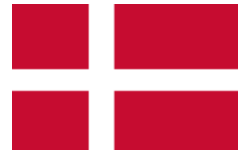


# FREDERIKSBORG FIRE & RESCUE SERVICE

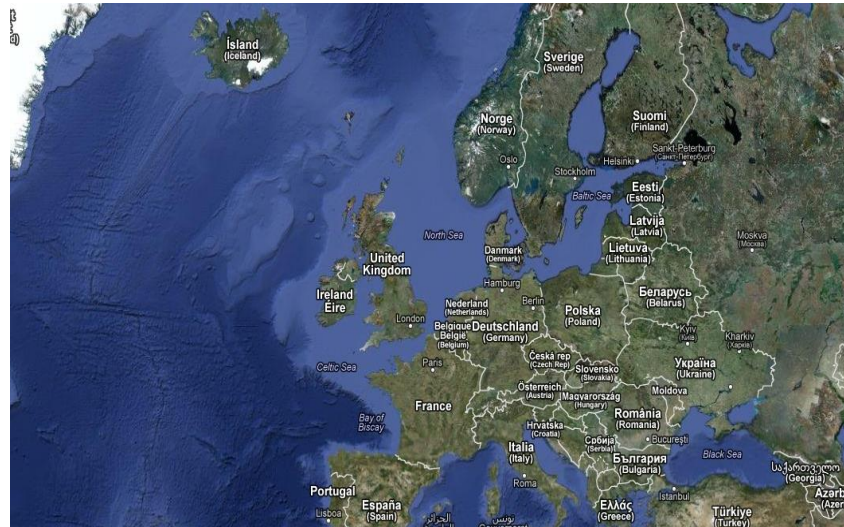


## DENMARK

**Enhancing emergency management and response to weather  
and climate events in Northern Europe**

# Future climate - Denmark

- **More rain.** More rain in winter and less in summer. The summer season will include both periods of drought and heavier downpours.
- **Milder winters.** Milder and more humid winters. The growing season of plants may be prolonged.
- **Warmer summers.** Warmer summers with a risk of more and longer heat waves.
- **Higher water levels.** A general increase in water levels is expected for the seas around Denmark.
- **More wind.** More powerful storms can be expected.



# Forest Fires in Denmark



Stenbjergbranden 2/6- 2004

# Storms

Allan – 28<sup>th</sup> October 2013 "just" a heavy storm

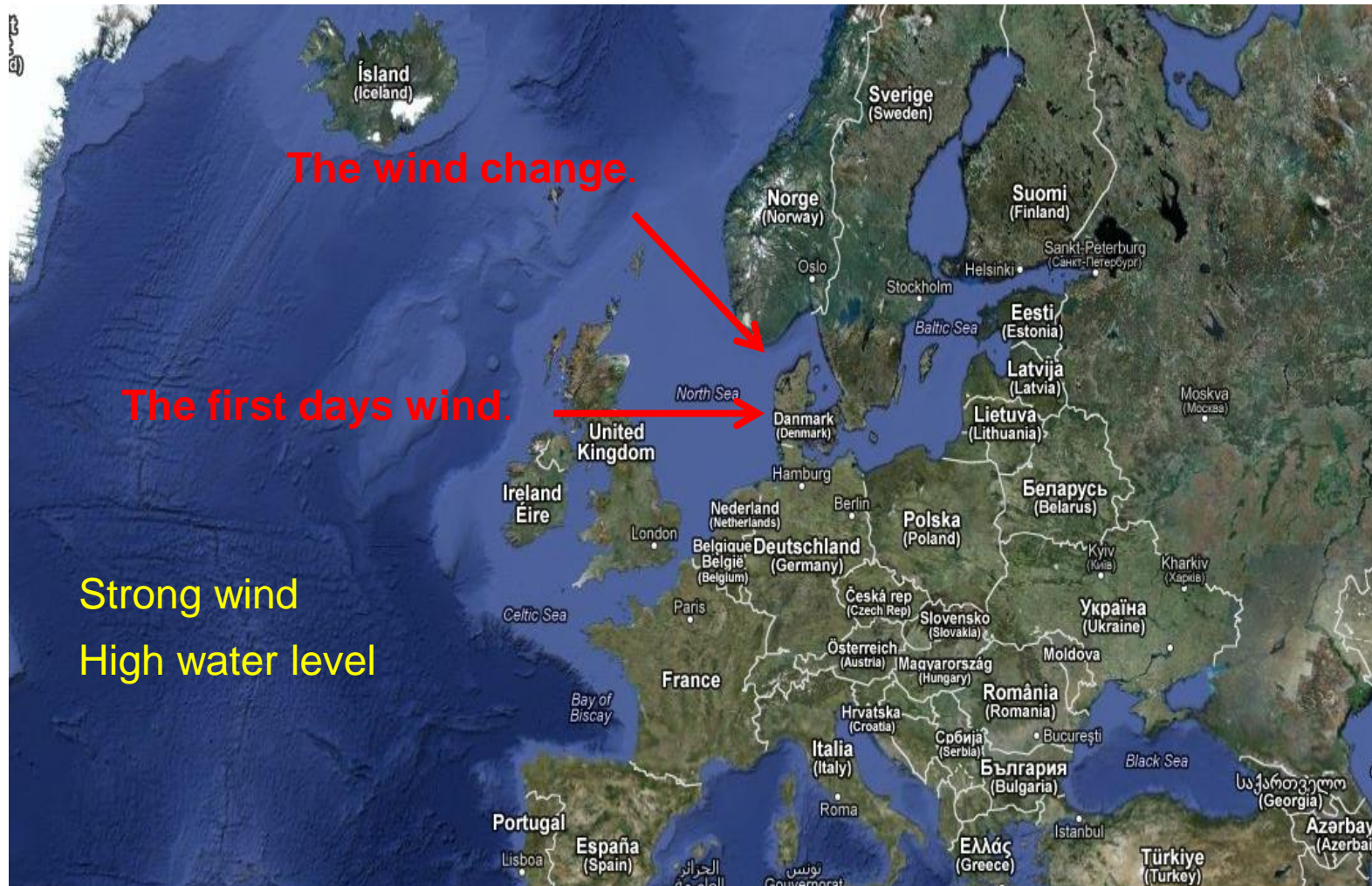
Bodil – 5<sup>th</sup> and 6<sup>th</sup> December 2013 – Flood

Dagmar/Egon – 9<sup>th</sup> and 10<sup>th</sup> January 2015 – Flood

Urd – 25<sup>th</sup> and 26<sup>th</sup> December 2016 - Flood

Ingolf - 28<sup>th</sup> and 29<sup>th</sup> October 2017 - Flood

# The Situation - storms



# The Challenge

Strong wind

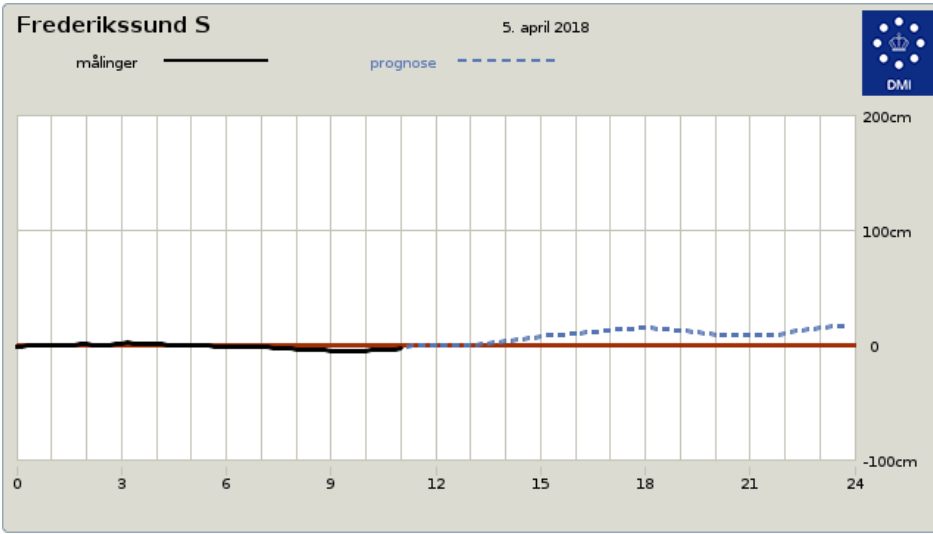
High water level



# Project and Operational tools

- Water level
- Sea water on land
- Flood maps

# Water level

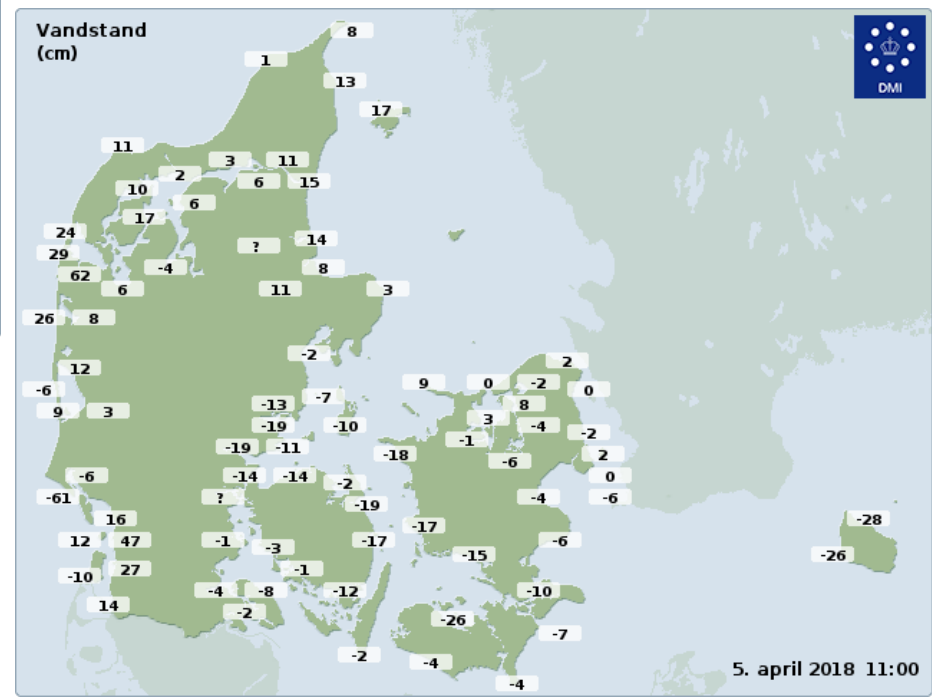


Frederikssund S 5. april 2018

Målinger  
Prognose

|       |   |   |       |   |   |       |   |   |       |   |    |       |   |    |       |   |    |
|-------|---|---|-------|---|---|-------|---|---|-------|---|----|-------|---|----|-------|---|----|
| 00:00 | - | 2 | 04:00 | + | 2 | 08:00 | - | 4 | 12:00 | + | 0  | 16:00 | + | 12 | 20:00 | + | 11 |
| 00:10 | - | 1 | 04:10 | + | 2 | 08:10 | - | 4 | 12:10 | + | 0  | 16:10 | + | 12 | 20:10 | + | 11 |
| 00:20 | - | 1 | 04:20 | + | 1 | 08:20 | - | 5 | 12:20 | + | 1  | 16:20 | + | 13 | 20:20 | + | 11 |
| 00:30 | - | 1 | 04:30 | + | 1 | 08:30 | - | 5 | 12:30 | + | 1  | 16:30 | + | 13 | 20:30 | + | 11 |
| 00:40 | - | 1 | 04:40 | + | 0 | 08:40 | - | 5 | 12:40 | + | 1  | 16:40 | + | 13 | 20:40 | + | 10 |
| 00:50 | - | 1 | 04:50 | + | 0 | 08:50 | - | 5 | 12:50 | + | 2  | 16:50 | + | 14 | 20:50 | + | 10 |
| 01:00 | - | 1 | 05:00 | + | 0 | 09:00 | - | 5 | 13:00 | + | 2  | 17:00 | + | 14 | 21:00 | + | 10 |
| 01:10 | + | 0 | 05:10 | - | 1 | 09:10 | - | 5 | 13:10 | + | 3  | 17:10 | + | 15 | 21:10 | + | 9  |
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| 01:30 | + | 0 | 05:30 | - | 1 | 09:30 | - | 5 | 13:30 | + | 3  | 17:30 | + | 15 | 21:30 | + | 10 |
| 01:40 | + | 1 | 05:40 | - | 2 | 09:40 | - | 5 | 13:40 | + | 4  | 17:40 | + | 15 | 21:40 | + | 10 |
| 01:50 | + | 2 | 05:50 | - | 2 | 09:50 | - | 5 | 13:50 | + | 4  | 17:50 | + | 16 | 21:50 | + | 11 |
| 02:00 | + | 2 | 06:00 | - | 2 | 10:00 | - | 5 | 14:00 | + | 5  | 18:00 | + | 17 | 22:00 | + | 12 |
| 02:10 | + | 1 | 06:10 | - | 1 | 10:10 | - | 5 | 14:10 | + | 5  | 18:10 | + | 17 | 22:10 | + | 13 |
| 02:20 | + | 1 | 06:20 | - | 1 | 10:20 | - | 5 | 14:20 | + | 6  | 18:20 | + | 16 | 22:20 | + | 14 |
| 02:30 | + | 1 | 06:30 | - | 1 | 10:30 | - | 5 | 14:30 | + | 7  | 18:30 | + | 16 | 22:30 | + | 15 |
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| 02:50 | + | 1 | 06:50 | - | 1 | 10:50 | - | 4 | 14:50 | + | 8  | 18:50 | + | 15 | 22:50 | + | 16 |
| 03:00 | + | 3 | 07:00 | - | 3 | 11:00 | - | 3 | 15:00 | + | 9  | 19:00 | + | 15 | 23:00 | + | 17 |
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| 03:20 | + | 3 | 07:20 | - | 3 | 11:20 | + | 0 | 15:20 | + | 10 | 19:20 | + | 13 | 23:20 | + | 18 |
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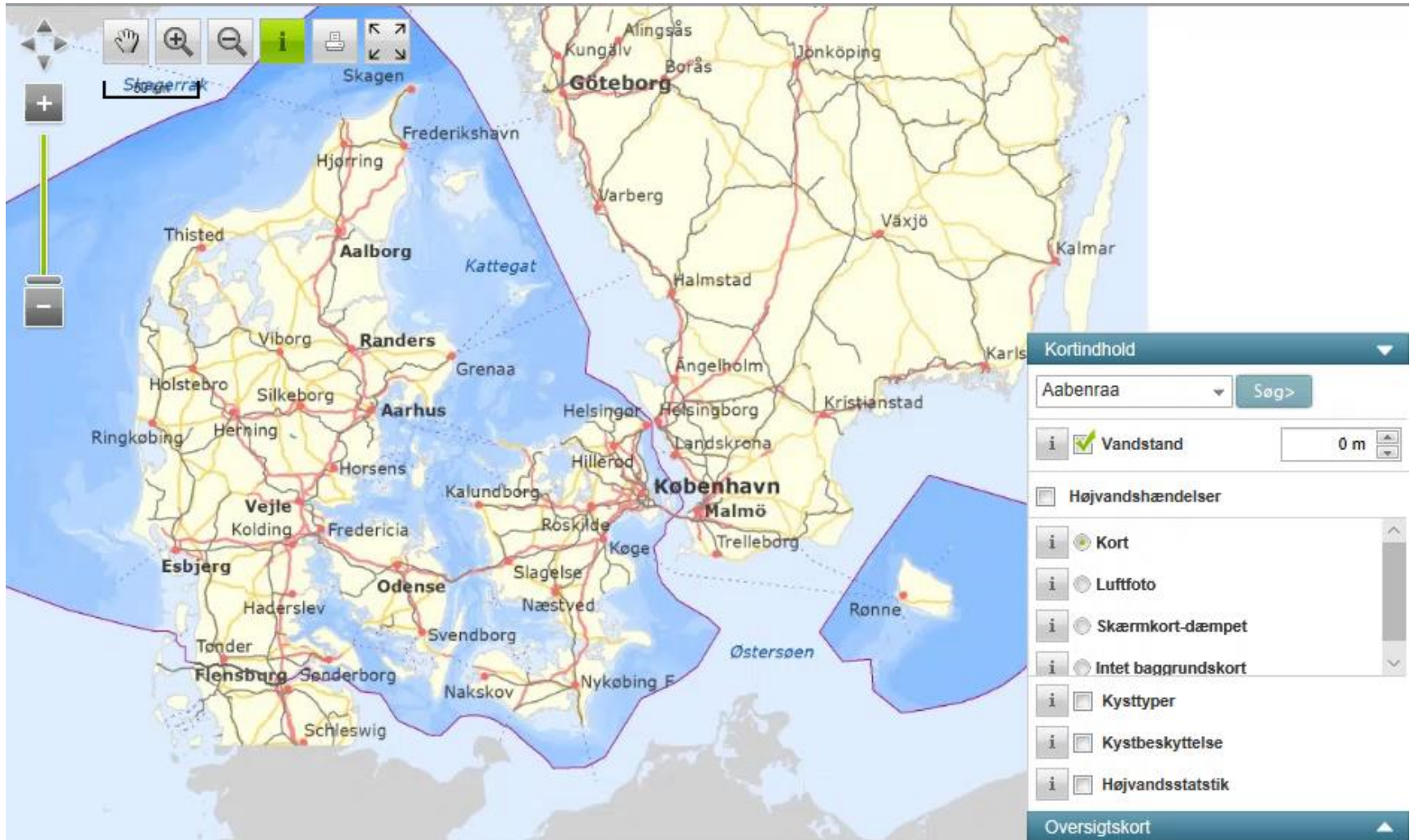
DMI



Source: [www.dmi.dk](http://www.dmi.dk), Denmark's Meteorological Institute

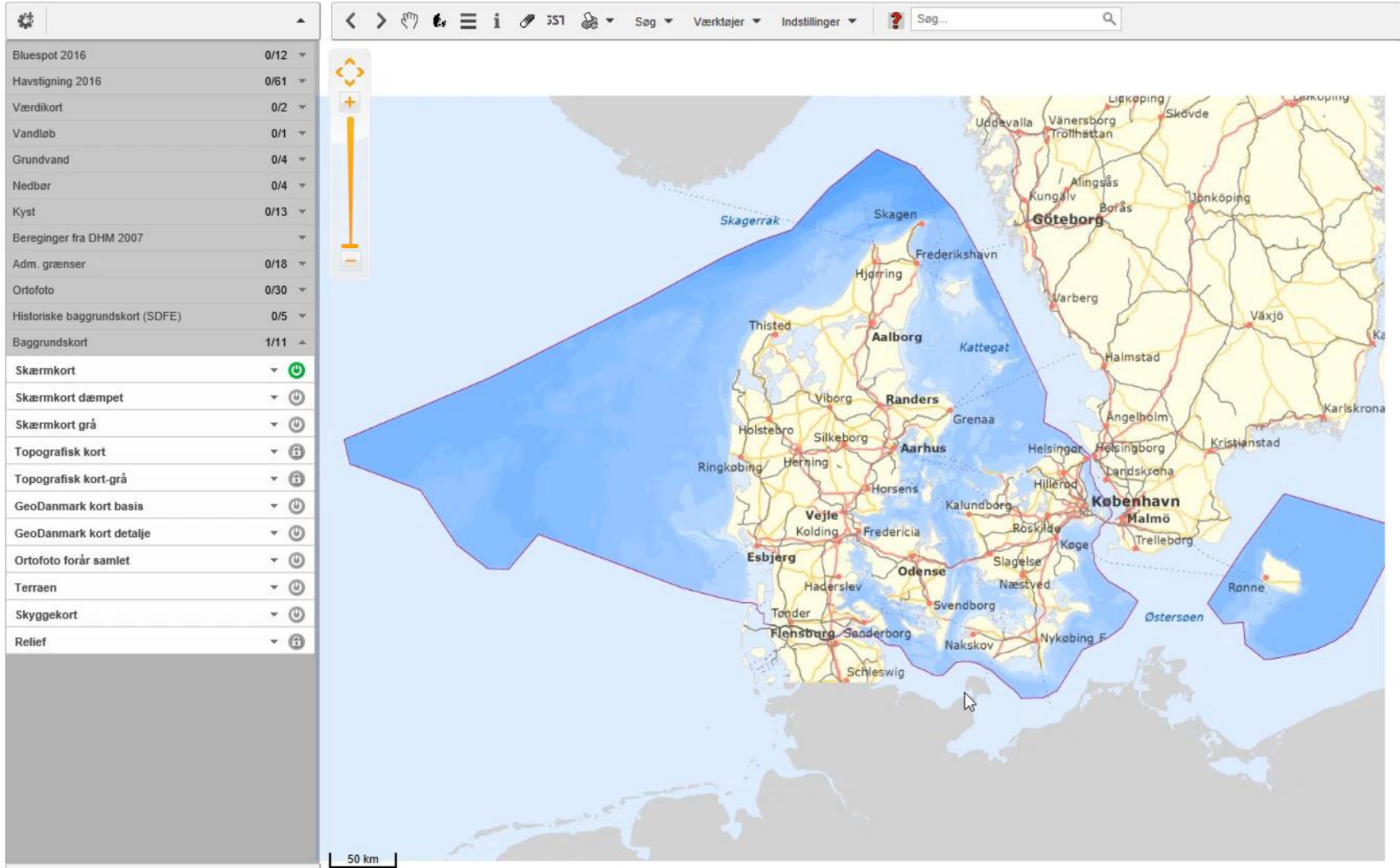


# Sea Water on land



Source: [www.klimatilpasning.dk](http://www.klimatilpasning.dk)

# Flood maps – Heavy rain



## Heavy Rain 2011 - Copenhagen



**2<sup>nd</sup> July 2011**  
**140 mm rain in 4 hours in Copenhagen**  
**90.000 flood damage**  
**Price**  
**830.000.000 Euro**

# Action plan



| Aktiveringsniveau    | Grøn   | Gul  | Rød  | Sort   |
|----------------------|--|--|--|--|
| Vandstand*           | 0,80 – 1,10 meter  | 1,11 – 1,3 meter   | 1,31 – 2,0 meter   | 2,01 meter og derover  |
| Trusselsbillede      | Ingen boliger berøres.   | Boliger i lavtliggende områder er i risiko for oversvømmelse.  | Større områder, inkl. Frederikssund midtby er i risiko over oversvømmelse.   | Større områder, inkl. Frederikssund midtby er i risiko over oversvømmelse.   |
| Størrelse på indsats | Mindre   | En indsats kan muligvis beskytte de truede boliger.  | Stor indsats vil sikre nogle boliger - andre skal klare sig selv og i værste fald evakueres.   | Stor indsats vil sikre nogle boliger – evakuering er en primær opgave.   |
| Aktører              | Kommunikationsafdelingen er den primære aktør. Der skal kommunikeres ud til borgere.   | Stabsberedskabet og krisestaben indkaldes (Chefer og nøglepersoner indkaldes, hvor der vurderes at være behov for cheftilstedeværelse for at koordinere kommunens opgaver).                                | Den samlede krisestab indkaldes i en situation, hvor der er behov for, at Frederikssund Kommunes ledelse og organisation varetager samtlige krisestyringsrelevante opgaver med det samme og i længere tid. | Den samlede krisestab indkaldes. Der er behov for, at Frederikssund Kommunes ledelse og organisation varetager samtlige krisestyringsrelevante opgaver med det samme og i længere tid. |
| Definering af niveau | Beredskabsniveau er defineret som en hændelse, der ikke ændrer det fastlagte serviceniveau, og som håndteres i eget fagområde. | Beredskabsniveau er defineret som en hændelse, der muligvis forringer det fastlagte serviceniveau, og hvor ansvaret for løsningen ligger i det fagområde, hvor hændelsen er identificeret. Evt. med hjælp. | Beredskabsniveau er defineret som en hændelse, der forringer det fastlagte serviceniveau og som håndteres i krisestaben.   | Beredskabsniveau er defineret som en hændelse, der forringer det fastlagte serviceniveau og som håndteres i krisestaben.   |

\* I varslat fra DMI er der ikke taget højde for usikkerheder, bølgehøjder, samtidshændelser og tilbageløb.

# From simulation to reality



Simulated flooding



Incidents during flooding in oktober 2017

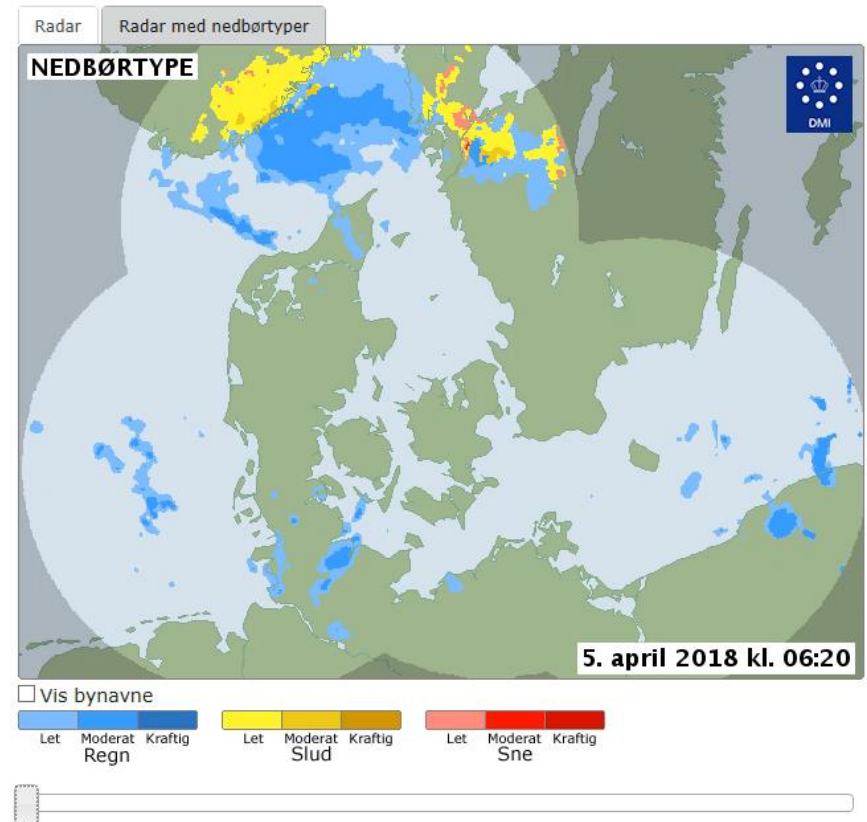
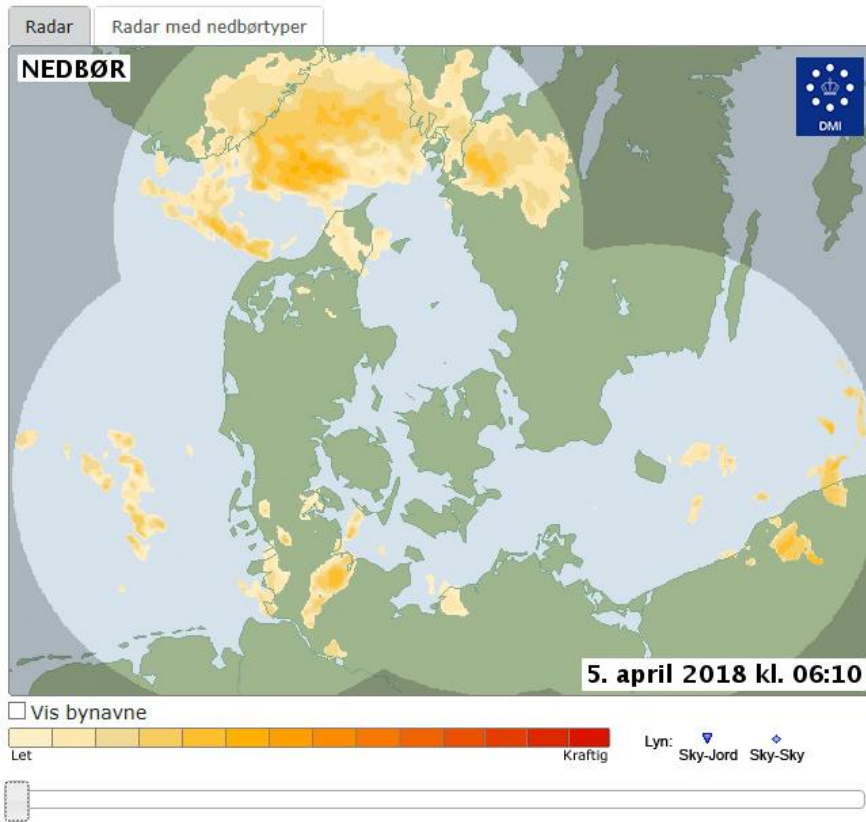
# Project and Operational tools

- Slippery roads
- Rain/sleet/snow
- Snow depth
- Lightning
- Local measurements (Wind, temp., humidity, rain, insolation)
- Drought index

# Slippery roads



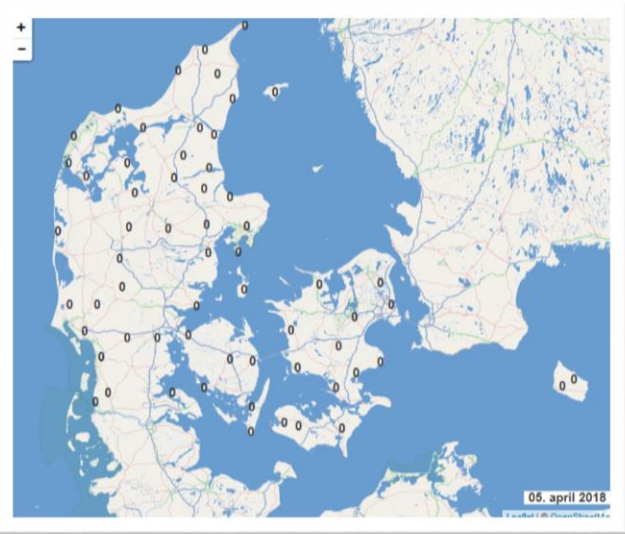
# Rain/Sleet/Snow



Source: [www.dmi.dk](http://www.dmi.dk), Denmark's Meteorological Institute

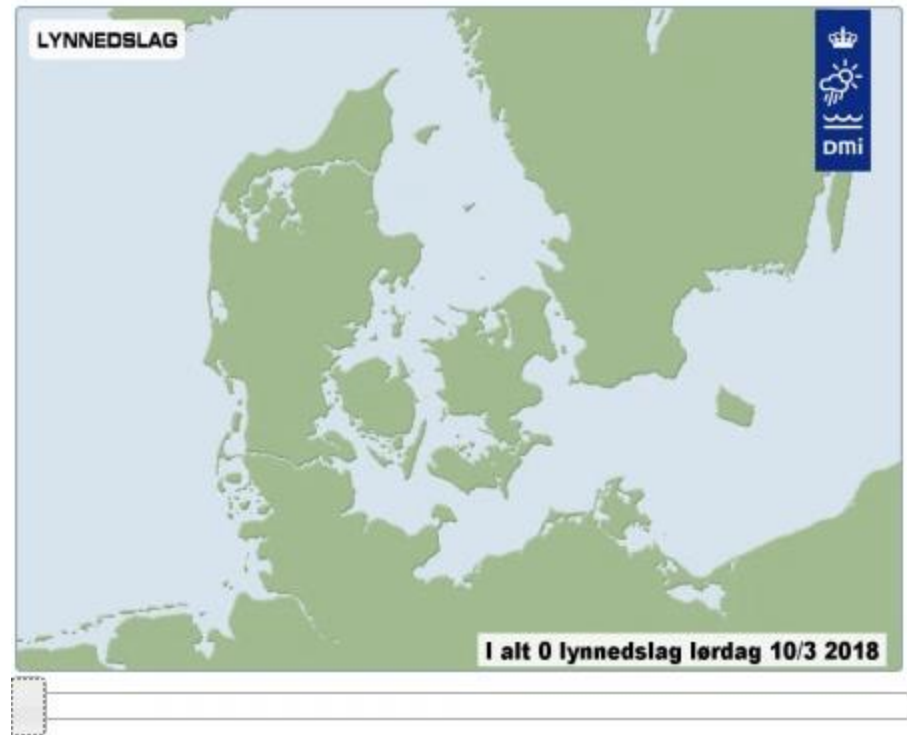


# Snow depth



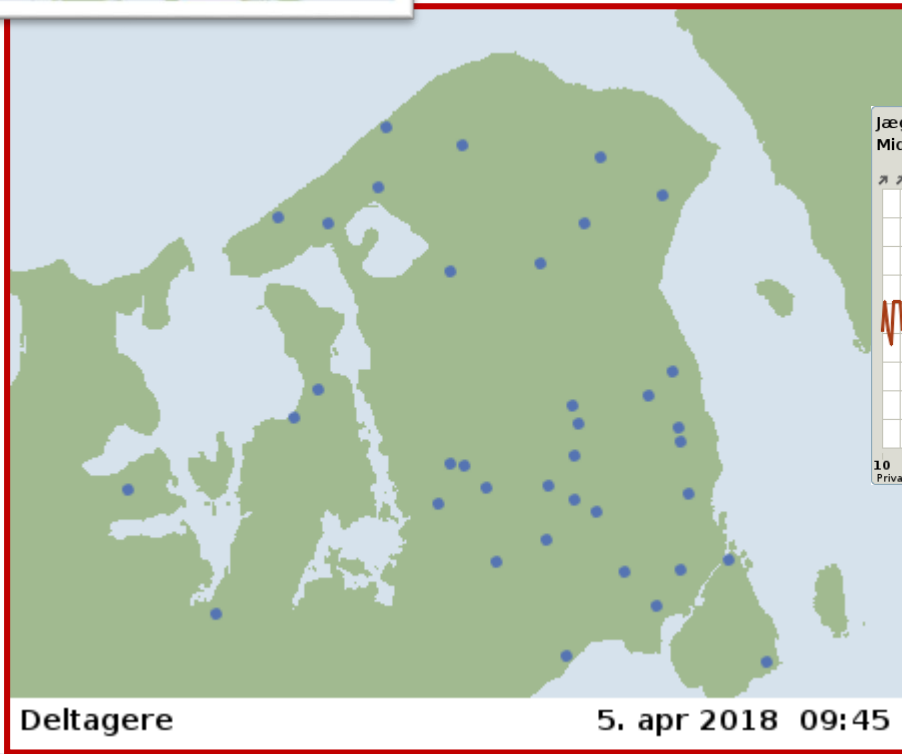
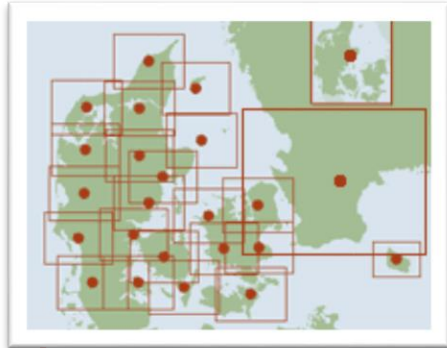
# Lightning

Previous days



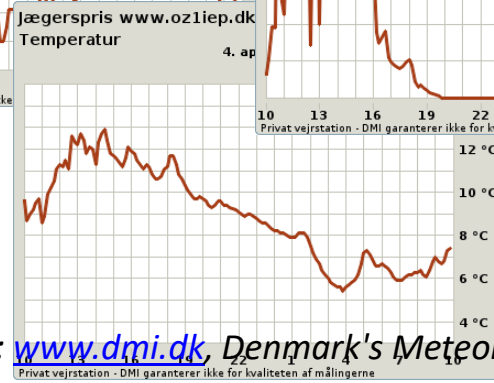
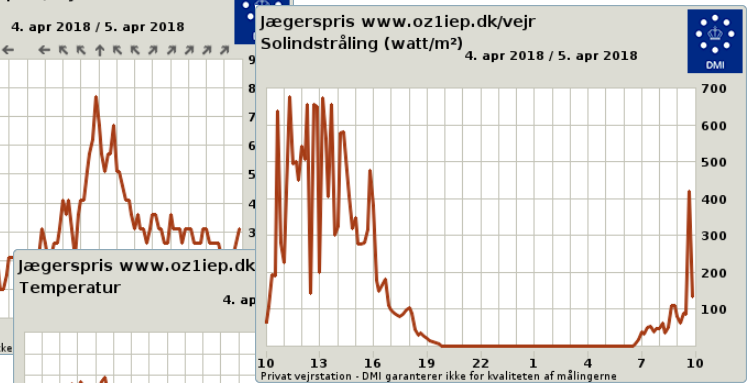
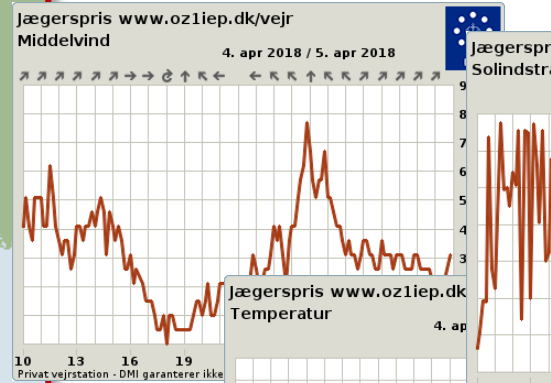
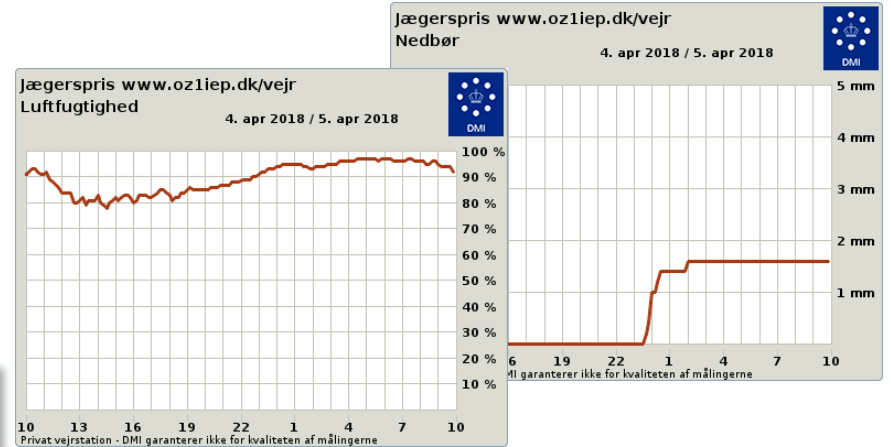
Source: [www.dmi.dk](http://www.dmi.dk), Denmark's Meteorological Institute

# Local measurements



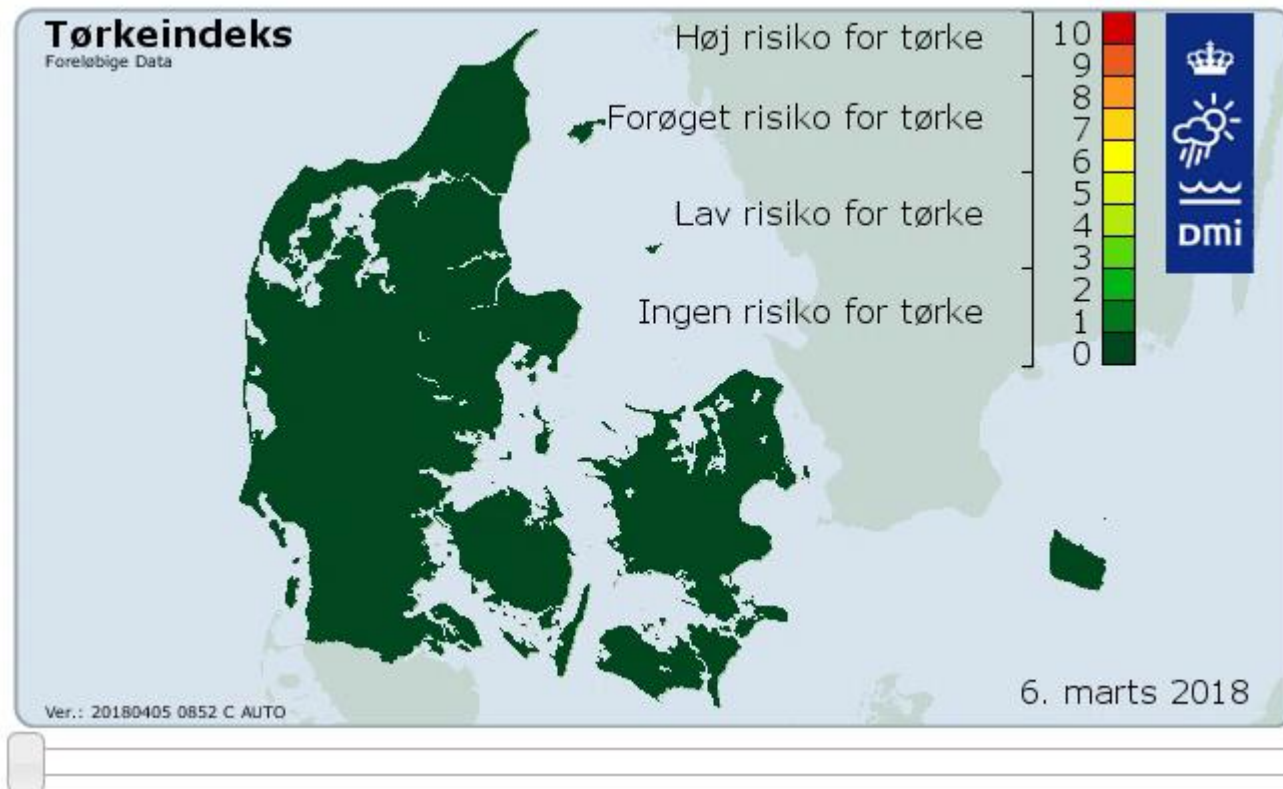
Deltagere

5. apr 2018 09:45



Source: [www.dmi.dk](http://www.dmi.dk), Denmark's Meteorological Institute

# Drought Index



# HEIMDALL-project

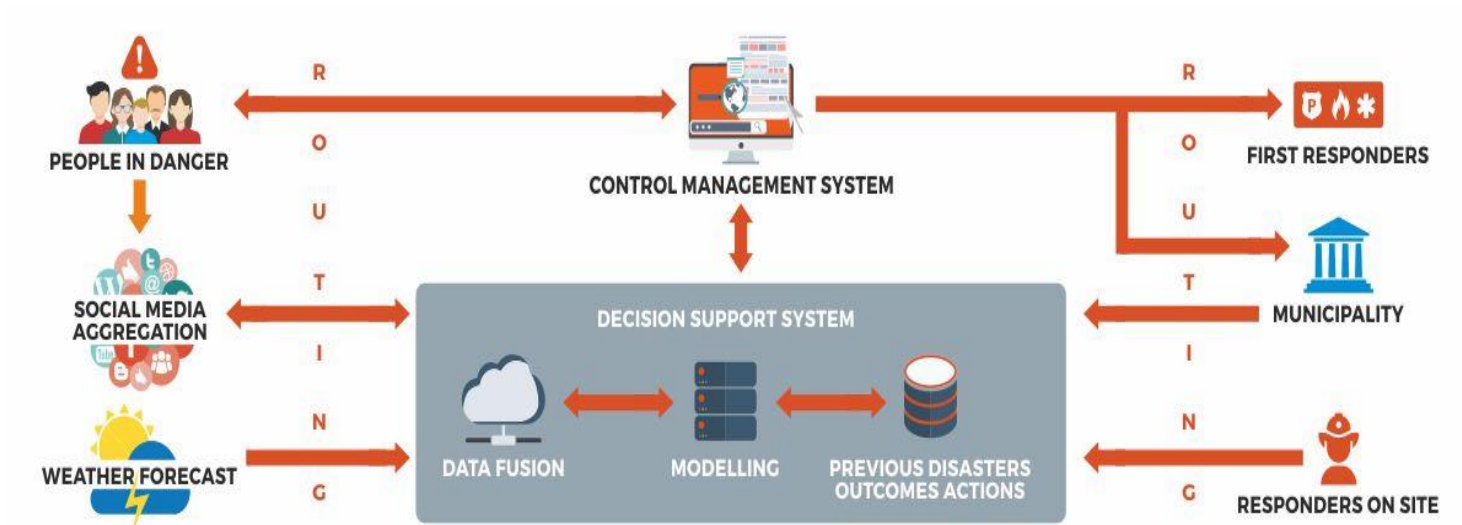
Multi-Hazard Cooperative Management Tool for Data Exchange, Response Planning and Scenario Building

HEIMDALL aims at **improving preparedness of societies to cope with complex crisis situations** by providing a flexible platform for multi-hazard emergency planning and management, which makes use of innovative technologies for the definition of multi-disciplinary scenarios and response plans, providing integrated assets to support emergency management, such as monitoring, modelling, situation and risk assessment, decision support and communication tools. HEIMDALL fosters data and information sharing among the relevant stakeholders, maximises the accuracy of valuable information and improves population awareness.

<http://heimdall-h2020.eu/>

# beAWARE-project

beAWARE proposes an integrated solution to support forecasting, early warnings, transmission and routing of the emergency data, aggregated analysis of multimodal data and management the coordination between the first responders and the authorities.



<http://beaware-project.eu/>



Chief Fire Officer /Executive Director  
Kim Lintrup – [klint@fbbr.dk](mailto:klint@fbbr.dk)