Examples of the use of ECMWF data at the RMI

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At the RMI, ECMWF data is used both for research as for operational practises. A few examples of (operational) products are presented in this poster. These examples include a checklist for determining the risk of severe convection, a product that assesses the risk of condensation on railway electrical equipment, the calculation of dispersion from a point source, the visualisation of the temperature and precipitation trend for the following 14 days, an automated warning system and a long range forecast.

1. Supercell checklist

The probability of severe convection depends on a multitude of ingredients. Forecasting these events is extremely difficult. To facilitate the forecasting, a checklist was constructed at the RMI. The checklist begins with a discrimination between airmasses (subtropical or polar). Parameters of latent stability, dynamics (shear,…), synoptics (divergence, …) are filled in the checklist together with the traditional convection parameters (STP, EHI, …) to obtain a storm risk quantification.

SEVERE STORM RISK DECISION TREE - RESULTS - ECMWF Hires

- COOL AIRMASS -

INSTABILITY	DYNAMICS	SYNOPS/COMP. INDICES	2TH OPINIONS	CONVECTION expected
LI-700 [°C]	01-SRH [m²/s²]	JET favorable?		model convection?
0.5	350	RIGHT EXIT		yes
LI [°C]	03-shear [m/s]	STP	STP BMJ	2th model
0.5	24	2	not asked	not asked
CAPE [J/kg]	BRN-shear [m²/s²]	STP-US	STP-US BMJ	
20	300	0	not asked	
EQL [m]		EHI	EHI 23km	
6000		0	not asked	
Teql < -10°C ?		synoptical configuration		
not asked		POST FRONT SW		
KO [°C]		VV @ 500 hPa		
0		not asked		

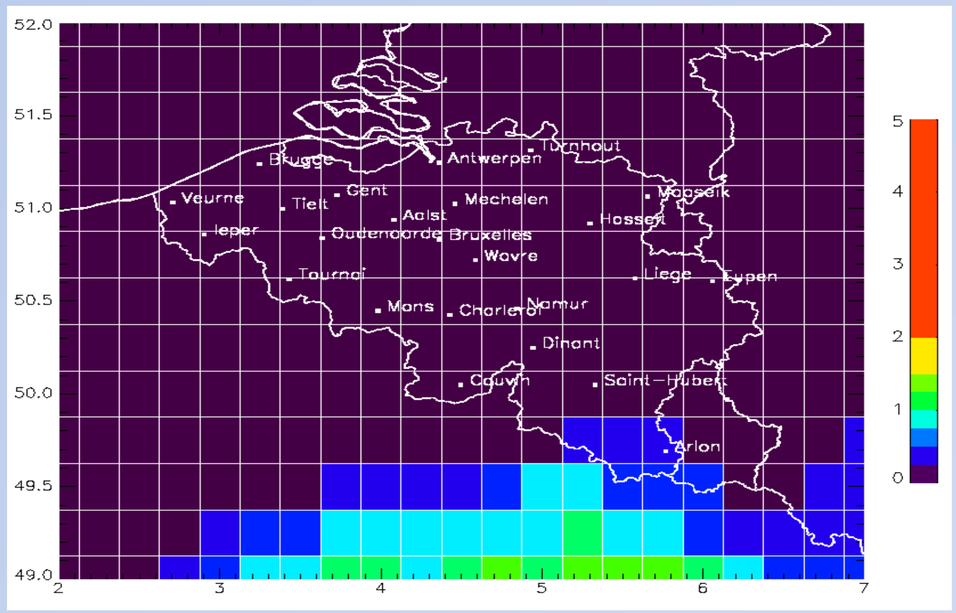
low value | moderate value | high value | extreme high value | suspect high value (see 2th opinion)

	The background color of the value of the severe storm risk is the indicative color for your thunderstorm warning.
STORM RISK	SEVERE STORM RISK
56	35

WARNING & INFO MESSAGES :

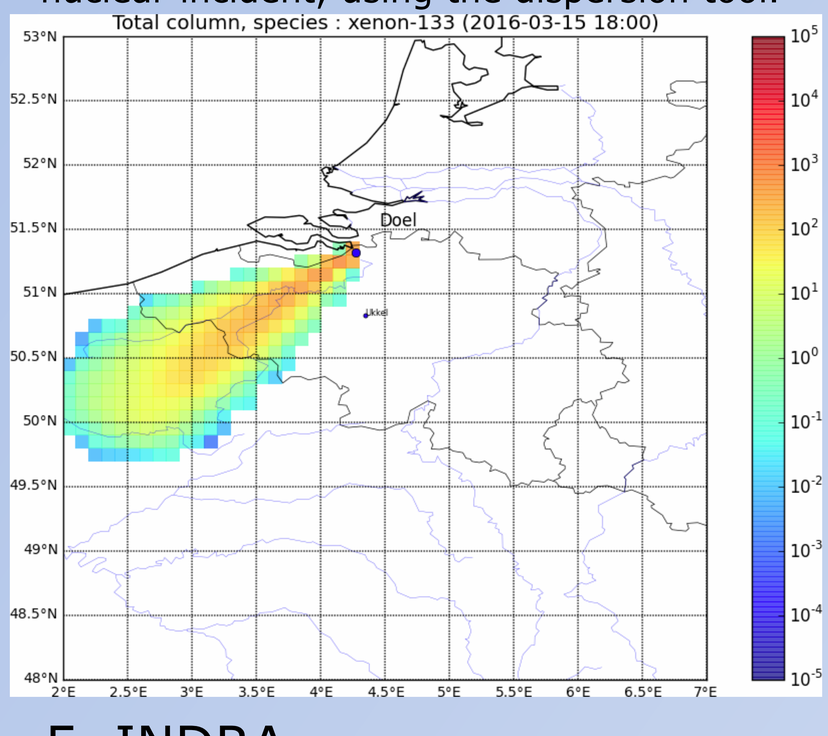
2. Condensation forecasting

Condensation on electric equipment can cause deterioration. The risk of condensation increases when a warm, moist air is advected after a cold and dry period. When the dewpoint of the air lies above the temperature of the equipment (engine), condensation occurs. This situation occurs frequently in the winter period. The RMI sends a warning to the railway company if the condensation lies above 1,5 g/m³ for at least one gridbox. The condensation is calculated using the ECMWF model.



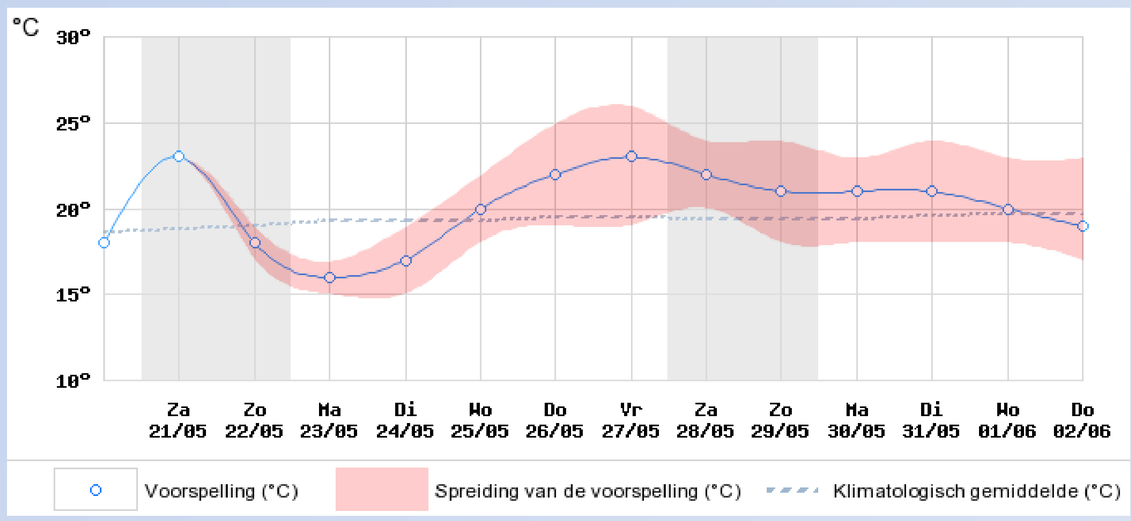
3. Dispersion calculation

To track particles, the dispersion or tracjectories can be calculated. These calculations are performed with FLEXPART, using ECMWF output. Frequently, “emergency tests” are performed, simulating a nuclear incident, using the dispersion tool.



4. ENS plume (website)

Detailed forecasts for five different regions in Belgium are provided on the website up to seven days ahead. These forecasts are constructed using IFS along with other models (UKMO, ALARO, GFS, …). To indicate the tendency, a “plume” is shown on the website. This plume is constructed with the ENS mean and the 80 percentage confidence interval of the ENS.



5. INDRA

The automatic warning system INDRA exploits the ECMWF deterministic as well as the ENS data for calculating probabilities of heavy precipitation. For 10 regions, the probability of precipitation, probability of precipitation exceeding a threshold and the mean precipitation are given with colours corresponding to the warning-level.

ECEPS forecast of 30/05 00:00 UTC:
Estimated probability of exceeding threshold of 25 mm (green color: estimated probability < 10 %).

Stations / Forecast	31/05 00:00	01/06 00:00	02/06 00:00	03/06 00:00	04/06 00:00	05/06 00:00	06/06 00:00	07/06 00:00
Oostende-Airport								
Gent-Industrie	10 %							
Chievres	57 %							
Uccle	47 %							
Antwerpen-Deurne								
Florennes	75 %							
St.-Hubert	73 %							
Bierset	71 %							
Kleine-Brogel	31 %							
Elsenborn	63 %		18 %					

6. Long range

During the winter season, the RMI provides a long range temperature forecast for an energy company. Along with other parameters (NAO, QBO, MJO, …), monthly and seasonal forecasts of the ECMWF model are used.

		Forecasts available on Friday															Forecasts available on Tuesday															Tan	Obs
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	[°C]	
1	45	A															A															1.0	N/A
2	46	A	A														A	X														**2.6**	**A**
3	47	A	A	A													A	X	A													**2.2**	**A**
4	48	N	A	A	A												N	X	N	A												1.8	N/A
5	49		A	A	A	N												X	N	N	B											**-2.5**	**B**
6	50			A	N	N	N												N	N	N	N										0.8	N/A
7	51				N	A	A	A												N	A	A	A									**3.2**	**A**
8	52					A	A	A	A												N	A	A	X								1.4	N/A
9	1						A	N	B	B												A	N	X	B							-0.9	N/B
10	2							A	N	N	X												N	X	A	A						1.4	N/A
11	3								A	A	X	X												X	A	A	A					**2.1**	**A**
12	4									N	X	X	B												A	A	B	B				**-3.1**	**B**
13	5										X	X	B	X												A	N	N	N			-0.6	N/B
14	6											X	N	X	X												N	N	N	B		**-2.1**	**B**
15	7												N	X	X	X												A	N	B	N	1.1	N/A
16	8													X	X	X													N	N	N	-0.8	N/B
17	9														X	X														N	N	1.1	N/A
18	10															X															N	0.9	N/A