EXHAUSTION

Heat and air pollution in a Nordic context

Webinar, December 16, 2022

Kristin Aunan (CICERO)

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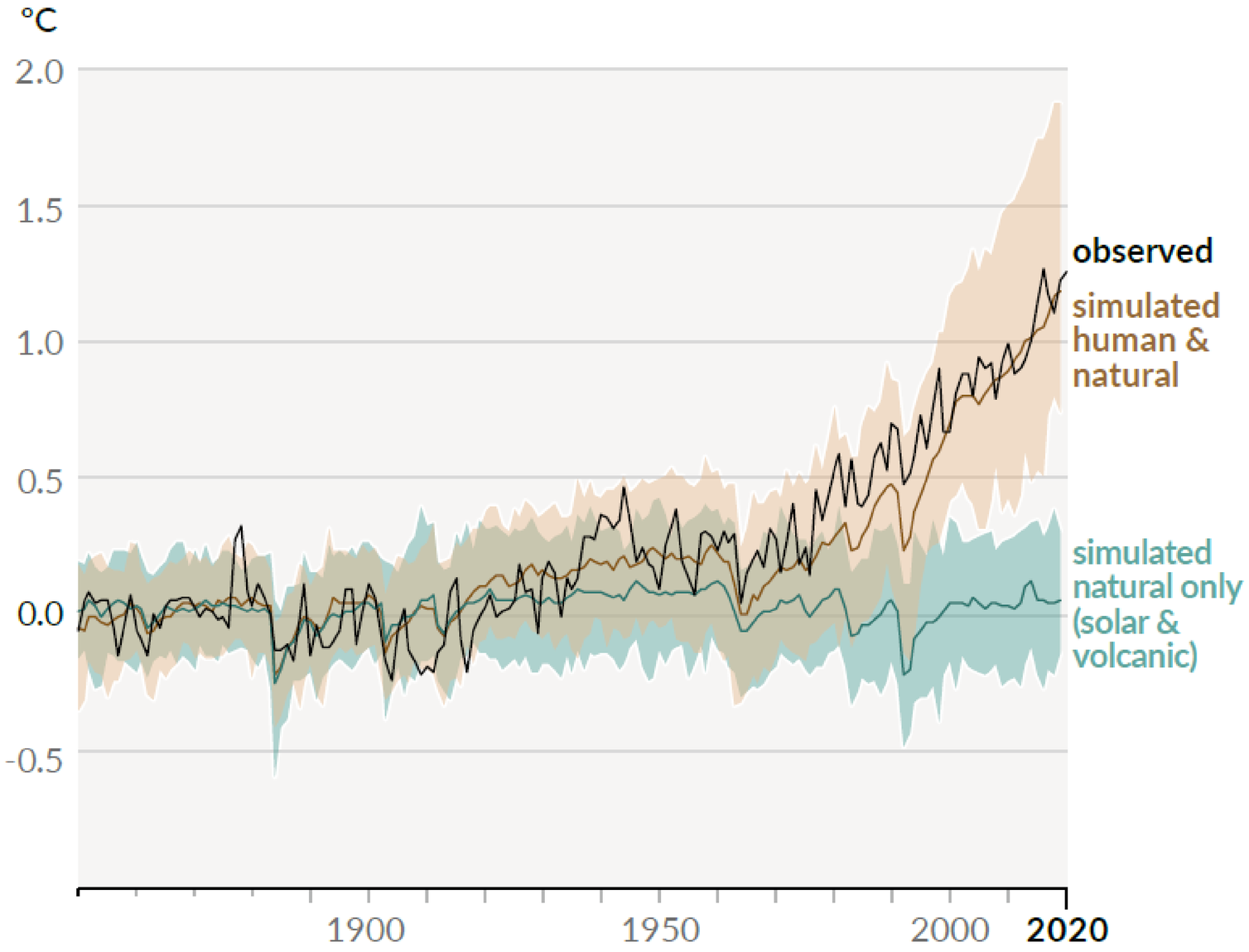
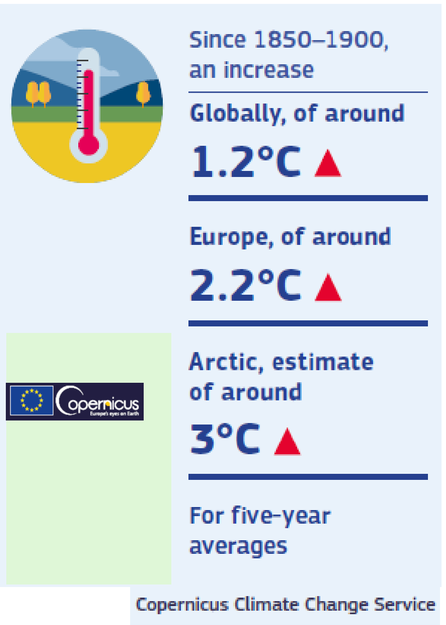
IPCC 2021: Change in global surface temperature



Global warming of 1.5°C and 2°C will be exceeded during the 21st century unless *deep reductions* in carbon dioxide and other greenhouse gas emissions occur in the coming decades

IPCC 2021 Europe

- Regardless of future levels of global warming, temperatures will rise in all European areas at a rate exceeding global mean temperature changes, similar to past observations (*high confidence*).
- The frequency and intensity of hot extremes, including marine heatwaves, have increased in recent decades and are projected to keep increasing regardless of the greenhouse gas emissions scenario. Critical thresholds relevant for ecosystems and humans are projected to be exceeded for global warming of 2°C and higher (*high confidence*).
- The frequency of cold spells and frost days will decrease under all the greenhouse gas emissions scenarios in this report and all time horizons, similar to past observations. (*high confidence*)



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Extreme heat is identified as a key climate change risk in Europe

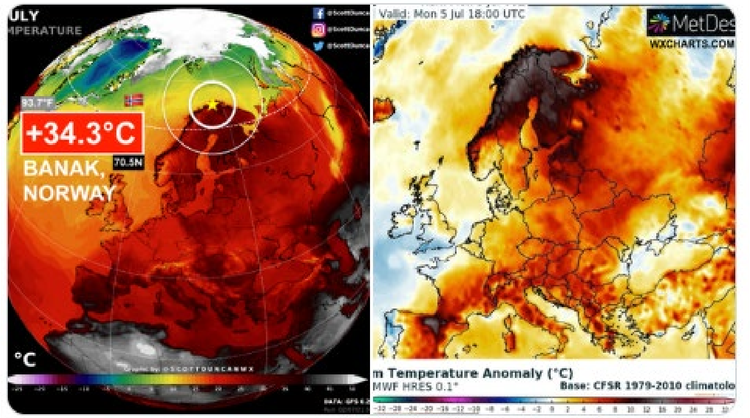
world weather attribution

Home About Analyses News Projects Resources

Without human-caused climate change temperatures of 40°C in the UK would have been extremely unlikely

On Monday and Tuesday, 18 & 19 July 2022, an exceptional heatwave affected large parts of the UK. It was the first time that temperatures of 40°C and above have been forecast in the UK.

28 July, 2022 | HEATWAVE | EUROPE



11:10 PM · Jul 5, 2021

UK issues first-ever 'red' warning for extreme heat in coming days

By Danica Kirka, Associated Press
Updated: July 15, 2022
Published: July 15, 2022

Cardiovascular diseases causes 60% of deaths in East Europe; 52% in Central Europe; 34% in West Europe

Met Office
@metoffice

Today has provisionally seen the highest #temperature ever recorded in #Italy 🌡️ ⚠️

SIAS have confirmed that Siracusa in #Sicily reached 48.8°C earlier this afternoon and if verified by @WMO, it will become a new European temperature record 📈

7:25 PM · Aug 11, 2021

2.6K 202 Share this Tweet

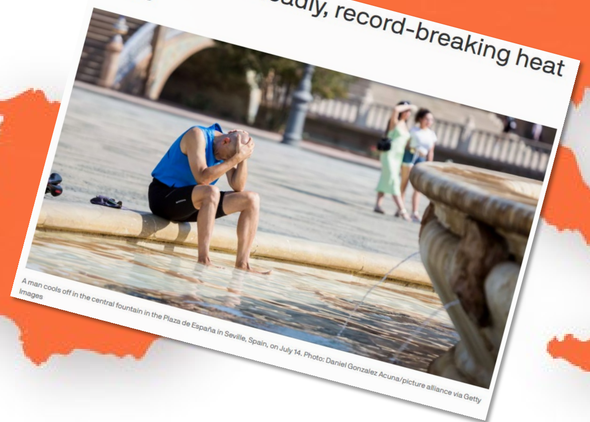
Accelerated western European heatwave trends linked to more-persistent double jets over Eurasia

Efi Rousi[1✉], Kai Kornhuber[1,2,3], Goratz Beobide-Arsuaga[4,5], Fei Luo[6,7] & Dim Coumou[1,6,7]

Persistent heat extremes can have severe impacts on ecosystems and societies, including excess mortality, wildfires, and harvest failures. Here we identify Europe as a heatwave hotspot, exhibiting upward trends that are three-to-four times faster compared to the rest of the northern midlatitudes over the past 42 years. This accelerated trend is linked to atmospheric dynamical changes via an increase in the frequency and persistence of double jet

Rousi et al., 2022. *Nat Commun,*.

Europe faces deadly, record-breaking heat wave



A man cools off in the central fountain in the Plaza de España in Seville, Spain, on July 14. Photo: Daniel Gonzalez Acuna/picture alliance via Getty Images

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Exposure to heat and air pollution in Europe – cardiopulmonary impacts and benefits of mitigation and adaptation (EU H2020)

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Interdisciplinary collaboration

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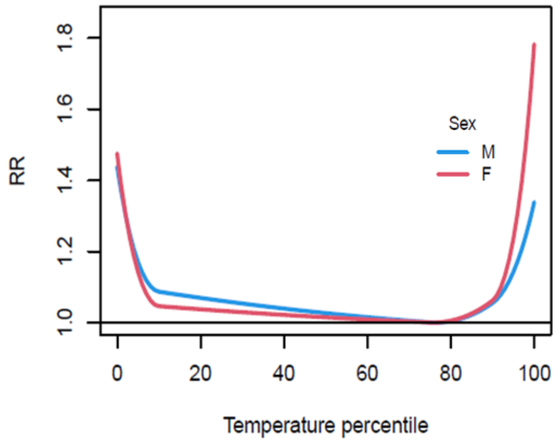
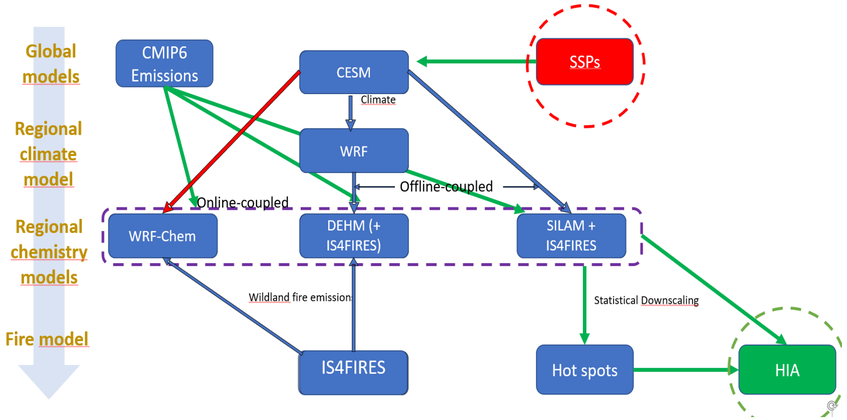
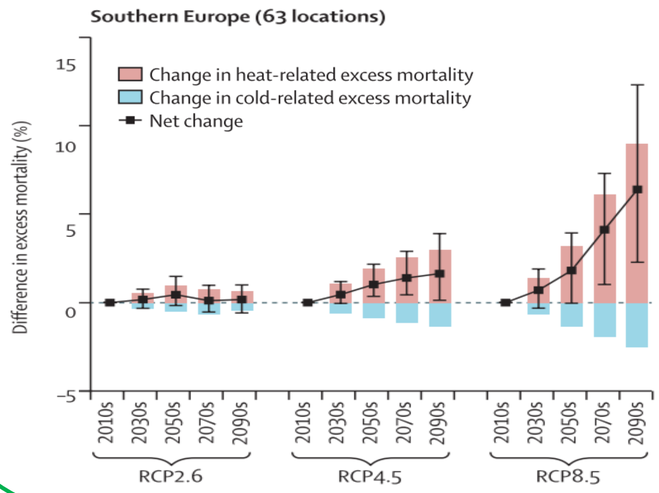
Epidemiology: Exposure-response



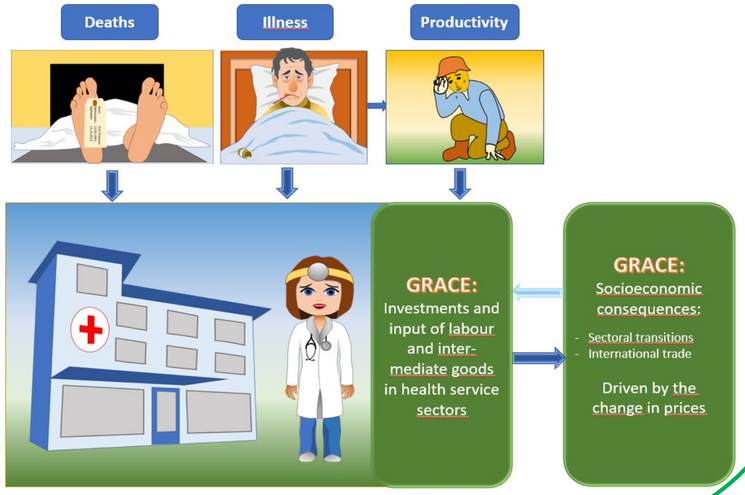
Climate and air pollution modelling



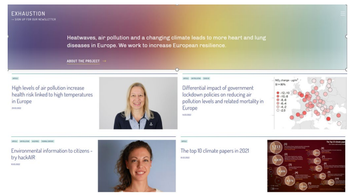
Health impact assessment - scenarios



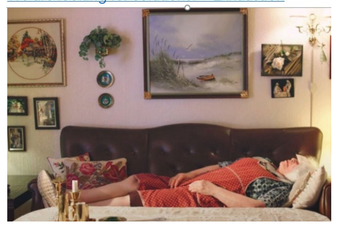
Socio-economic consequences



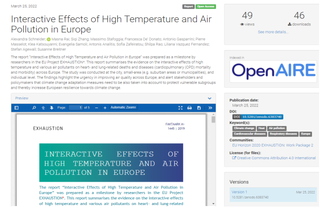
Dissemination, exploitation & communication

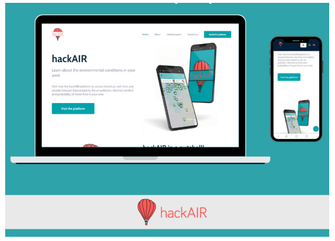


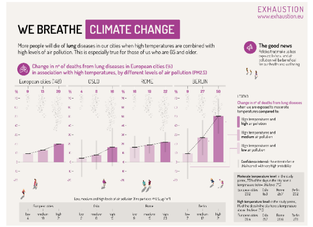
We are looking for solutions! – Exhaustion

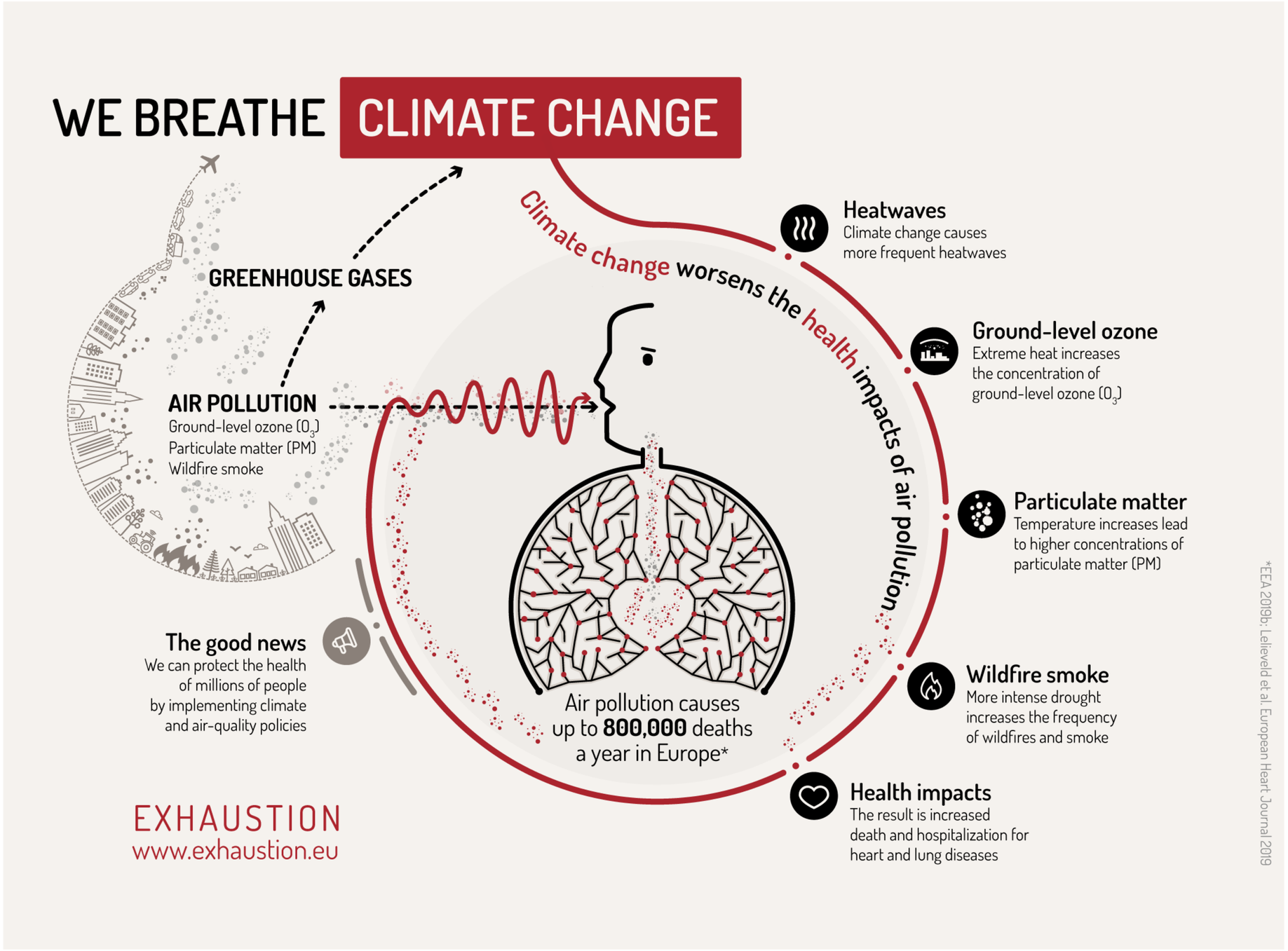


A Breath – Exhaustion



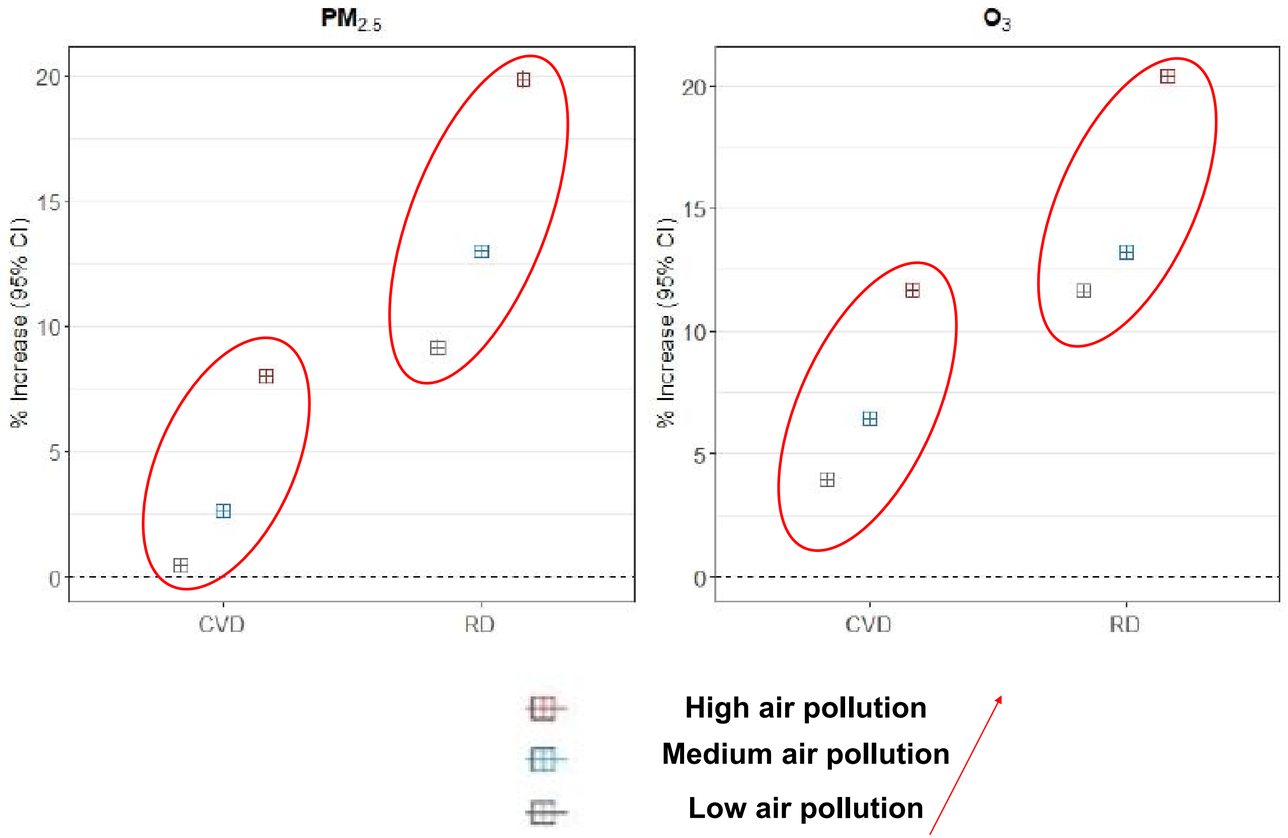




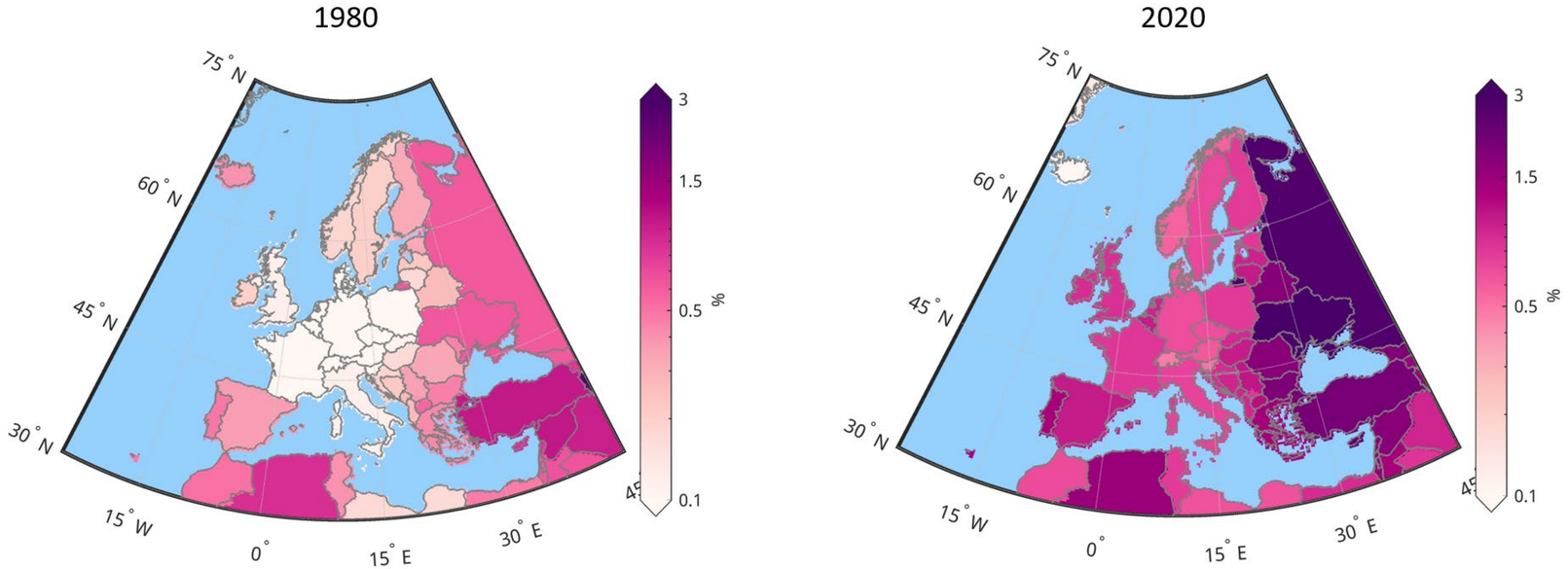

WE BREATHE CLIMATE CHANGE
GREENHOUSE GASES
AIR POLLUTION
Ground-level ozone (O_3)
Particulate matter (PM)
Wildfire smoke
Climate change worsens the health impacts of air pollution
Air pollution causes up to 800,000 deaths a year in Europe*
Heatwaves
Climate change causes more frequent heatwaves
Ground-level ozone
Extreme heat increases the concentration of ground-level ozone (O_3)
Particulate matter
Temperature increases lead to higher concentrations of particulate matter (PM)
Wildfire smoke
More intense drought increases the frequency of wildfires and smoke
Health impacts
The result is increased death and hospitalization for heart and lung diseases
The good news
We can protect the health of millions of people by implementing climate and air-quality policies
EXHAUSTION
www.exhaustion.eu
*EEA 2019b; Lelieveld et al. European Heart Journal 2019

Air pollution modifies the relationship between temperature and heart and lung disease mortality in summer months – data from 148 European cities

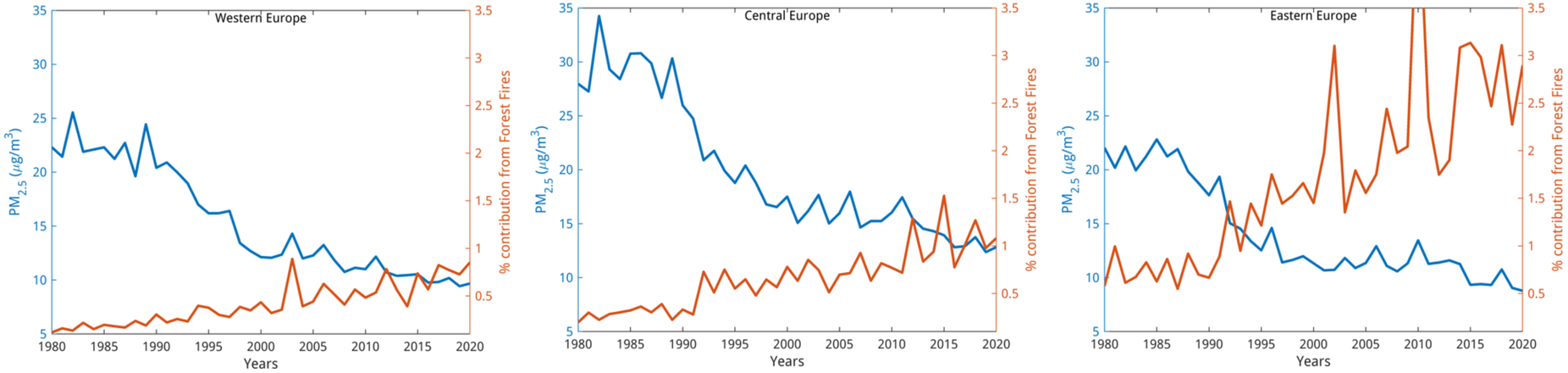
% increase (95%CI) in cardiovascular and respiratory deaths for an increase in the mean temperature from the 75th to the 99th percentile of the location-specific temperature distribution



Increasing contribution from wildfires to air pollution over Europe could make it harder to reach air quality targets



Population weighted $PM_{2.5}$ exposure and % contribution of fire emissions



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Unpublished estimates based on data from FMI (EXHAUSTION/HEATCOST)

Talks today

- Air pollution at global scale, by researcher Risto Hänninen, Finnish Meteorological Institute, Finland
- Nordic air pollution projections, by researcher Ulas Im, University of Aarhus, Denmark
- Health impacts of temperature change and air pollution: Results from Norway in the EXHAUSTION Project , by researcher Shilpa Rao, Norwegian Institute for Public Health
- Extreme temperature preparedness - lessons for action in the Nordic countries, by senior advisor Cathrine Hårsaker, Red Cross Norway

Thank you!

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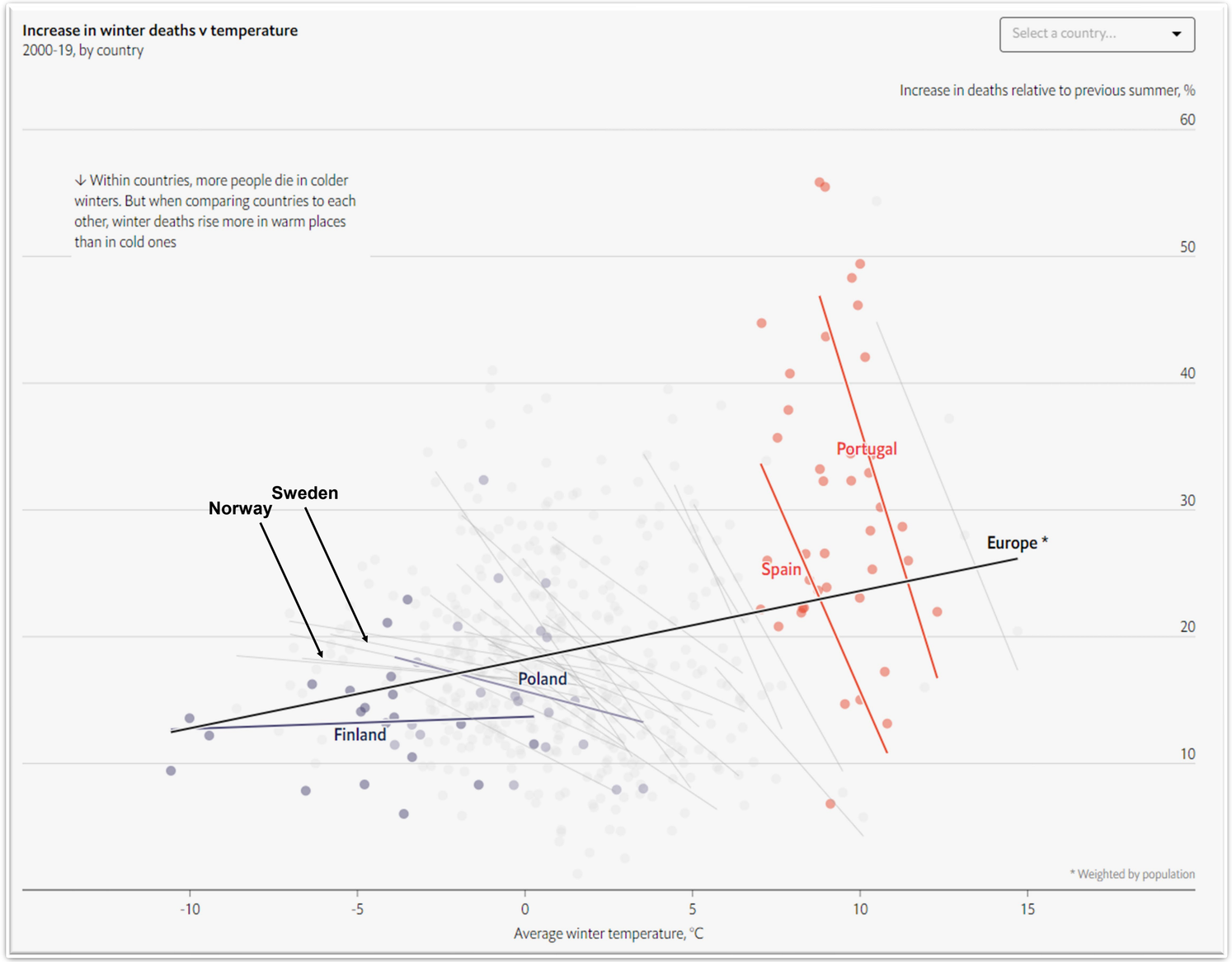
The cold side of the U-curve (linearized)



The Economist, Nov 26, 2022. Russia is using energy as a weapon