



WEATHER ánd DATA

Wim van den Berg

NVBM 25th anniversary: "The Future Weather Factory"

Amersfoort, 25 November 2016

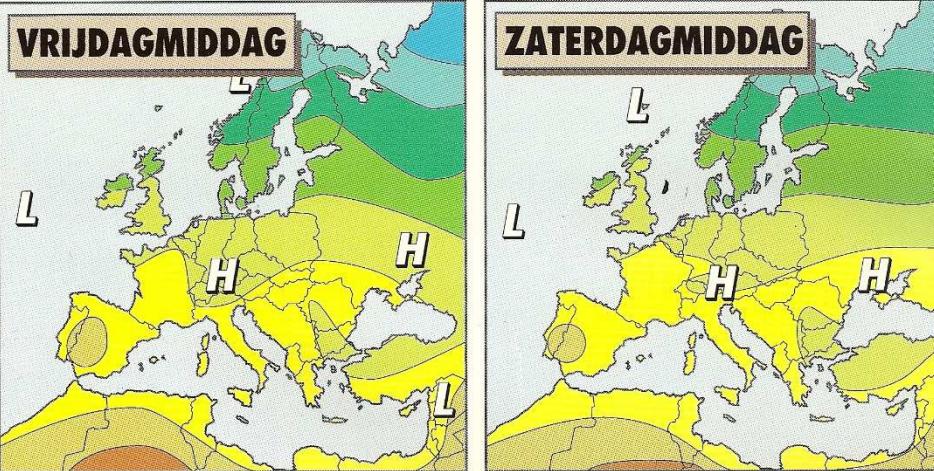
A BRIEF TOUR through METEOROLOGY from TODAY'S VIEWPOINT of DATA SCIENCE

- Blueprint of experienced forecaster/researcher
- Some observations
- Colourful maps
- Today's ensemble forecast
- Trending topics
- Data mining with Meteorologica

BLUEPRINT

- Basic interest in weather
- Measurements & data analysis (how do I measure in an optimal way in my garden)
 - Or inspect observations from good stations like WUR Veenkampen; try to understand small scale changes
- Observe and learn about regional weather when you are on holidays or business trip
 - Tip: become a storm chaser
- Ongoing education (journals, conferences)
- Operational skills (either with modelling & verification, or in the weather room)
 - Example: manual forecasts that are verified (Algemeen Dagblad)

Also ~25y old



© Algemeen Dagblad
Bron: Meteo Consult Wageningen



land	plaats	zon op/onder	gisteren	vandaag	woensdag	donderdag	vrijdag	zaterdag
BELGIE	Brussel	7.09/17.46	7/16 ☁	19 ☀	9/19 ☁	10/18 ☁	11/17 ☁	12/18 ☁
	St.Hubert	7.04/17.44	3/12 ☁	16 ☁	7/17 ☁	8/16 ☁	8/16 ☁	9/17 ☁
BULGARIJE	Sofia	6.42/17.41	6/8 ☁	13 ☀	5/15 ☀	6/17 ☀	6/17 ☀	6/18 ☀
DENEMARKEN	Aalborg	6.58/17.13	6/12 ☁	14 ☁	9/14 ☁	8/13 ☁	9/13 ☁	9/13 ☁
	Kopenhagen	6.44/17.05	3/12 ☁	15 ☁	10/15 ☁	9/14 ☁	10/14 ☁	10/14 ☁
FINLAND	Helsinki	7.05/17.06	-1/10 ☁	7 ☀	2/7 ☁	3/9 ☁	7/12 ☁	8/11 ☁
FRANKRIJK	Bordeaux	7.21/18.15	6/20 ☀	23 ☀	13/22 ☁	12/22 ☀	10/23 ☀	11/24 ☀
	Grenoble	6.58/17.50	1/17 ☀	21 ☀	7/20 ☁	8/20 ☁	7/21 ☀	7/22 ☁
	Montpellier	7.01/17.58	10/20 ☀	22 ☀	14/22 ☁	13/23 ☀	12/23 ☀	12/24 ☀
	Paris	7.14/17.58	4/18 ☀	21 ☀	10/21 ☁	11/20 ☁	10/21 ☁	10/22 ☀
GRIEKENLAND	Athene	6.36/17.45	16/21 ☀	21 ☁	13/21 ☁	14/22 ☀	15/22 ☀	15/22 ☀
	Heraklion	6.27/17.42	20/22 ☁	22 ☁	16/20 ☁	17/21 ☀	17/22 ☀	17/22 ☀
GR.BRITTANNIE	Edinburg	7.49/18.08	13/17 ☁	17 ☁	10/16 ☁	11/17 ☁	9/16 ☁	12/17 ☁
	London	7.29/18.05	11/17 ☁	19 ☁	10/18 ☁	11/18 ☁	13/18 ☁	14/19 ☁
	Plymouth	7.42/18.21	14/15 ☁	16 ☁	10/16 ☁	12/16 ☁	13/16 ☁	13/17 ☁
HONGARIJE	Budapest	7.05/17.52	6/14 ☁	17 ☁	9/19 ☁	9/20 ☁	9/21 ☀	9/21 ☀
IERLAND	Dublin	7.56/18.25	14/17 ☁	16 ☁	9/15 ☁	12/16 ☁	11/15 ☁	13/16 ☁
IJSLAND	Rejkjavik	8.24/18.01	4/7 ☁	7 ☁	3/6 ☁	5/6 ☁	2/5 ☁	1/4 ☁
ITALIE	Bolzano	6.35/17.25	3/18 ☀	21 ☁	6/22 ☁	7/21 ☀	6/21 ☀	7/22 ☀
	Genua	6.42/17.38	14/20 ☀	21 ☁	15/22 ☁	15/21 ☀	15/21 ☀	15/21 ☀
	Rimini	6.27/17.23	5/19 ☁	21 ☁	9/22 ☁	9/22 ☁	10/21 ☀	10/22 ☀
	Rome	6.26/17.27	8/20 ☀	21 ☁	9/21 ☁	10/21 ☁	10/21 ☀	10/21 ☀
JOEGOSLAVIE	Belgrado	5.57/16.51	5/12 ☁	18 ☀	7/21 ☁	8/22 ☁	9/21 ☁	9/21 ☀
	Serajewo	6.04/17.00	6/10 ☁	14 ☀	5/18 ☁	6/19 ☁	7/19 ☁	7/19 ☀
	Luxemburg	7.00/17.41	2/12 ☁	17 ☁	8/17 ☁	9/17 ☁	9/17 ☁	10/18 ☁
MALTA	Valetta	6.11/17.24	15/23 ☁	23 ☀	16/24 ☀	16/23 ☀	16/23 ☀	15/23 ☀
NEDERLAND	Eelde	7.04/17.34	6/14 ☁	17 ☁	7/17 ☁	9/16 ☁	10/16 ☁	11/16 ☁
	Maastricht	7.04/17.41	7/15 ☁	19 ☁	8/19 ☁	10/18 ☁	10/17 ☁	11/18 ☁
	Rotterdam	7.11/17.45	9/16 ☁	18 ☀	8/18 ☁	10/17 ☁	11/17 ☁	12/17 ☁
	Terschelling	7.10/17.39	12/15 ☁	15 ☁	12/16 ☁	13/15 ☁	13/15 ☁	13/16 ☁

BLUEPRINT

- Basic interest in Weather
- Measurements & data analysis (how do I measure in an optimal way in my garden)
 - Or inspect observations from good stations like WUR Veenkampen; try to understand small scale changes
- Observe and learn about regional weather when you are on holidays or business trip
 - Tip: become a storm chaser
- Ongoing education (journals, conferences)
- Operational skills (either with modelling & verification, or in the weather room)
 - Example: manual forecasts that are verified (Algemeen Dagblad)

ALWAYS START YOUR WORKING DAY WITH WEATHER INSTEAD OF MAIL!

METEOROLOGY == DATA SCIENCE?!

The activities of Greater Data Science are classified into 6 divisions:

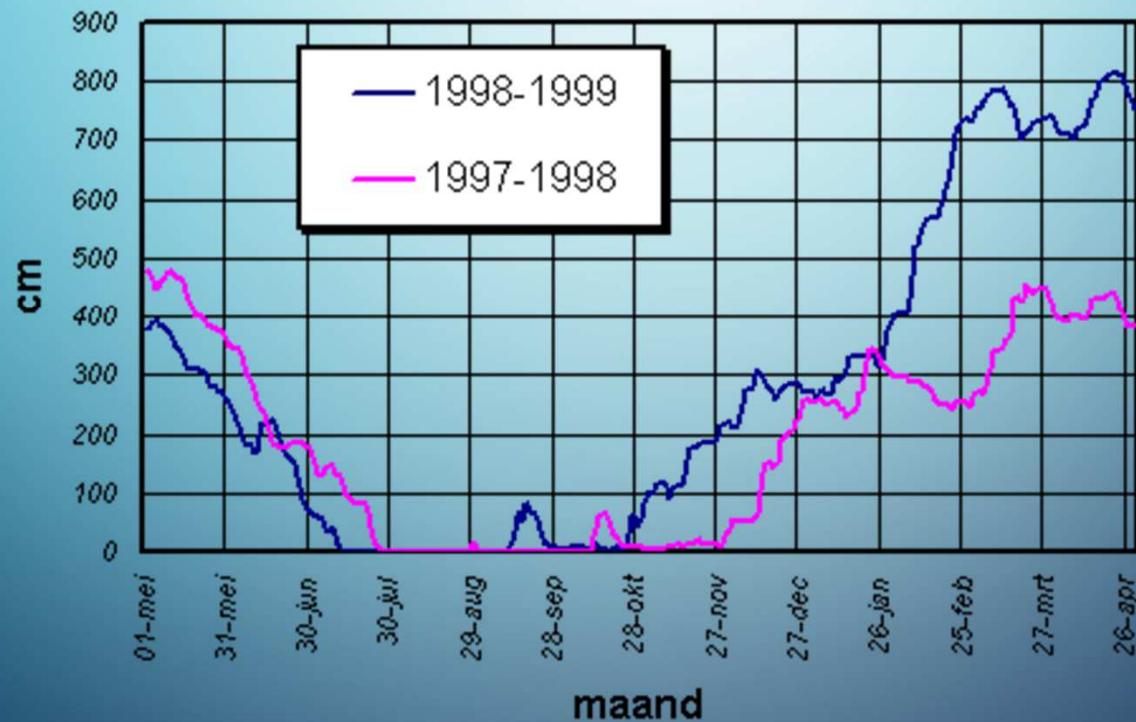
- 1. Data Exploration and Preparation*
- 2. Data Representation and Transformation*
- 3. Computing with Data*
- 4. Data Modeling*
- 5. Data Visualization and Presentation*
- 6. Science about Data Science*

Data Science, David Donoho 2015

DATA EXPLORATION

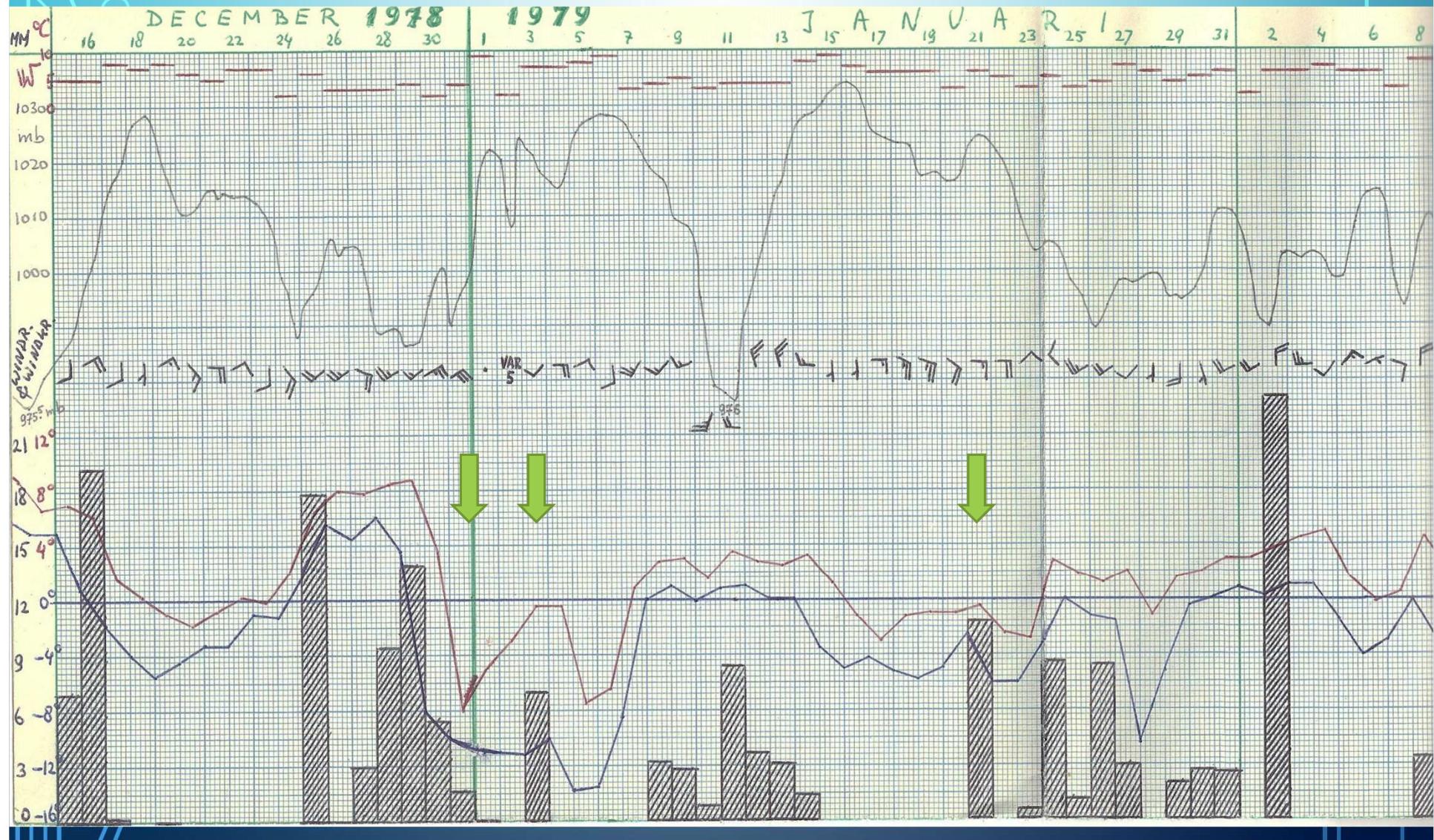
April 1999: Snowdepth >8m on Säntis (CH) Observatory

Sneeuwhoogte Saentis



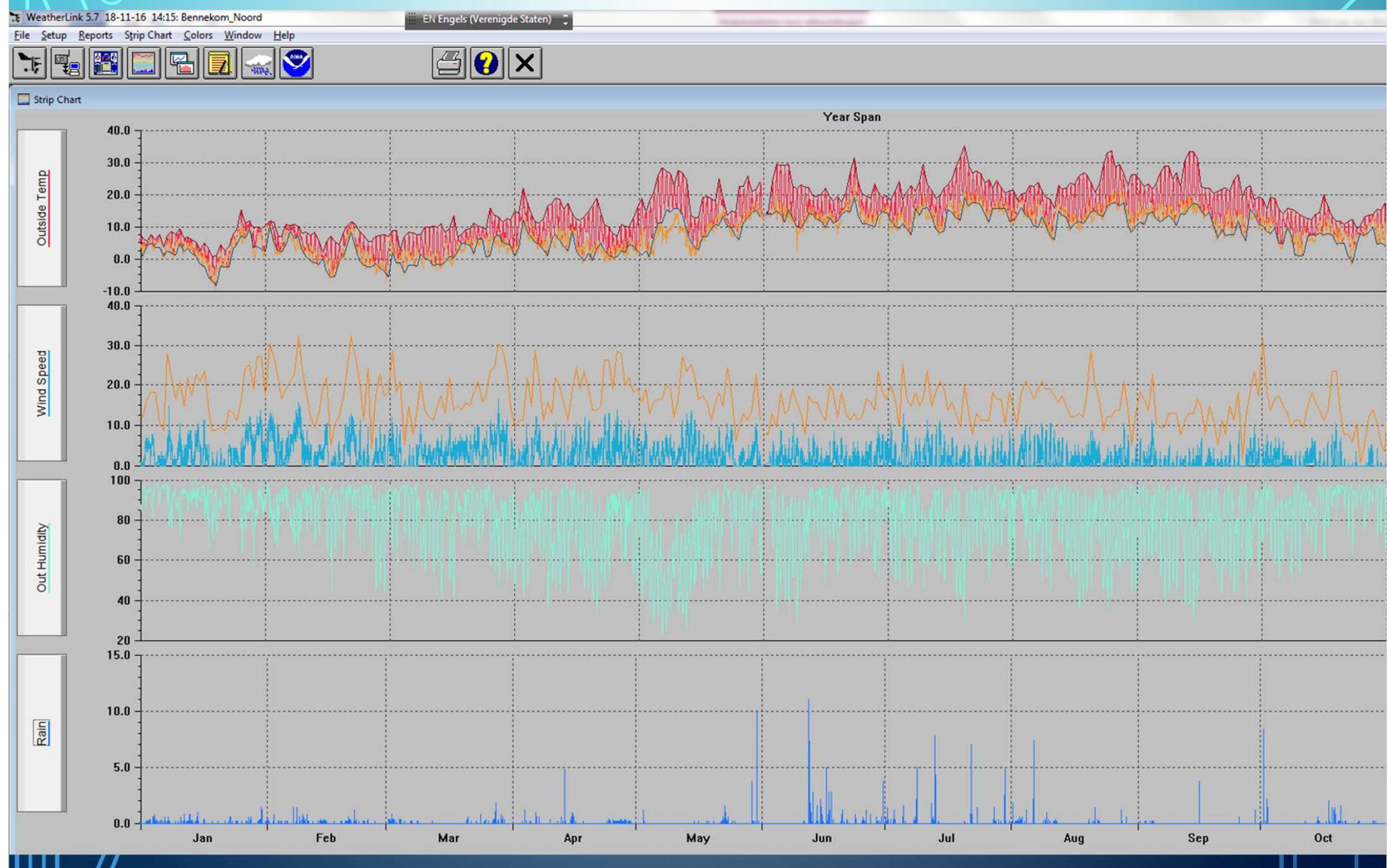
DATA REPRESENTATION AND TRANSFORMATION

Some Observations, manually 1979...





Vantage Pro2, 2016



DATA VISUALIZATION

Microscale Variations at Veenkampen (WUR): 23 October

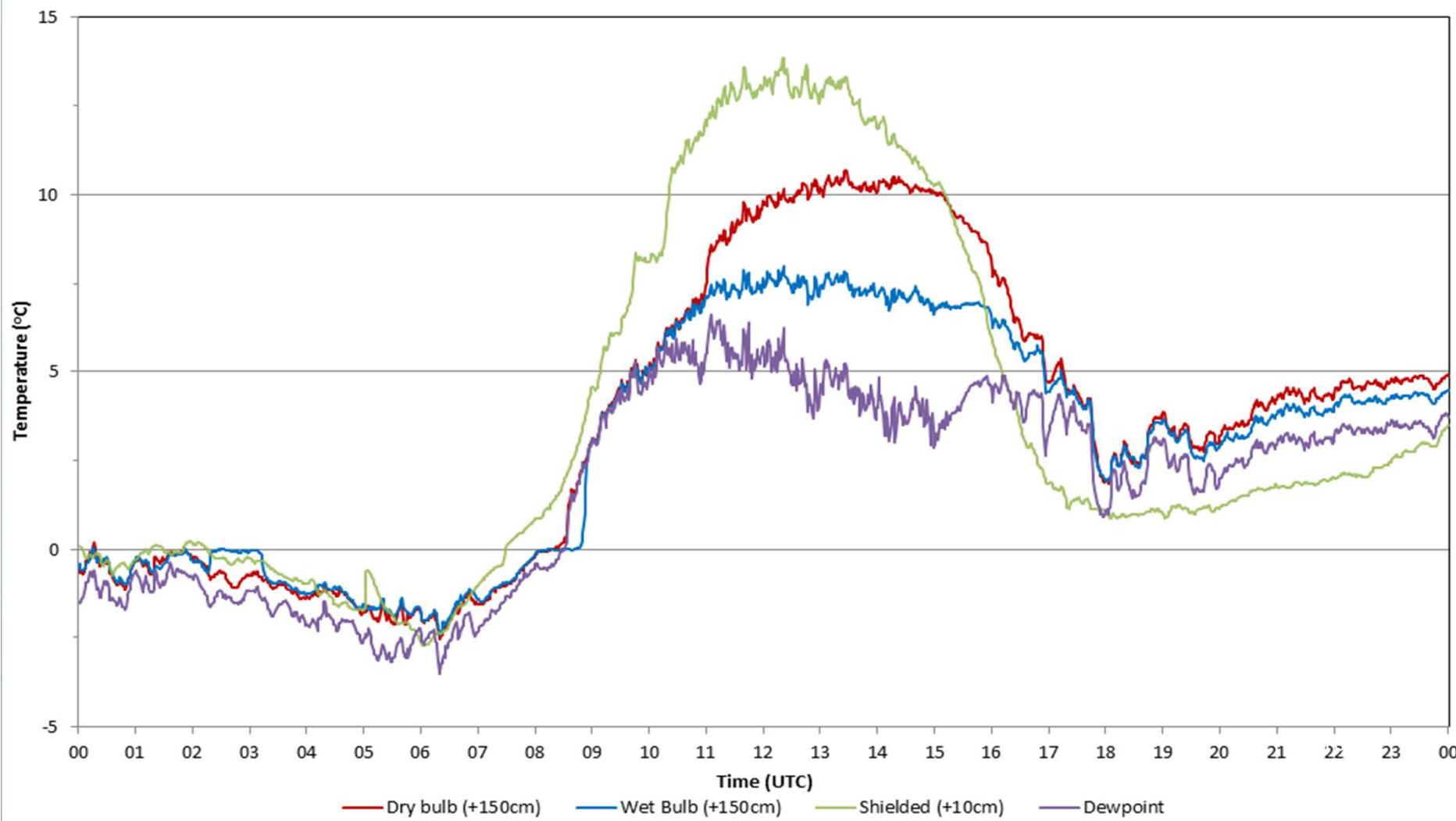


WA GENINGEN UNIVERSITY
METEOROLOGY AND AIR QUALITY

Tmin = -2.5
Tmax = 10.7

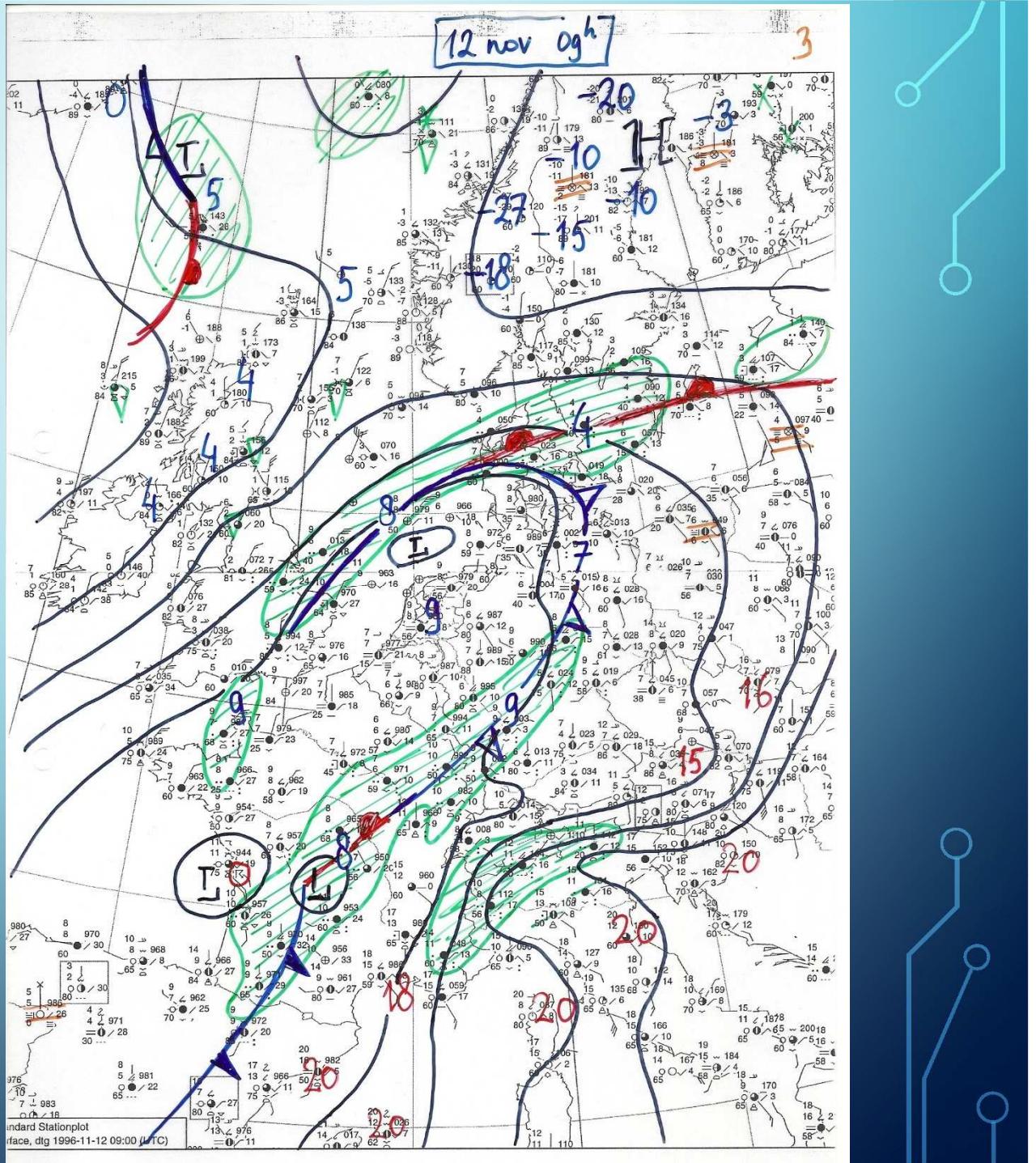
Temperature

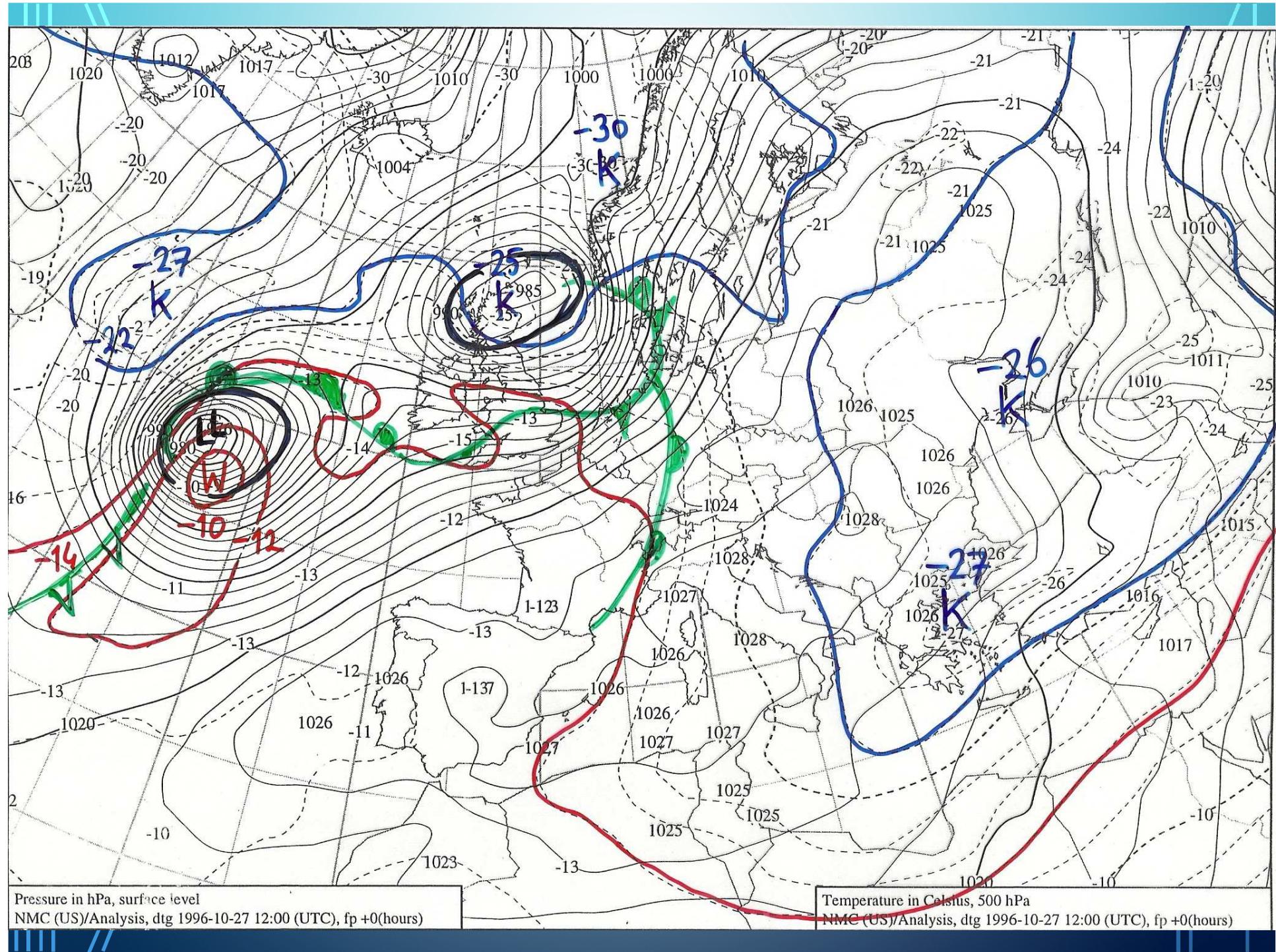
Sunday 23-10-2016 00:00



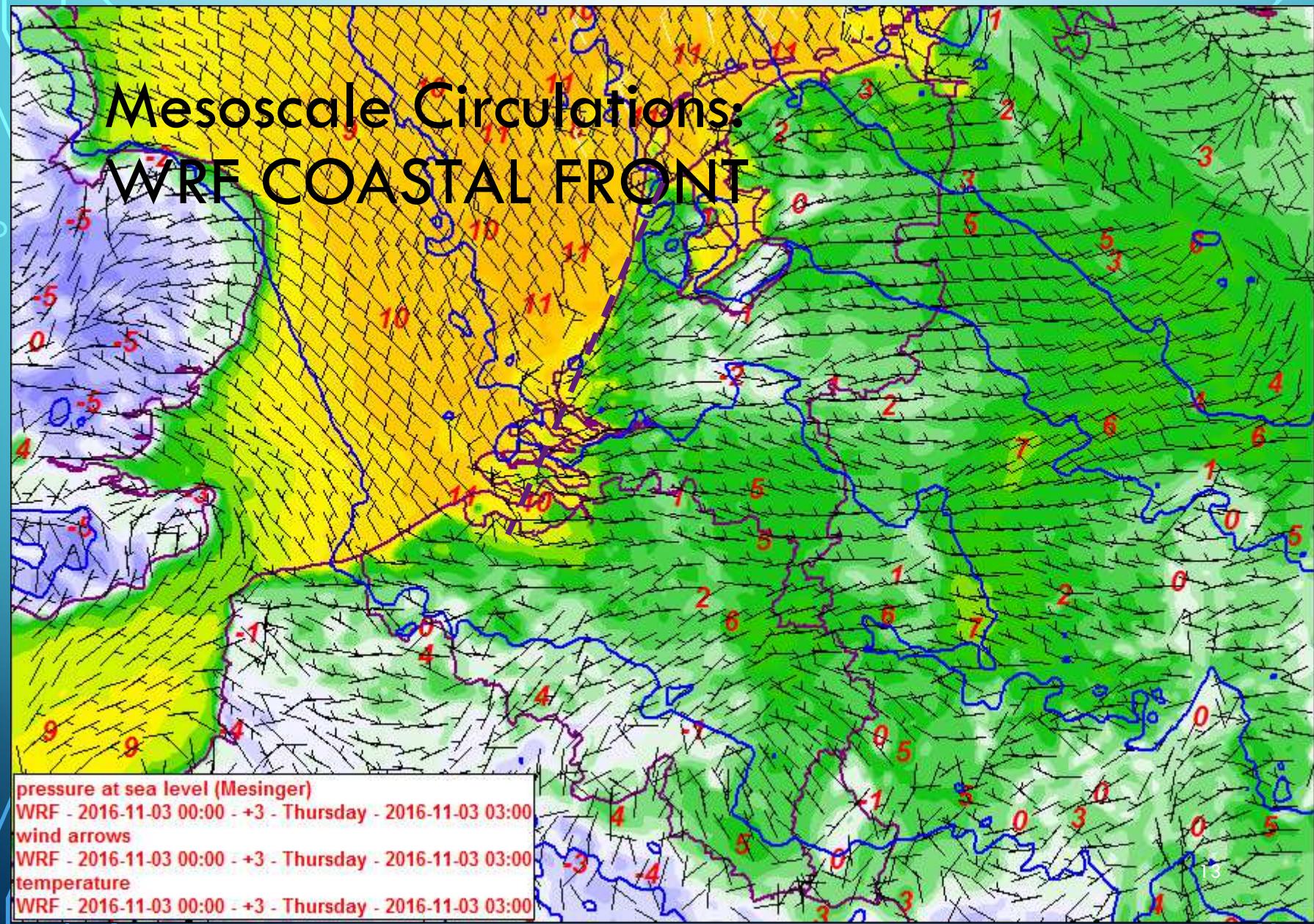
COLORFUL MAPS

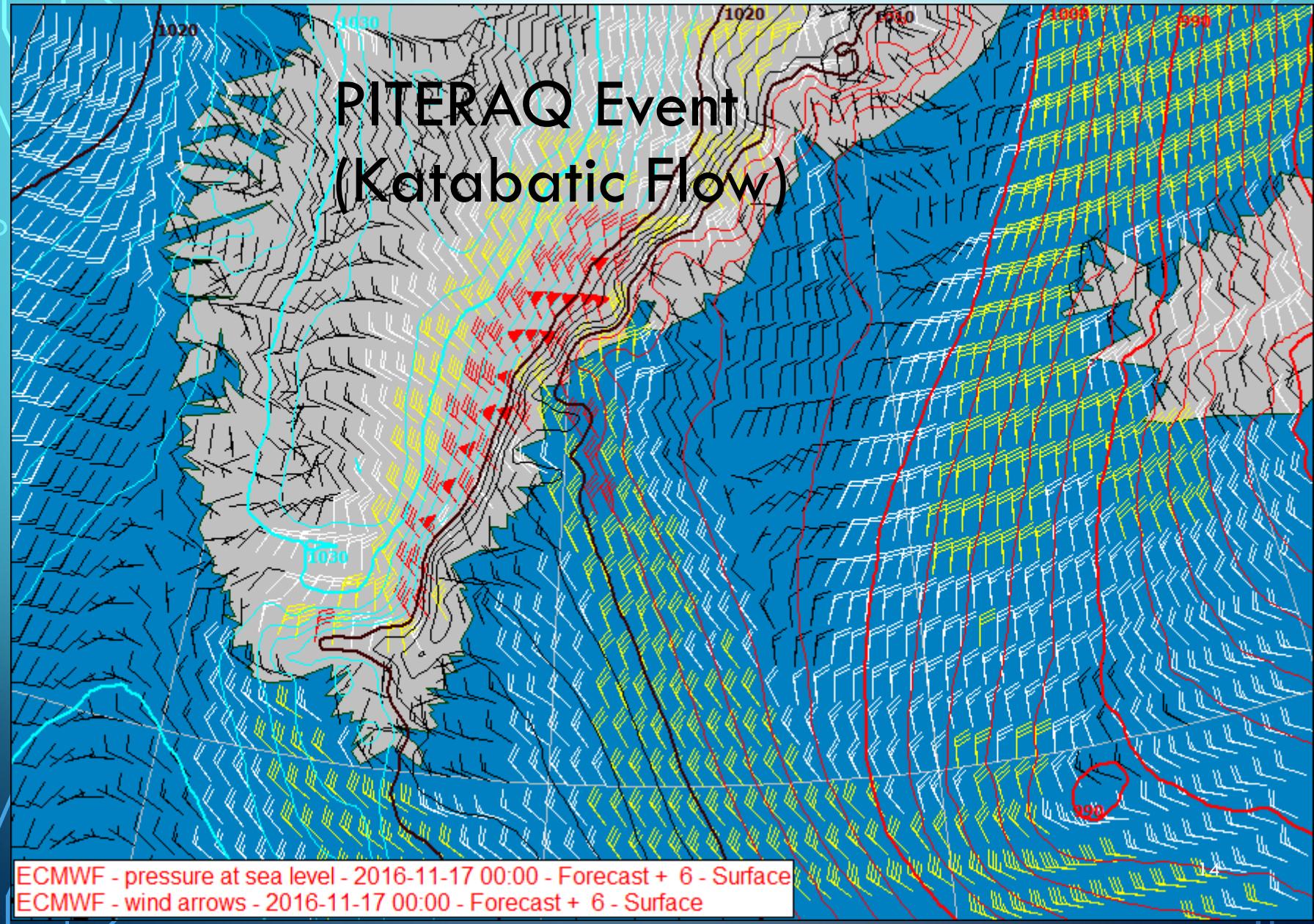
Overhead Sheets (1996)



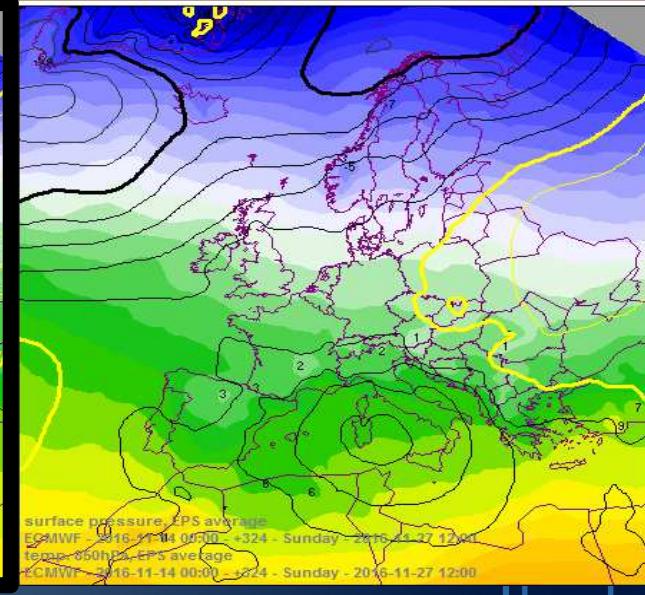
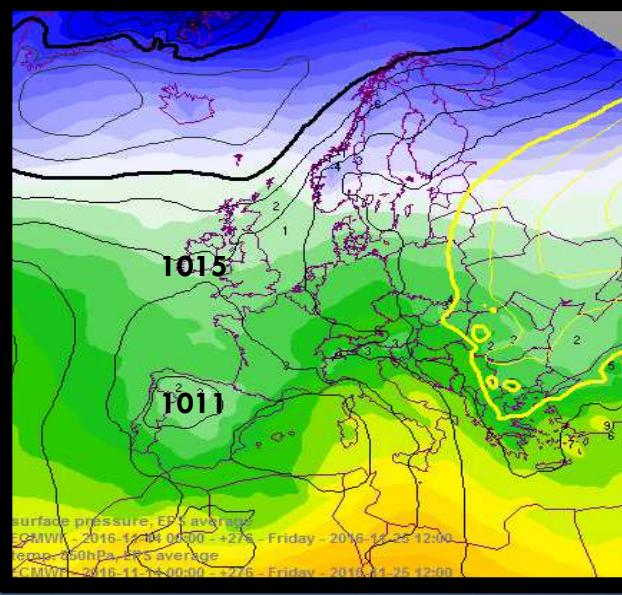
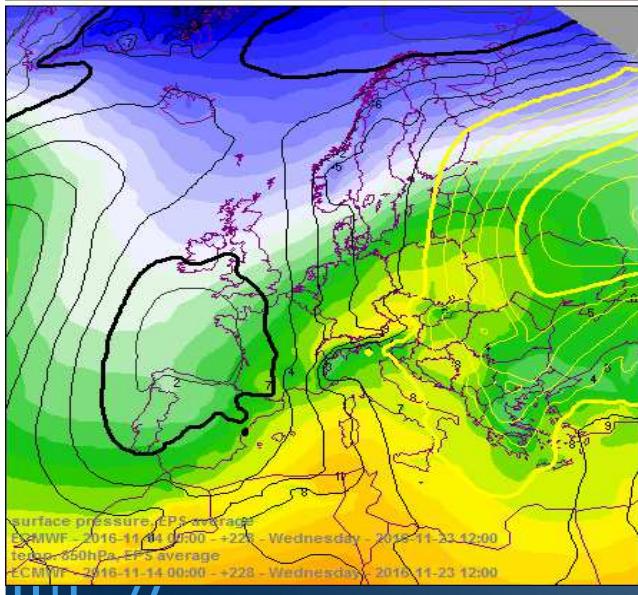
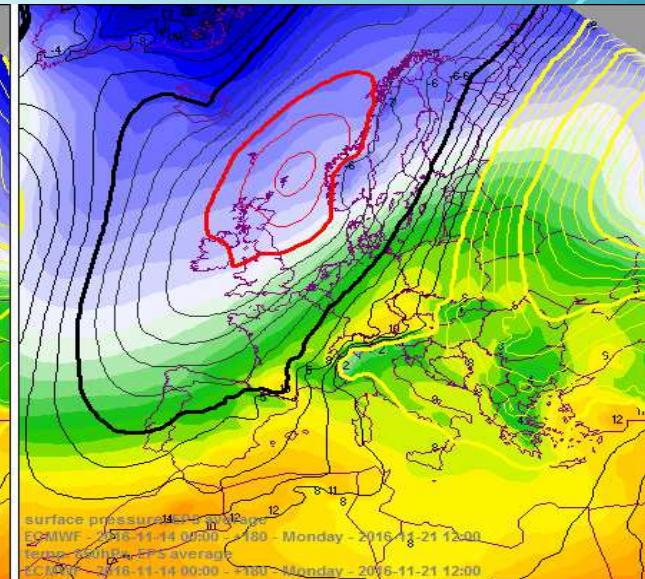
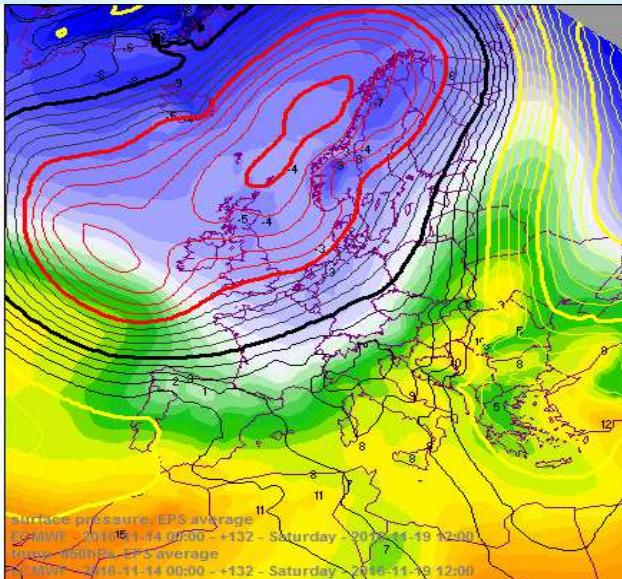
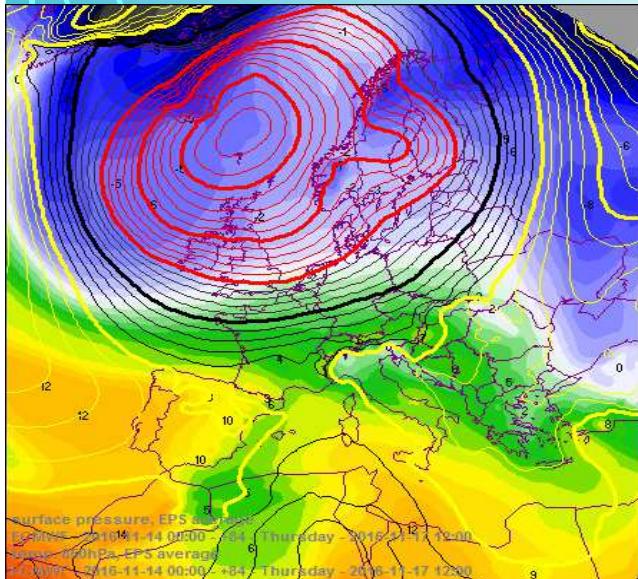


Mesoscale Circulations: WRF COASTAL FRONT

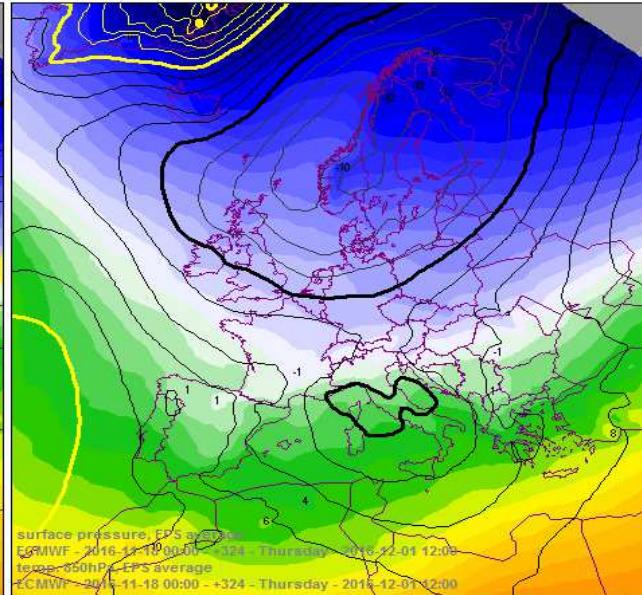
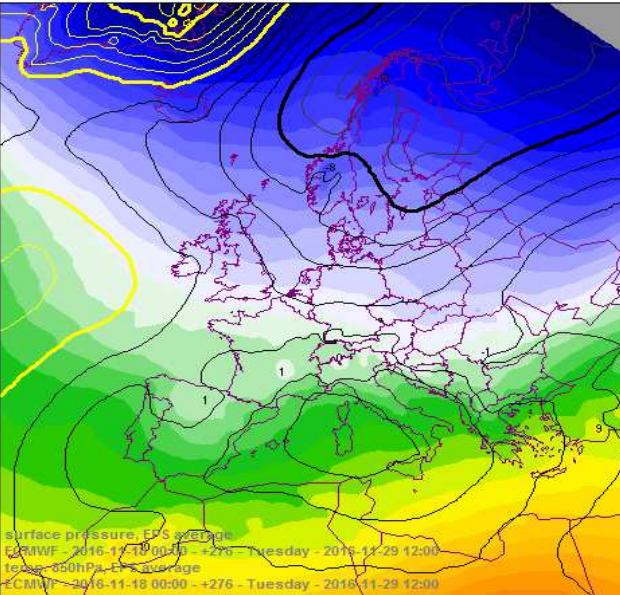
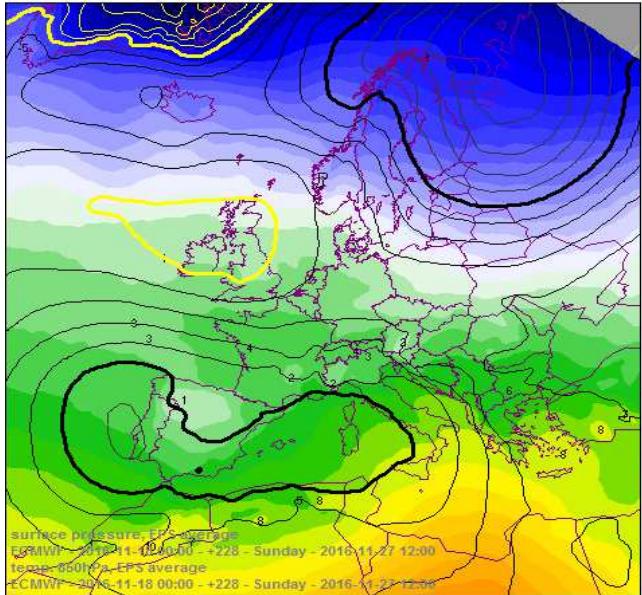
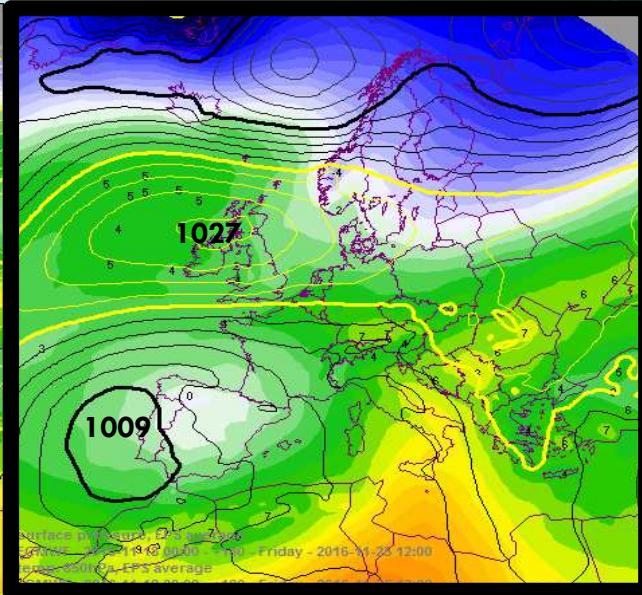
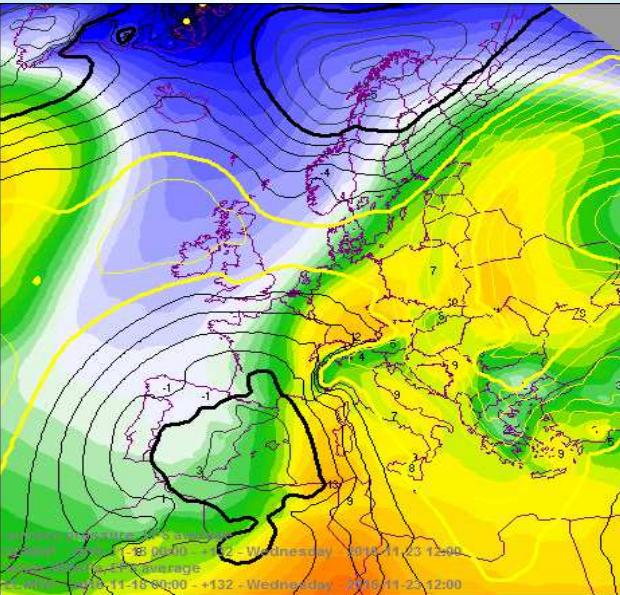
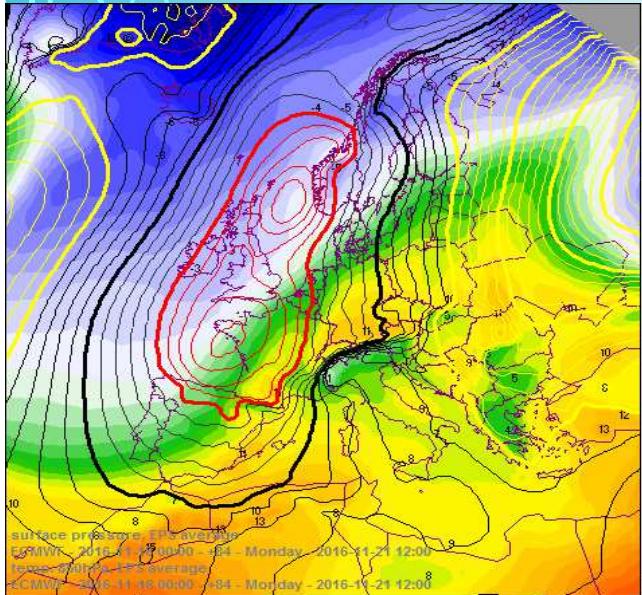




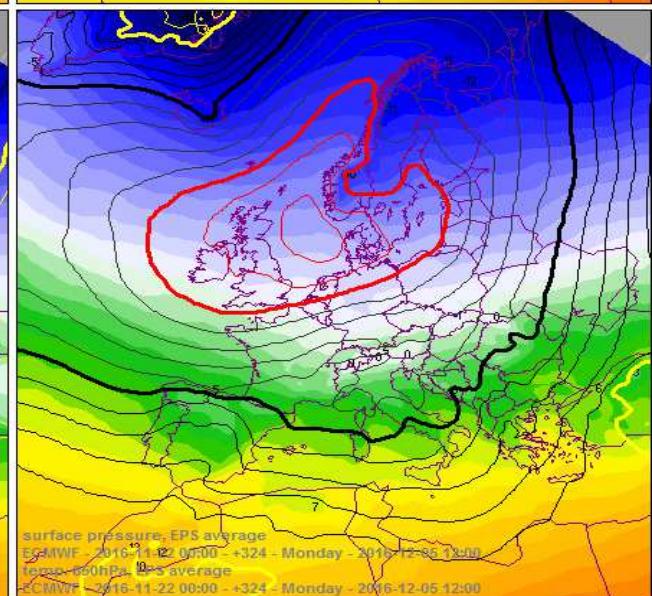
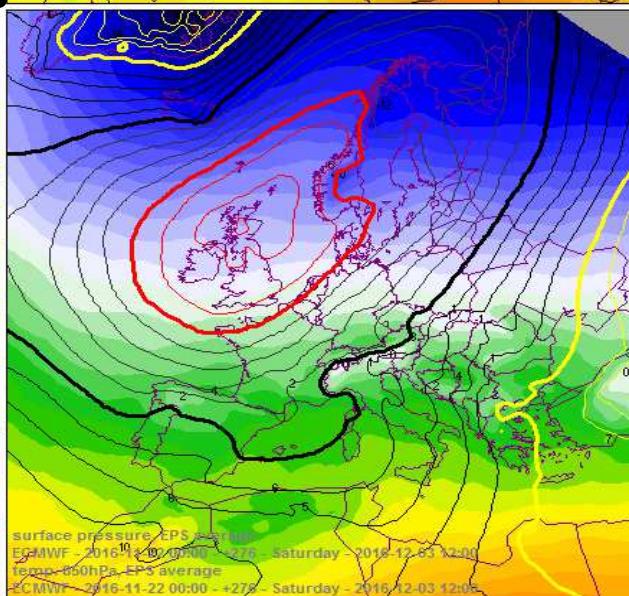
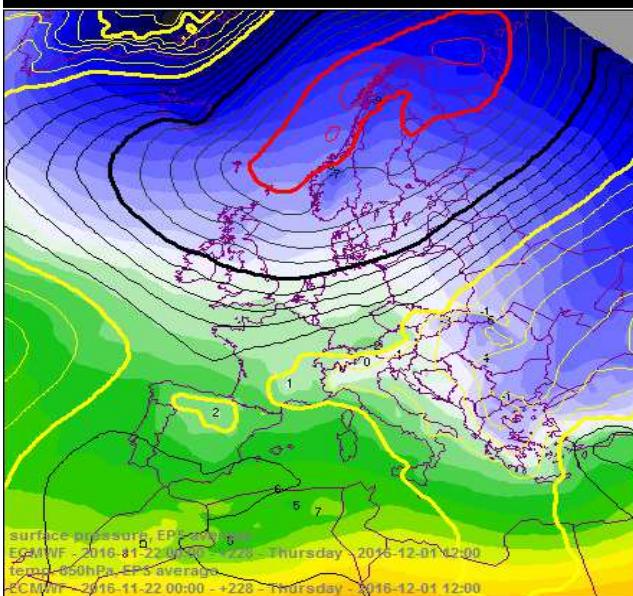
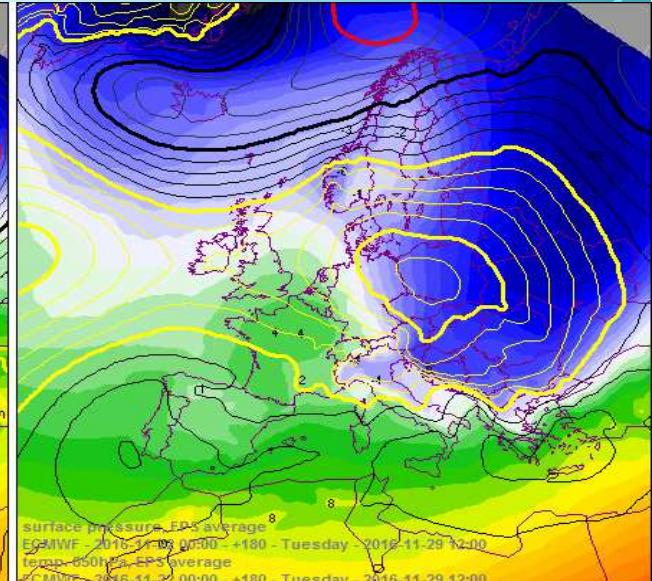
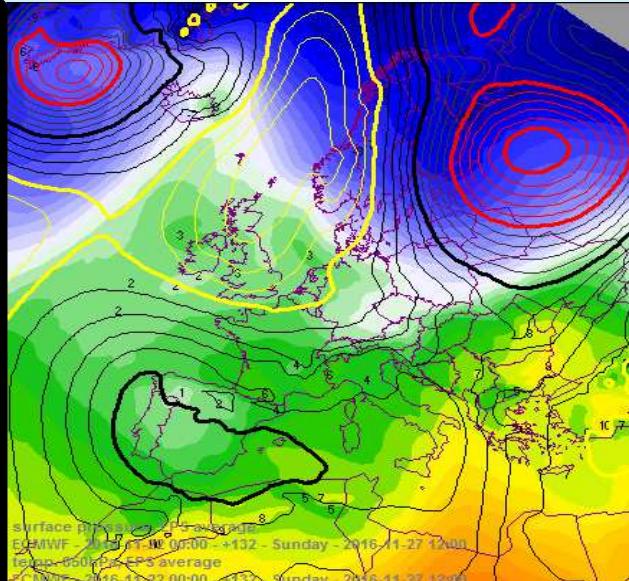
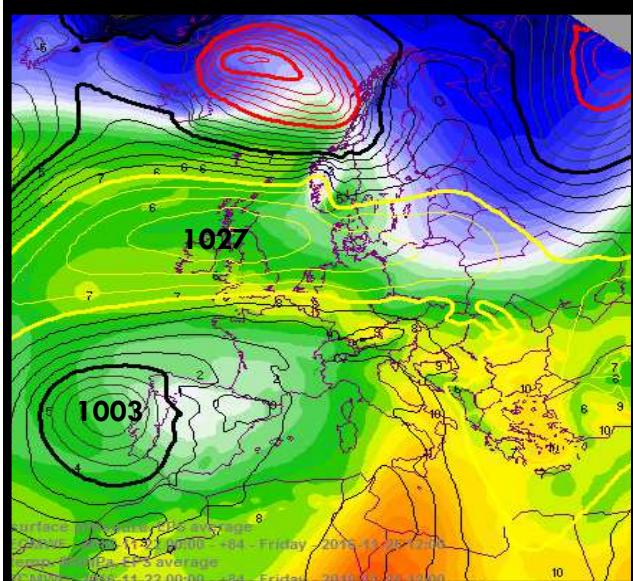
INTERPRET the Ensemble Mean for today Friday 25 Nov (+276)

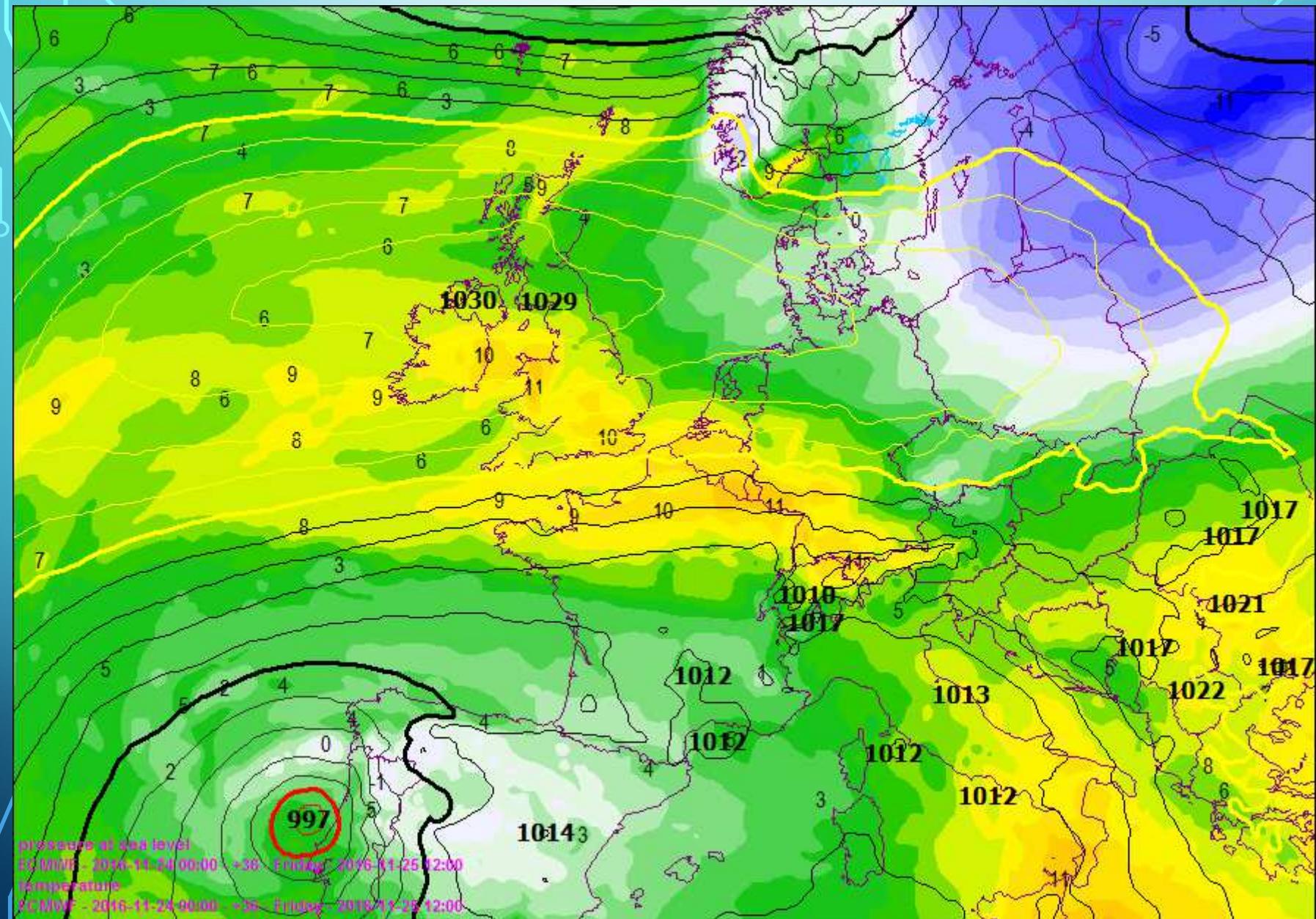


Friday 25 Nov (+180)



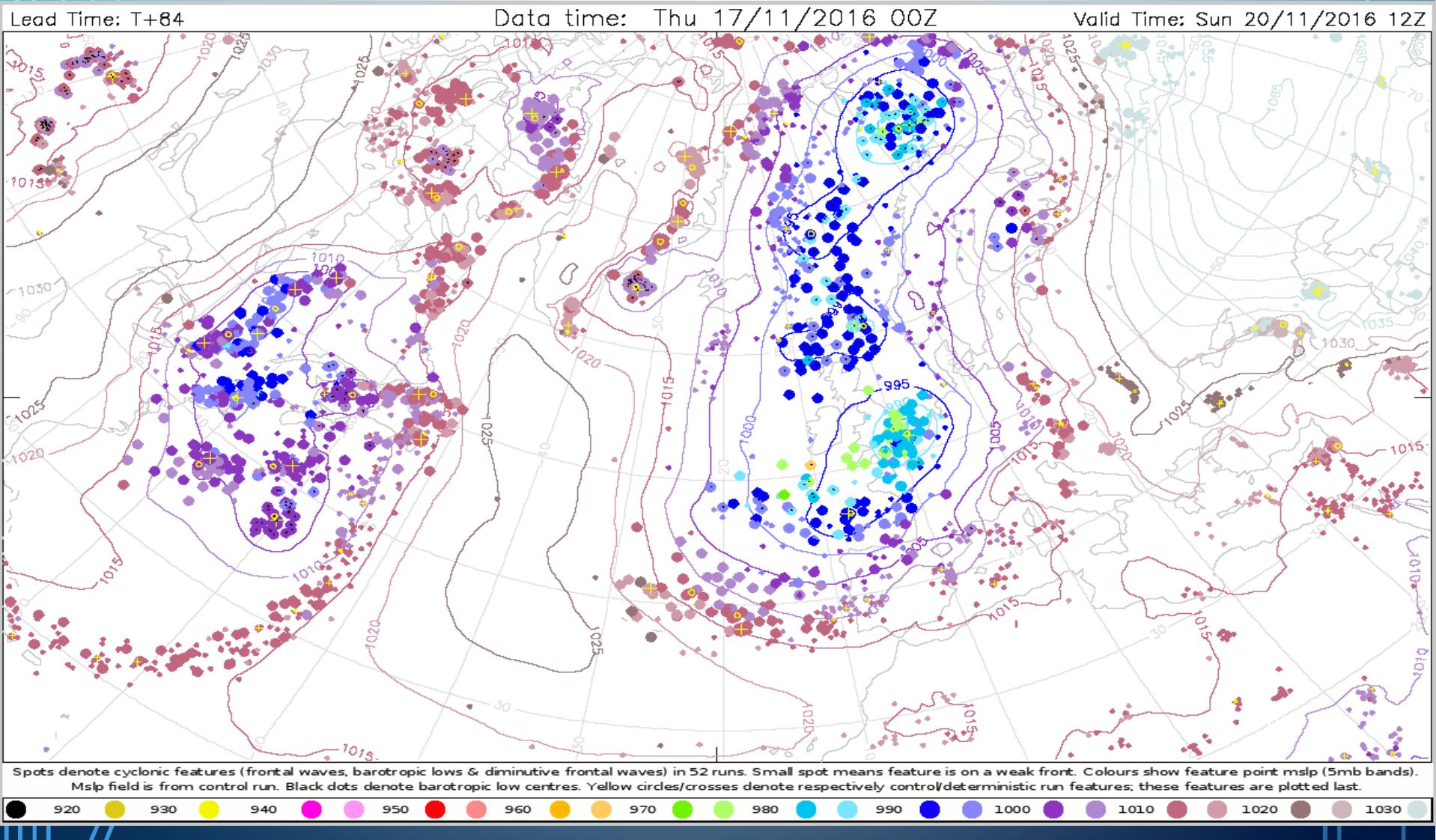
Friday 25 Nov (+84)





Data mining in ENSEMBLE FORECASTS

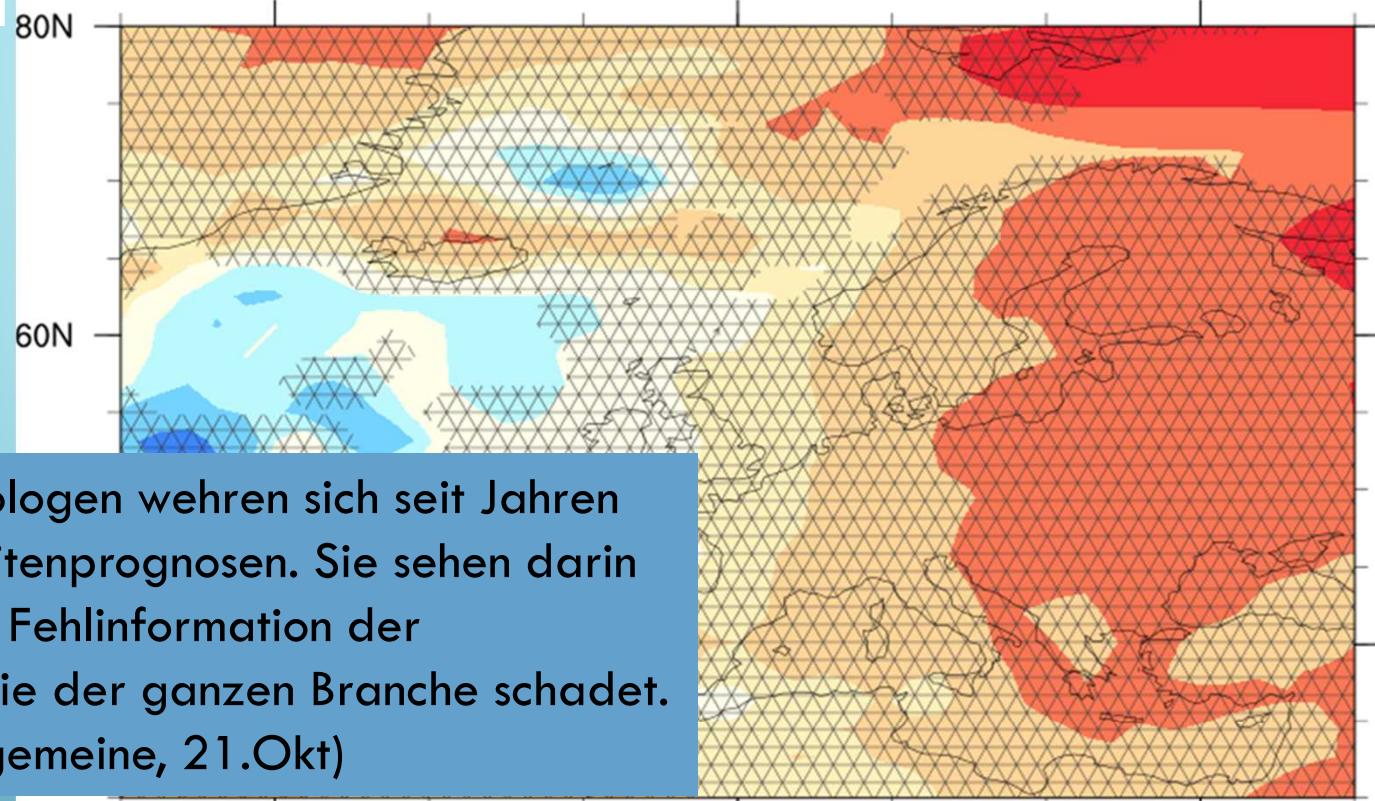
Sunday 20 Nov Feature Map (MSLP)



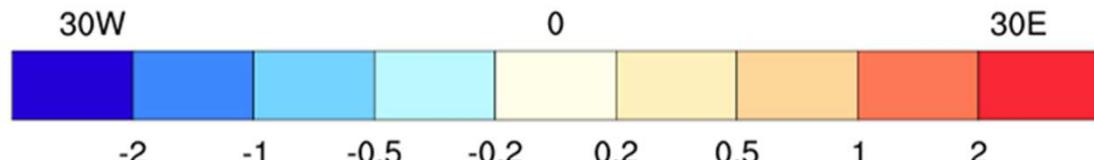
... and in Seasonal Forecasts

Abweichung des Ensemblemittels
vom Klimamittelwert 1981-2014
Temperatur in 2m Höhe

GCFS1 Vorhersage
DezJanFeb (Monat 3-5)
Start am 01/10/2016



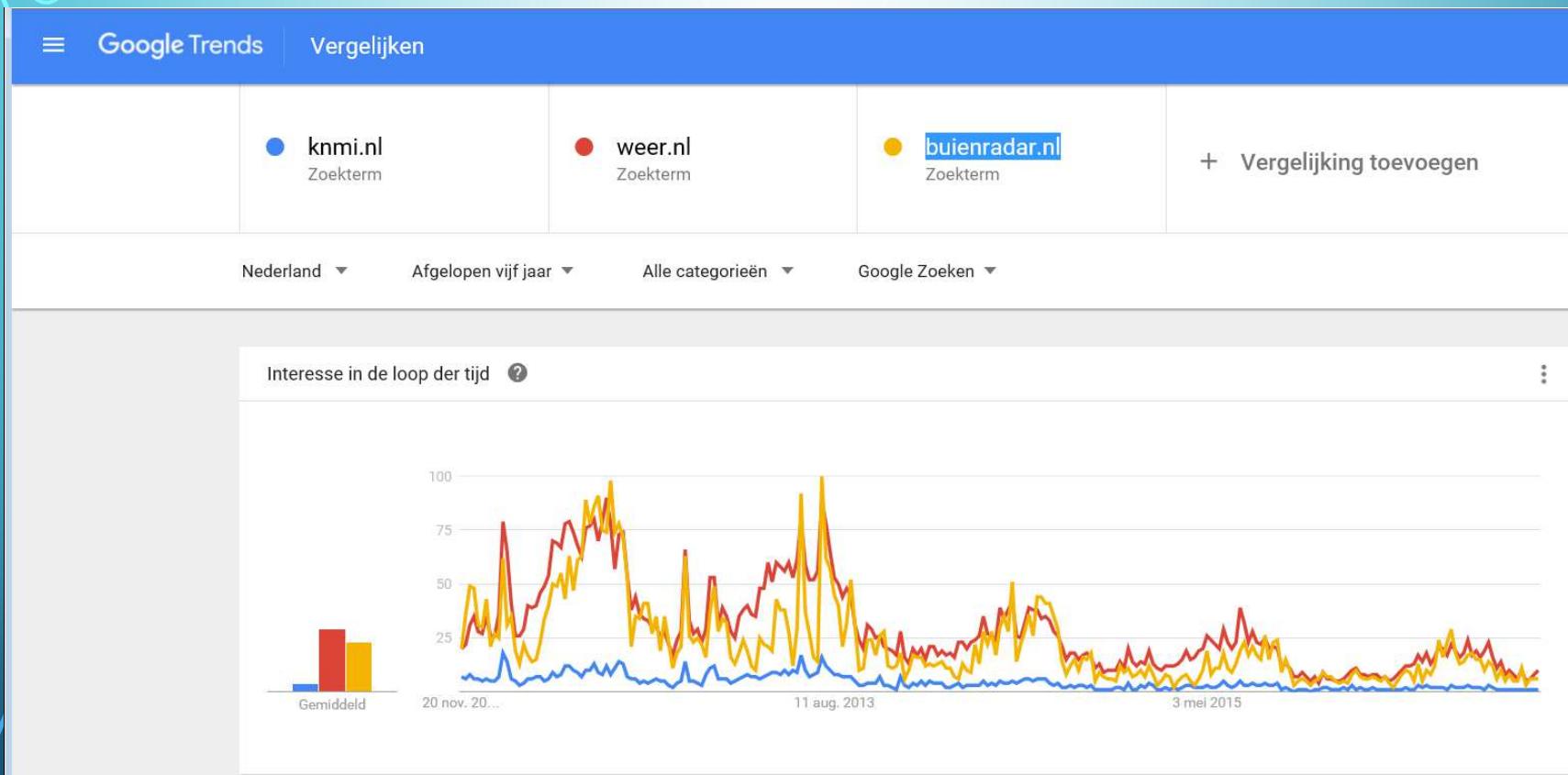
Seriöse Meteorologen wehren sich seit Jahren
gegen Jahreszeitenprognosen. Sie sehen darin
eine fahrlässige Fehlinformation der
Öffentlichkeit, die der ganzen Branche schadet.
(Frankfurter Allgemeine, 21.Okt)



Anomalie [° C], nicht-schraffierte Regionen: gute Vorhersagen in der Vergangenheit

DATA SCIENCE: Trending Topics

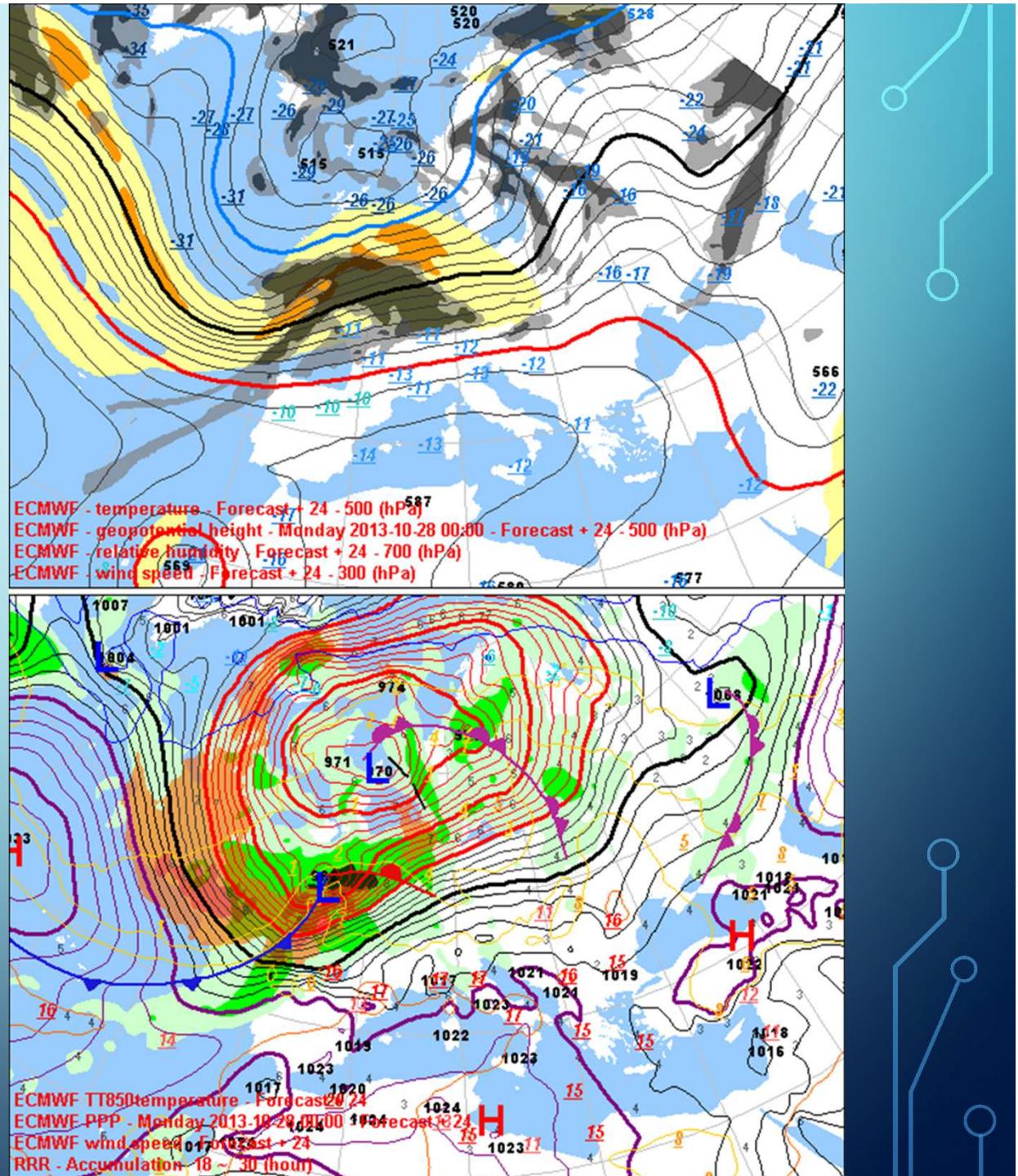
Less Interested in Weather or...?



Do you Recognize the Events?



28 OCT 2013
(Presented at WUR
In Weather_briefing.ppt)



Data Mining with Meteorologica (June 2016)



and Weerspiegel (June 2016)





THANK YOU

and

NEVER FORGET TO ENJOY THE WEATHER!