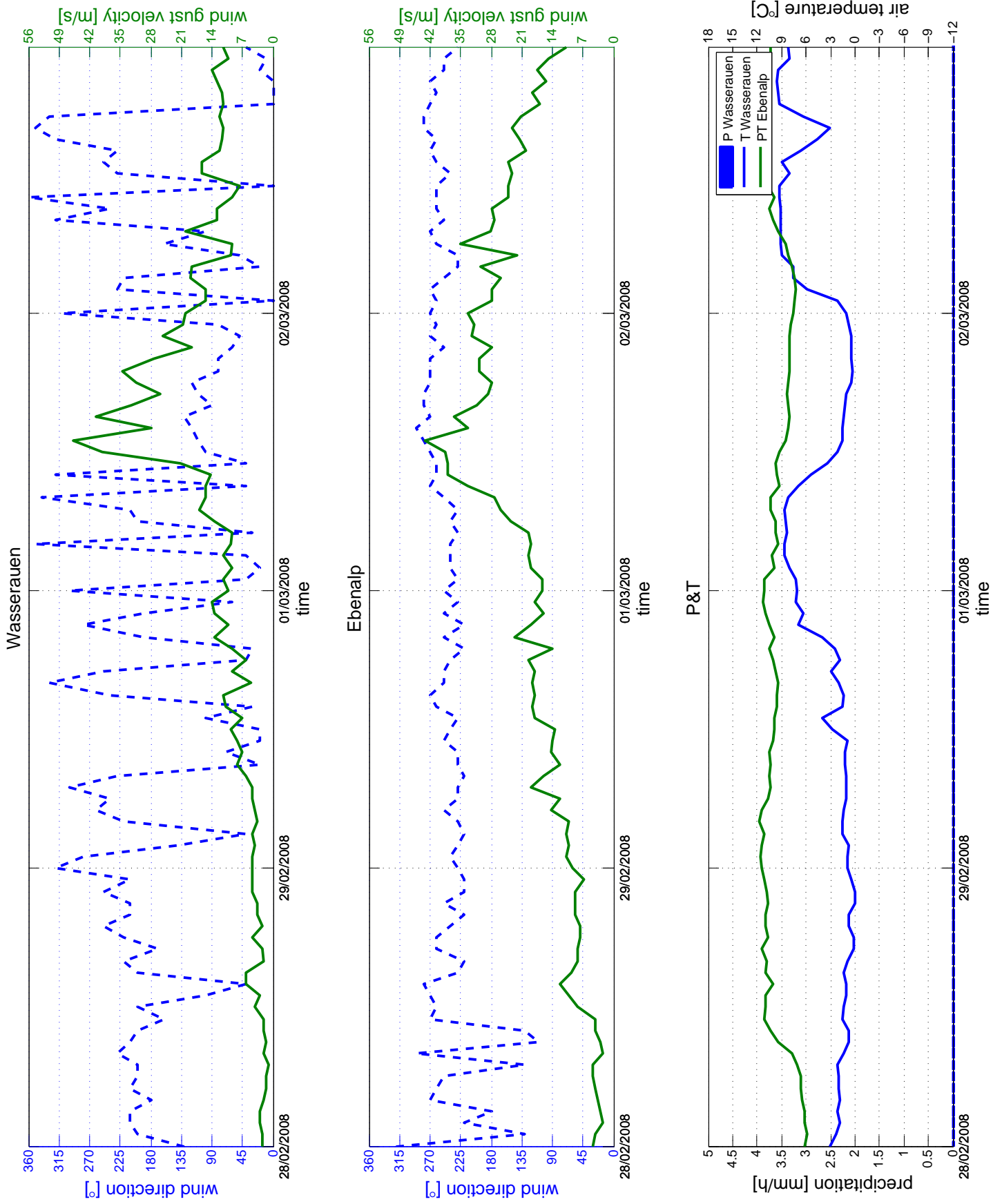
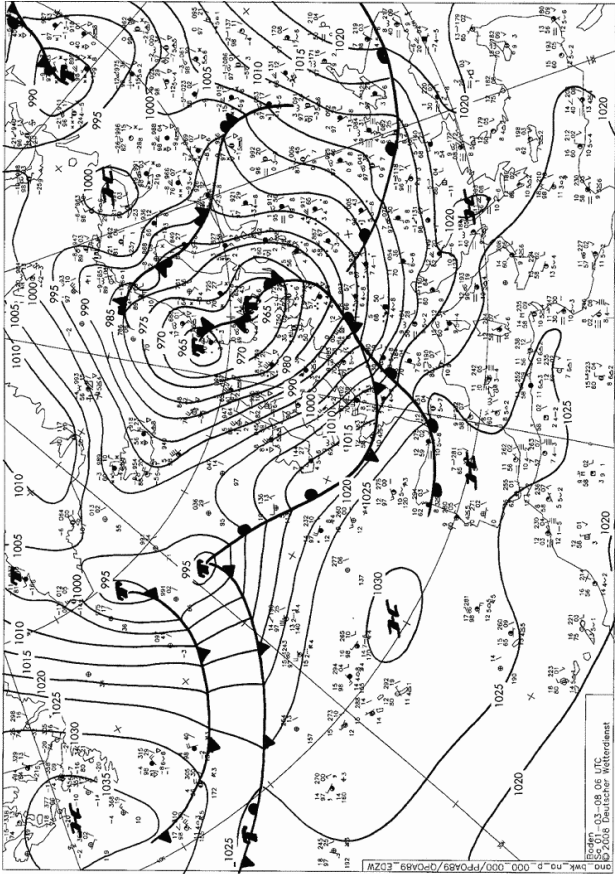
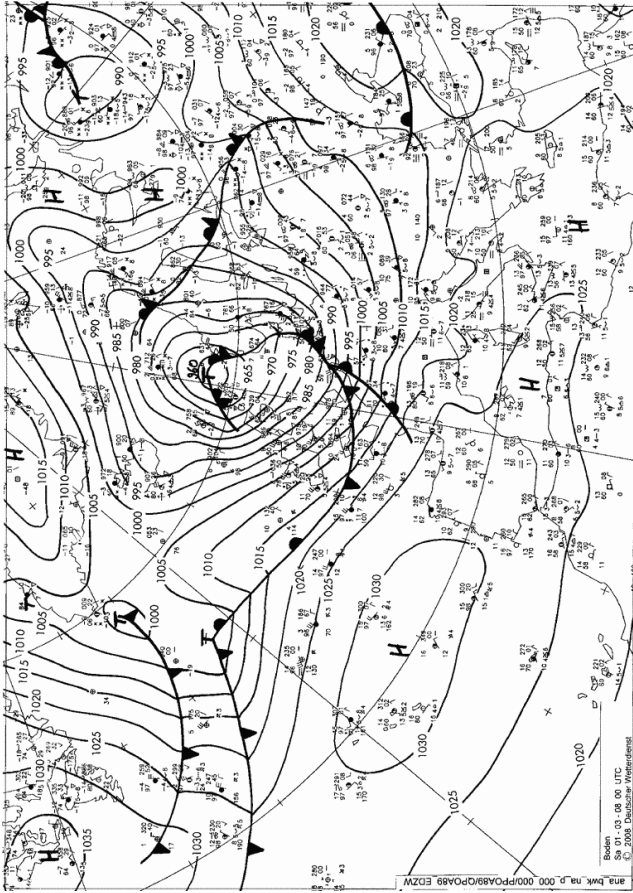


Figure 2.11

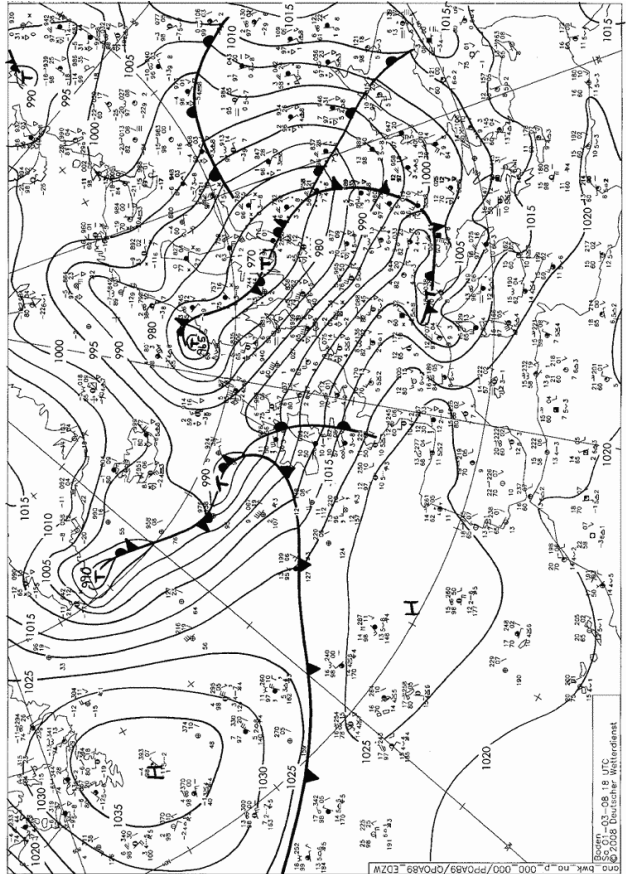
2 Weather charts for selected events



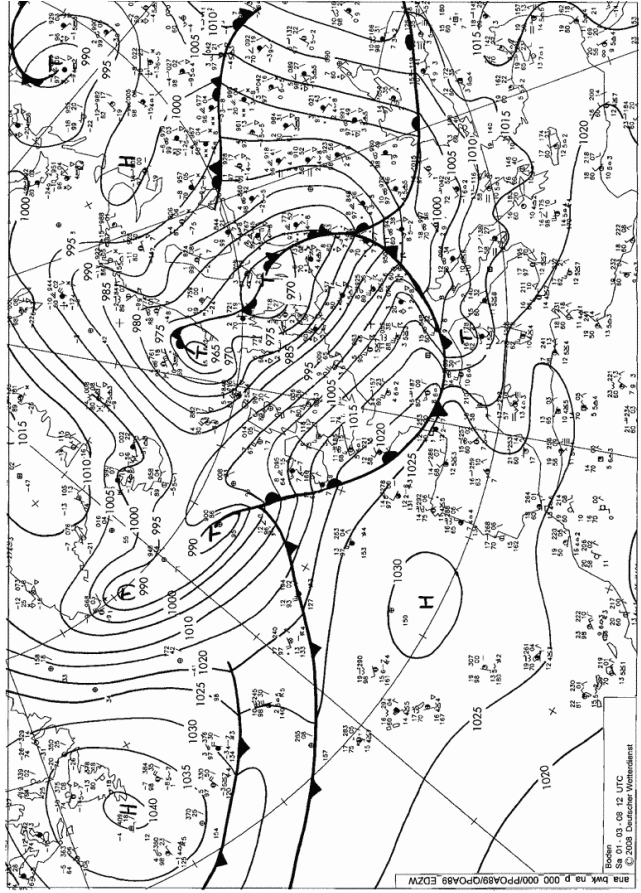
<http://www.wetter3.de/fax>



<http://www.wetter3.de/fax>



<http://www.wetter3.de/fax>



<http://www.wetter3.de/fax>

Figure 2.12

2.5 Laseyer Event 19/01/2007

2 Weather charts for selected events

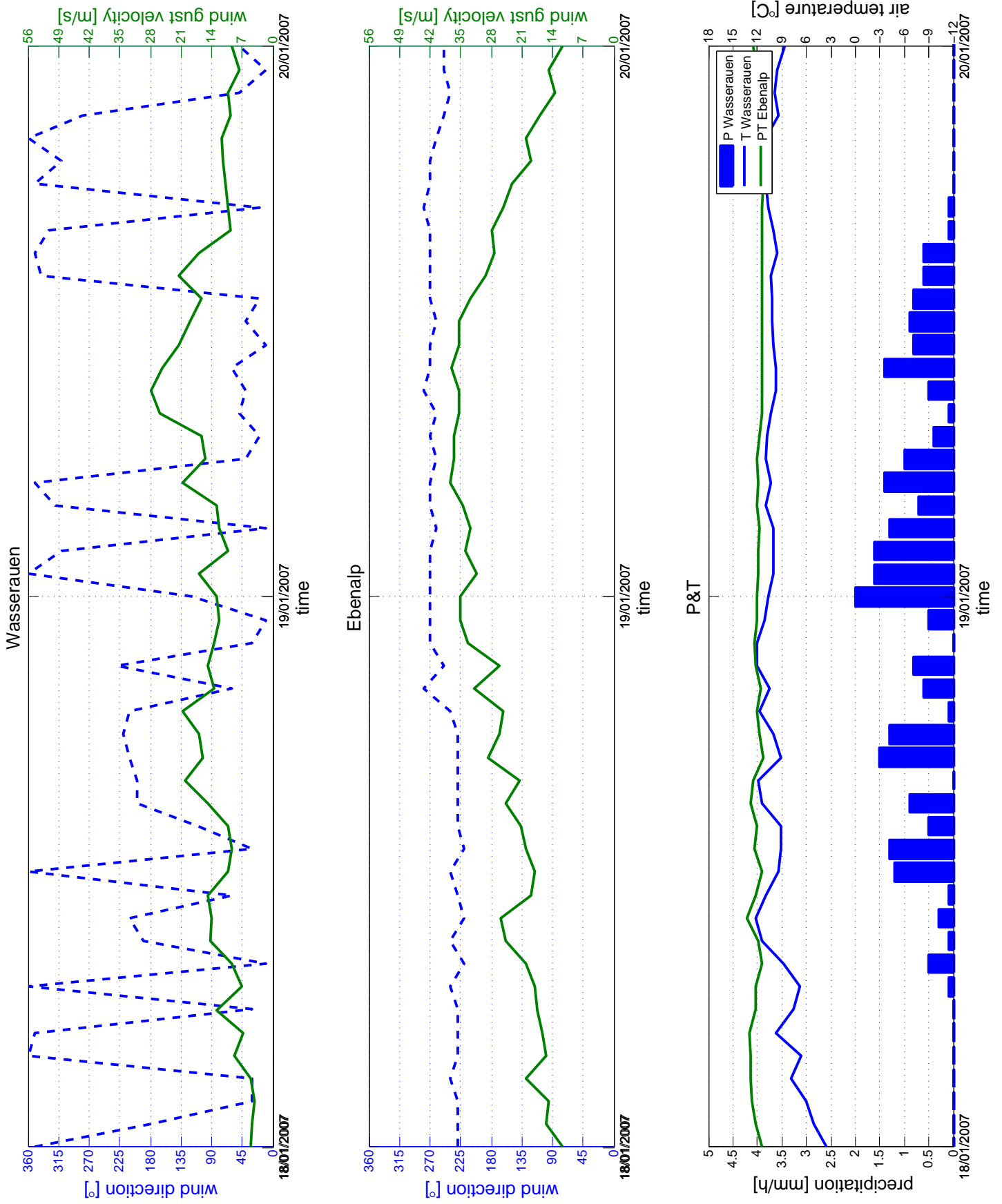


Figure 2.13

2 Weather charts for selected events

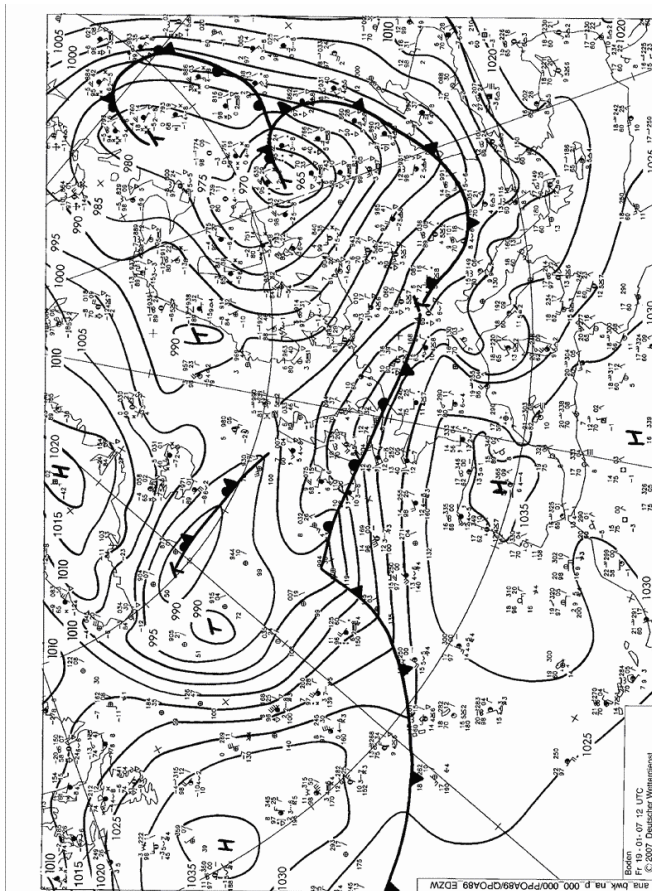
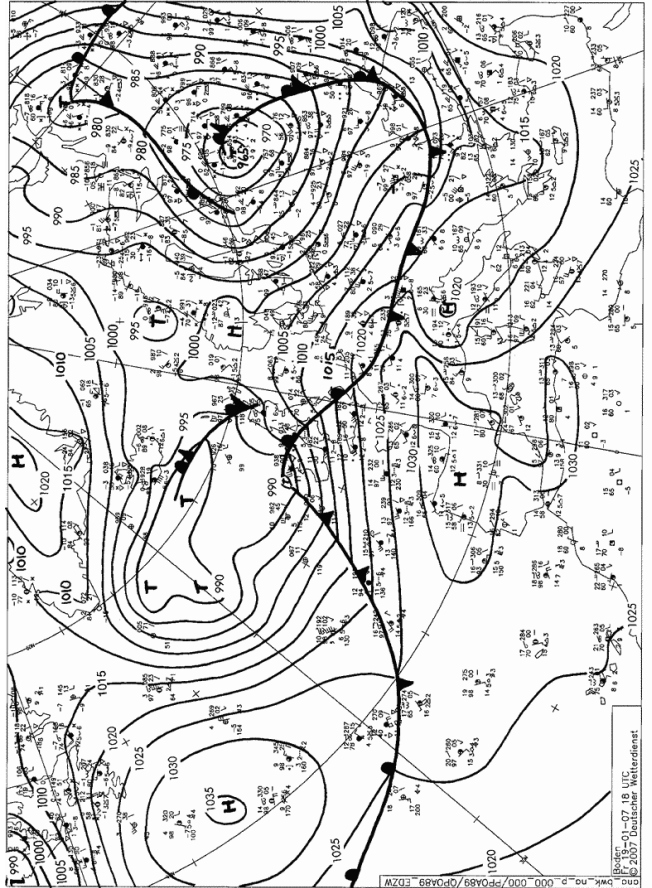
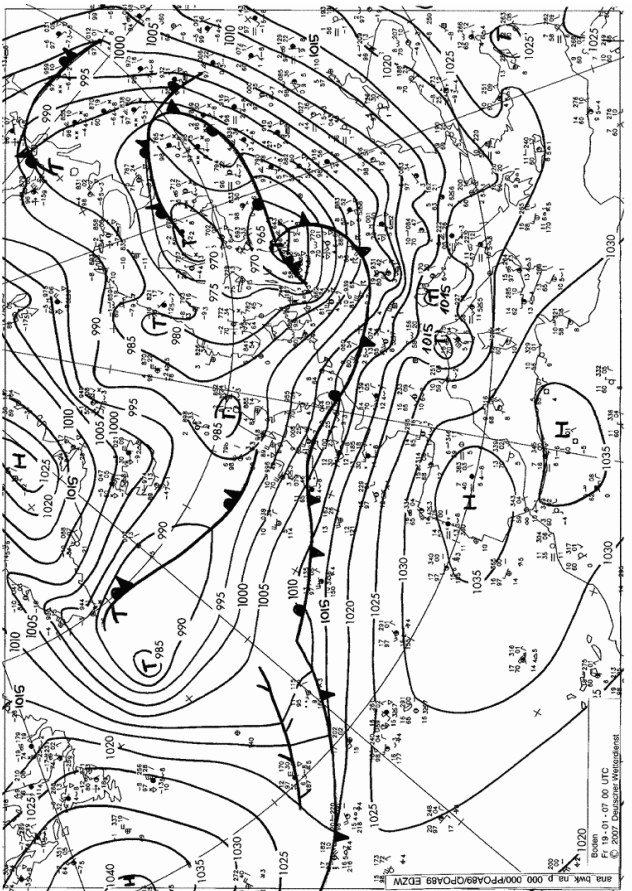
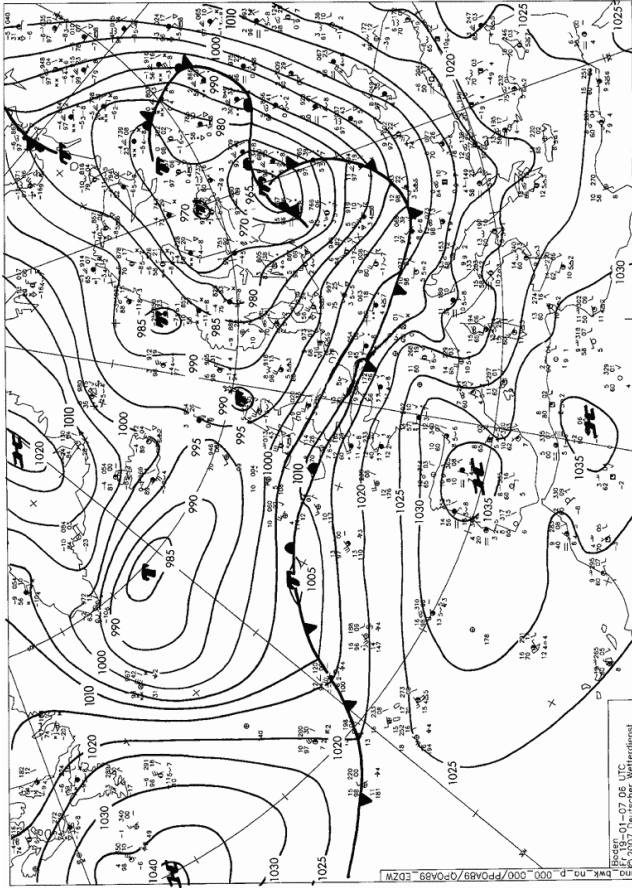


Figure 2.14

3 Wind observations at the location of the train accident

The following plots show two recent laseyer events and compare the wind velocity and wind direction at the location of the train accident in January 2007 (next to the rail tracks of the Appenzellerbahn) and at the weather station of Meteomedia (valley station of the Ebnalpbahn).

3 Wind observations at the location of the train accident

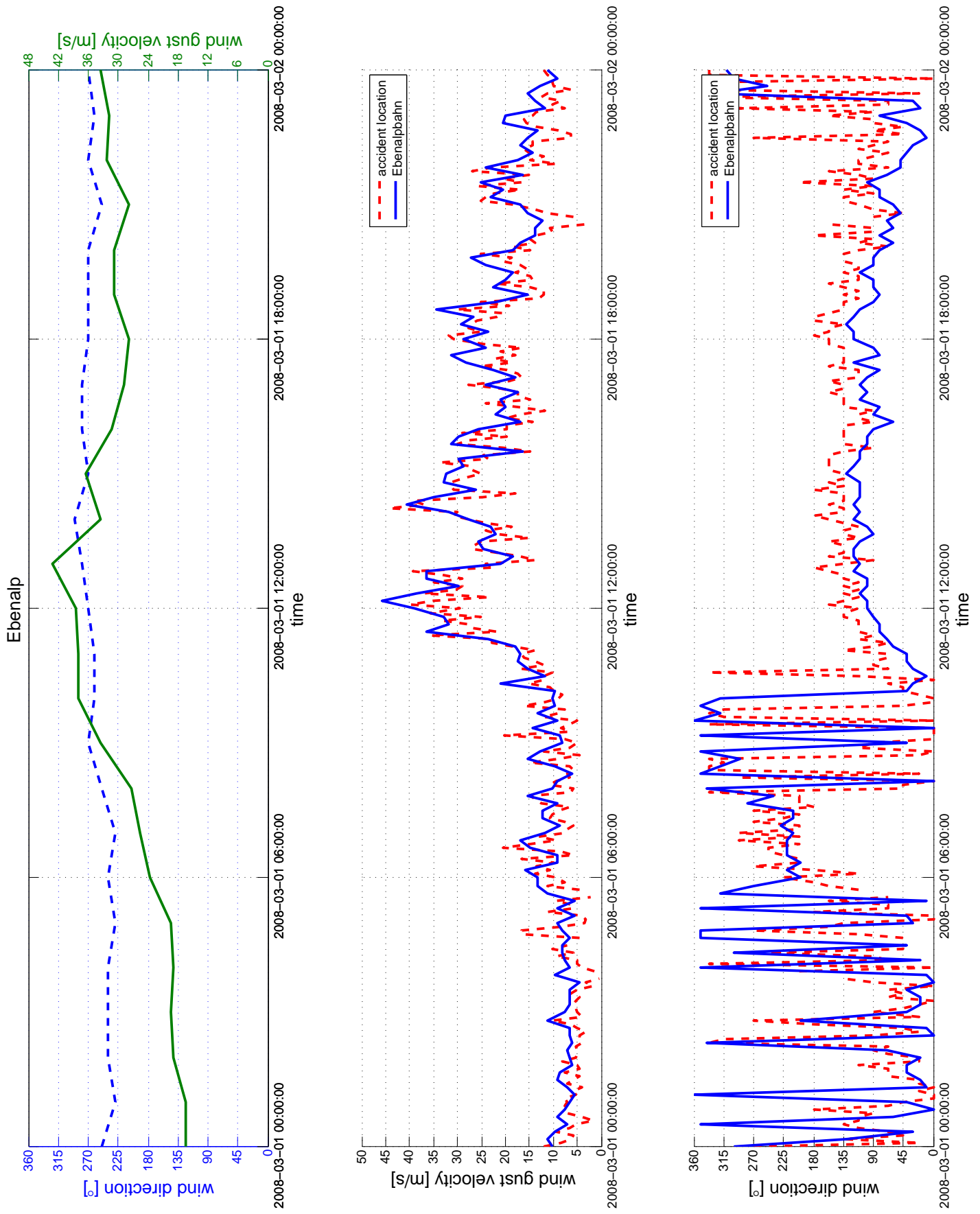


Figure 3.1

3 Wind observations at the location of the train accident

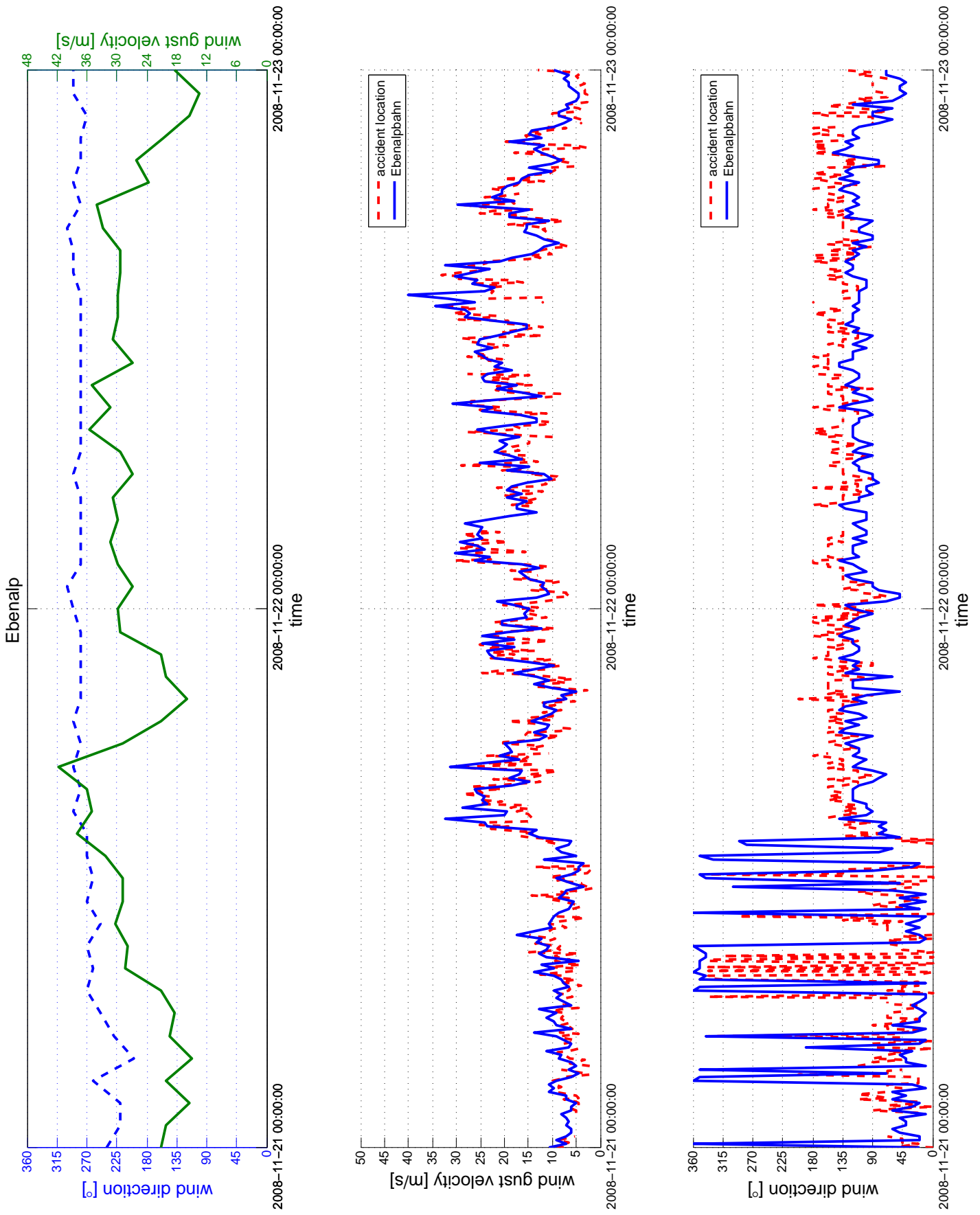
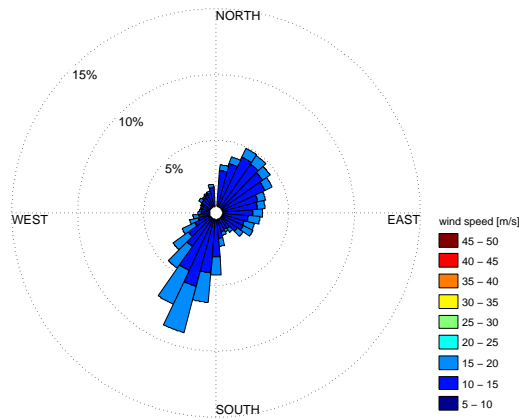


Figure 3.2

4 Windrose plots 1998-2009

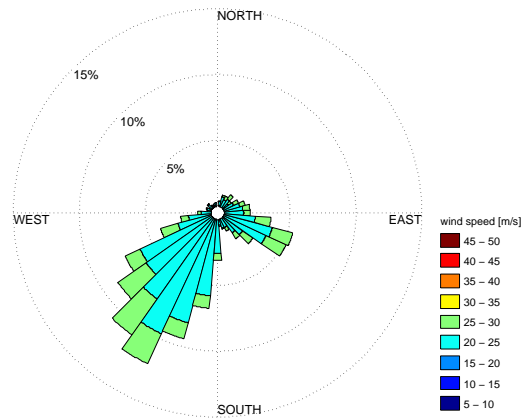
4 Windrose plots 1998-2009

Wind direction, intensity and frequency for Wasserauen for the period 1998-2009
 Conditions: Wa minangle: 0, Wa maxangle: 360, Wa minwindspeed: 10, Wa maxwindspeed: 20
 Conditions met on 1739 days for 9244 hours



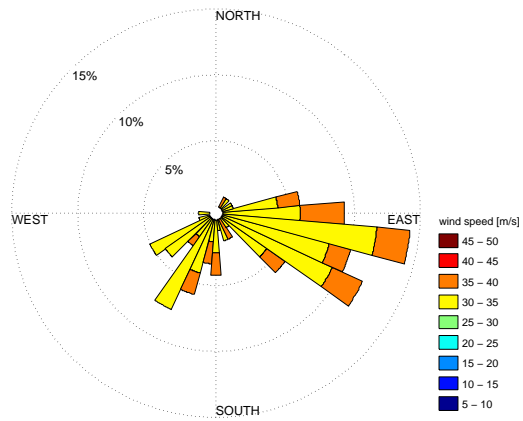
(a) wind gust range: 10-20 m/s

Wind direction, intensity and frequency for Wasserauen for the period 1998-2009
 Conditions: Wa minangle: 0, Wa maxangle: 360, Wa minwindspeed: 20, Wa maxwindspeed: 30
 Conditions met on 453 days for 1683 hours



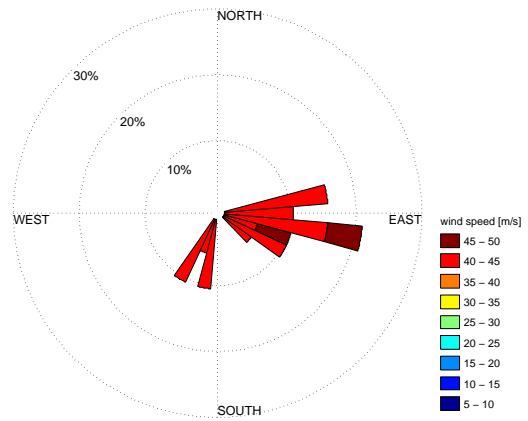
(b) wind gust range: 20-30 m/s

Wind direction, intensity and frequency for Wasserauen for the period 1998-2009
 Conditions: Wa minangle: 0, Wa maxangle: 360, Wa minwindspeed: 30, Wa maxwindspeed: 40
 Conditions met on 55 days for 119 hours



(c) wind gust range: 30-40 m/s

Wind direction, intensity and frequency for Wasserauen for the period 1998-2009
 Conditions: Wa minangle: 0, Wa maxangle: 360, Wa minwindspeed: 40, Wa maxwindspeed: 50
 Conditions met on 13 days for 19 hours



(d) wind gust range: 40-50 m/s

Figure 4.1: Recorded wind direction, intensity (colours) and frequency (percentage circles) of wind gusts at Wasserauen for different gust velocity ranges for the period 1998-2009. No wind direction requirements were imposed.

4 Windrose plots 1998-2009

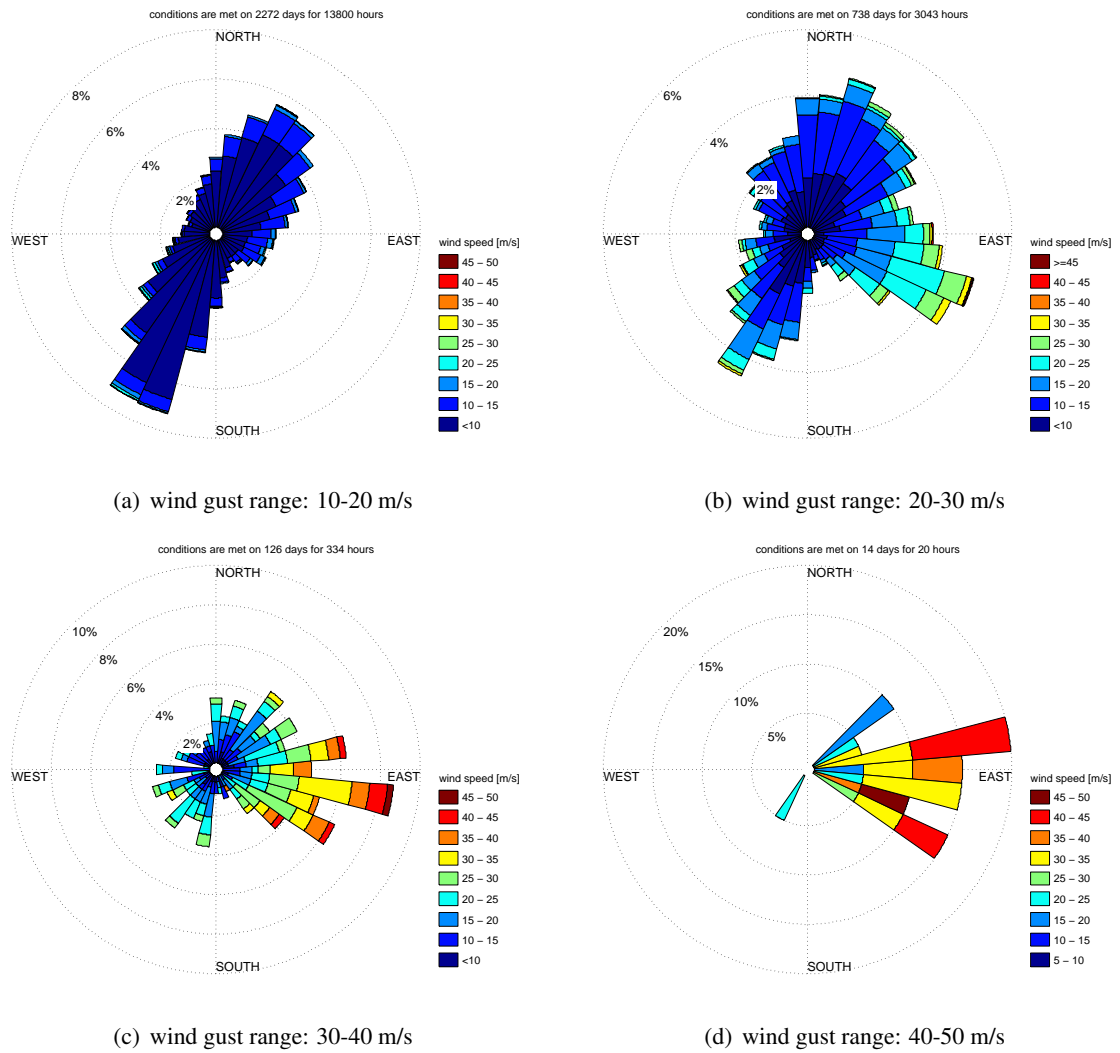


Figure 4.2: Recorded wind direction, intensity (colours) and frequency (percentage circles) of wind gusts at Wasserauen for wind directions between 240 and 360 degree azimuth and different gust velocity ranges on Ebenalp. Analysed for the period 1998-2009.

4 Windrose plots 1998-2009

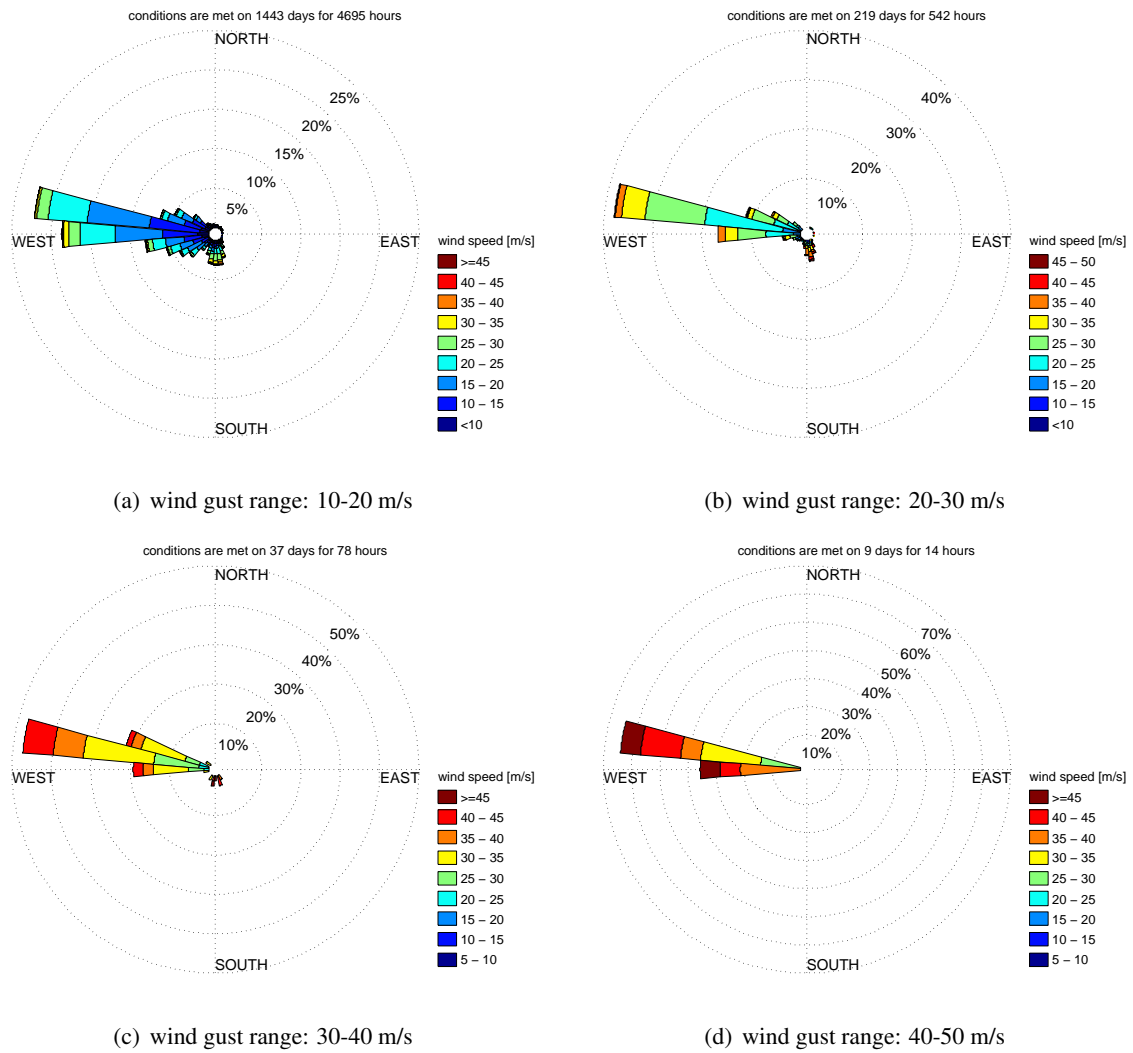


Figure 4.3: Recorded wind direction, intensity (colours) and frequency (percentage circles) of wind gusts on Ebenalp for wind directions between 0 and 180 degree azimuth and different gust velocity ranges at Wasserauen. Analysed for the period 1998-2009.

5 ARPS runs with heterogenous surface fields

5.1 150m run

5 ARPS runs with heterogenous surface fields

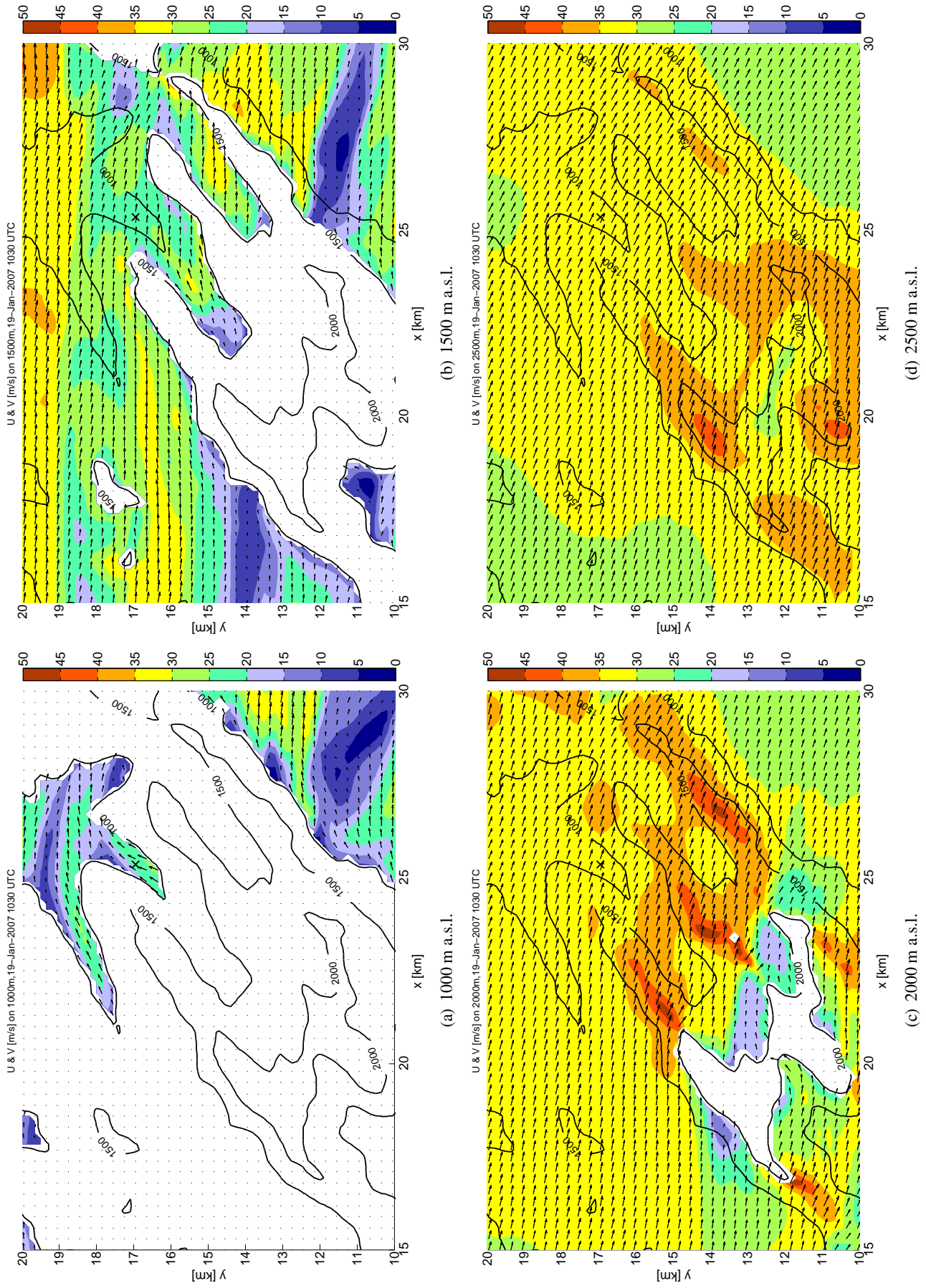


Figure 5.1: Horizontal wind direction (arrows) and velocity (colors, in m/s) of the ARPS-150m simulation (with heterogenous surface roughness) on different elevations on January 19th at 10.30 UTC. The approximate location of the train accident is marked with a cross.

5.2 50m run

5 ARPS runs with heterogenous surface fields

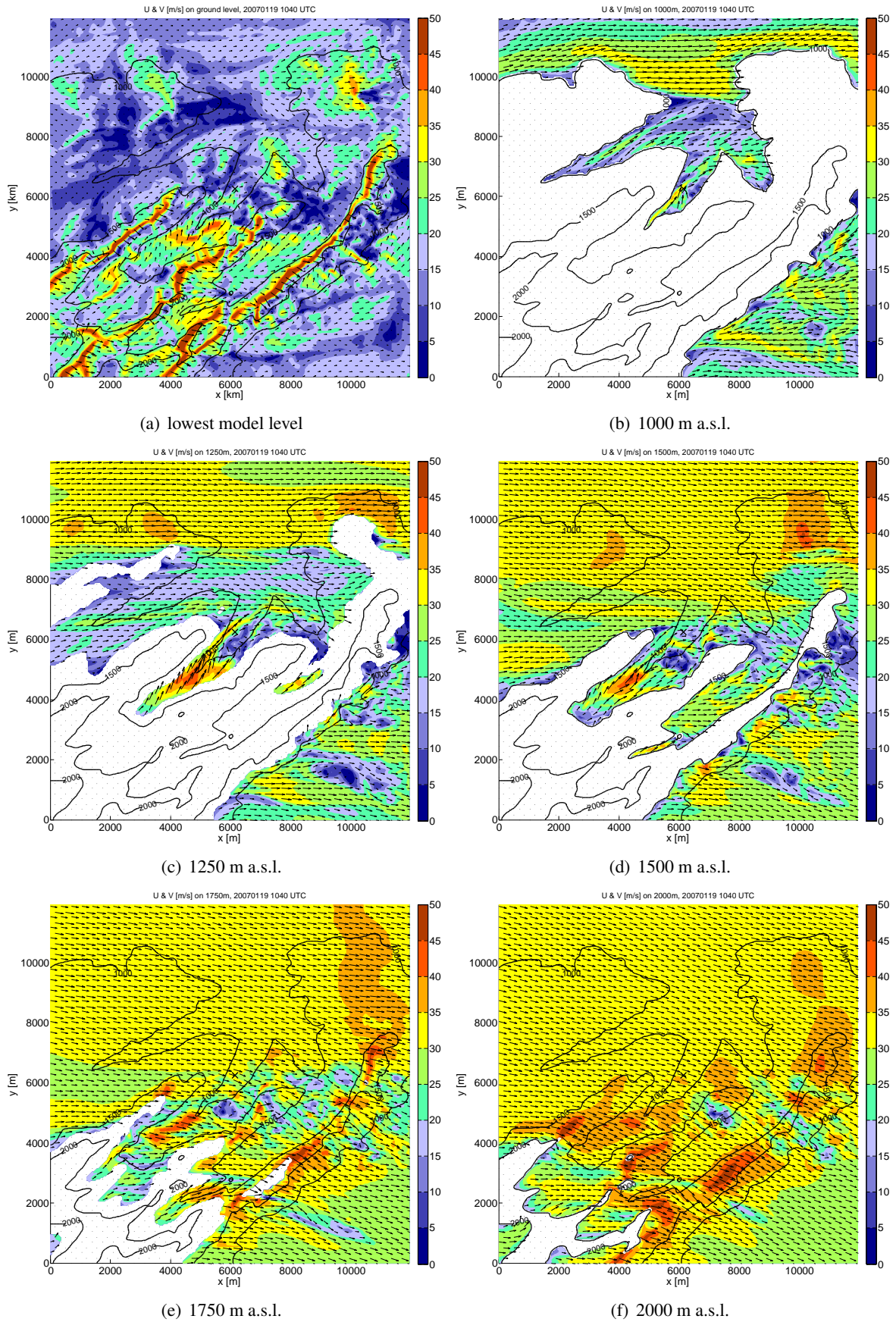


Figure 5.2: Horizontal wind direction (arrows) and velocity (colors, in m/s) of the ARPS-50m simulation (with heterogenous surface roughness) on different elevations on January 19th at 10.40 UTC. The approximate location of the train accident is marked with a cross.

5 ARPS runs with heterogenous surface fields

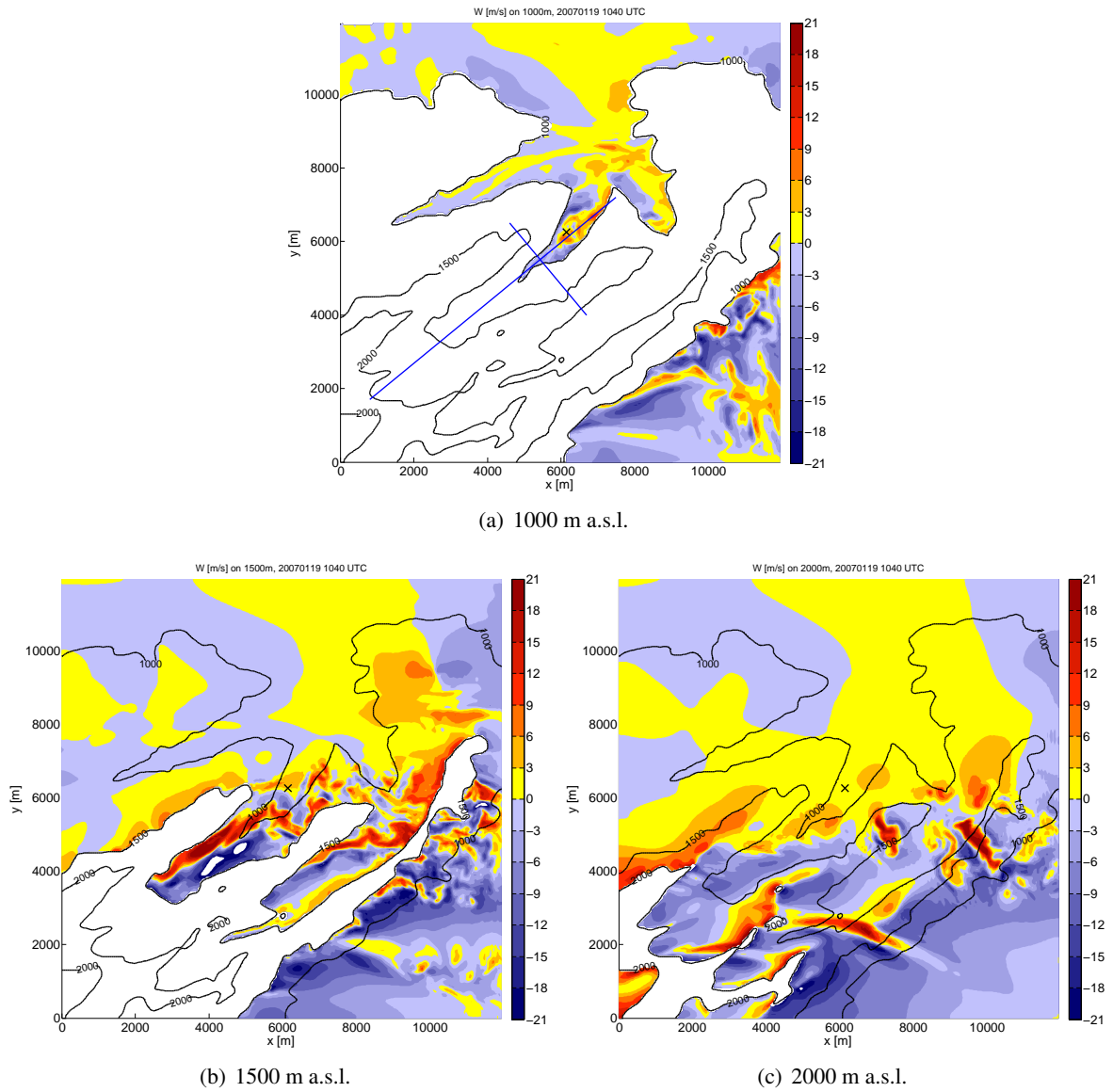


Figure 5.3: Vertical wind velocity (colours, in m/s) of the ARPS-50m simulation for January 19th at 10.40 UTC on different elevations. The approximate location of the train accident is marked with a cross. The two blue lines in (a) indicate the course of the vertical cross sections in Figure 5.4.

5 ARPS runs with heterogenous surface fields

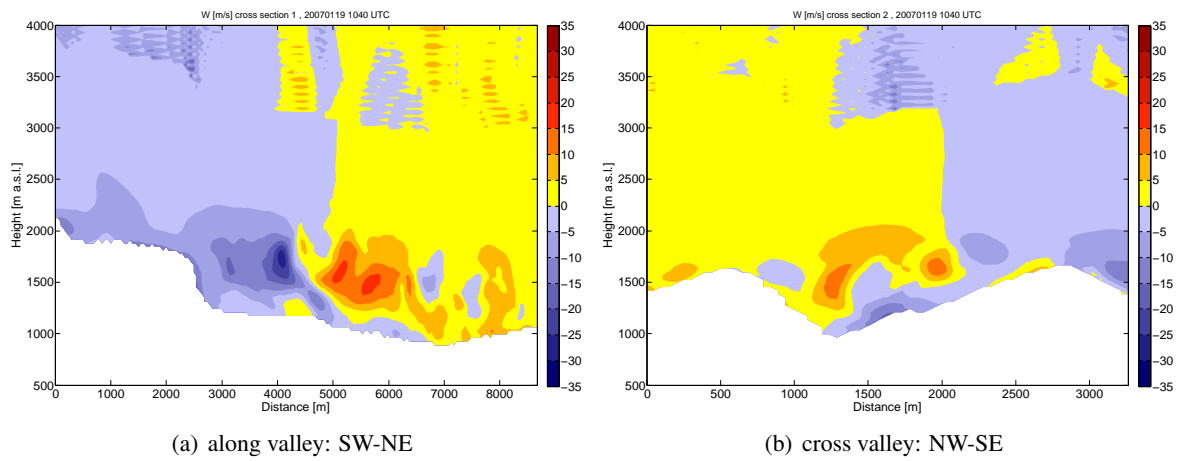


Figure 5.4: Vertical cross sections of vertical velocity (colours, in m/s) of the ARPS-50m simulation for January 19th at 10.40 UTC. The course of the cross sections is depicted in Figure 5.3(a).