European Climate Research Alliance

ECRA General Assembly 2015

"New knowledge for risk reduction"

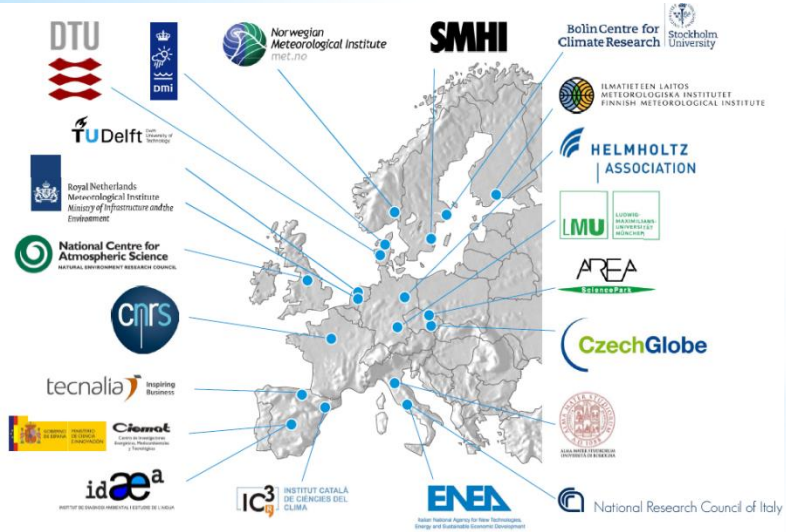
25/26 March 2015

Square Brussels Meeting Centre

www.ecra-climate.eu

High Impact Events

- **Welcome on behalf of the HIE CP:**
  - **Peter Braesicke**, KIT
  - Martin Drews, DTU



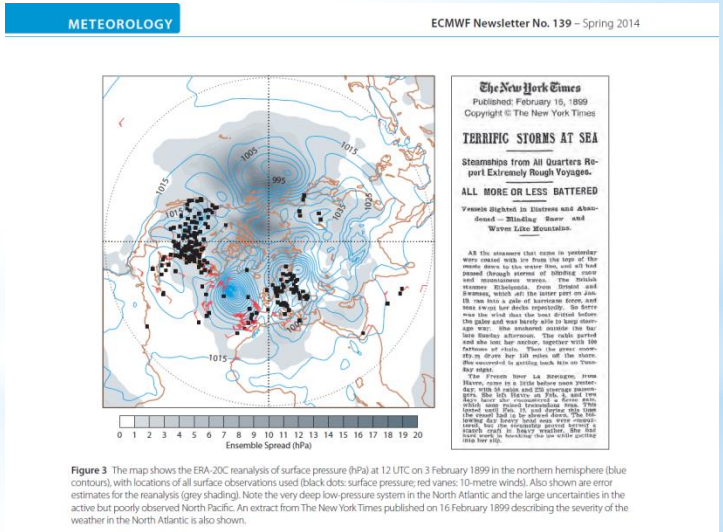
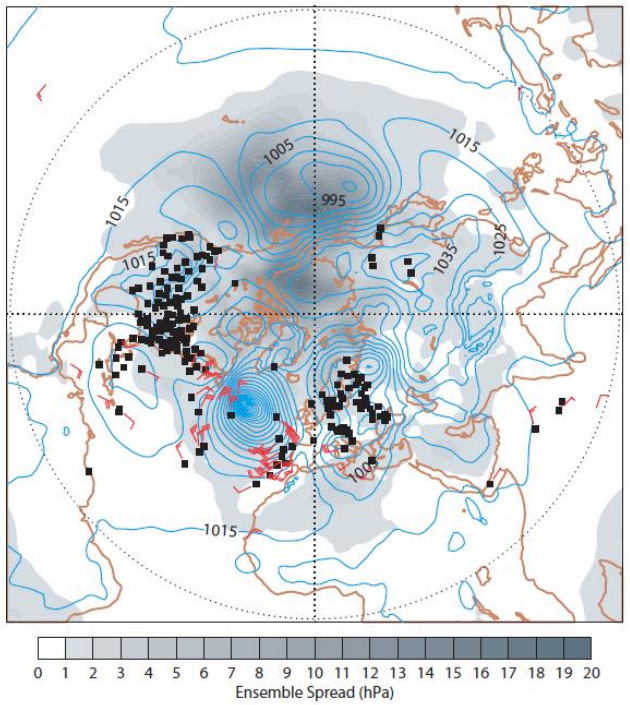


Figure 3 The map shows the ERA-20C reanalysis of surface pressure (hPa) at 12 UTC on 3 February 1899 in the northern hemisphere (blue contours), with locations of all surface observations used (black dots: surface pressure; red vanes: 10-metre winds). Also shown are error estimates for the reanalysis (grey shading). Note the very deep low-pressure system in the North Atlantic and the large uncertainties in the active but poorly observed North Pacific. An extract from The New York Times published on 16 February 1899 describing the severity of the weather in the North Atlantic is also shown.

High Impact Events



The New York Times
Published: February 16, 1899
Copyright © The New York Times

TERRIFIC STORMS AT SEA

Steamships from All Quarters Report Extremely Rough Voyages.

ALL MORE OR LESS BATTERED

Vessels Sighted in Distress and Abandoned — Blinding Snow and Waves Like Mountains.

All the steamers that came in yesterday were coated with ice from the tops of the masts down to the water line, and all had passed through storms of blinding snow and mountainous waves. The British steamer Ethelgonda, from Bristol and Swansea, which left the latter port on Jan. 19, ran into a gale of hurricane force, and seas swept her decks repeatedly. So fierce was the wind that the boat drifted before the gales and was barely able to keep steerage way. She anchored outside the bar late Sunday afternoon. The cable parted and she lost her anchor, together with 100 fathoms of chain. Then the great snowstorm drove her 150 miles off the shore. She succeeded in getting back late on Tuesday night.

The French liner La Bretagne, from Havre, came in a little before noon yesterday, with 58 cabin and 225 steerage passengers. She left Havre on Feb. 4, and two days later she encountered a fierce gale, which soon raised tremendous seas. This lasted until Feb. 12, and during this time the vessel had to be slowed down. The following day heavy head seas were encountered, but the steamship proved herself a stanch craft in heavy weather. She had hard work in breaking the ice while getting into her slip.

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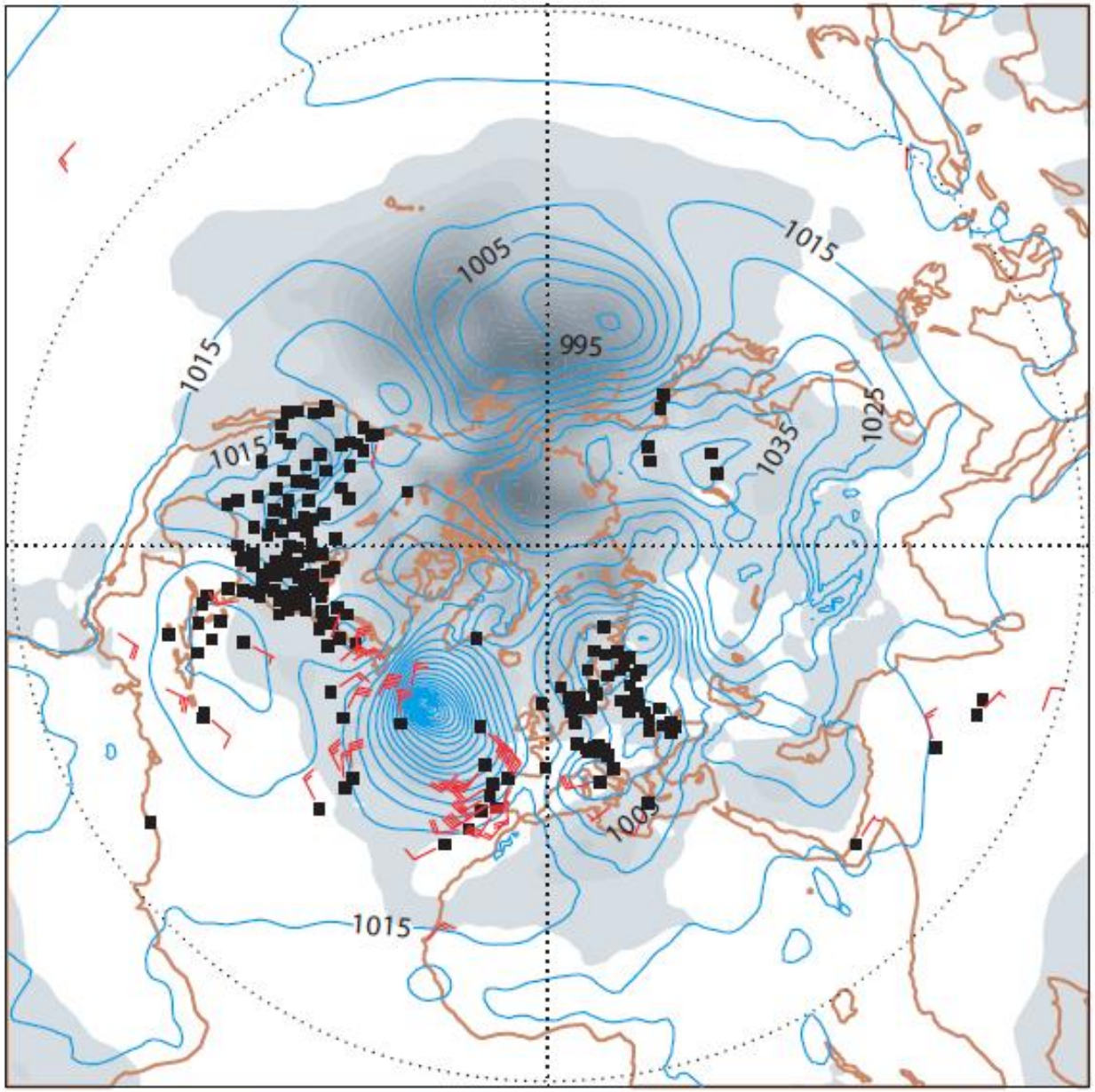

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High Impact Events

- **Meetings:**
  - Cambridge 2012 (Gauging interest …)
  - Bergen 2013 (Developing a white paper …)
  - Copenhagen 2014 (Adding an implementation plan …)
- **Outputs:**
  - White Paper/Implementation Plan
  - Web: http://www.ecra-climate.eu/index.php/collaborative-programmes/hievents
  - In progress: Briefing Document (Autumn 2015)

High Impact Events

- **Questions:**
  - Will high impact events occur more frequently?
  - What are regional impacts of extreme events?
  - How could prediction and projection capabilities be enhanced?
- **Answers:**
  - Can only be achieved through collaboration!
  - No answers are final, answers develop …
  - Examples will be discussed …

High Impact Events

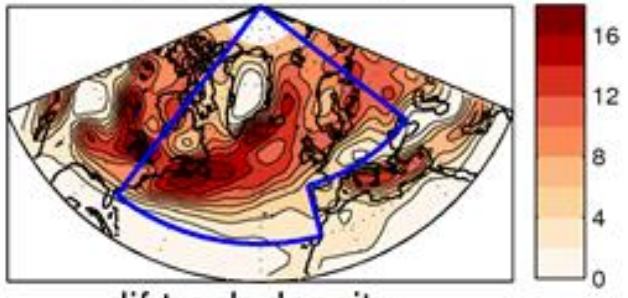
- **Activities:**
  - Assessment of past HIEs (e.g. storms and floods)
  - High resolution climate modelling
  - Downscaling (using different methodologies)
  - Climate risk analysis, vulnerability and adaptation

High Impact Events

CMIP5 model biases

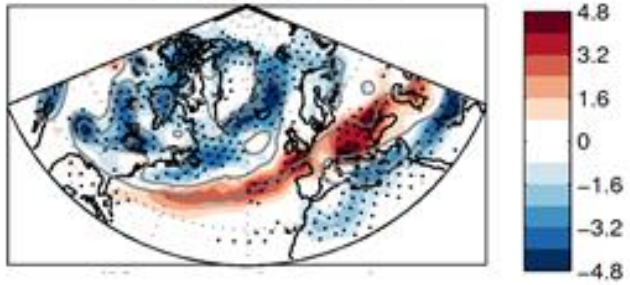
National Centre for Atmospheric Science
NATURAL ENVIRONMENT RESEARCH COUNCIL

djf track density



DJF ERA-Interim wintertime cyclone track density (1990-2009) (Tracks per month in a 5° radius)

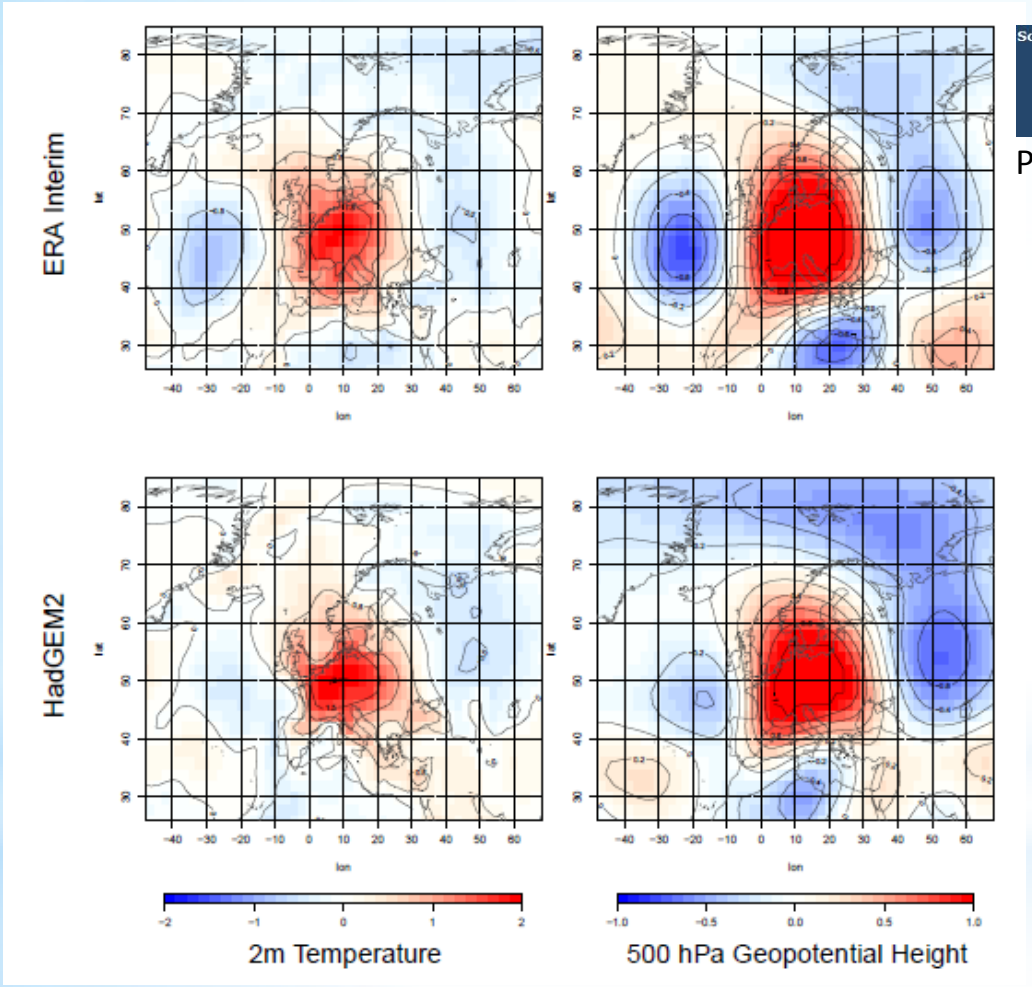
djf track density



DJF CMIP5 historical model mean biases against ERA-Interim from 22 CMIP5 models

Zappa *et al.* 2013a, *J. Climate*

High Impact Events



Science and Engineering at The University of Edinburgh
School of GeoSciences
Personal Home Pages

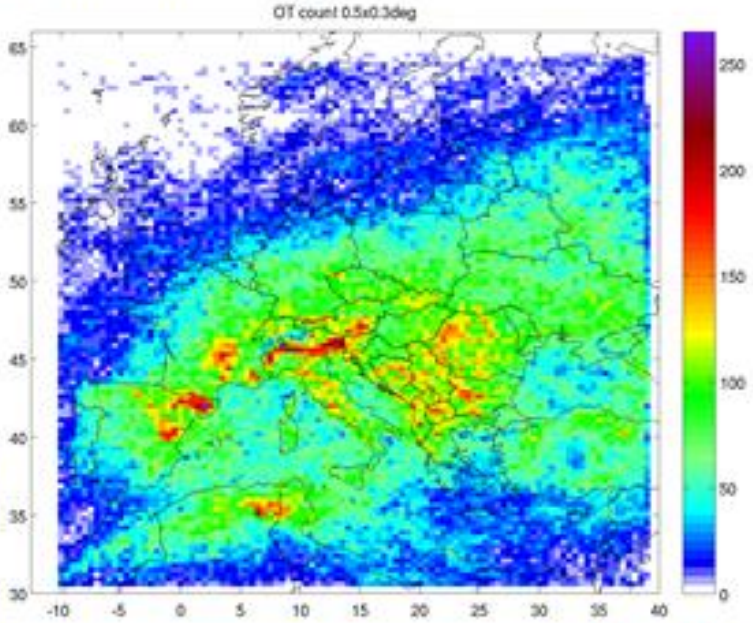
Profs. Hegerl and Tett

From Krueger et al., ERL, in press.
Model (bottom) vs data (top) circulation responsible for moderate (once/ season) T extremes.

High Impact Events

Estimation of hailstorm probability

- Proxy for hailstorms: overshooting tops (OT) of severe convective clouds
- MSG SEVERI 2004-2014



- North-to-south gradient in hailstorm probability
- Several hot spots related to orography

(Punge, 2015)

25.03.2015 Hail Research at IOT

High Impact Events

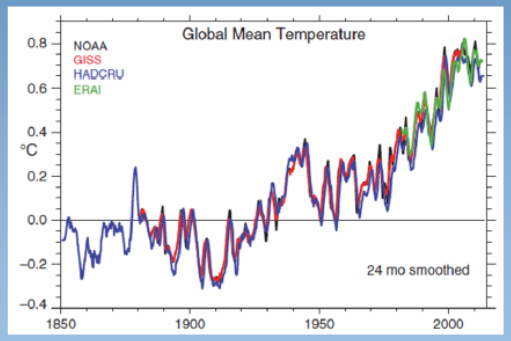
- **Programme (for tomorrow):**
  - **CP Lead:**
    - **Peter Braesicke**, KIT (todays overview)
    - Martin Drews, DTU (tomorrows discussion)
  - **CP Presentations:**
    - Jana Sillmann (CICERO, Norway): **Observed and simulated temperature extremes during the recent warming hiatus**
    - Romualdo Romero (UIB, Spain): **Learning for the future from the observation and modelling of Medicanes**
    - Bart van den Hurk (KNMI, Netherlands): **Scenarios of future weather**
    - Kirsten Halsnæs (DTU, Denmark): **Climate risks and adaptation**
  - **Many more people and institutions …**

High Impact Events

- Beyond the Mean –

Temperature extremes during the recent warming hiatus

Jana Sillmann (CICERO)

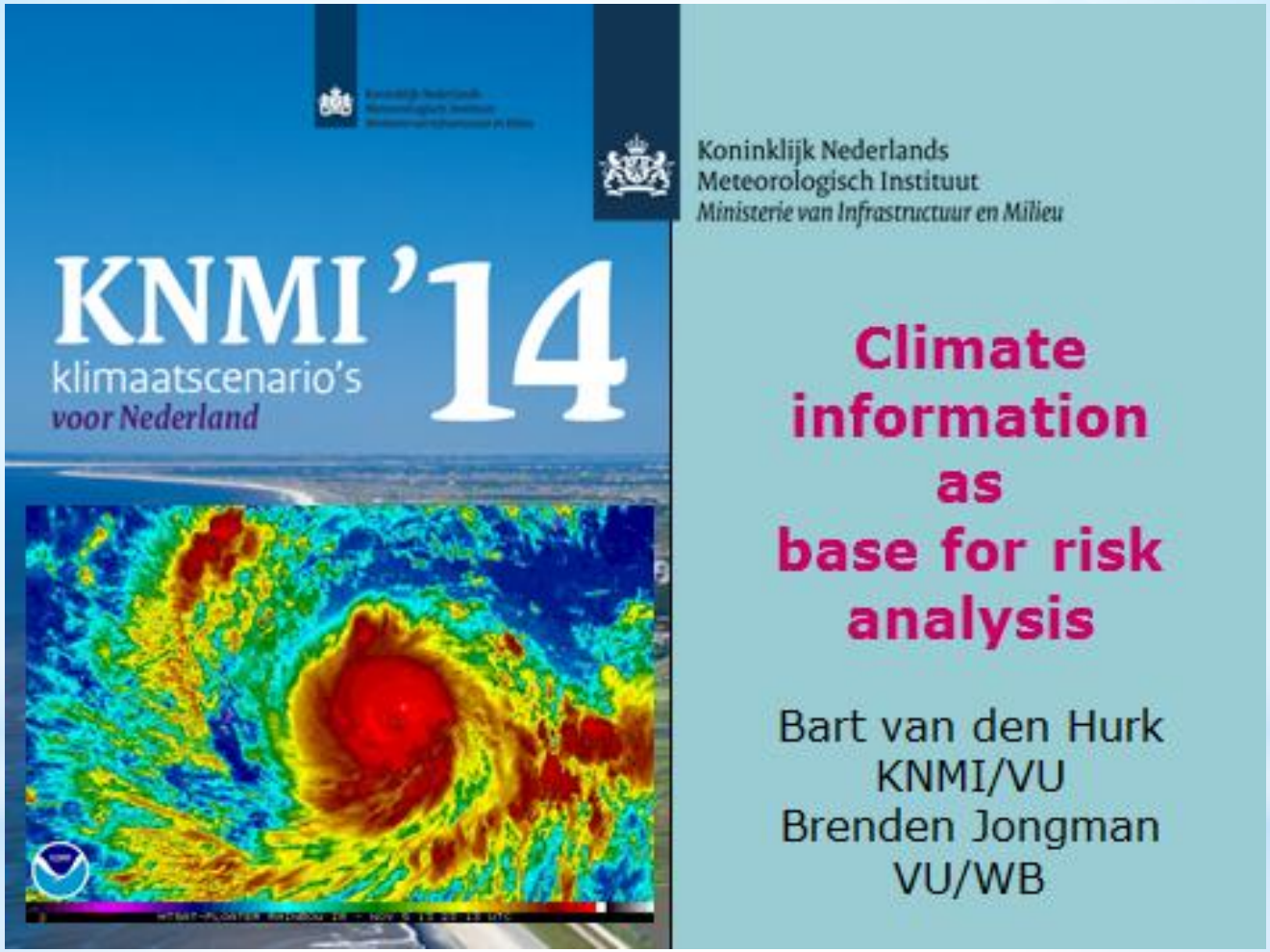


ECRA General Assembly, Brussel, March 26th, 2015

°CICERO Senter for klimaforskning www.cicero.uio.no
Center for International Climate and Environmental Research - Oslo

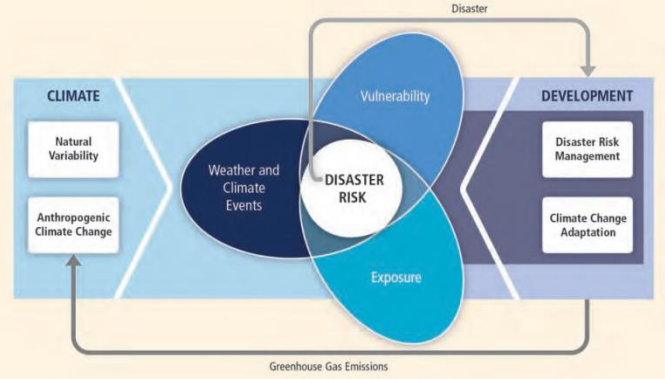
High Impact Events

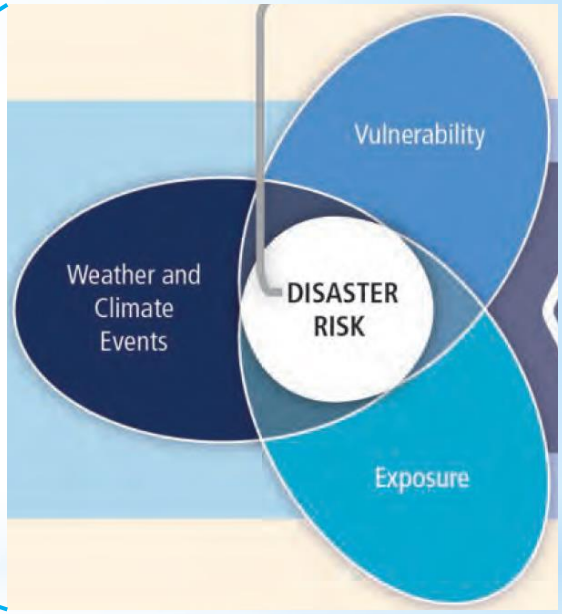
High Impact Events



High Impact Events

- **Bridging Gaps:**
  - **Managing the Risks of Extreme Events** and Disasters to Advance Climate Change Adaptation (IPCC, 2012): http://www.ipcc.ch/report/srex/





  - **High Impact Weather** (WMO): http://www.wmo.int/pages/prog/arep/wwrp/new/HIW_Silver_Spring_2014.html

温故而知新 (on ko chi shin)

To the past to inform the future

High Impact Events

High Impact Events

MOTIVATION

Medicanes or "Mediterranean hurricanes" are *extreme windstorms* potentially threatening the islands and coastal areas:

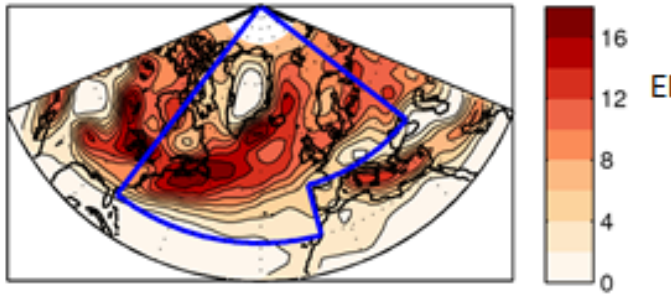
- Are there favoured locations for medicane development ?
- How intense can they become ?
- How could they react in frequency and intensity to global warming ?

High Impact Events

CMIP5 response to climate change

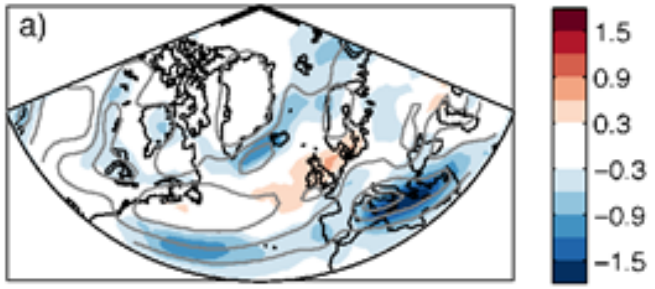
National Centre for Atmospheric Science
NATURAL ENVIRONMENT RESEARCH COUNCIL

djf track density



ERA-Interim wintertime cyclone track density (1990-2009)

track density



CMIP5 cyclone track density: RCP4.5 Scenario (2070-2100) minus Historical (1980-2005)

Fewer Scandinavian and Mediterranean cyclones

Zappa *et al.* 2013b, *J. Climate*

Estimation of hailstorm probability

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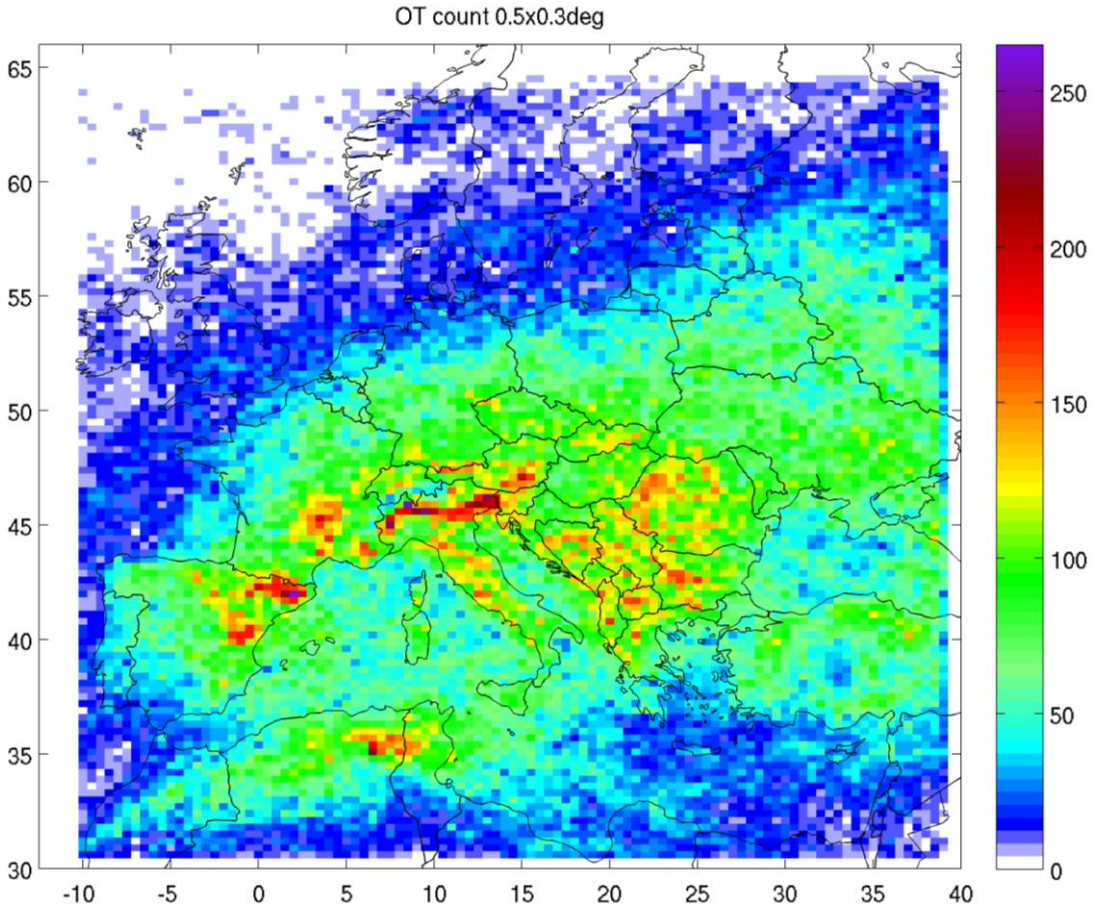


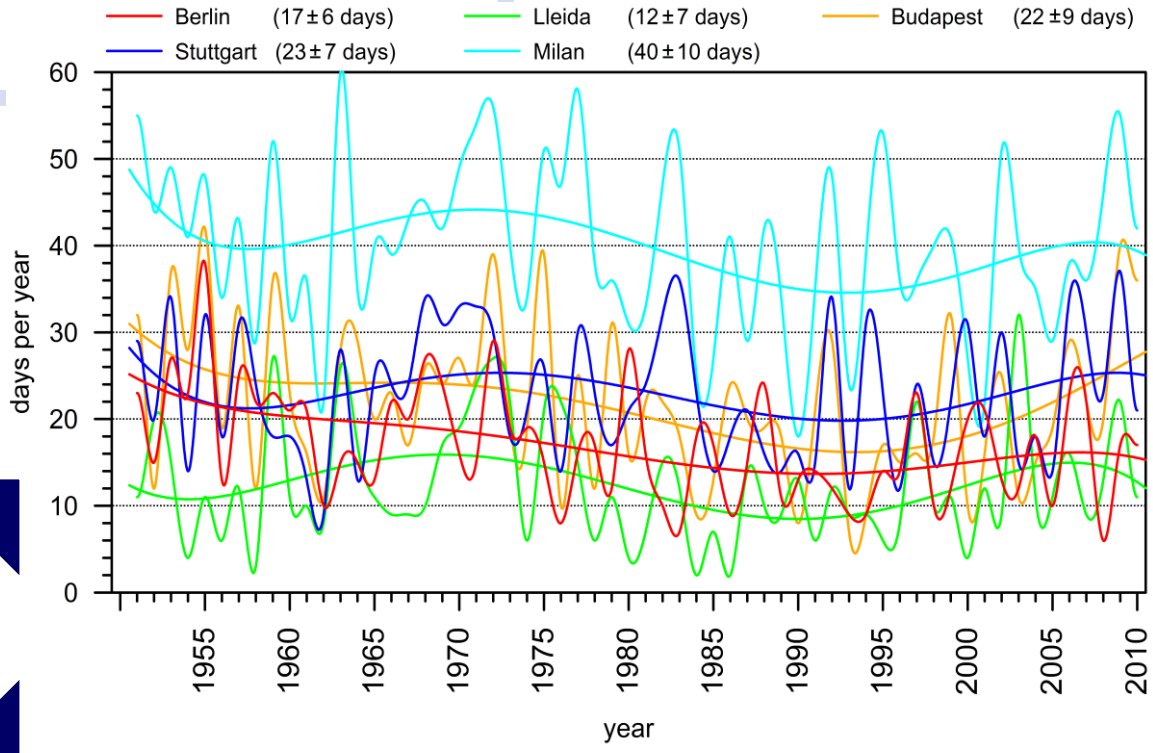
(Punge, 2015)

Long-term variability of hailstorm probability

- Assessment of hailstorm potential using a logistic regression approach
- Output: Potential Hail Index (PHI): number of days with potential for hail

coastDatII

Downscaled Reanalysis run driven by NCEP–NCAR 1 (@ HZG)



- High annual variability
- Long-term variability similar at different locations

(Mohr et al., 2015)