Rijkswaterstaat
Ministry of Infrastructure and the Environment

The Sinterklaasstorm 2013-12-5

The benefits of national coordinated early warnings

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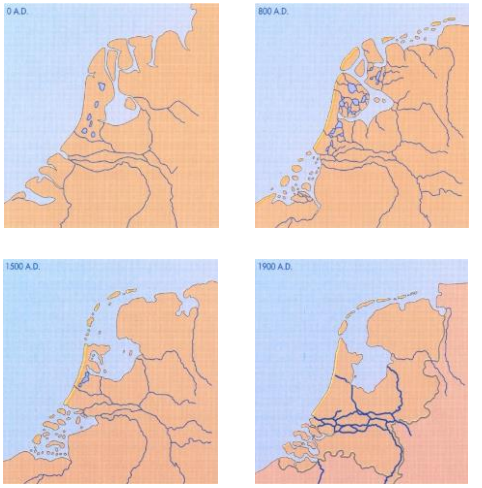
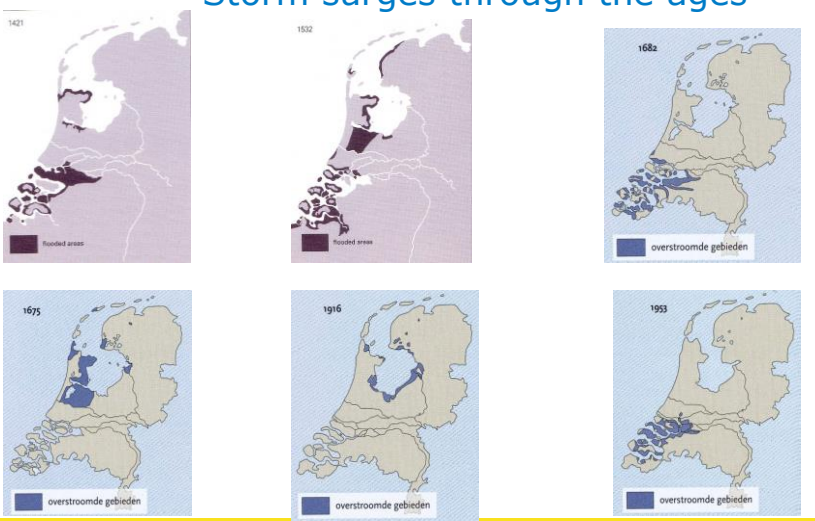
Content

- Coastal flooding history;
- Governance and policy of flood risk management;
- Development storm December 1st until December 7th
- Lessons learned and impacts for the future
- Does coordination stop when the storm is over?

Land/water development through the ages



Storm surges through the ages

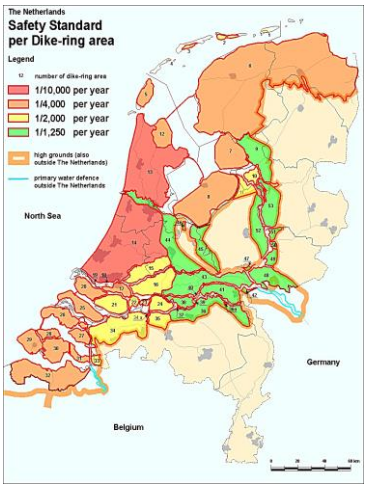


Effects of storm 1953

- 1836 inhabitants died
- 100.000 inhabitants lost there houses and their belongings
- Ten thousands of cattle drowned
- 200.000 ha flooded
- Nowadays people are still traumatised

Respons: emergency measures

Safety standards, as laid down in the current Water Act



- Probability of exceedance
- Dike rings with uniform standards.

Chance of experiencing a flood during a lifetime

- **Green** 6% (1:1,250)
- **Yellow**: 3,75% (1:2,000)
- **Orange** 2% (1:4,000)
- **Red** 0,75% (1:10,000)

We have to defend us, as otherwise…. ……

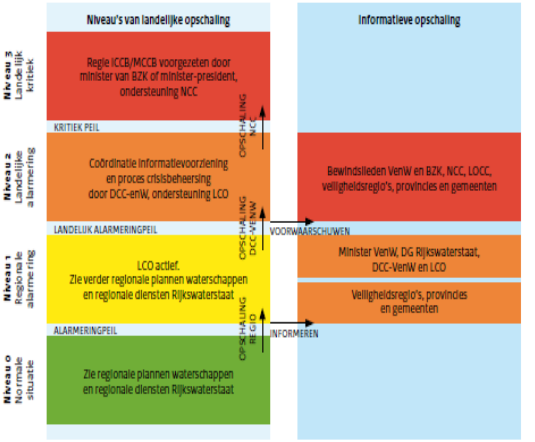
But we must also be prepared in case of….

What is the objective of the National Coordination Centre Flood Threat (LCO)

- LCO is commissioned by The National Ministry of Infrastructure and Environment
- Operates on a national level
- Give early information (and warning) in case of extreme river discharge or storm surge that could cause flooding
- Give advice how to act at a national level (at regional level the water boards are responsible)
- Give advice on mobilization of nationally available emergency measures or material like pumps, F16s (remote control), big bags, etc.
- Give adequate information for communication/press releases

Upscaling levels LCO

- Level 3: **code red (critical level**)
- Level 2: **code orange (national alarm)**
- Level 1: **code yellow (regional alarm)**
- 0: **code green (normal)**



development storm surge (related to forecasts)

Friday November 30:

Long term prediction shows a possible storm surge along the Dutch coast for Friday December 6

Sunday December 1:

50 % Chance of a water level that exceeds the warning levels (1/5 per year)

Tuesday December 3:

- 90 % Chance of exceeding regional warning levels at Vlissingen (south west Netherlands)
- 30 % chance of exceeding the national warning levels (1/40 per year)

Wednesday December 4:

- Upscaling to second level of crisis management (forming of a departmental crisis team)
- Focus shifts from Vlissingen to Delfzijl (Northern part of the Netherlands):
- Prediction for Thursday evening: high storm surge combined with ebb

Thursday December 5 in the morning:

- Delfzijl likely 2 high tides
- First: night Thursday to Friday exceeding level 1
- Second: Friday afternoon no exceeding of warning levels

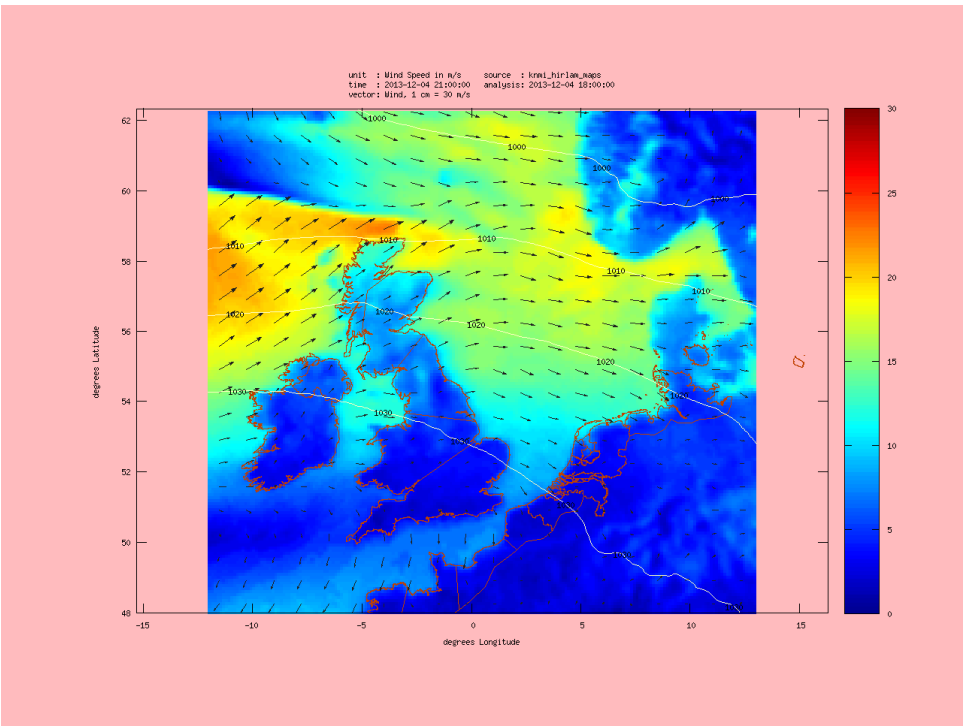
Thursday December 5 LCO-announcement at 17:26 uur:

Delfzijl (NL-D Ems estuary): critical water levels; design level could nearly be reached

Exceeding level 2 in the night December 5th-6th

Exceeding of level 1 in the afternoon December 6th is possible

The levees are strong enough to withstand this storm, only small (normal) damage is expected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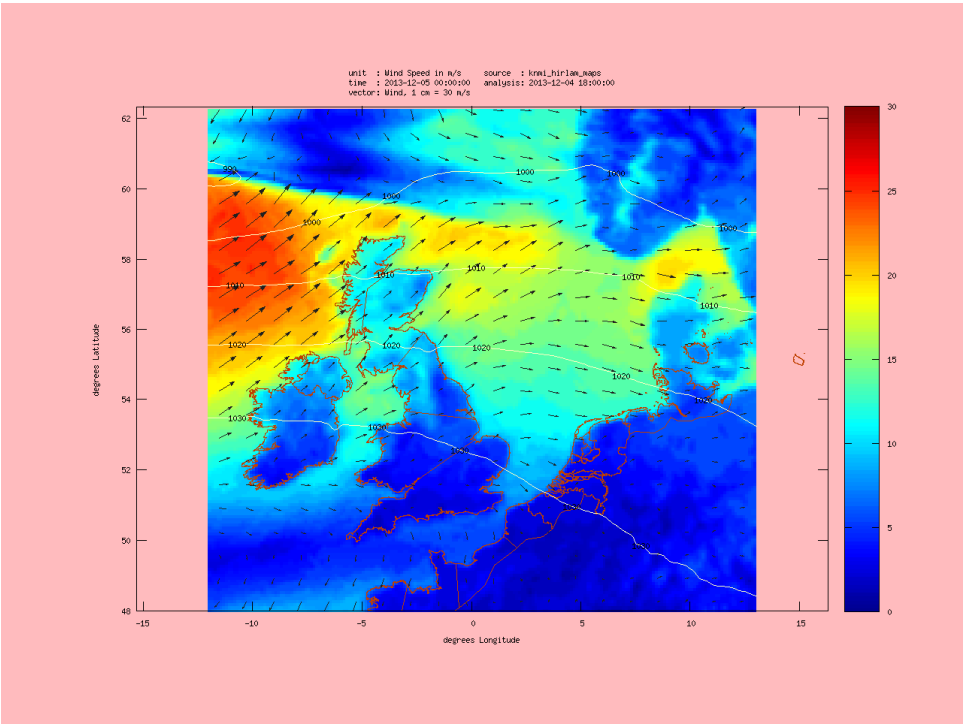
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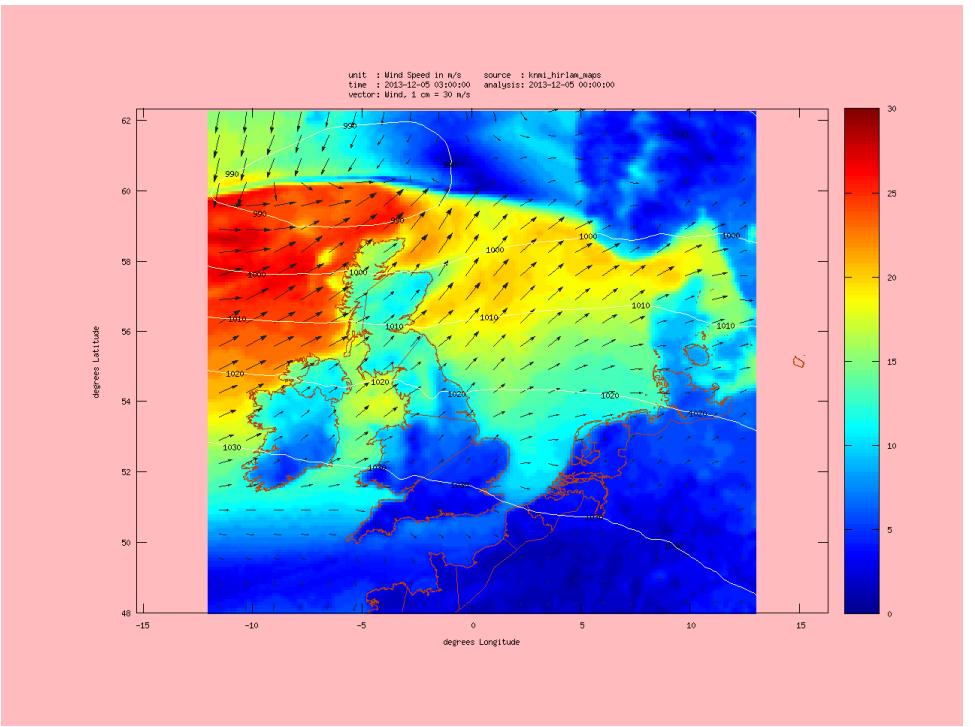
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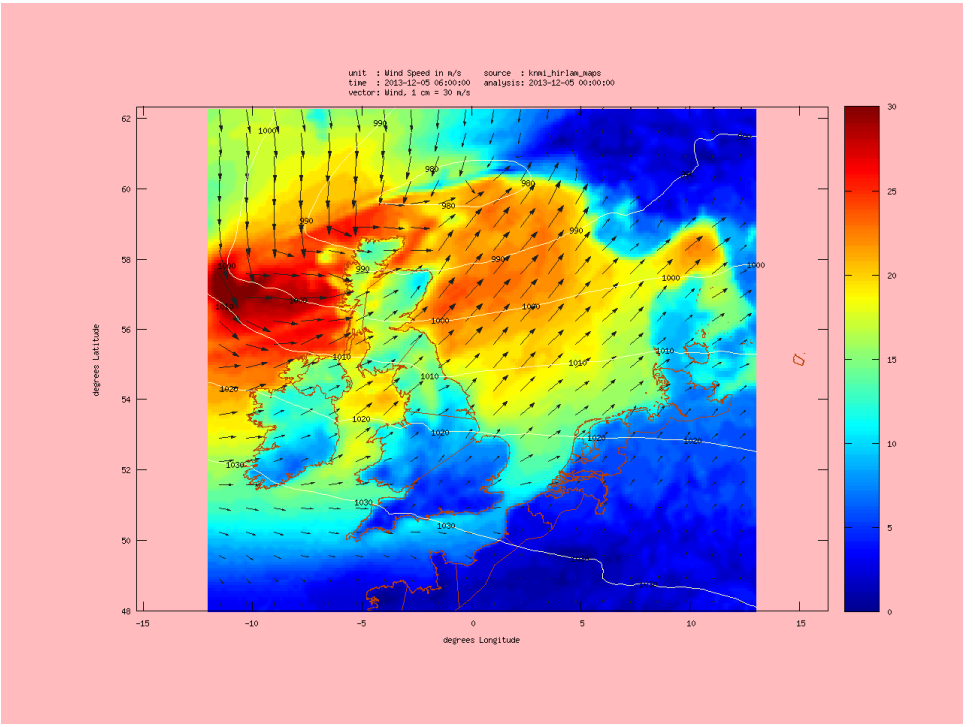
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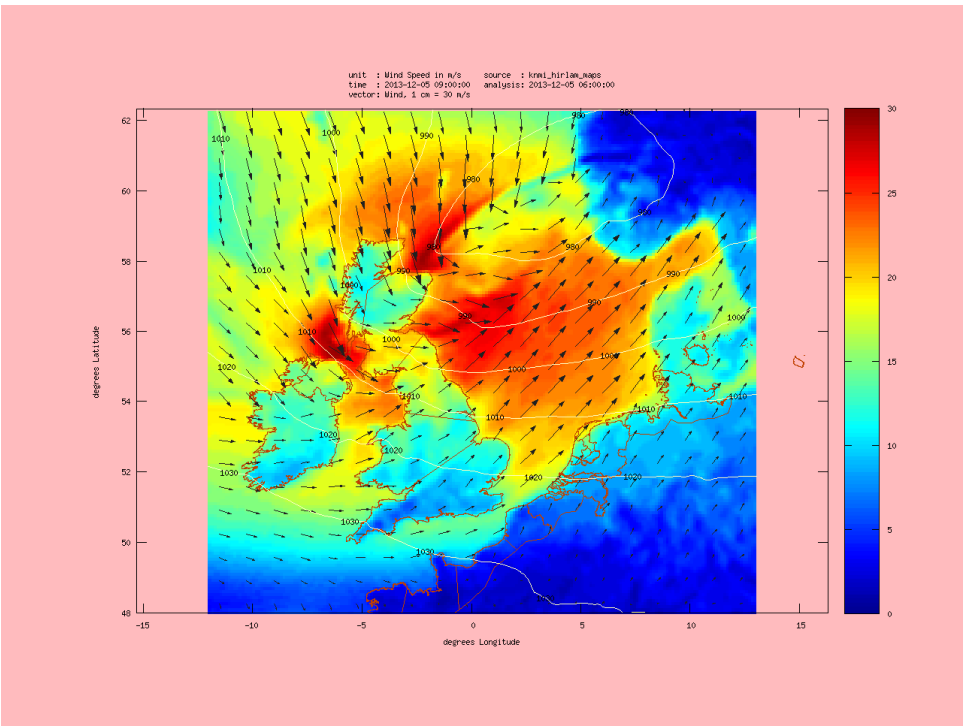
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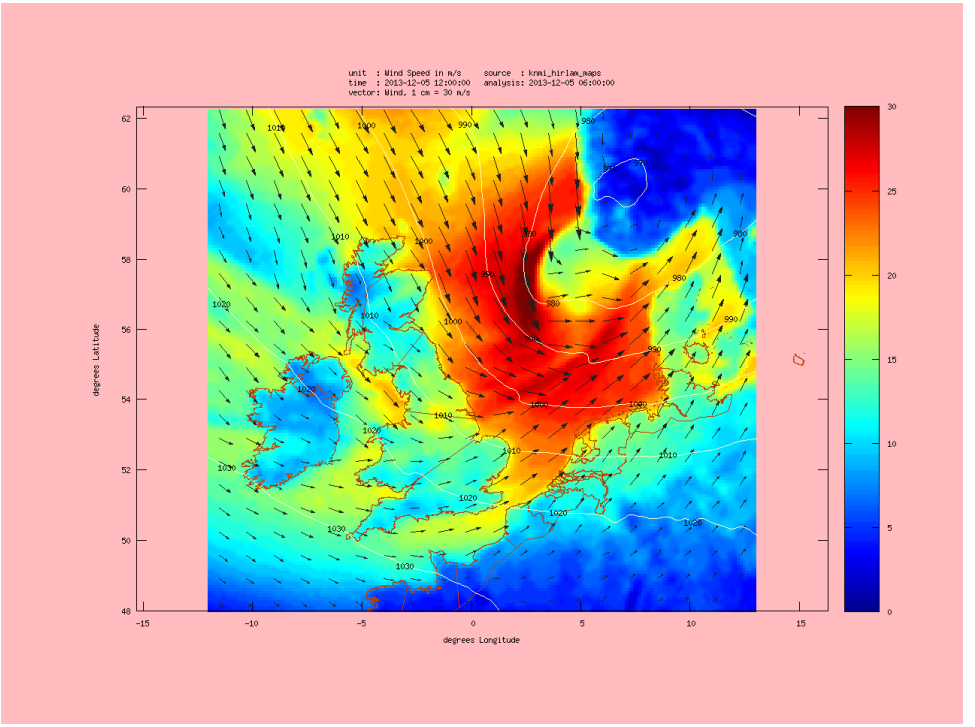
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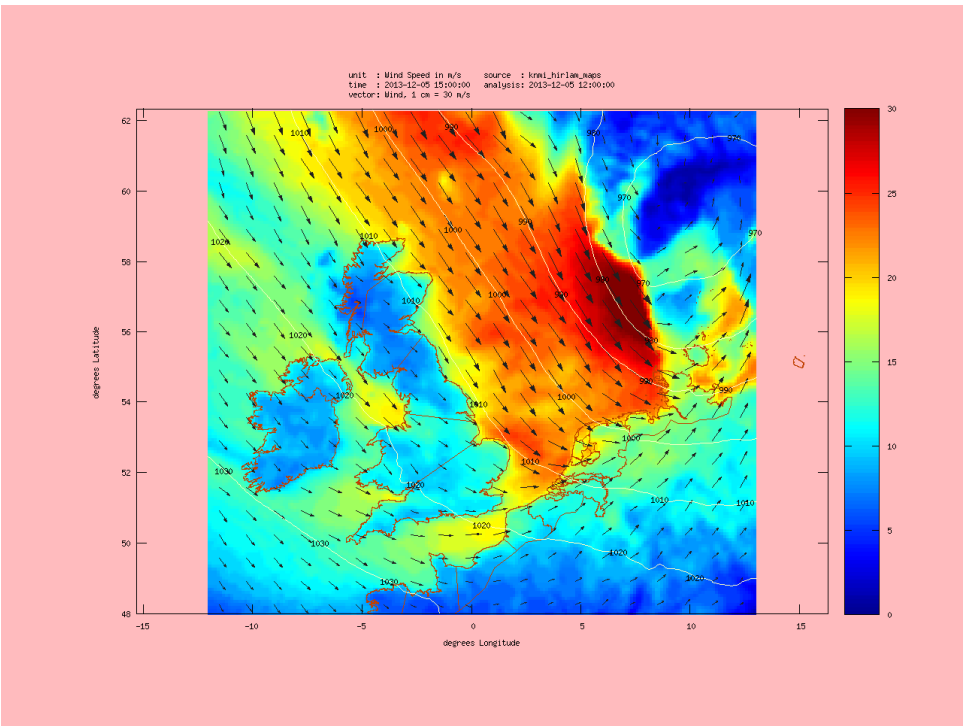
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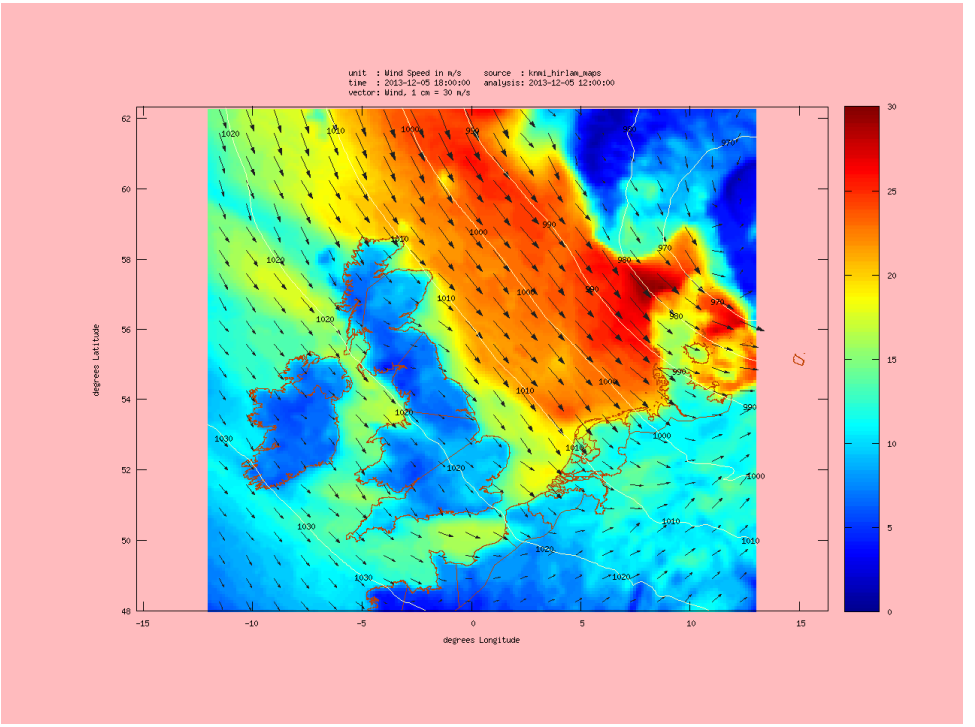
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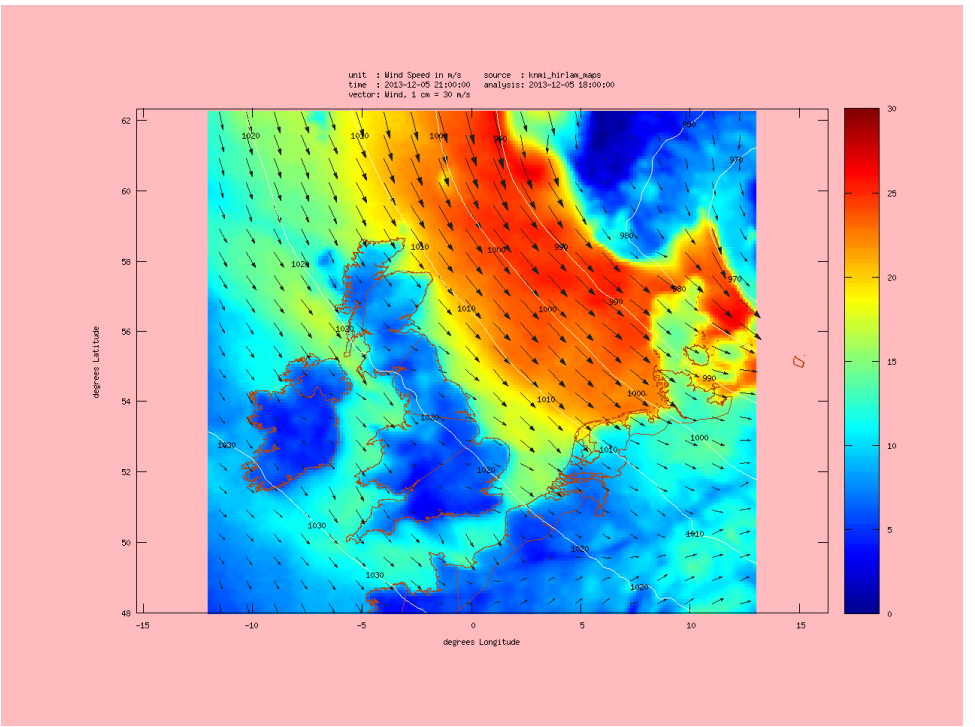
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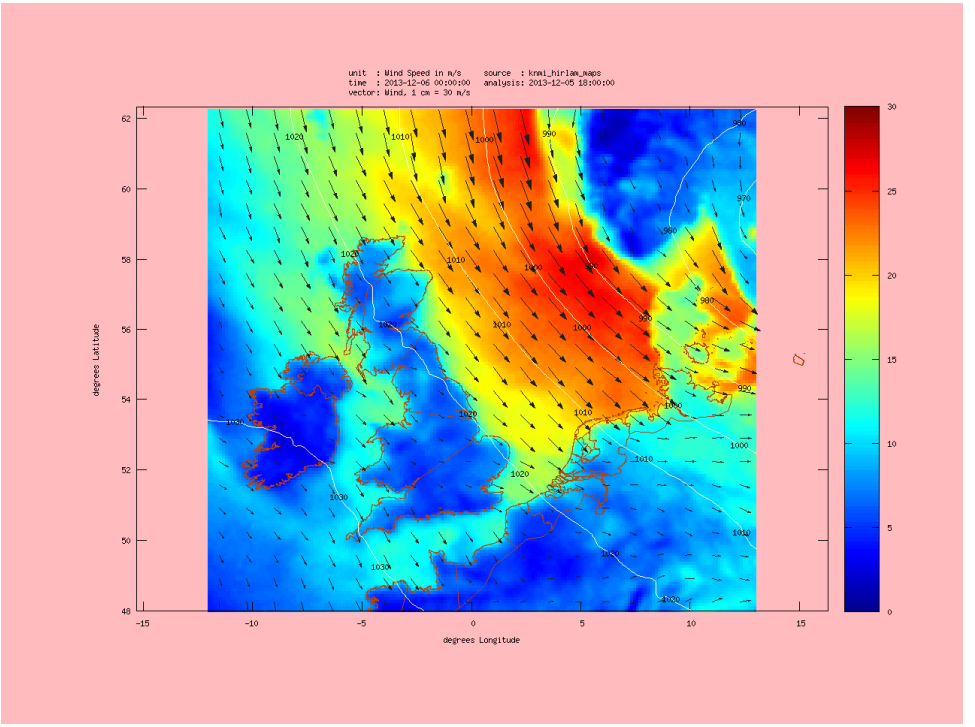
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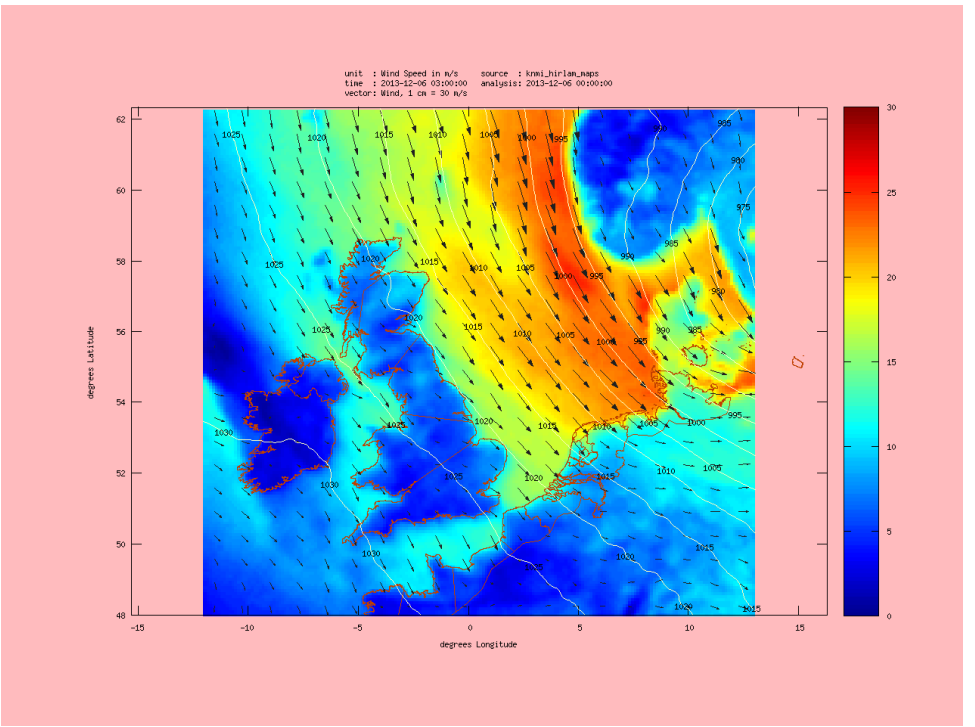
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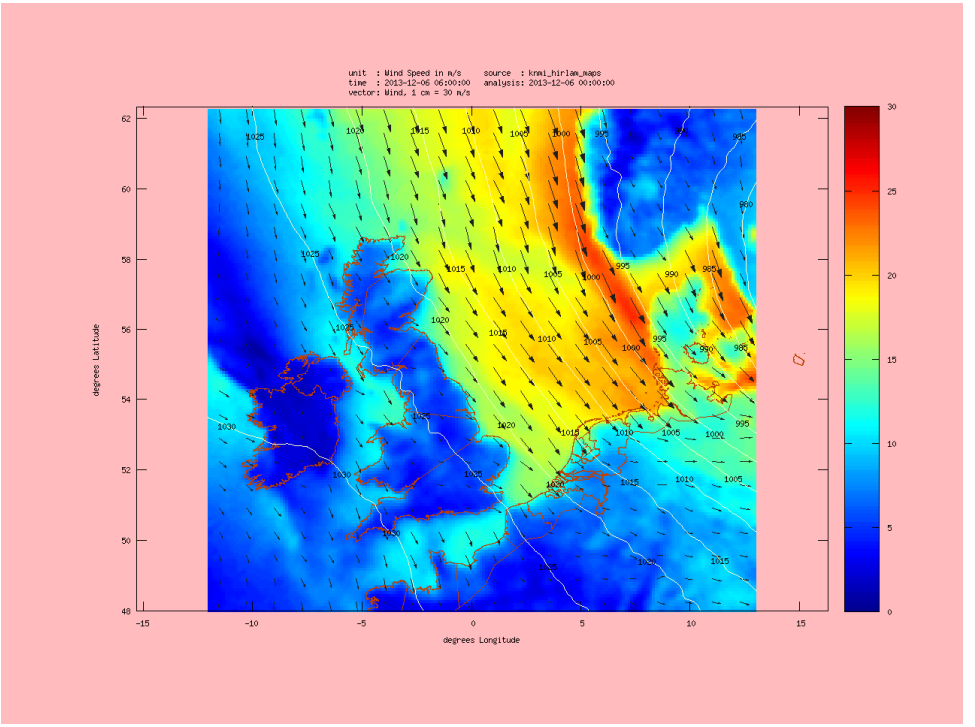
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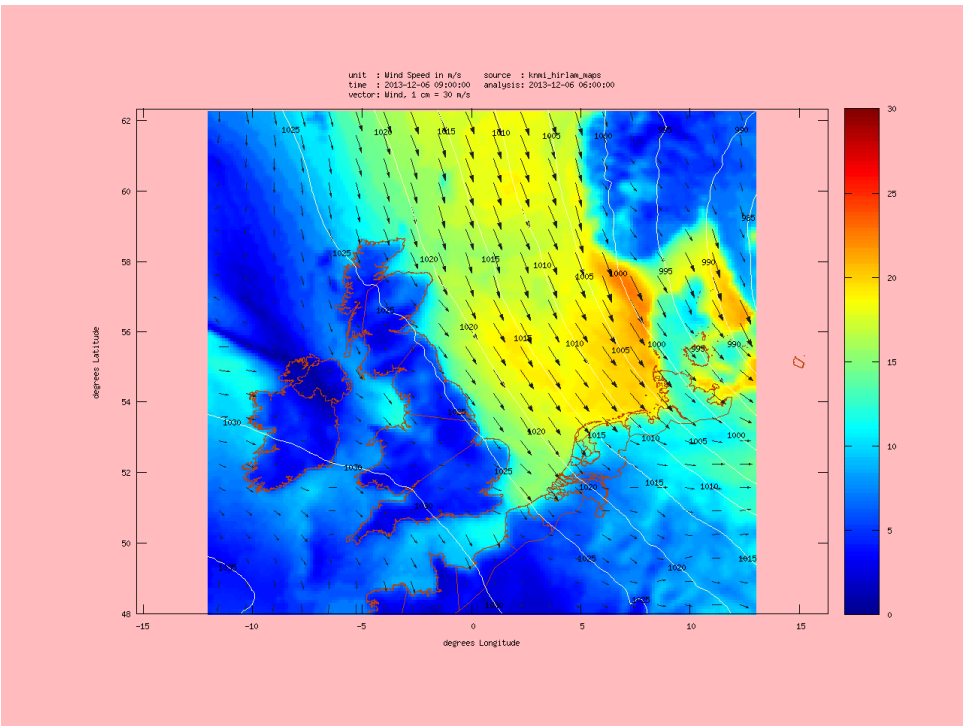
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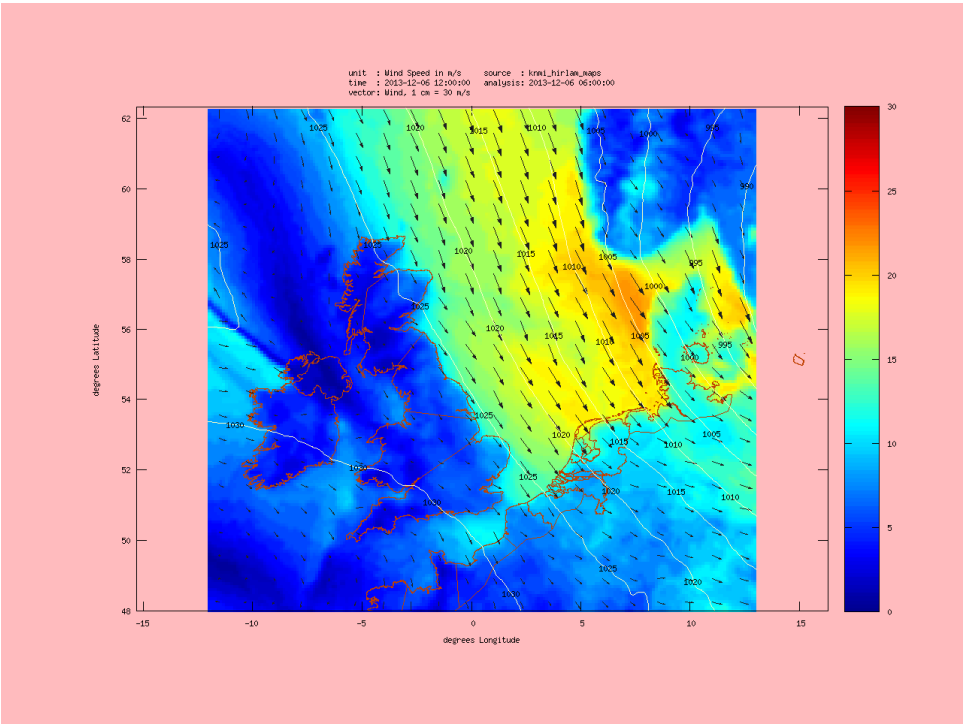
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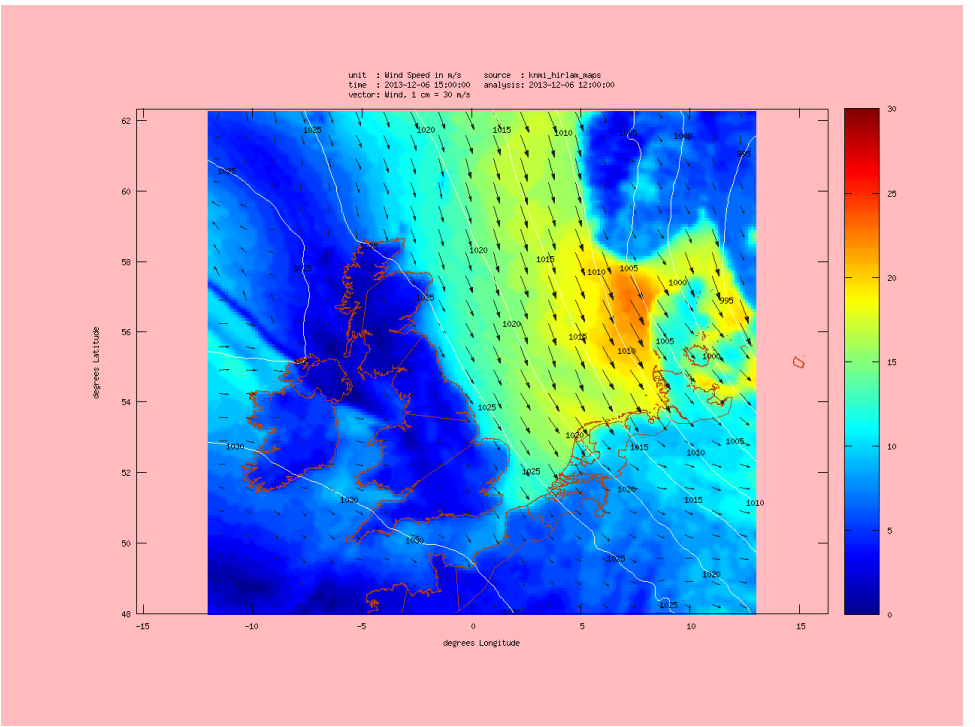
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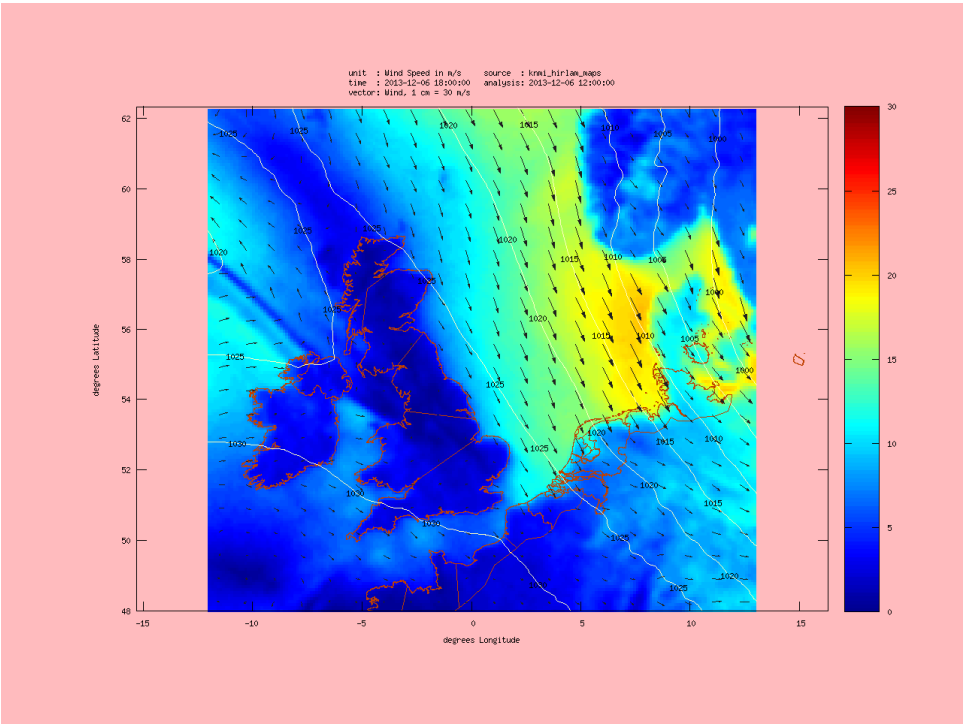
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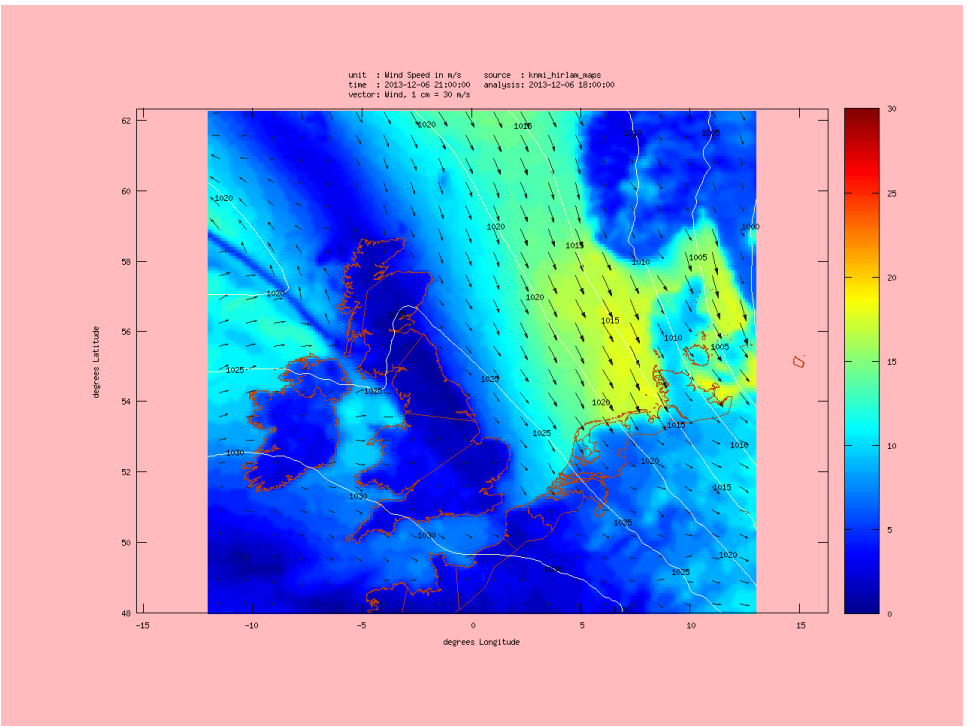
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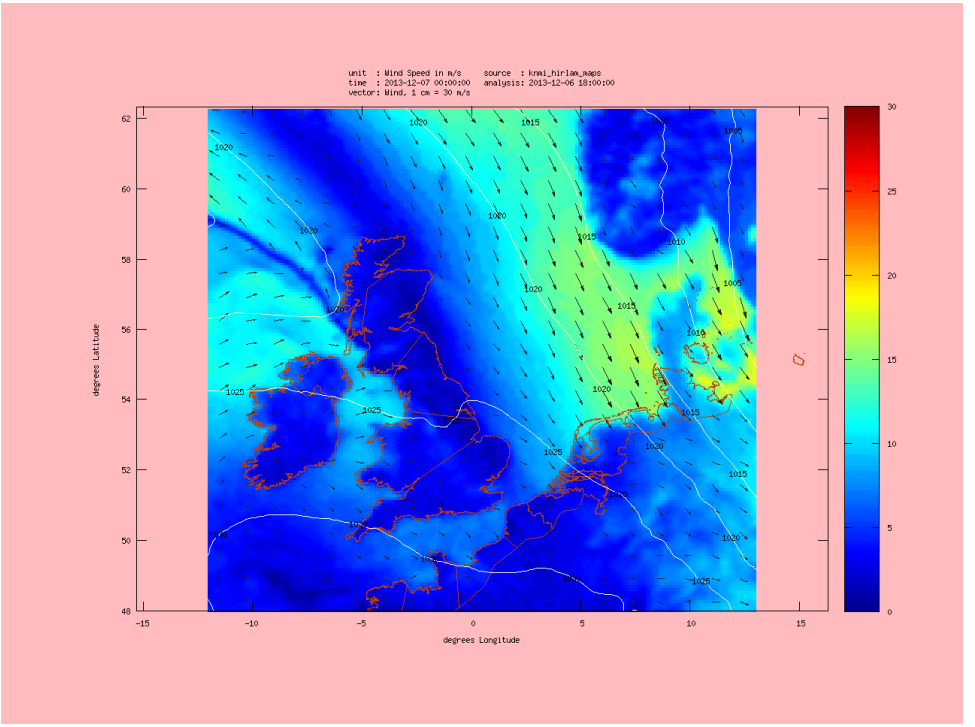
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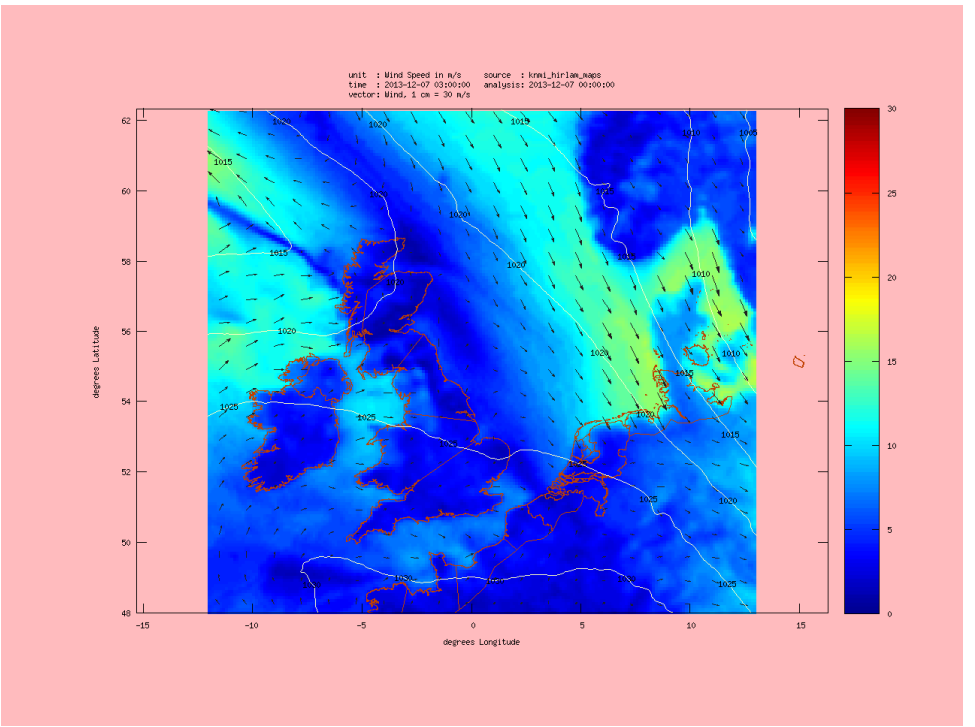
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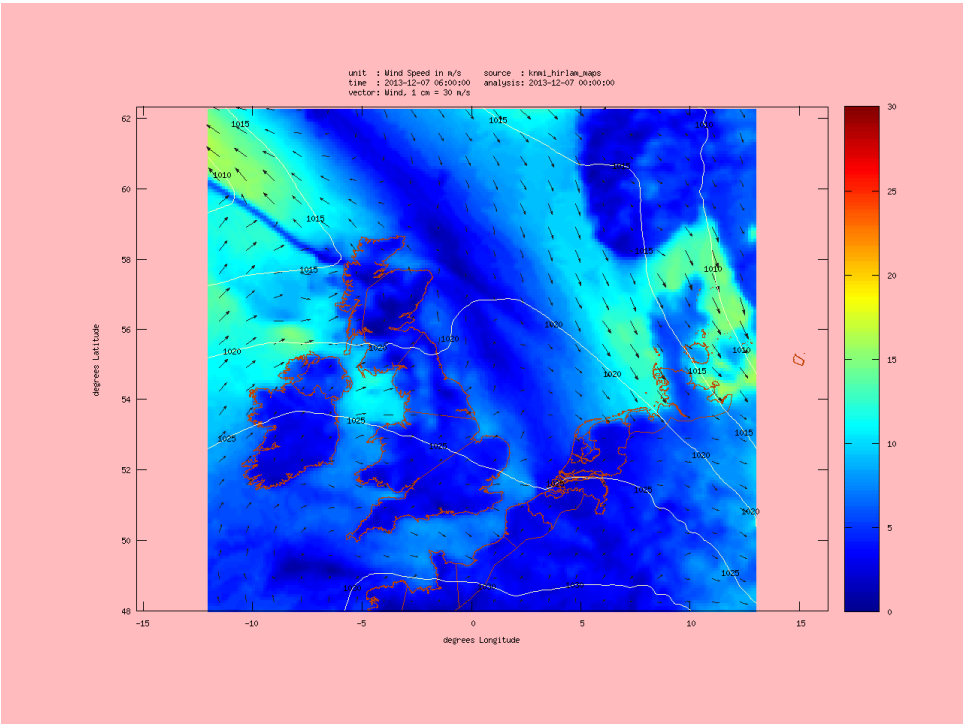
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Top 35 water levels since 1900 for several locations, south to north

In red letters measured highest waterlevels December 5-6

Green: above warning level

Yellow: above regional alarm level

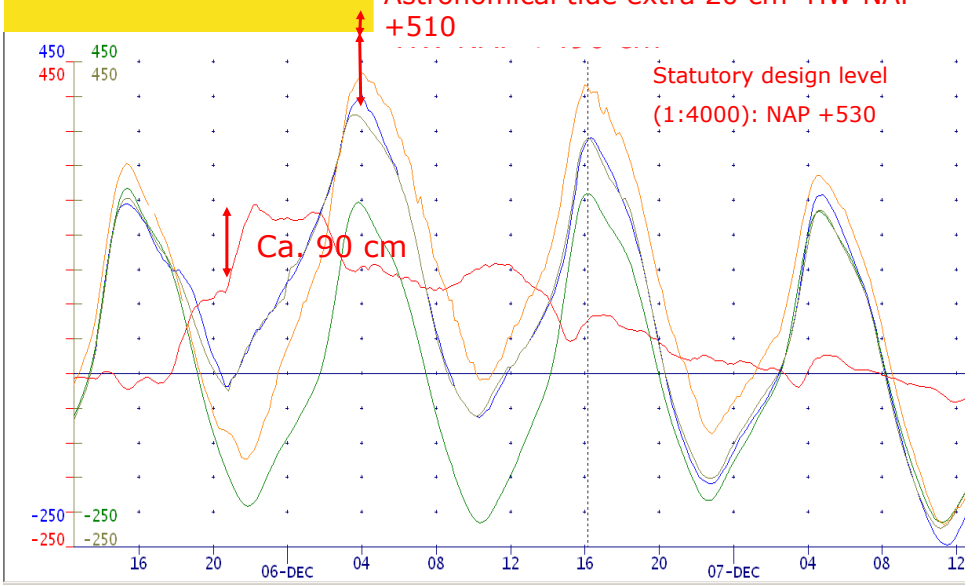
Orange: above national alarm level

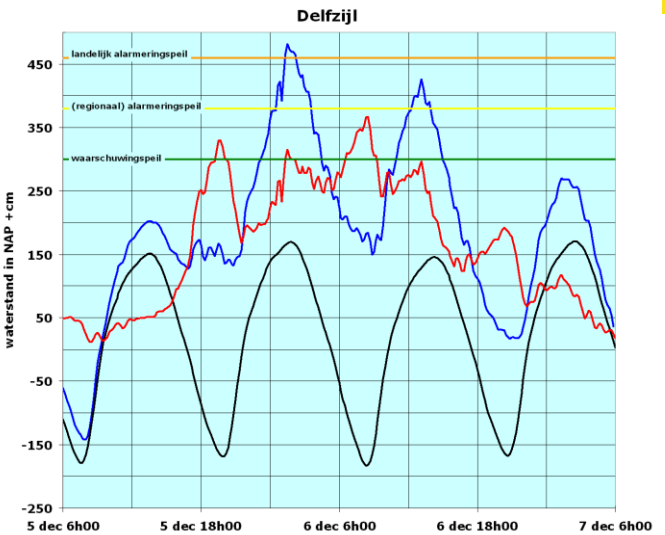
bijlage 10

Hoogste 50 hoogwaterstanden na 1900
(Den Helder en Harlingen na 1932)

nr	Vlissingen datum	stand in NAP +cm	Hoek van Holland datum	stand in NAP +cm	Den Helder datum	stand in NAP +cm	Harlingen datum	stand in NAP +cm	Delfzijl datum	stand in NAP +cm
1	01-02-1953	+455	01-02-1953	+385	01-02-1953	+325	03-01-1976	+369	01-11-2006	+483
2	06-12-2013	+399	09-11-2007	+316	31-01-1953	+312	22-12-1954	+369	06-12-2013	+482
3	03-01-1976	+394	06-12-2013	+301	03-01-1976	+297	26-02-1990	+366	28-01-1901	+453
4	12-03-1906	+392	23-12-1954	+300	22-12-1954	+289	23-12-1954	+366	13-03-1906	+451
5	28-01-1994	+387	13-01-1916	+300	23-12-1954	+277	31-01-1953	+366	04-02-1944	+448
6	27-02-1990	+384	03-01-1976	+298	26-02-1990	+275	01-02-1983	+355	16-02-1962	+446
7	14-11-1993	+383	26-11-1928	+296	09-11-2007	+271	20-01-1976	+353	04-01-1976	+435
8	01-03-1949	+382	30-12-1904	+296	01-02-1983	+270	09-11-2007	+350	13-01-1916	+432
9	26-11-1928	+374	12-03-1906	+290	21-02-1993	+265	28-01-1994	+344	06-12-2013	+426
10	15-11-1977	+373	28-01-1994	+288	05-12-2013	+254	05-12-2013	+342	28-01-1994	+425
11	16-11-1966	+373	27-02-1990	+284	14-02-1989	+253	16-02-1962	+340	09-11-2007	+421
12	15-11-1993	+372	16-11-1966	+280	01-03-2008	+251	01-02-1953	+334	19-11-1973	+419
13	02-01-1995	+371	10-12-1965	+280	16-02-1962	+251	18-01-2007	+331	21-01-1976	+408
14	02-02-1983	+371	14-02-1989	+279	06-12-1940	+251	21-02-1993	+331	03-01-1976	+406
15	28-02-1990	+370	14-12-1973	+279	27-02-1990	+250	27-02-1990	+330	10-01-1995	+403
16	23-11-1930	+370	21-03-2008	+275	20-01-1976	+248	01-01-1995	+329	14-12-1973	+399
17	09-11-2007	+367	21-12-2003	+272	18-03-2007	+245	13-12-1973	+327	31-12-1977	+396
18	21-03-1961	+367	01-01-1995	+270	18-01-2007	+242	01-11-2006	+326	22-12-1954	+393
19	10-12-1965	+365	24-12-1954	+270	28-01-1994	+242	18-03-2007	+320	27-02-1990	+392
20	30-12-1904	+365	01-03-1949	+270	12-01-2007	+240	20-01-1960	+320	24-11-1981	+391
21	01-03-1990	+364	07-04-1943	+268	29-01-1938	+240	03-01-1976	+319	02-02-1983	+388
22	01-02-1953	+364	15-11-1977	+267	01-11-2006	+238	01-12-1936	+319	28-02-1990	+387
23	29-08-1996	+361	26-01-1944	+267	02-02-1969	+238	06-12-2013	+318	24-11-1981	+385
24	01-12-1936	+360	23-11-1908	+266	06-12-2013	+236	01-03-2008	+317	02-12-1917	+382
25	26-01-1944	+358	14-11-1993	+265	01-01-1995	+236	12-01-2007	+309	30-01-2000	+381
26	02-01-1995	+357	25-01-1993	+265	28-01-1994	+234	03-11-1970	+305	18-03-2007	+378
27	23-12-1954	+356	01-02-1953	+265	20-12-1991	+233	07-12-1940	+305	12-01-2007	+378
28	27-02-1990	+355	06-12-1940	+265	13-12-1973	+233	14-11-1977	+304	06-12-1973	+373
29	14-12-1973	+355	01-12-1936	+265	27-10-2002	+231	28-01-1994	+303	01-03-2008	+370
30	11-11-1992	+354	28-02-1990	+264	18-12-1979	+231	24-11-1981	+303	12-12-1929	+368
31	24-11-1984	+354	02-02-1983	+264	20-01-1960	+230	30-12-1977	+303	03-12-1999	+366
32	13-01-1916	+353	06-11-1922	+263	19-01-1945	+230	02-02-1969	+302	28-01-1994	+366
33	29-10-1960	+352	17-02-1962	+262	20-10-1935	+229	09-01-1958	+302	18-09-1914	+366
34	28-02-1967	+352	11-11-1912	+262	01-12-1936	+228	12-12-1990	+300	03-12-1917	+365
35	28-11-1974	+351	02-01-1995	+261	30-01-2000	+227	24-11-1981	+300	02-01-1995	+364

Vlissingen





Conclusions

- The storm surge caused a extreme water rise in the northern coastal area (Eems-Dollard)
- Delfzijl had a 1:50 per year event
- The maximum surge and high tide were (luckily) not in phase
- According to the procedures
  - Oosterscheldebarrier closed
  - Hollandse IJsselbarrier closed
  - Maeslantbarrier did not close
  - Hartelbarrier did not close
  - Passages through the levees were closed (Den Oever, Harlingen en Delfzijl).
- As expected there was relatively little damage at the coastal defences (dunes and levees)
- There was no anxiety among the people in the Netherlands, other than: will the train still go?

Does coordination stop when the storm is over?



- The day after, LCO asked the water boards for a quick scan of the damage on levees, dunes etc.
- In case of much and grave damage along the coast, national coordination on mobilizing emergency measure could be needed
- LCO can coordinate in that situation
- Luckily that was not necessary