

Meteorological measurements in Reydarfjordur 1998-2002

Dr. Þórður Arason

Dr. Sigrún Karlsdóttir

Mr. Flosi Hrafn Sigurðsson

Mr. Hreinn Hjartarson

Mr. Torfi Karl Antonsson

Vedurstofa Islands

Icelandic Meteorological Office

The Icelandic Meteorological Office

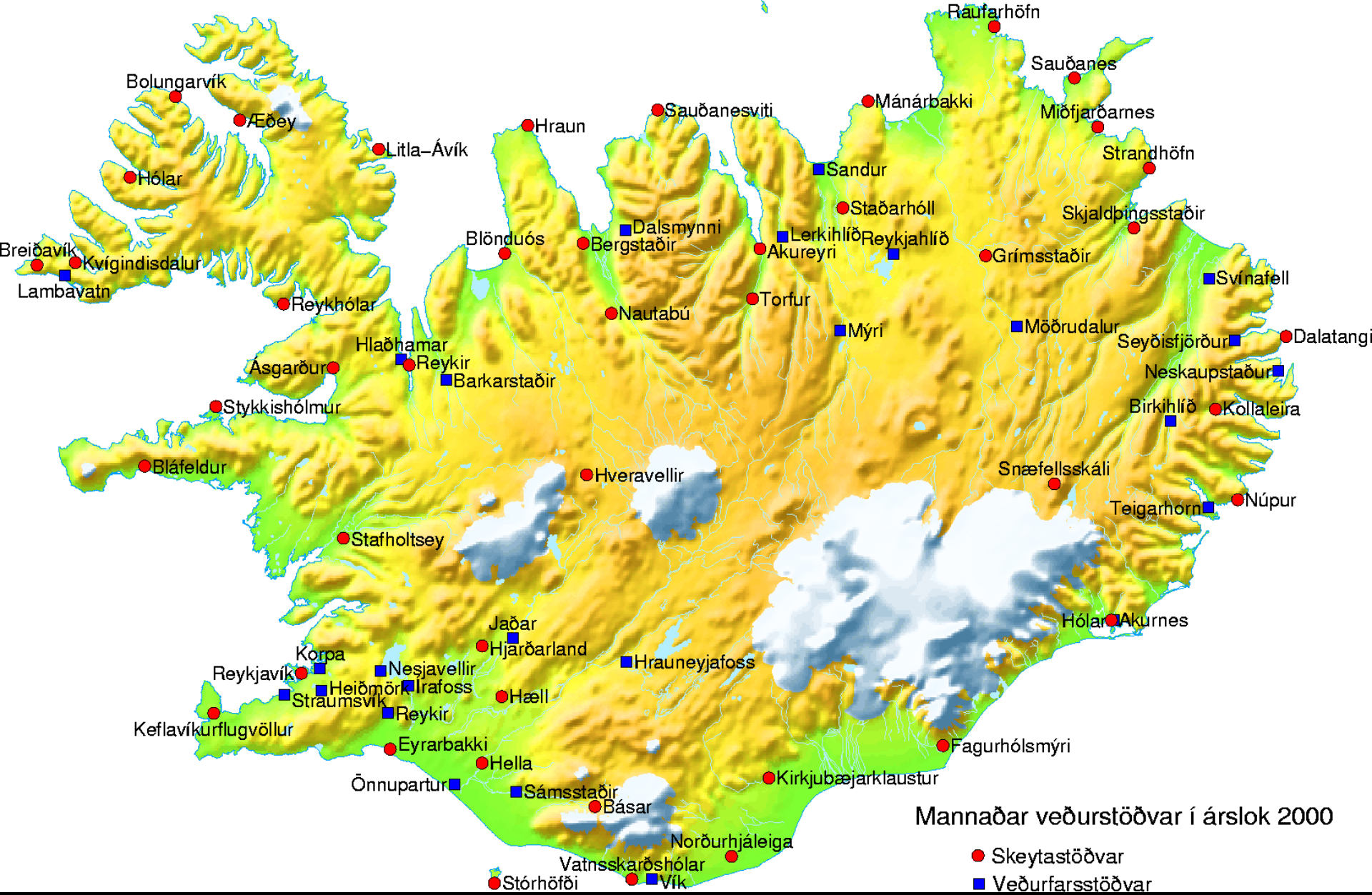
under the Ministry of the Environment

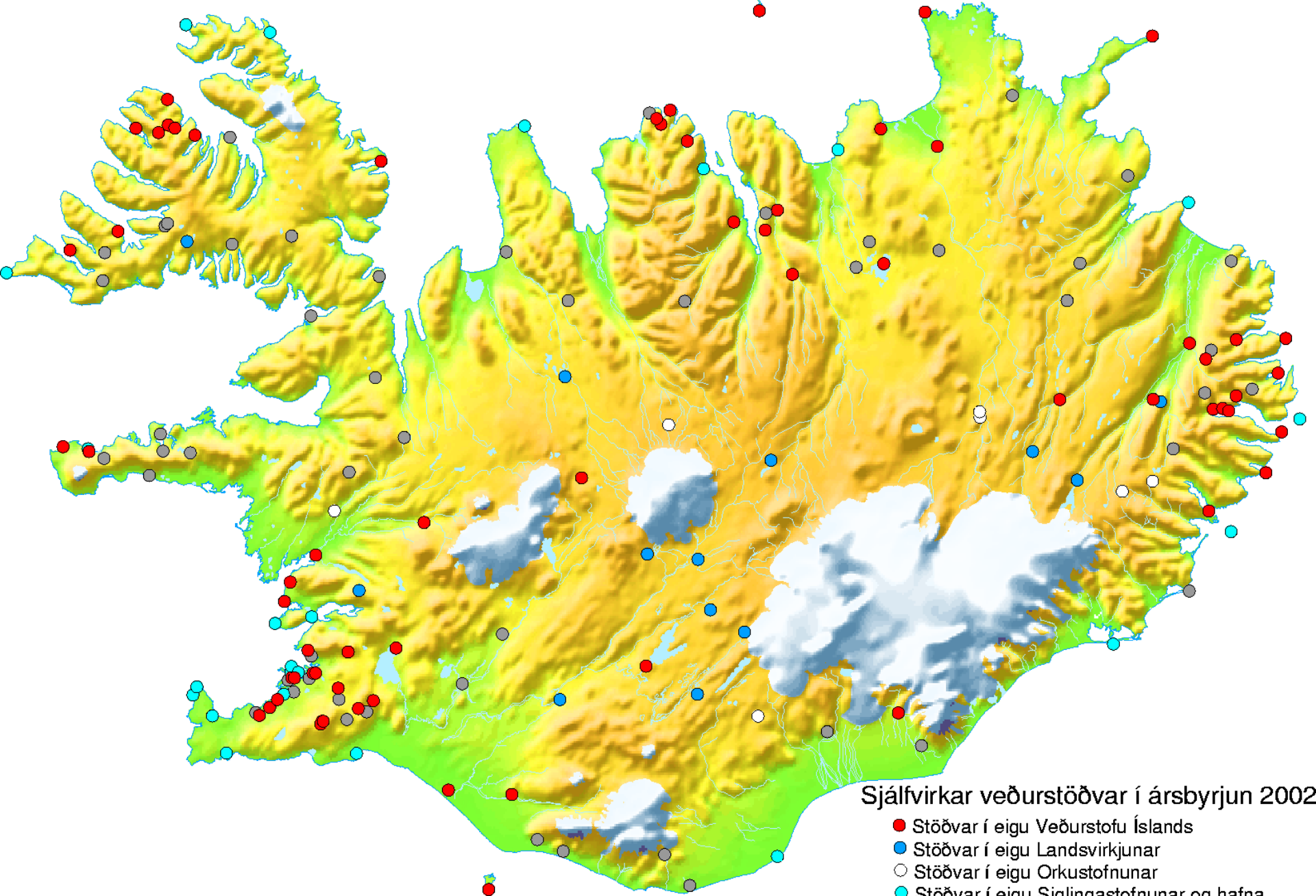
- Dept. of Instruments and Observations
- Dept. of Research and Processing
- Dept. of Computers and Information Technology
- Geophysics Dept.
- Dept. of Weather Services



staff of about 110

manned weather stations 130





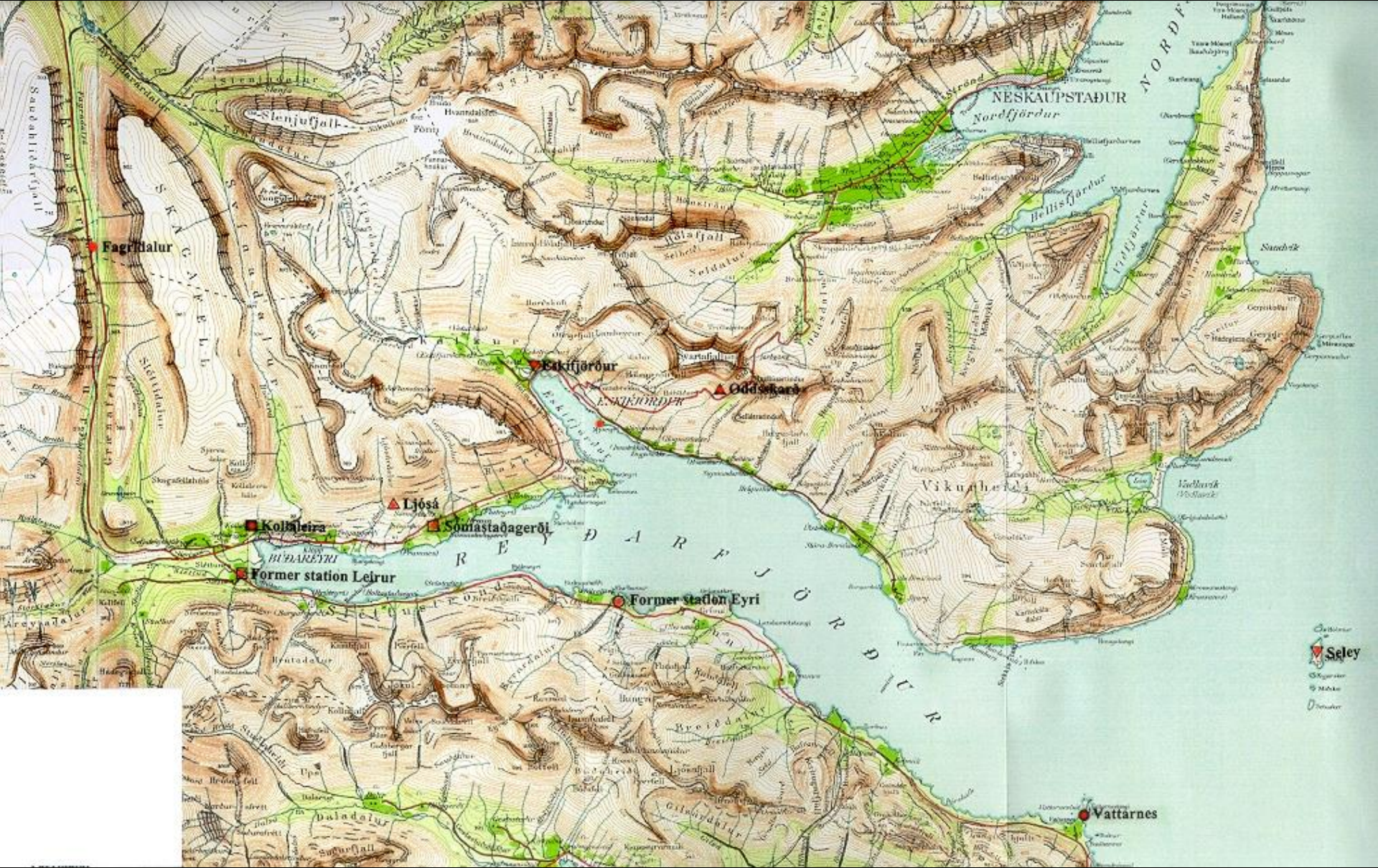
Sjálfvirkar veðurstöðvar í ársbyrjun 2002

- Stöðvar í eigu Veðurstofu Íslands
- Stöðvar í eigu Landsvirkjunar
- Stöðvar í eigu Orkustofnunar
- Stöðvar í eigu Siglingastofnunar og hafna
- Stöðvar í eigu Vegagerðarinnar





Observations in Reydarfjordur



Stations in Reydarfjordur

- ***Kollaleira - manned station (1976-)***
- *Somastadagerdi (1981-1985)*
- *Mjoeyri (1981-1985)*
- *Eyri (1993-1995)*
- *Leirur (1993-1995)*
- *Eskifjordur (1998-)*
- *Gagnheidi (1993-)*
- *Oddskard (1995-) (Vg, PRA)*
- *Fagridalur (1996-) (Vg, PRA)*
- *Seley (1996-) (Siglingast, IMA)*
- ***Somastadagerdi (1998-04-)***
- *Vattarnes (2000-06-)*
- *Ljosa (2000-06-)*
- *Kollaleira (2000-06-)*

Kollaleira

- *Manned climatic station (1976-1984)*
- *Manned synoptic station (old farm) (1984-1990)*
- *Manned synoptic station (new farm) (1990-)*
- *W-L Wind-recorder, 2m (1982-)*
- *Windspeed recorder, 10m (1998-10-)*
- *Automatic weather station (2000-06-)*





Kollaleira

4 6'00

Kollaleira

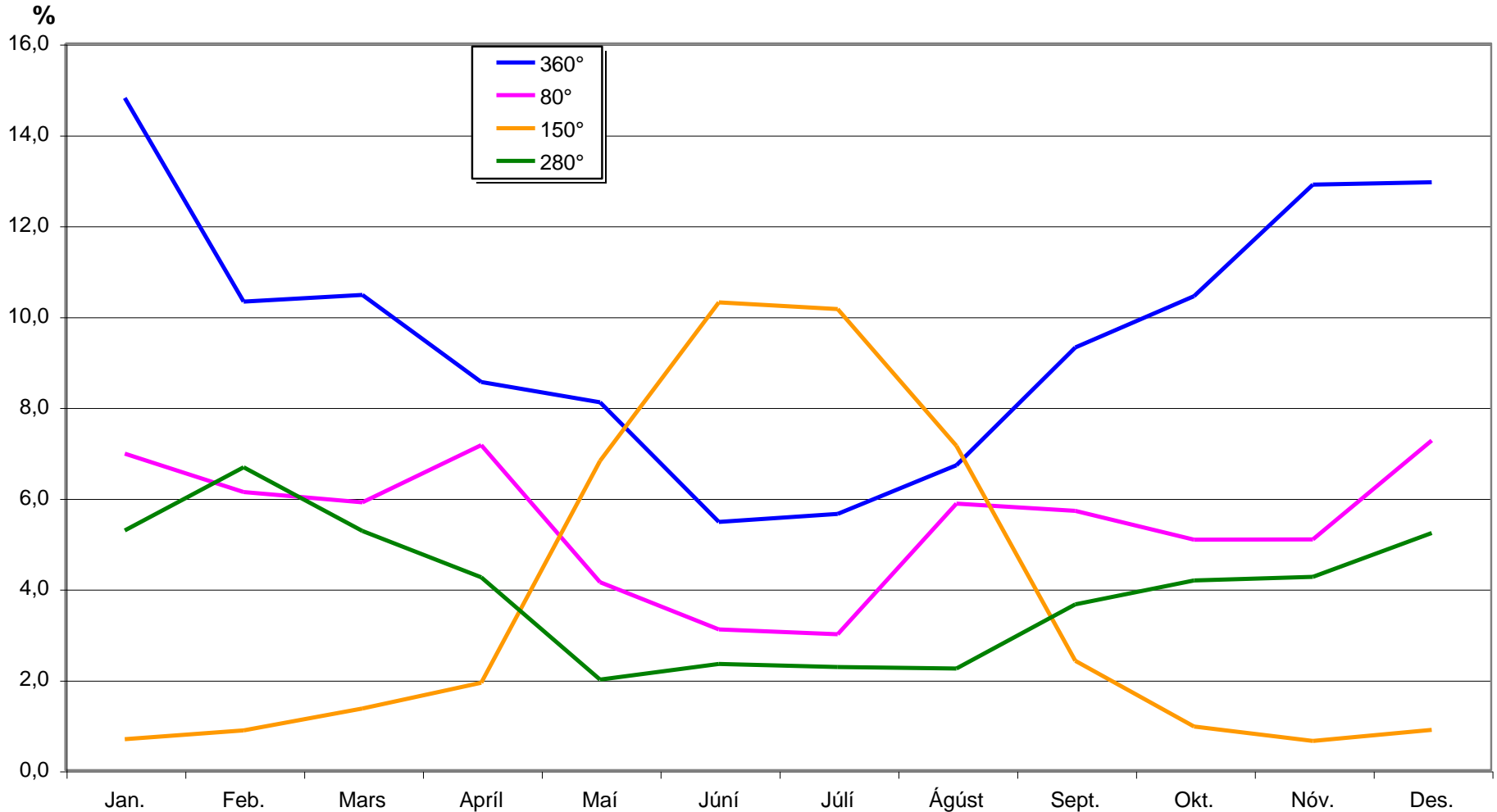




Kollaleira - Woelfle Lambrecht wind-recorder

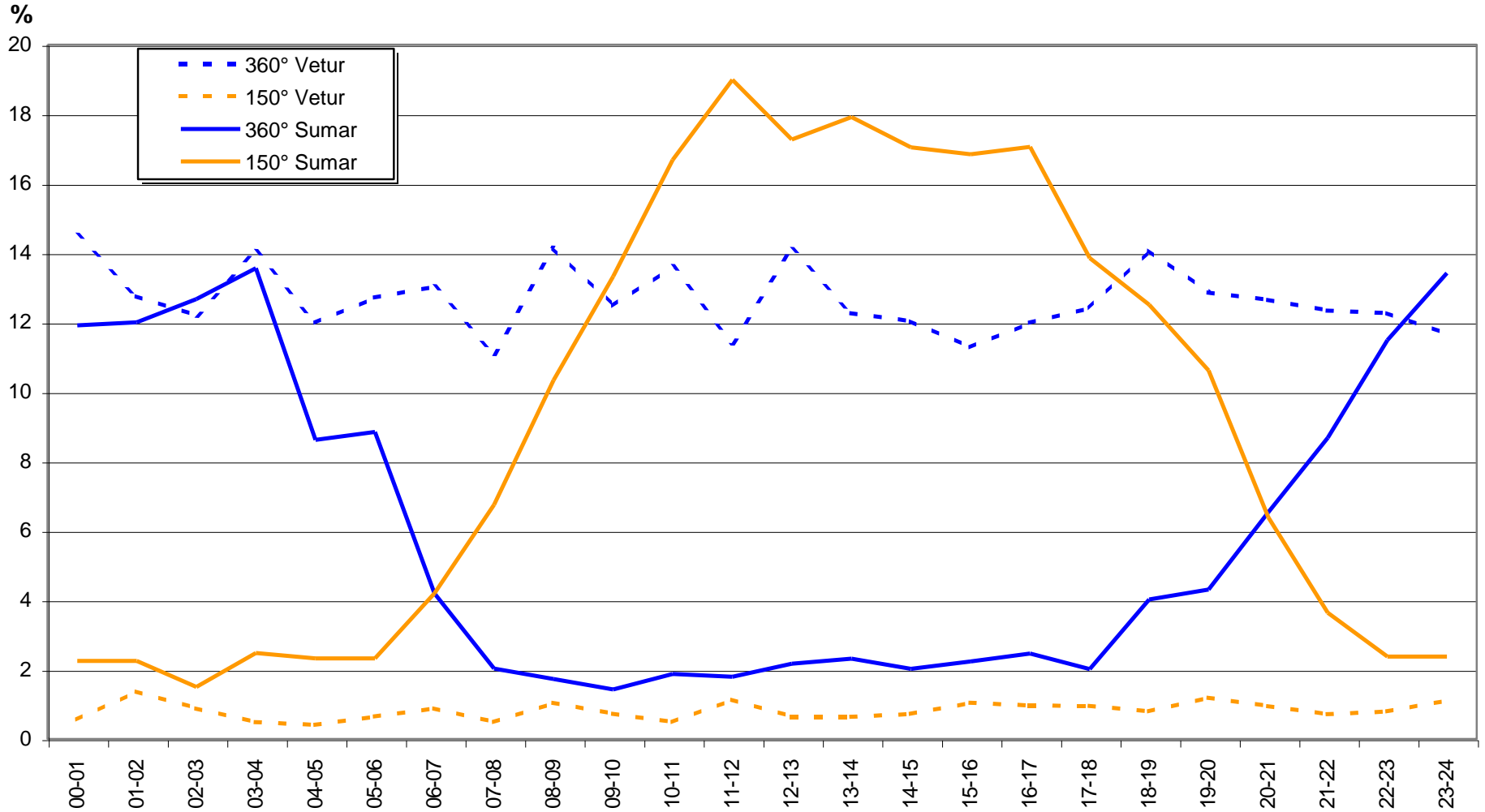
Kollaleira 1983-1998

Annual variation in frequency of wind directions



Kollaleira 1983-1998

Diurnal variation in frequency of wind directions



Eyri

1993-06 to 1994-09



Leirur (Slettunes)
1993-06 to 1995-10





Somastadagerdi

Since 1998-04

*Measurements in a 38 m mast
recorded every 10 min*

- *Air temperature at 3, 10, and 37m*
- *Relative humidity at 3 m*
- *Young windspeed, gust, direction and SD of direction at 10 m*
- *3D Gill windspeed and SD of windspeed at 10 and 37 m*

Somastadagerdi

Change 2001-09

Addition

- *Young SD of windspeed at 10 m*
- *Young windspeed, gust, direction and SD of windspeed and direction at 37 m*

Termination

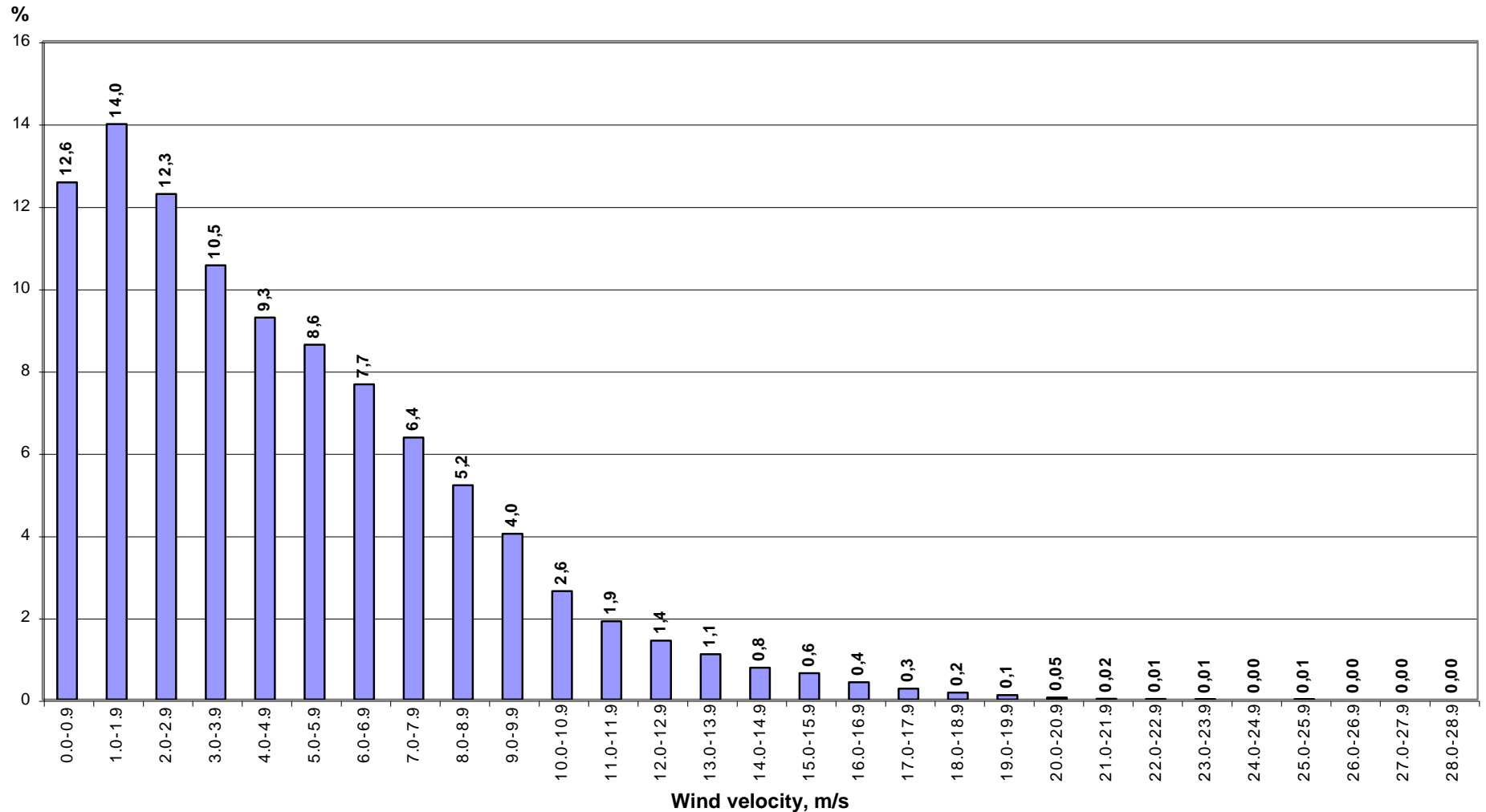
- *Horizontal components of 3D Gill windspeed and SD of windspeed at 10 and 37 m*





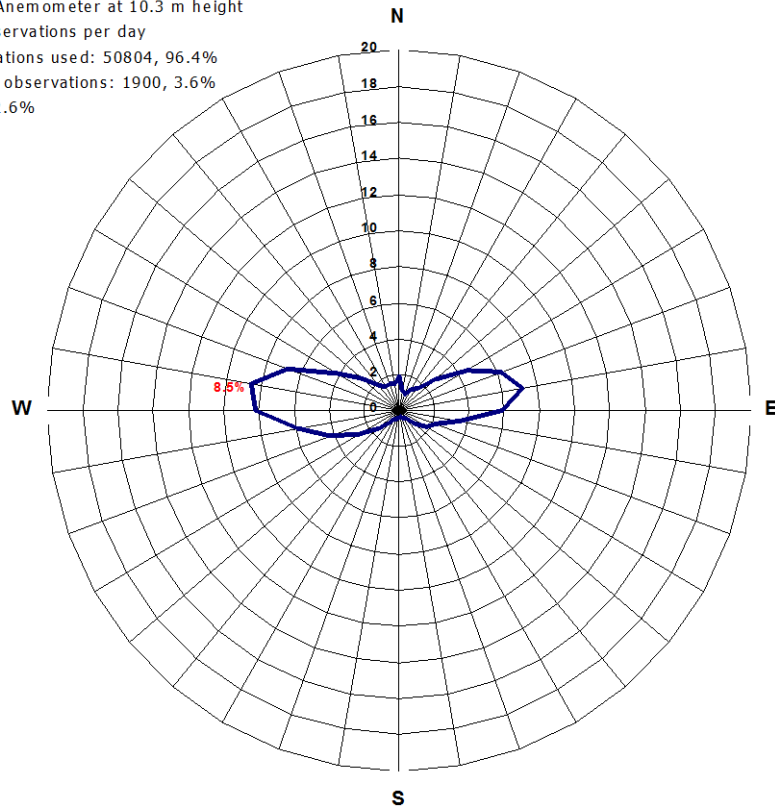
Somastadagerdi

Wind speed distribution, May 1998 - April 1999

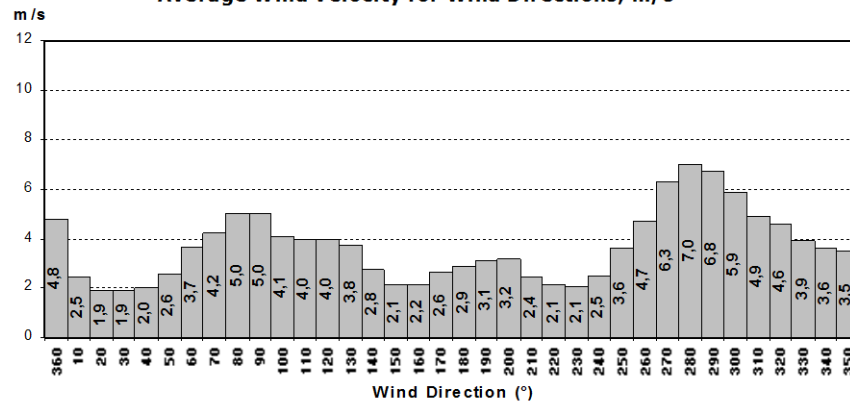


Frequency of Wind Directions, % Year, May 1999 - April 2000

Young Anemometer at 10.3 m height
 144 observations per day
 Observations used: 50804, 96.4%
 Missing observations: 1900, 3.6%
 Calm: 2.6%

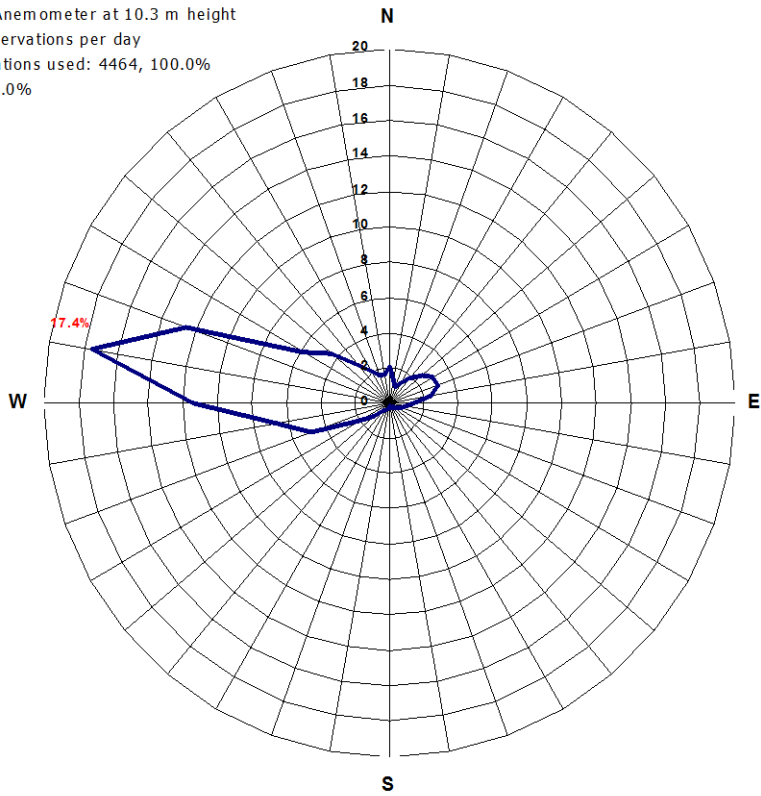


Average Wind Velocity for Wind Directions, m/s



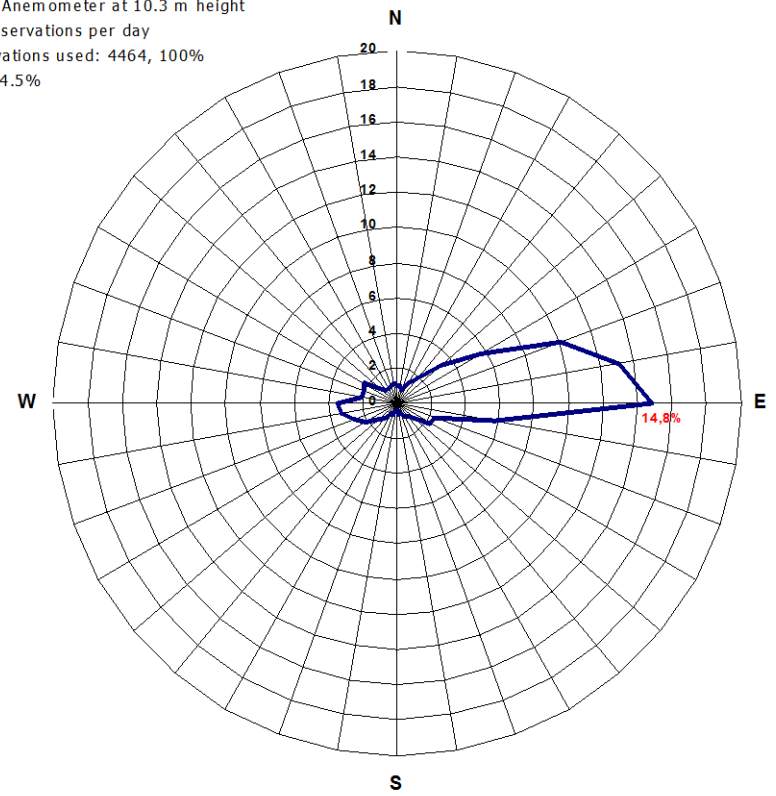
Frequency of Wind Directions, % January 2000

Young Anemometer at 10.3 m height
144 observations per day
Observations used: 4464, 100.0%
Calm: 1.0%

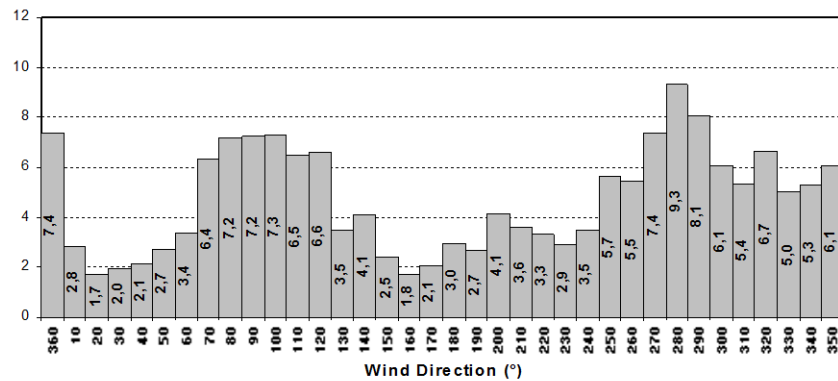


Frequency of Wind Directions, % July 2000

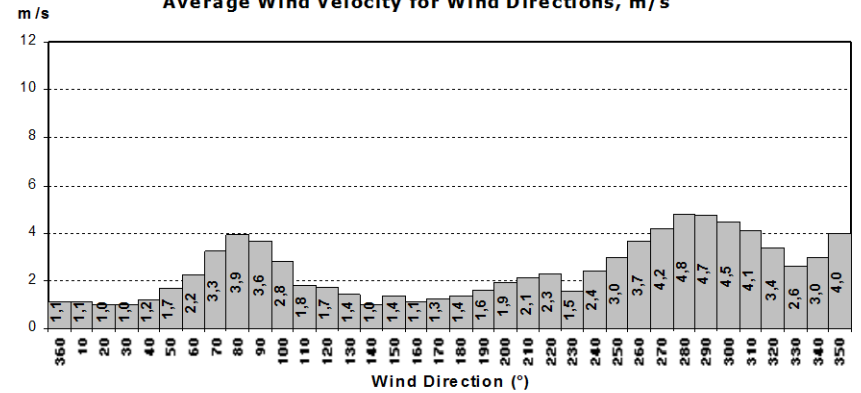
Young Anemometer at 10.3 m height
144 observations per day
Observations used: 4464, 100%
Calm: 4.5%



Average Wind Velocity for Wind Directions, m/s

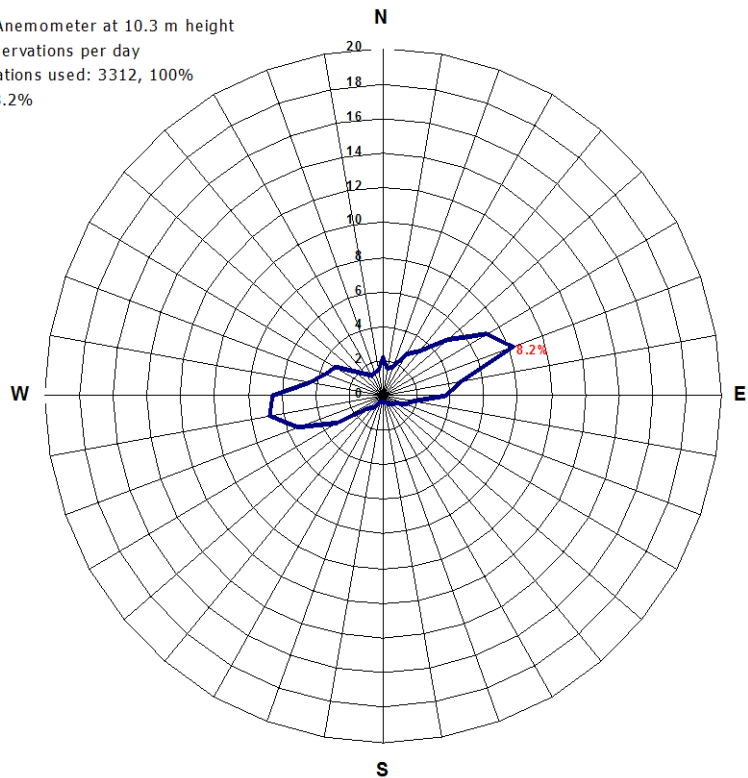


Average Wind Velocity for Wind Directions, m/s



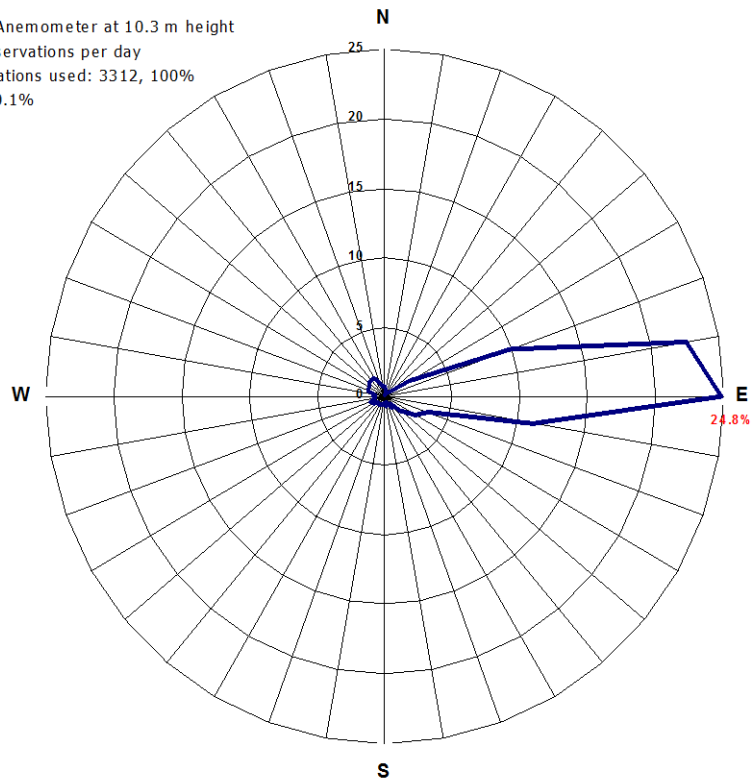
Frequency of Wind Directions, % High Summer, June - August 2000, Night Hours 00 - 06 GMT

Young Anemometer at 10.3 m height
144 observations per day
Observations used: 3312, 100%
Calm: 8.2%

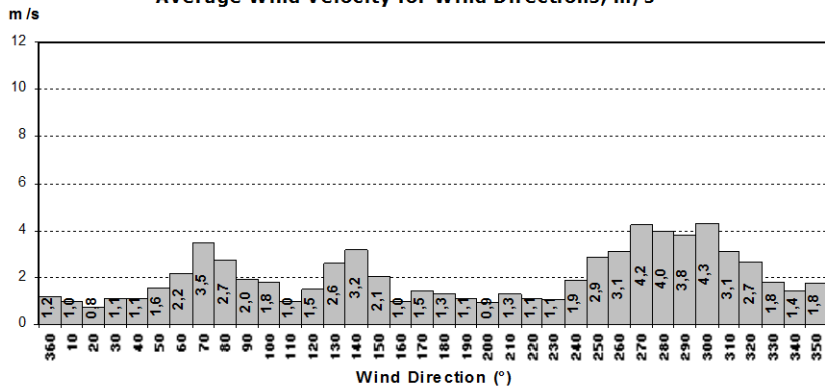


Frequency of Wind Directions, % High Summer, June - August 2000, Day Hours 12 - 18 GMT

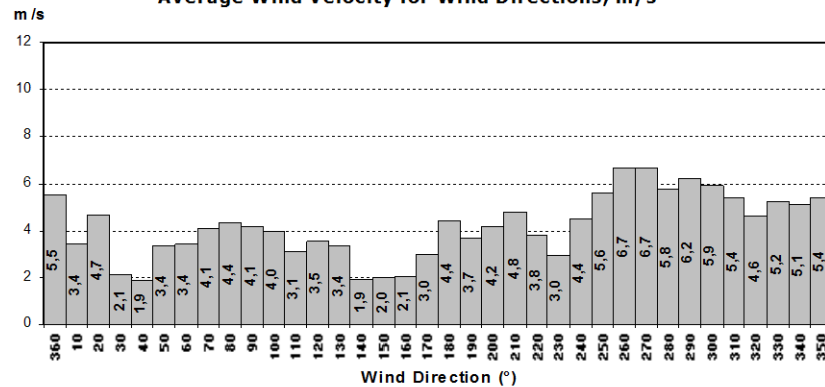
Young Anemometer at 10.3 m height
144 observations per day
Observations used: 3312, 100%
Calm: 0.1%



Average Wind Velocity for Wind Directions, m/s



Average Wind Velocity for Wind Directions, m/s



*Three additional AWS
Kollaleira - Ljosa - Vattarnes
since June 2000*

Measurements recorded every 10 min

- Air temperature at 2 m*
- Relative humidity at 2 m*
- Windspeed, gust and direction at 10 m*
- SD of windspeed and direction*



Kollaleira AWS 2000-06



4 6'00

Ljosa 2000-06 - 280 m

Ljosa

4 6'00





Vattarnes 2000-06

3 6'00



Vattarnes

Vedurstofa Islands - Reports

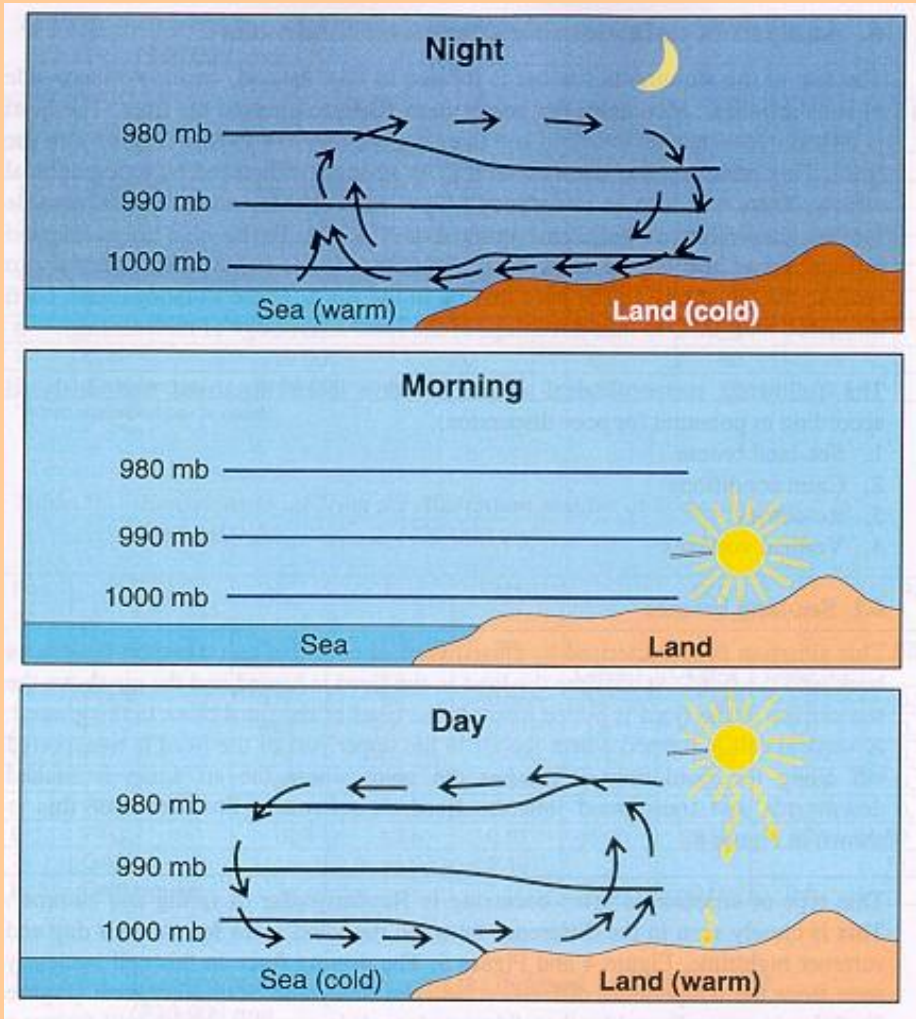
- *1986: Vedurathuganir á Reydarfjardarsvaedinu, 116 pp.*
- *1999-06: Vindmaelingar ad Kollaleiru 1983-1998, 41 pp.*
- *1999-08: Wind observations at Eyri and Leirur in Reydarfjordur, 32 pp.*
- *1999-10: Wind and stability observations at Somastadagerdi in Reydarfjordur, May 1998 - April 1999, 55 pp.*
- *2000-01: Additional wind and stability observations at Somastadagerdi in Reydarfjordur, 36 pp.*
- *2000-05: Additional wind and stability observations at Somastadagerdi in Reydarfjordur II, November 1999 - April 2000, 33 pp.*
- *2000-09: Additional wind and stability observations at Somastadagerdi in Reydarfjordur III, May - August 2000, 64 pp.*
- *2001-08: Additional wind and stability observations at Somastadagerdi in Reydarfjordur IV, September 2000 - May 2001, 58 pp.*
- *2002-09: Additional wind and stability observations at Somastadagerdi in Reydarfjordur V, June 2001 - May 2002, 78 pp.*

Sea and land breeze

- *Easterly winds during days*
- *Westerly winds during nights*
- *Reversed winds at a higher level*
- *How high is this circulation cell?*

- *Air rises at the end of the Reyðarfjörður valley*
- *Air descends over the sea*
- *Does the air descend inside the fjord?*

- *Recirculation?*



August 2000

Somastadagerdi

Vattarnes

Seley

Frequency of Wind Directions, %
August 2000

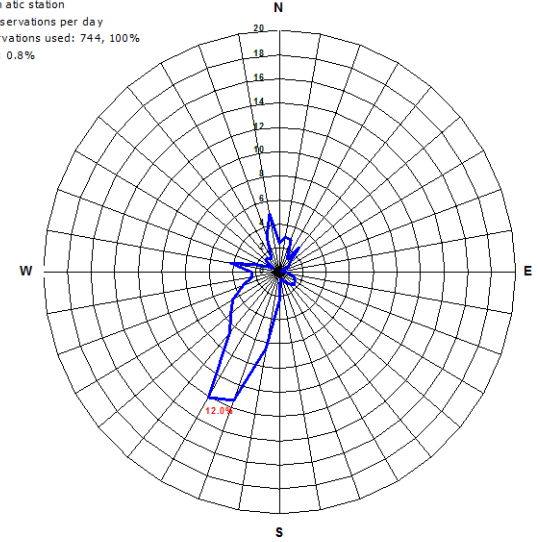
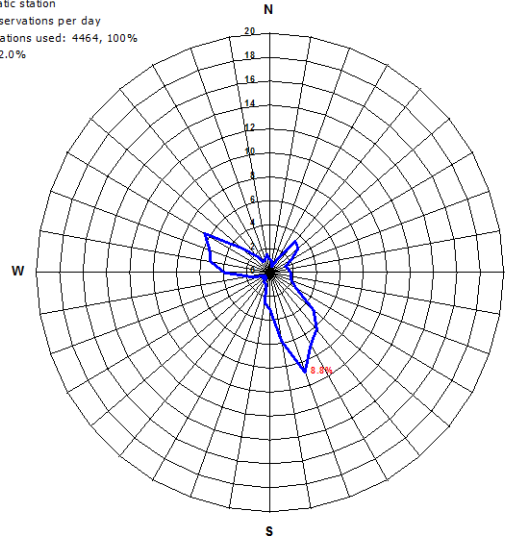
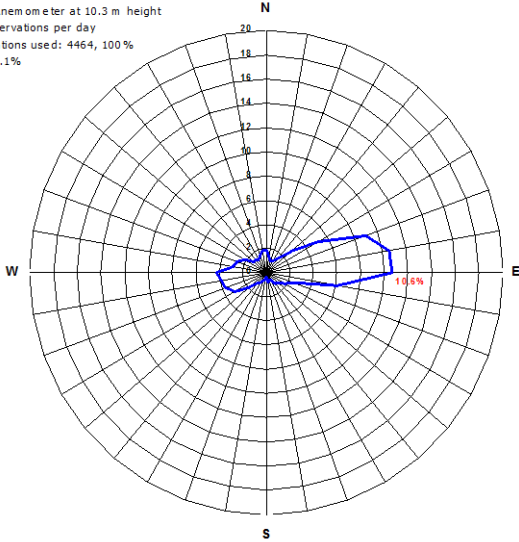
Frequency of Wind Directions, %
August 2000

Frequency of Wind Directions, %
August 2000

Young Anemometer at 10.3 m height
144 observations per day
Observations used: 4464, 100%
Calm : 5.1%

Automatic station
144 observations per day
Observations used: 4464, 100%
Calm : 2.0%

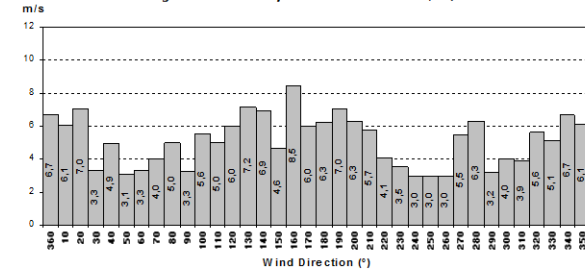
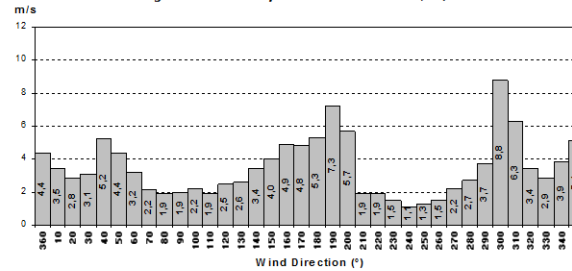
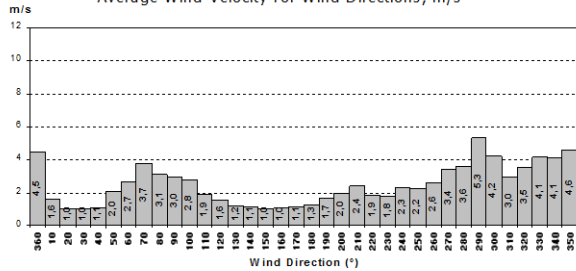
Automatic station
24 observations per day
Observations used: 744, 100%
Calm : 0.8%



Average Wind Velocity for Wind Directions, m/s

Average Wind Velocity for Wind Directions, m/s

Average Wind Velocity for Wind Directions, m/s



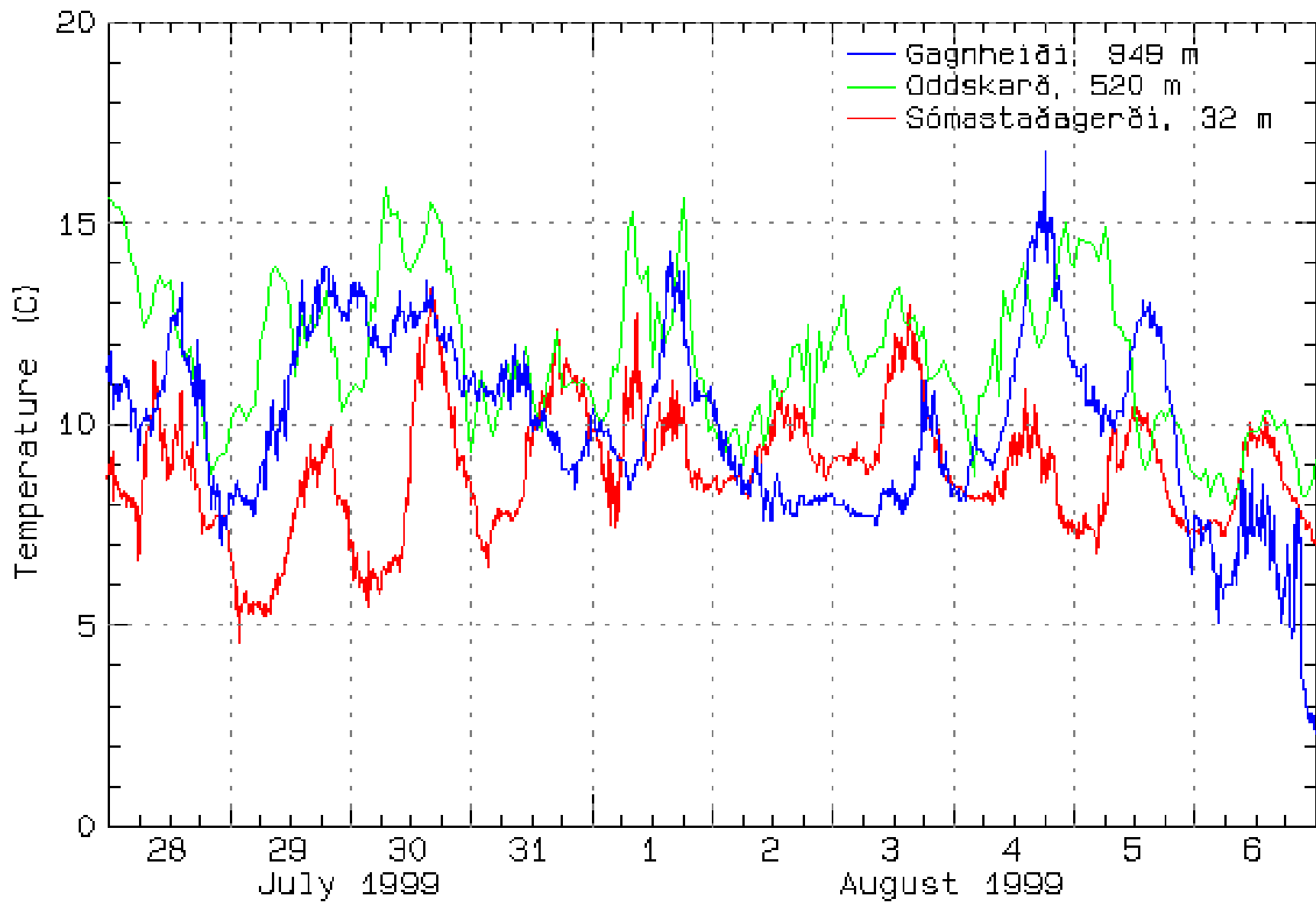


Örtun
Seley
Örtun
Örtun
Örtun

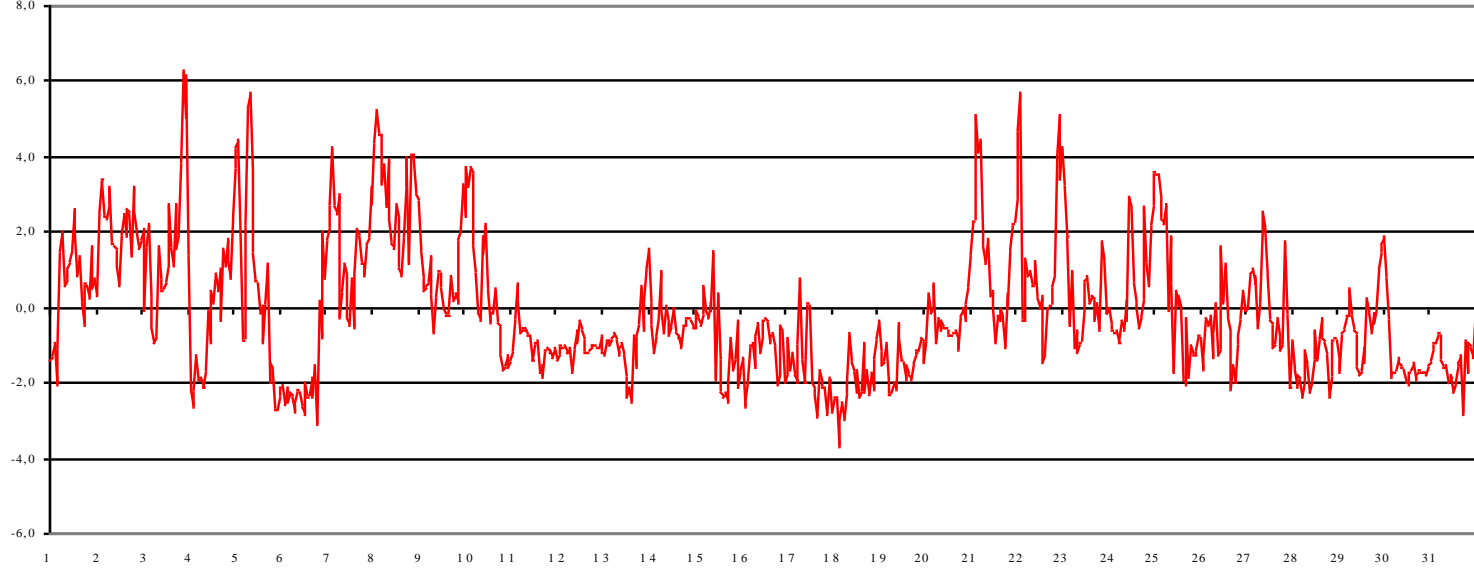
Temperature inversions



Odds kard 1995-07 - 520 m

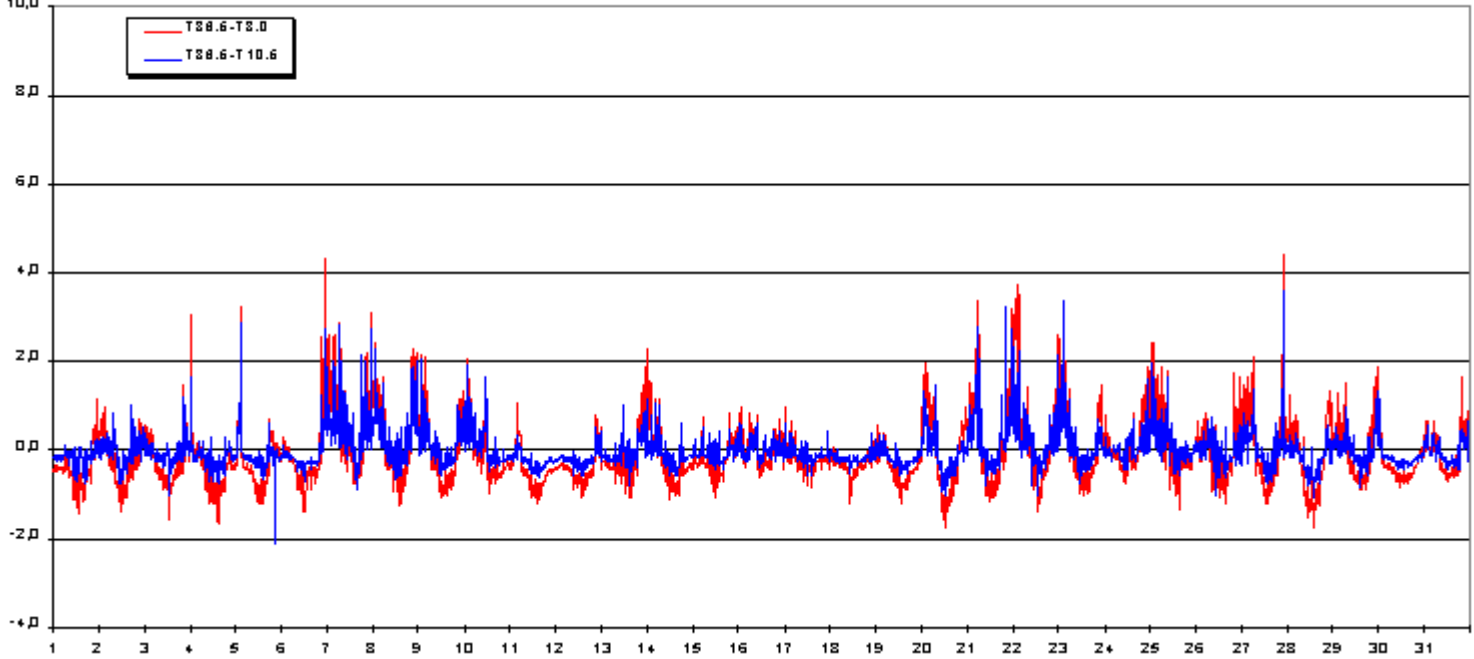


°C



August

°C



Fumigation problems during summer mornings

Night and early morning:

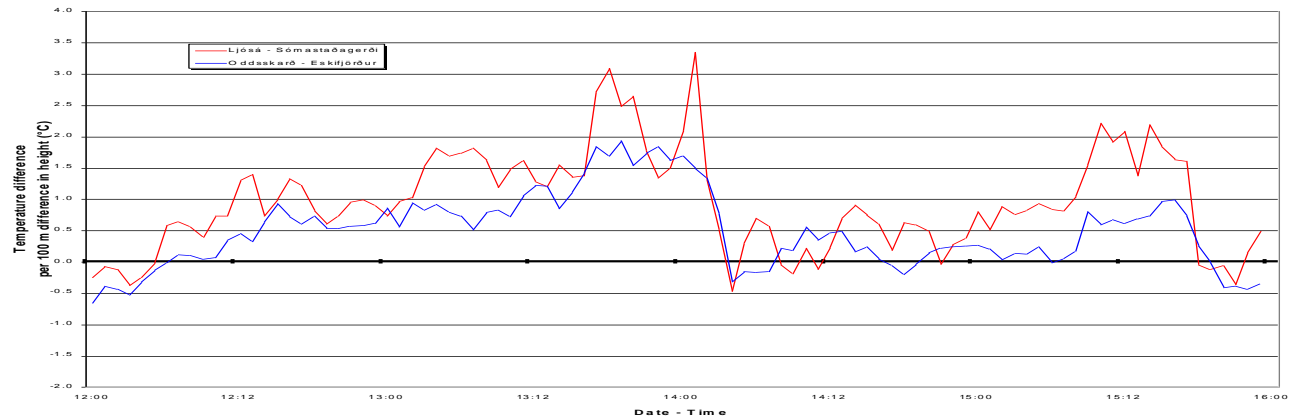
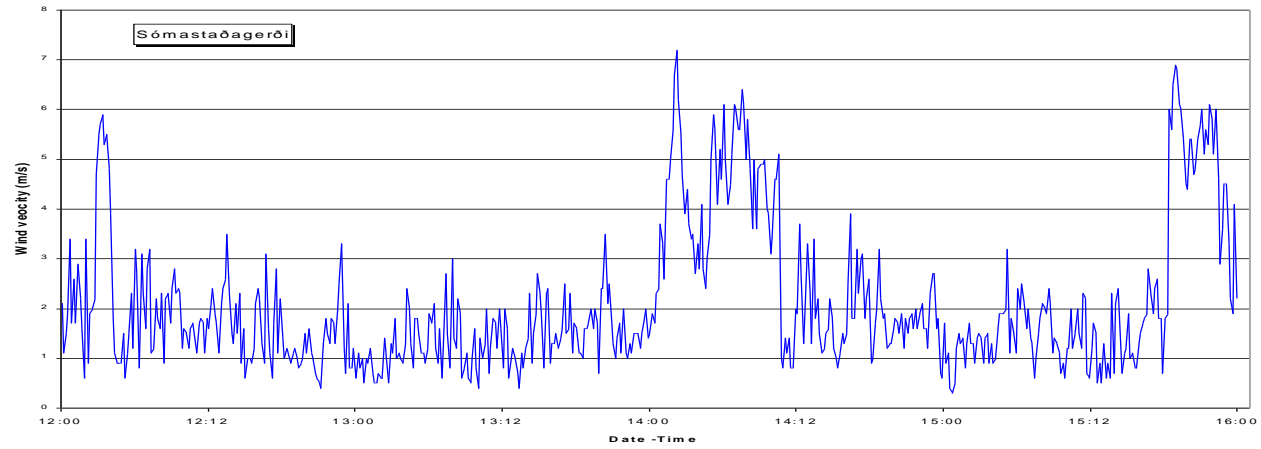
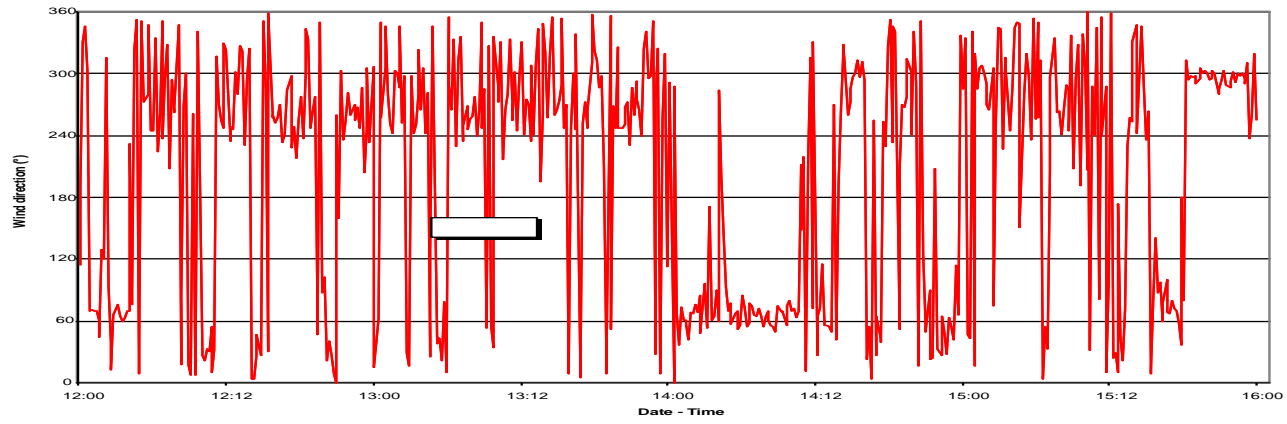
- Light westerly winds
- Very stable air
- Polluted air accumulates in the fjord at a narrow height level - concentrations in layer may be high

Morning:

- Initial phase of the sea-breeze - turning to easterly winds
- Recirculated polluted air reaches the inner part of Reydarfjordur
- The air becomes unstable

***Possible fumigation with high concentrations
reaching the Budareyri-town !***

*Near calm winds and
multiple re-entries*



How typical are the last few years

- for average conditions?
- for extreme conditions?

Three main scenarios leading to short term pollution

- Sea and land breeze recirculation
- Fumigation problems during summer mornings
- Near calm winds and multiple re-entries along with high atmospheric stability