Ecosystem RE?-storation

Ре?-ставрація екосистем

Hochschule
für nachhaltige Entwicklung
Eberswalde

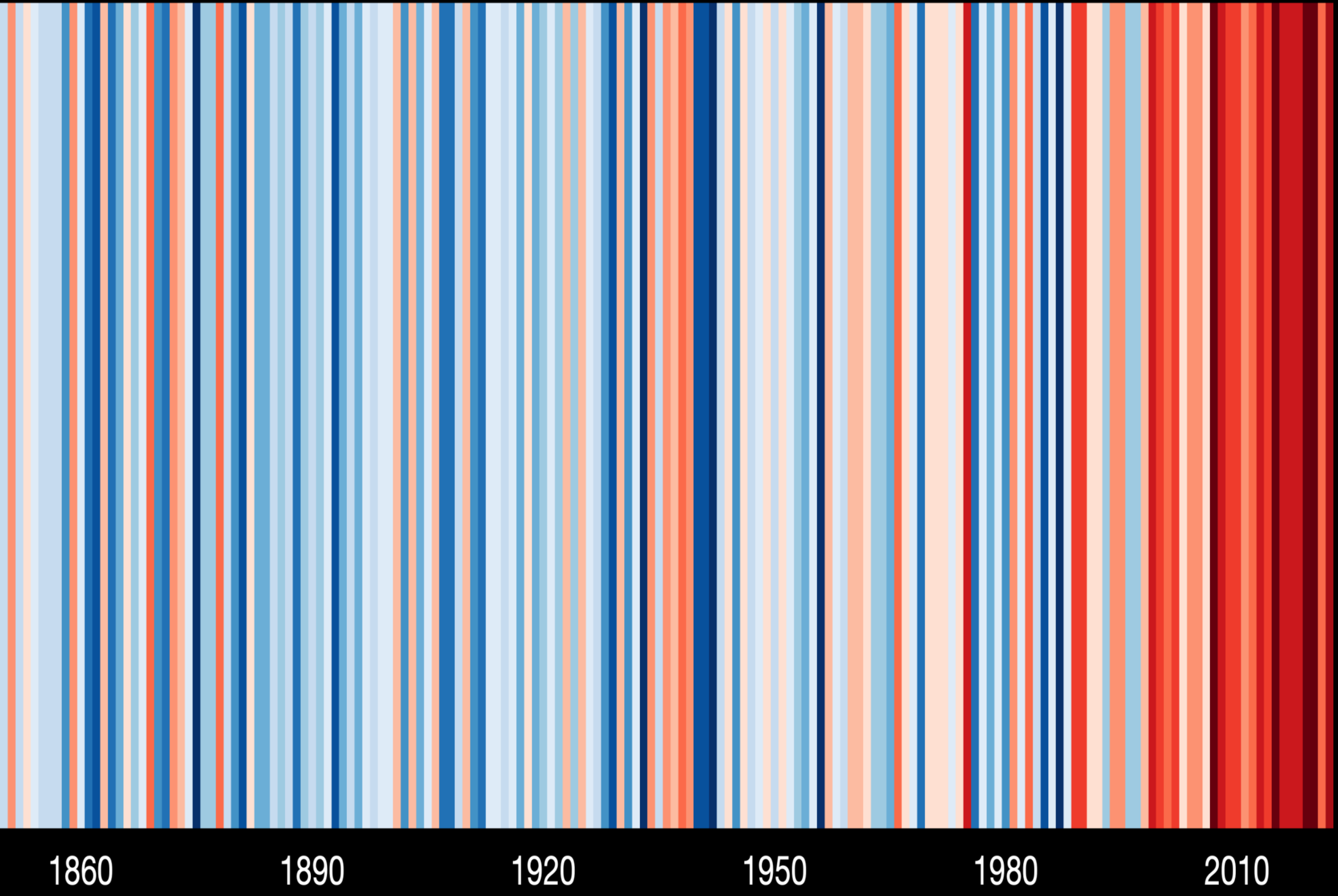
Centre for Econics and
Ecosystem Management

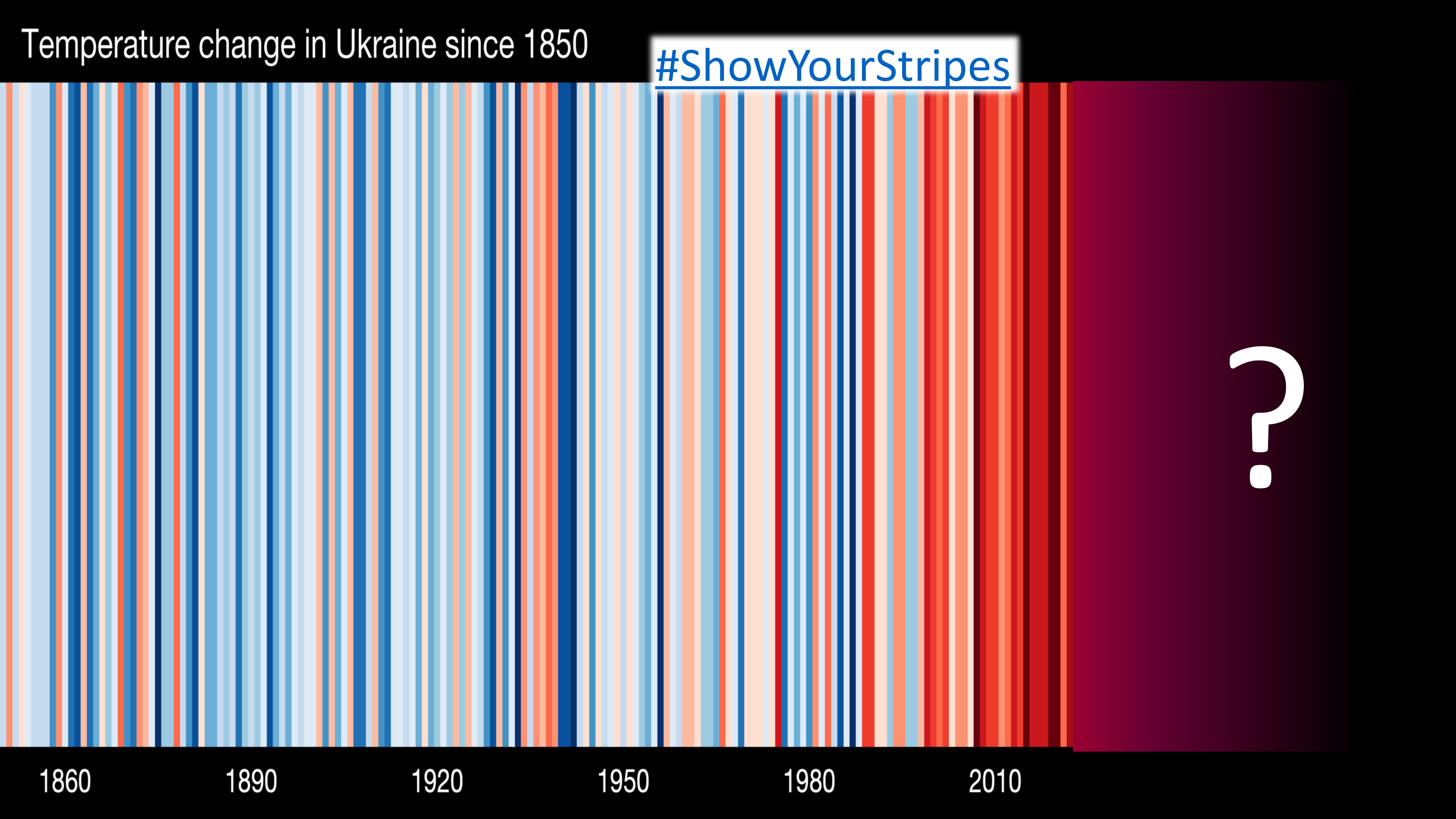
pyrophob

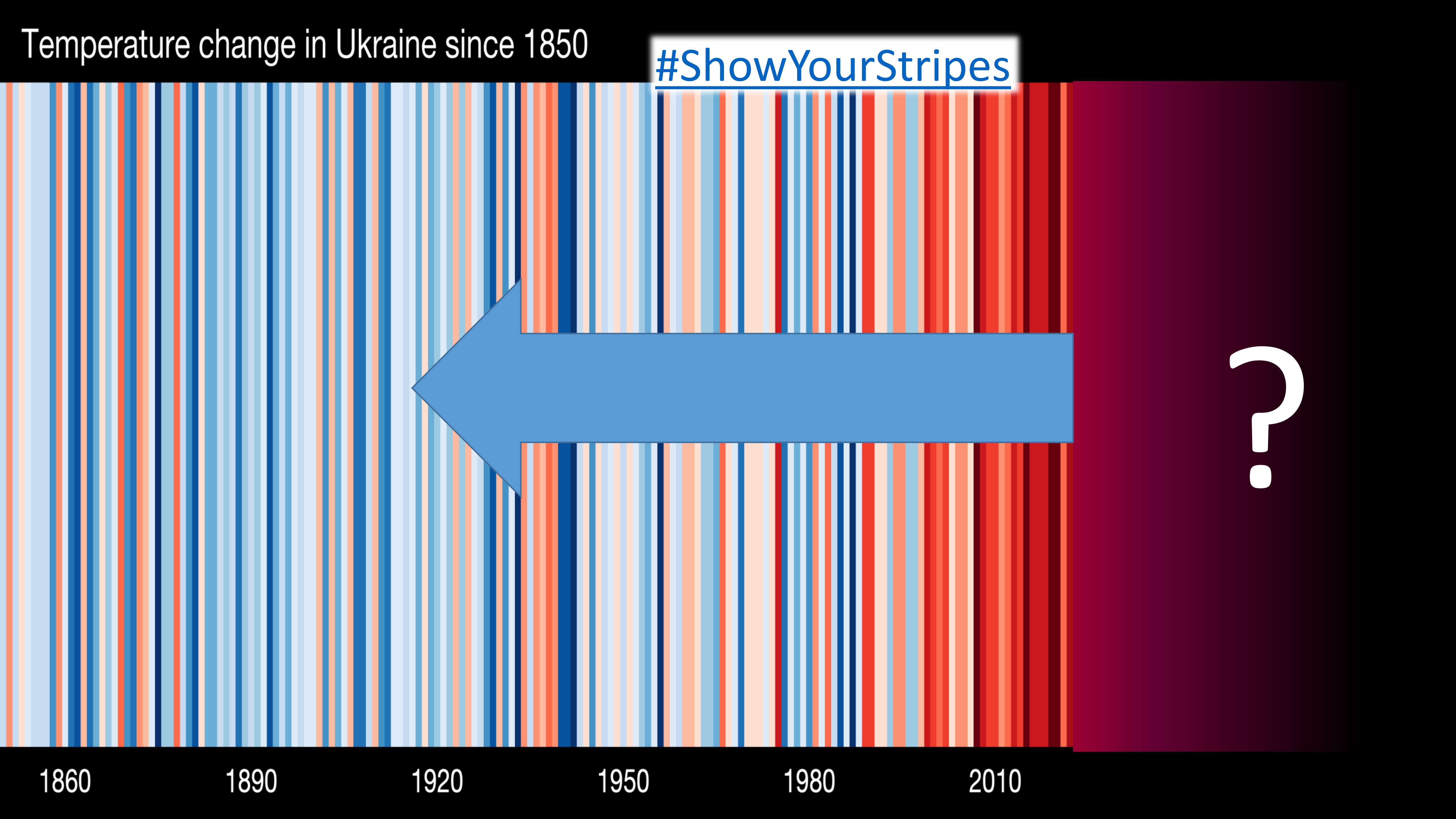
Prof. Dr. Pierre Ibisch

Temperature change in Ukraine since 1850

#ShowYourStripes



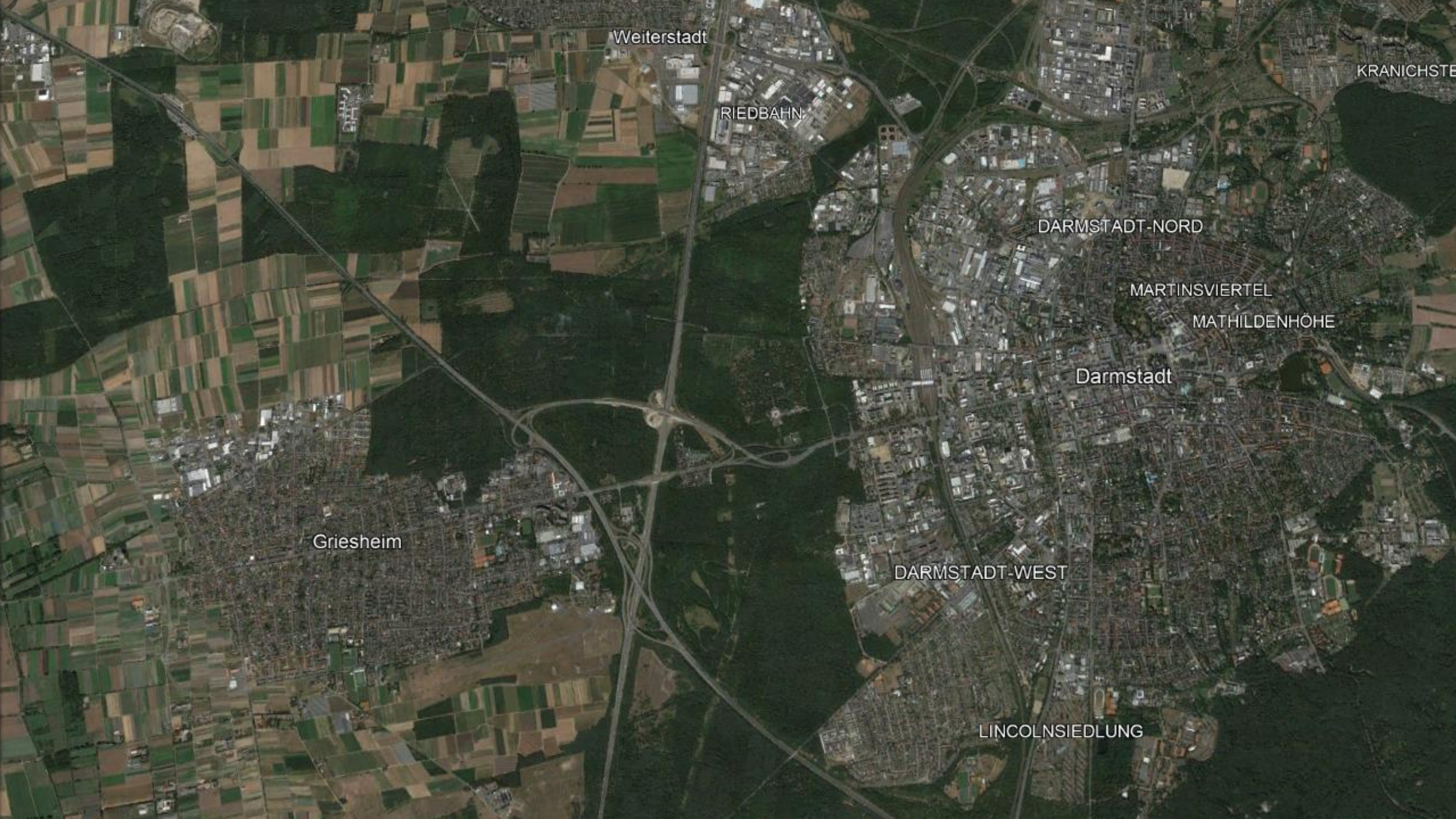

Temperature change in Ukraine since 1850
#ShowYourStripes
?
1860
1890
1920
1950
1980
2010

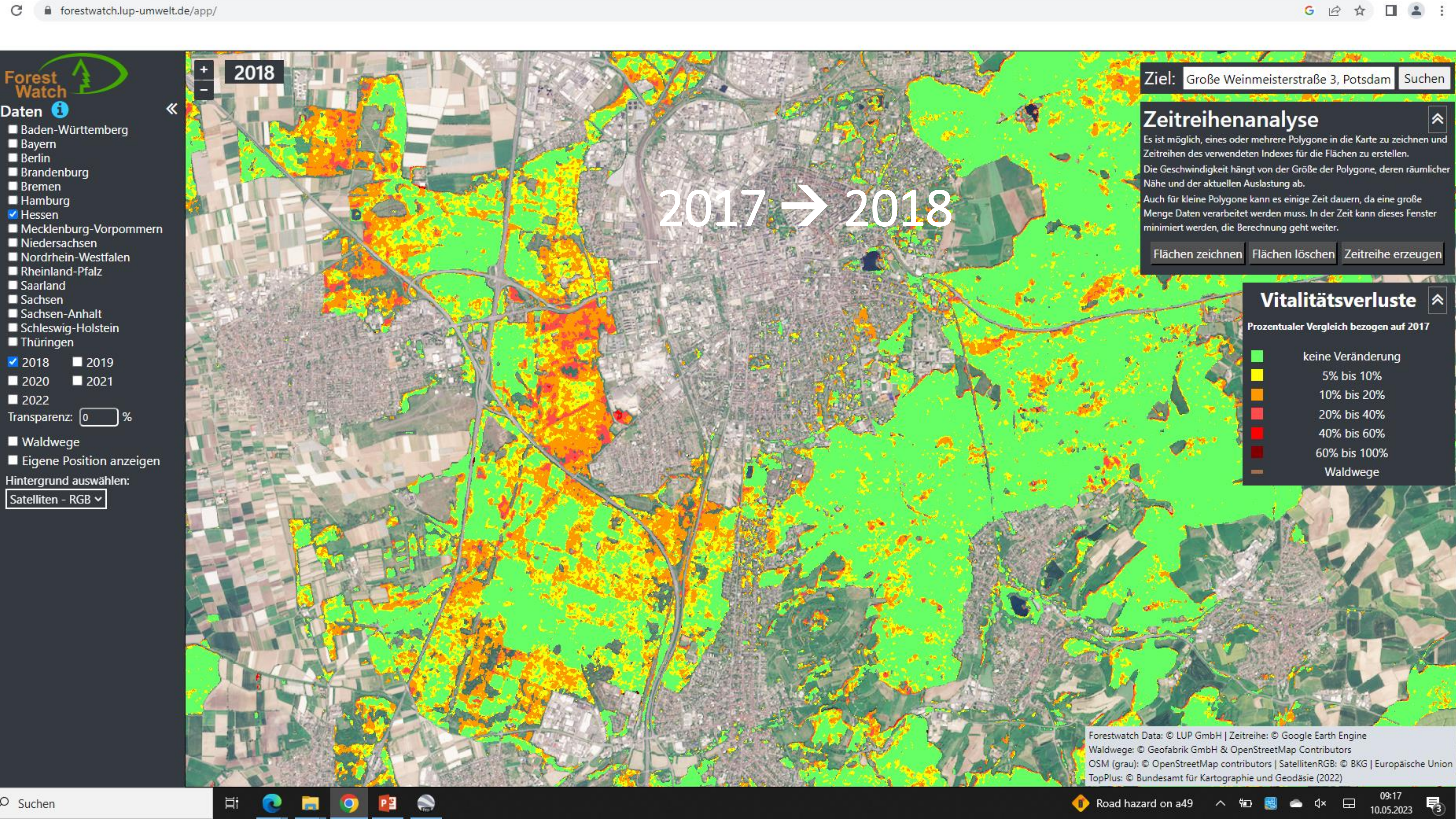


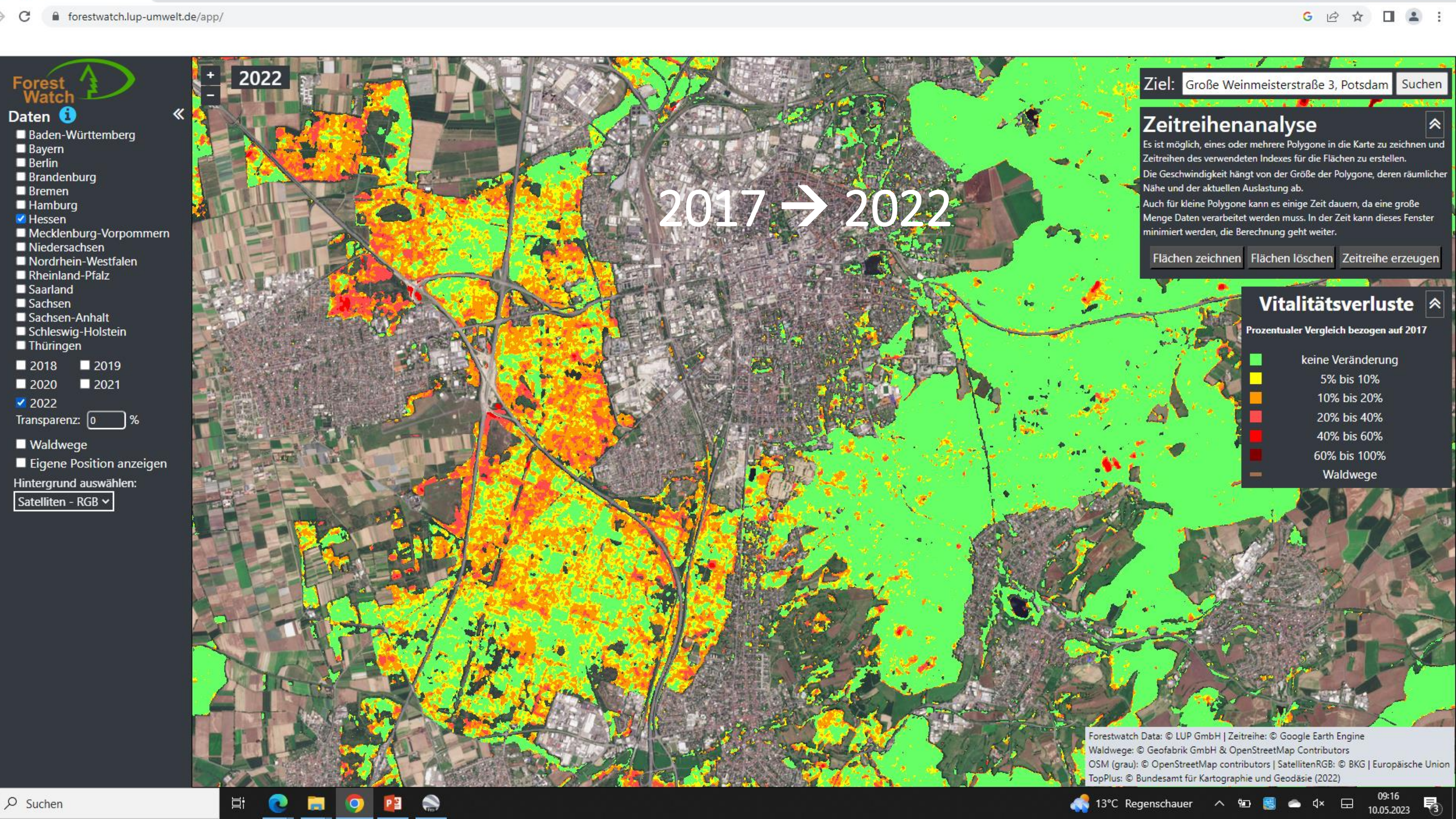
Temperature change in Ukraine since 1850
#ShowYourStripes
?
1860
1890
1920
1950
1980
2010


Temperature change in Ukraine
Relative to average of 1971-2000 [°C]
#ShowYourStripes
2.0
1.0
0.0
-1.0
-2.0
1850
1900
1950
2000
2022
?
Зміна клімату
Кліматична криза


Mosigkauer Heide, Dessau, Sachsen-Anhalt, 2020


Weiterstadt
RIEDBAHN
KRANICHSTE
DARMSTADT-NORD
MARTINSVIERTEL
MATHILDENHÖHE
Darmstadt
Griesheim
DARMSTADT-WEST
LINCOLNSIEDLUNG


forestwatch.lup-umwelt.de/app/
Forest Watch
Daten
Baden-Württemberg
Bayern
Berlin
Brandenburg
Bremen
Hamburg
Hessen
Mecklenburg-Vorpommern
Niedersachsen
Nordrhein-Westfalen
Rheinland-Pfalz
Saarland
Sachsen
Sachsen-Anhalt
Schleswig-Holstein
Thüringen
2018
2019
2020
2021
2022
Transparenz: 0 %
Waldwege
Eigene Position anzeigen
Hintergrund auswählen:
Satelliten - RGB
2018
2017 → 2018
Ziel: Große Weinmeisterstraße 3, Potsdam
Suchen
Zeitreihenanalyse
Es ist möglich, eines oder mehrere Polygone in die Karte zu zeichnen und Zeitreihen des verwendeten Indexes für die Flächen zu erstellen.
Die Geschwindigkeit hängt von der Größe der Polygone, deren räumlicher Nähe und der aktuellen Auslastung ab.
Auch für kleine Polygone kann es einige Zeit dauern, da eine große Menge Daten verarbeitet werden muss. In der Zeit kann dieses Fenster minimiert werden, die Berechnung geht weiter.
Flächen zeichnen
Flächen löschen
Zeitreihe erzeugen
Vitalitätsverluste
Prozentualer Vergleich bezogen auf 2017
keine Veränderung
5% bis 10%
10% bis 20%
20% bis 40%
40% bis 60%
60% bis 100%
Waldwege
Forestwatch Data: © LUP GmbH | Zeitreihe: © Google Earth Engine
Waldwege: © Geofabrik GmbH & OpenStreetMap Contributors
OSM (grau): © OpenStreetMap contributors | SatellitenRGB: © BKG | Europäische Union
TopPlus: © Bundesamt für Kartographie und Geodäsie (2022)
Suchen
Road hazard on a49
09:17
10.05.2023


forestwatch.lup-umwelt.de/app/
Forest Watch
Daten
Baden-Württemberg
Bayern
Berlin
Brandenburg
Bremen
Hamburg
Hessen
Mecklenburg-Vorpommern
Niedersachsen
Nordrhein-Westfalen
Rheinland-Pfalz
Saarland
Sachsen
Sachsen-Anhalt
Schleswig-Holstein
Thüringen
2018
2019
2020
2021
2022
Transparenz: 0 %
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Eigene Position anzeigen
Hintergrund auswählen:
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2022
2017 → 2022
Ziel: Große Weinmeisterstraße 3, Potsdam
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Zeitreihe erzeugen
Vitalitätsverluste
Prozentualer Vergleich bezogen auf 2017
keine Veränderung
5% bis 10%
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20% bis 40%
40% bis 60%
60% bis 100%
Waldwege
Forestwatch Data: © LUP GmbH | Zeitreihe: © Google Earth Engine
Waldwege: © Geofabrik GmbH & OpenStreetMap Contributors
OSM (grau): © OpenStreetMap contributors | SatellitenRGB: © BKG | Europäische Union
TopPlus: © Bundesamt für Kartographie und Geodäsie (2022)
Suchen
13°C Regenschauer
09:16
10.05.2023


Darmstadt, Westwald, Mai 2022

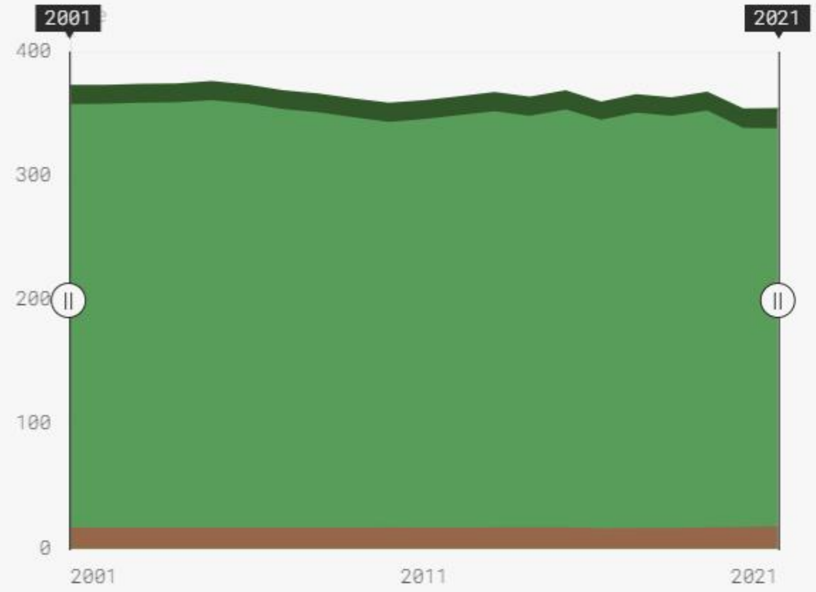
https://ctrees.org/products/country-jurisdiction

LEARN MOR

Explore data on carbon stocks, emissions, and removals for all countries and jurisdictions

https://ctrees.org/products/country-jurisdiction

CARBON STOCK EMISSIONS REMOVALS



364.9 $MtCO_2e$
TOTAL CARBON

349.6 $MtCO_2e$
CARBON IN FOREST AREAS

15.3 $MtCO_2e$
CARBON IN NONFOREST AREAS

SELECTED AREA **Germany, Nordrhein-Westfalen**


Wasserschutzgebiet, Harz, bei Königshütte, Oktober 2021


Hessen, Waldeck-Frankenberg, Östlich Elsoff, Mai 2021


Eichenberg, Hainich, Thüringen (2019)
Flachgründiger Boden auf Muschelkalk
Reaktion von Buchen auf Dürre- und Hitzestress


Hohe Schrecke – Finne, Thüringen (2021)
Reaktion von Buchen auf Dürre- und Hitzestress

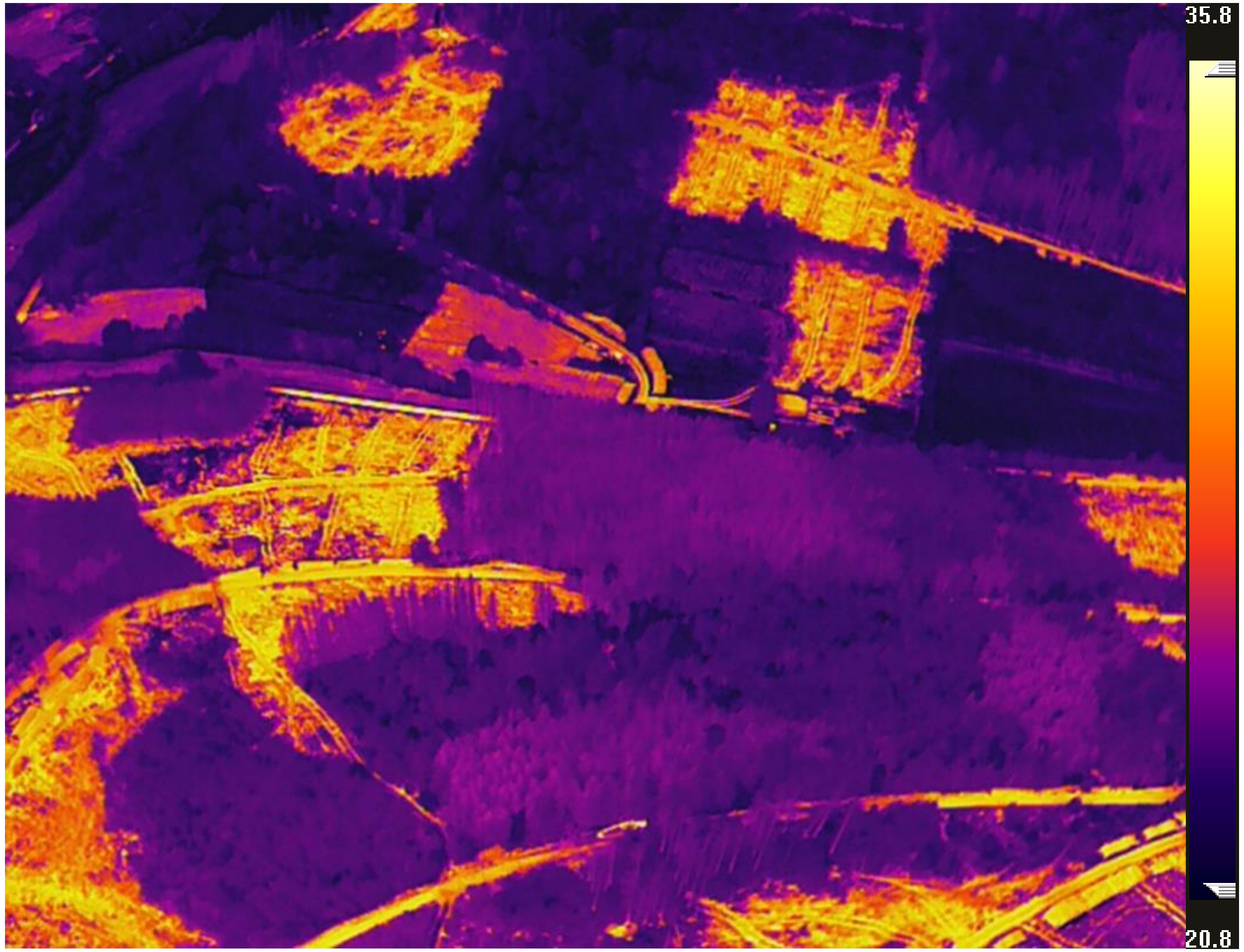
Hohe Schrecke – Finne, Thüringen (2021)
Artenreiche Naturverjüngung
unter teilweise absterbenden Buchen


Douglasienpflanzung auf Kalamitätsfläche
Montabaurer Höhe, Rheinland-Pfalz (2021),
Wasserschutzgebiet, FFH

Post-calamity plantation with Douglas fir
Oberharz, Saxony Anhalt, Germany (2021)
Water protection area, next to SAC


Oberbergischer Kreis, NRW, April 2021

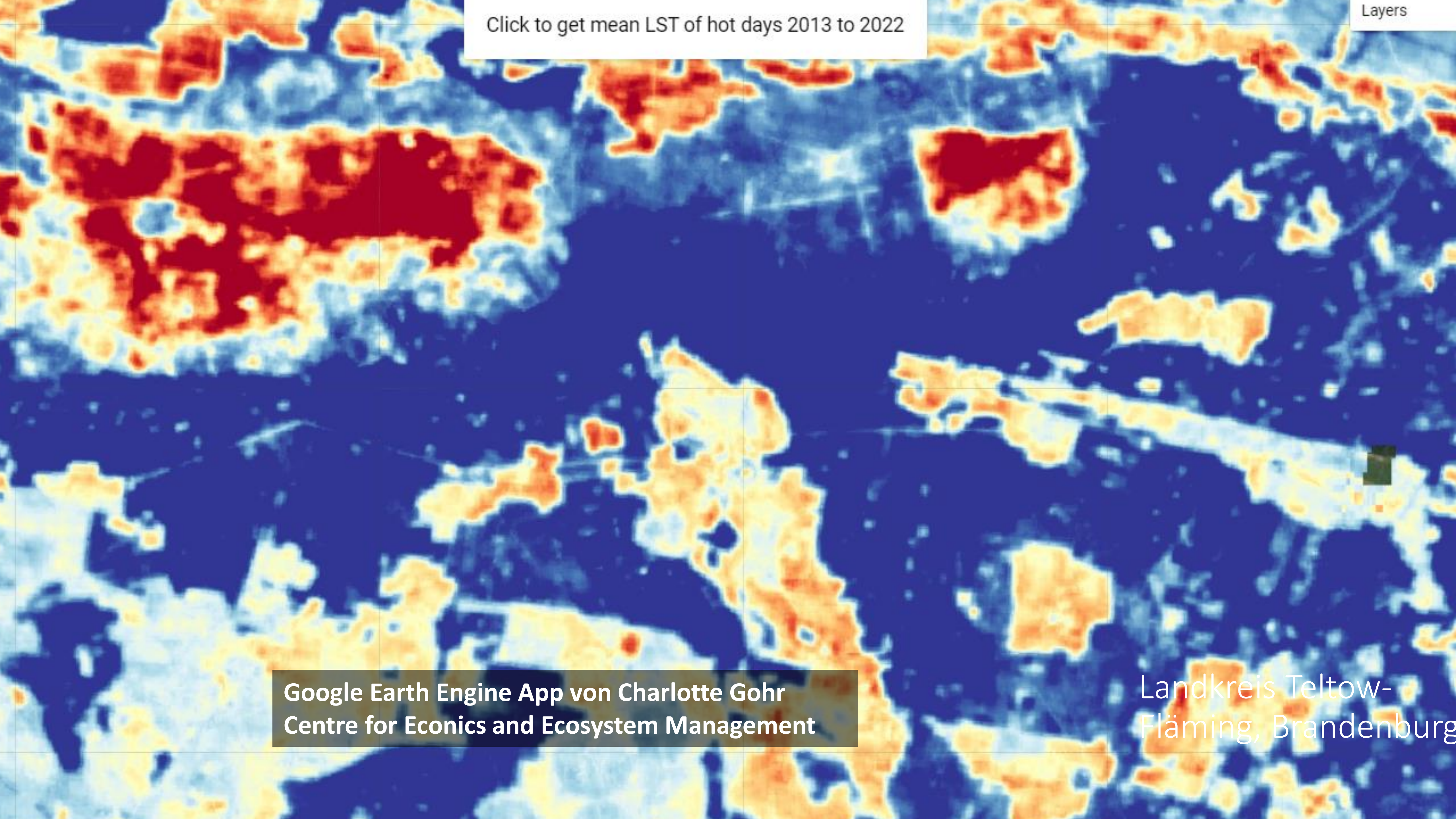
Eco-climatology

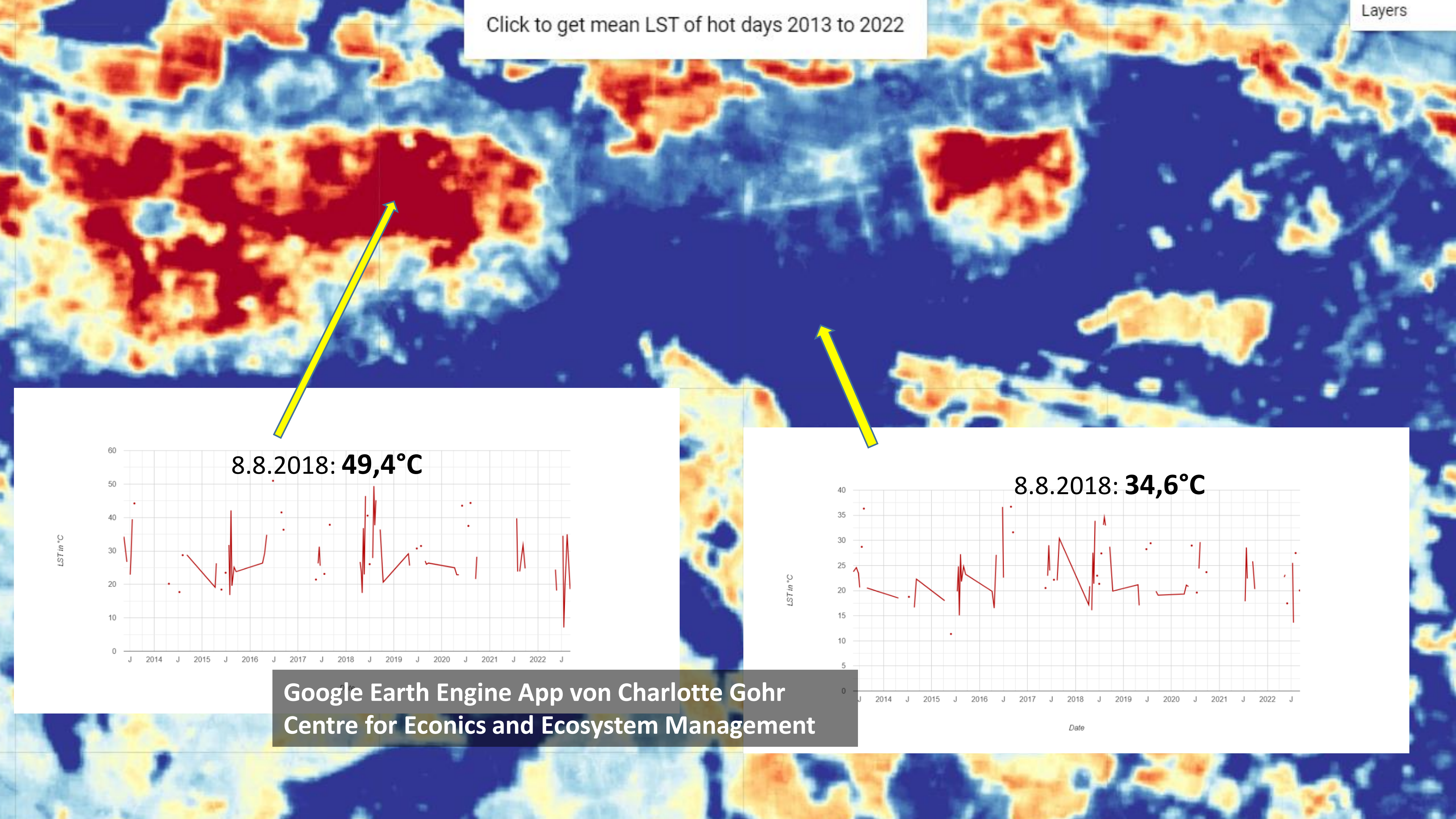


Drohnengestützes Luftbild sowie Infrarotaufnahme eines Forsts mit lebenden sowie abgestorbenen stehenden Fichten und kahlgeschlagenen Flächen; Elsoff, Bad Berleburg, Rheinland-Pfalz im Sommer 2021 (Ibisch et al. 2021)

Google Earth Engine App von Charlotte Gohr
Centre for Econics and Ecosystem Management

Landkreis Teltow-Fläming, Brandenburg


Click to get mean LST of hot days 2013 to 2022
Layers
Google Earth Engine App von Charlotte Gohr
Centre for Econics and Ecosystem Management
Landkreis Teltow-
Fläming, Brandenburg


Click to get mean LST of hot days 2013 to 2022
Layers
8.8.2018: 49,4°C
8.8.2018: 34,6°C
LST in °C
Date
Google Earth Engine App von Charlotte Gohr
Centre for Econics and Ecosystem Management

Hot + dry = hotter + drier

Гарячий + сухий = гарячіший + сухіший

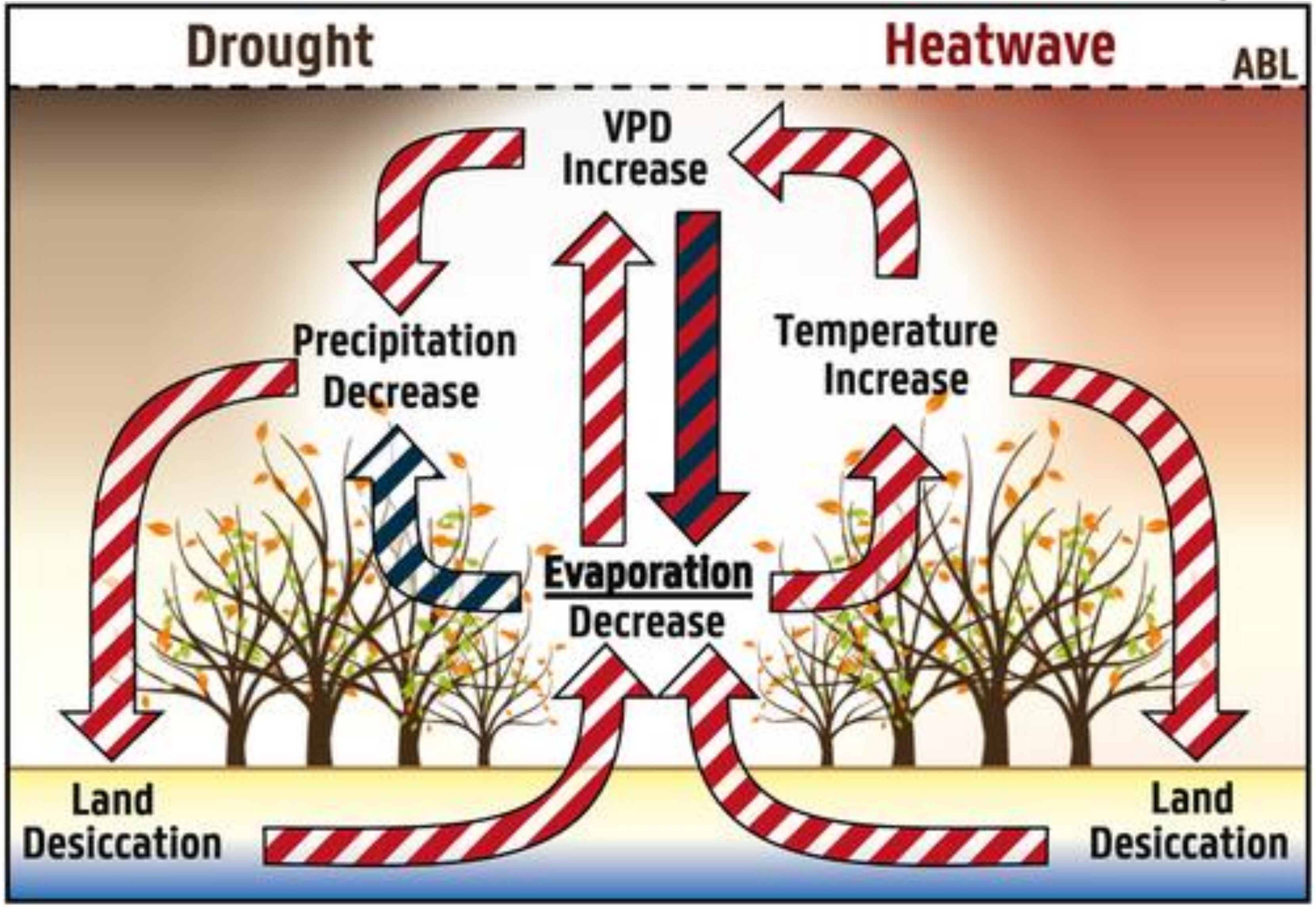
ANNALS of THE NEW YORK ACADEMY OF SCIENCES

PERSPECTIVE | Open Access

Land–atmospheric feedbacks during droughts and heatwaves: state of the science and current challenges

Diego G. Miralles, Pierre Gentine, Sonia I. Seneviratne, Adriaan J. Teuling

25 June 2018 | https://doi.org/10.1111/nyas.13912 | Citations: 126



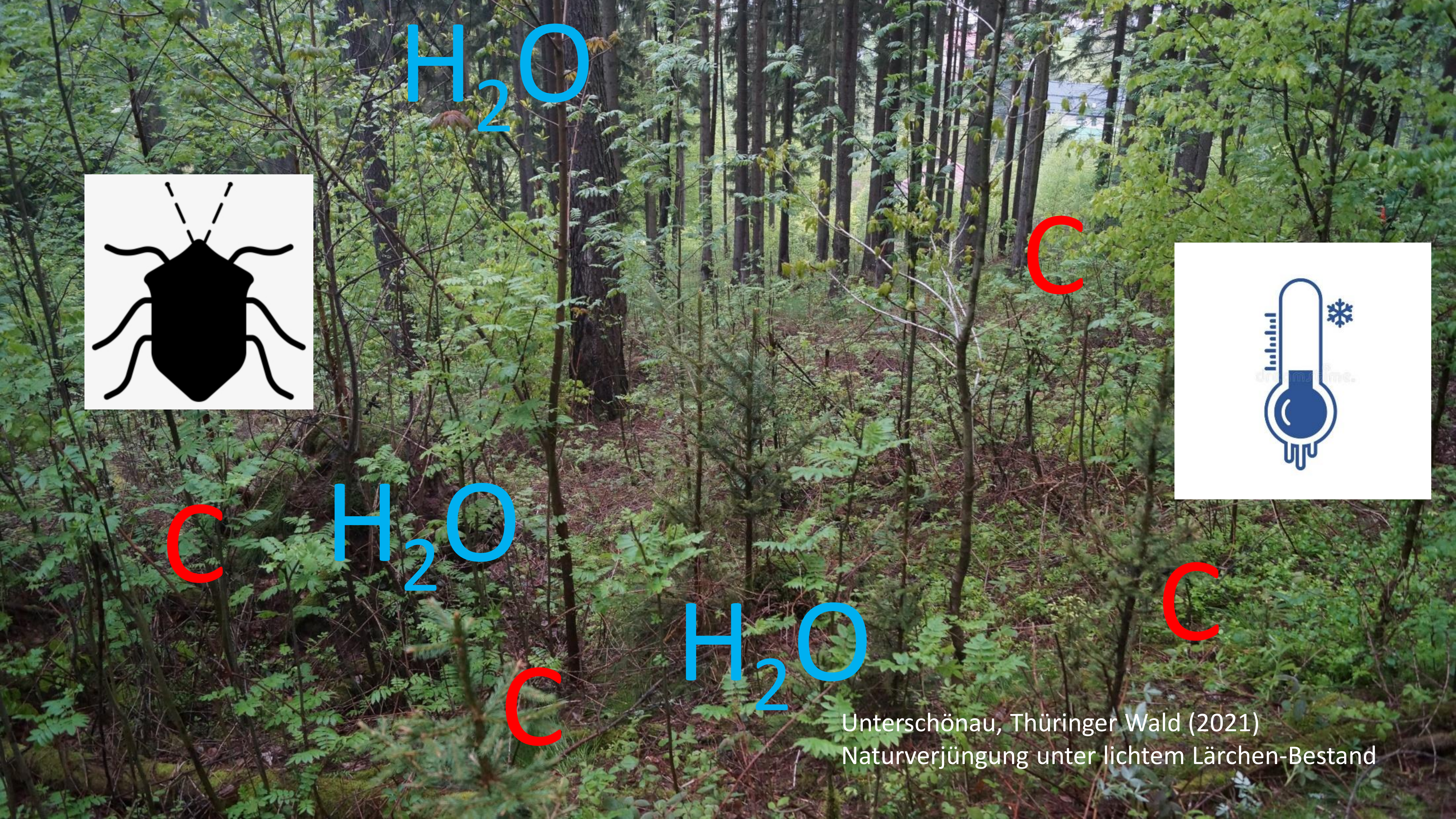
- Feedback loops: Land ecosystems as amplifier of hydrometeorological extremes

- Петлі зворотного зв'язку: Наземні екосистеми як підсилювач гідрометеорологічних екстремальних явищ


Burgaue (2020)
Leipziger Auwald

Jungenwald, Saarland (2021)
Artenreiche Naturverjüngung
unter stehendem Fichten-Totholz

Oberharz, Sachsen-Anhalt (2021)
Wasserschutzgebiet


H_2O
C
H_2O
C
H_2O
C
C
Unterschönau, Thüringer Wald (2021)
Naturverjüngung unter lichtem Lärchen-Bestand

Pyrogeographie

www.nature.com/scientificreports

scientific reports

Check for updates

OPEN

Global warming is shifting the relationships between fire weather and realized fire-induced CO_2 emissions in Europe

Jofre Carnicer[1,2,3]✉, Andrés Alegria[4], Christos Giannakopoulos[5], Francesca Di Giuseppe[6], Anna Karali[5], Nikos Koutsias[7], Piero Lionello[8], Mark Parrington[6] & Claudia Vitolo[9]

Fire activity has significantly changed in Europe over the last decades (1980–2020s), with the emergence of summers attaining unprecedented fire prone weather conditions. Here we report a significant shift in the non-stationary relationship linking fire weather conditions and fire intensity measured in terms of CO_2 emissions released during biomass burning across a latitudinal gradient of European IPCC regions. The reported trends indicate that global warming is possibly inducing an incipient change on regional fire dynamics towards increased fire impacts in Europe, suggesting that emerging risks posed by exceptional fire-weather danger conditions may progressively exceed current wildfire suppression capabilities in the next decades and impact forest carbon sinks.

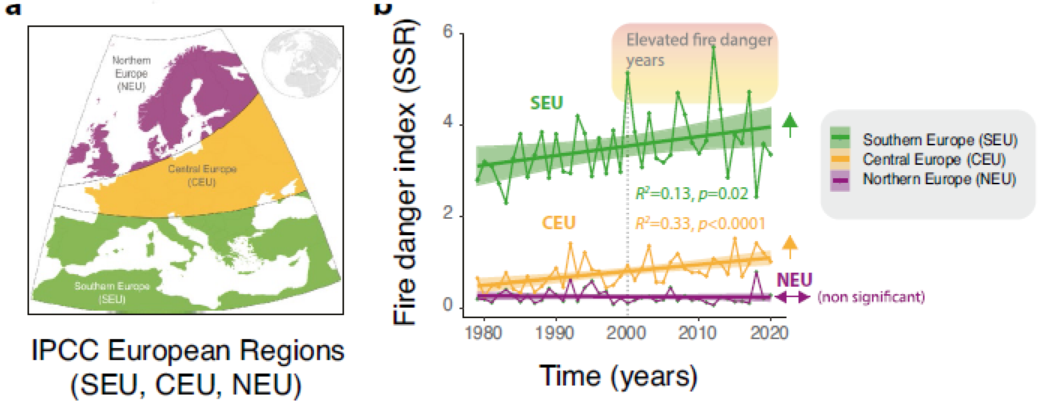


Figure 1. Fire weather dynamics in European IPCC regions. (a) A map summarising the distribution of the IPCC regions analysed. The map was produced using QGIS v3.16 (see "Methods"). (b) Observed trends in the Seasonal Severity Rating index (SSR) in Southern, Central and Northern Europe over 1980–2019. Colored shaded areas highlight years characterized by higher SSR values over the analyzed period. Ordinary least squares fits are indicated.

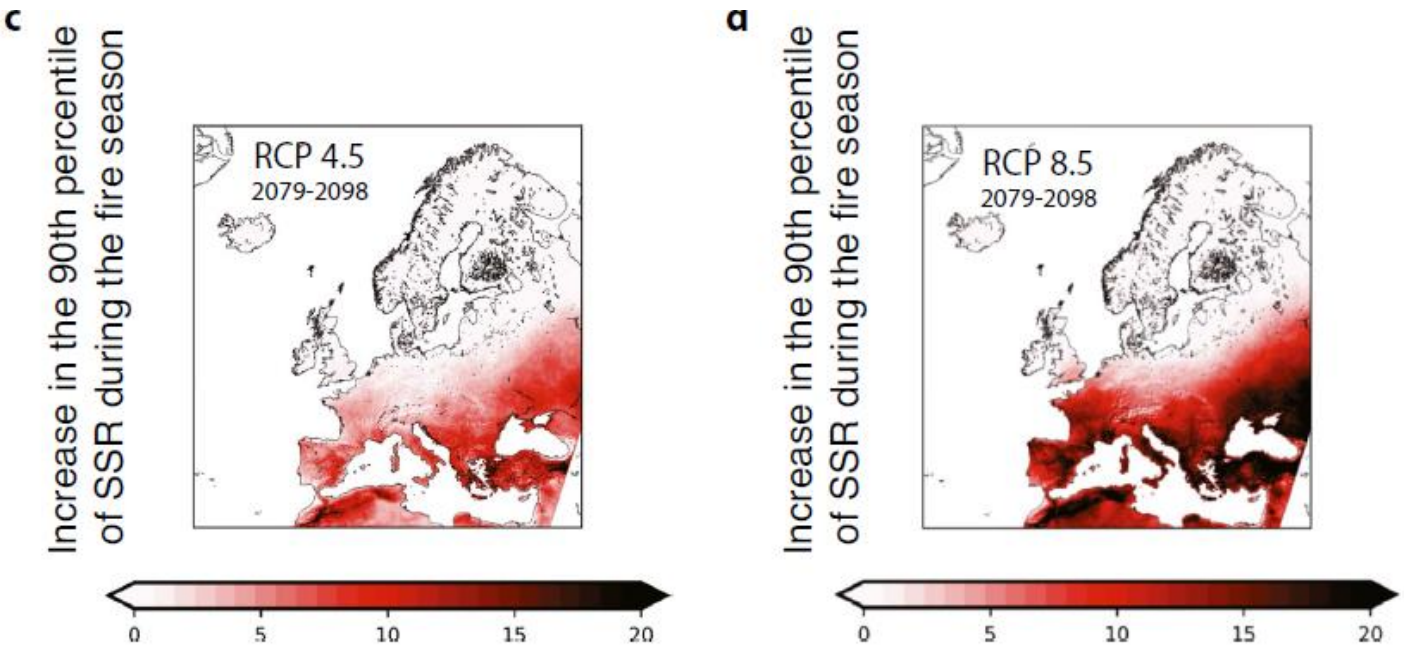


Figure 2. Observed changes in the non-stationary relationships between fire weather danger (SSR) and fire impacts (CO_2 emissions, MtC) in Southern Europe. (a) Changes in the explained variation (R^2) observed in moving-window correlation analyses over the last two decades (2000–2020). Asterisks in panel a (*) indicate significant correlationships, observed only in the last decade. (b) Observed relationship between Seasonal Severity Rating index (SSR) and satellite-estimated fire-induced CO_2 emissions in the last decade. (c) Projected increase in the 90th percentile of SSR during the fire season predicted for the 2079–2098 time period under RCP 4.5. SSR increases are represented relative to the values estimated for the reference period (1986–2005, Fig. S4). (d) Projected increase in the 90th percentile of SSR under RCP 8.5. Maps were produced using Python Programming Language version 3.8 (see "Methods").

Project

PYROPHOB (пірофобний)

01.05.2020 – 30.04.2025

Strategies for the development pf pyrophobic and climate change resilient post-fire forests

Стратегії розвитку пірофобних та стійких до зміни клімату післяпожежних лісів

Gefördert durch:
Bundesministerium für Ernährung und Landwirtschaft
Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit
aufgrund eines Beschlusses des Deutschen Bundestages

Treuenbrietzen, Brandenburg (Germany), February 2019

Centre for Econics and Ecosystem Management

Restoration
Реставрація

Treuenbrietzen, Brandenburg (Germany), February 2019

Centre for Econics and Ecosystem Management

Restoration
Реставрація

Treuenbrietzen, Brandenburg (Germany), February 2019

Restoration ?
Реставрація?

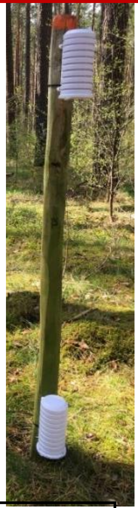
Treuenbrietzen, Brandenburg (Germany), May 2019


Centre for Econics and Ecosystem Management
„Pro-storation“ ?
„Про-ставрація“?
Treuenbrietzen, Brandenburg (Germany), February 2019


„Pro-storation“ ?
„Про-ставрація“?
Hochschule für nachhaltige Entwicklung Eberswalde
Centre for Econics and Ecosystem Management
Forschungswald CleverForst / PYROPHOB
Treuenbrietzen Stadtwald, 24. August 2020

Microclimate

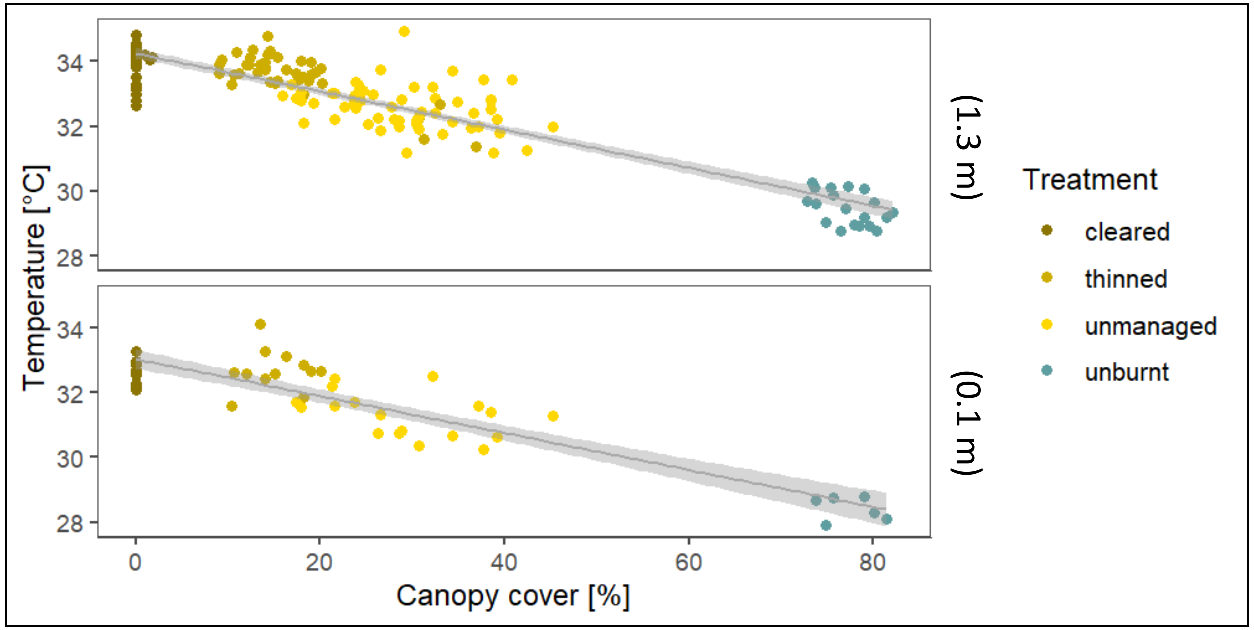
Dr. Jeanette Blumröder, Prof. Dr. Pierre Ibisch



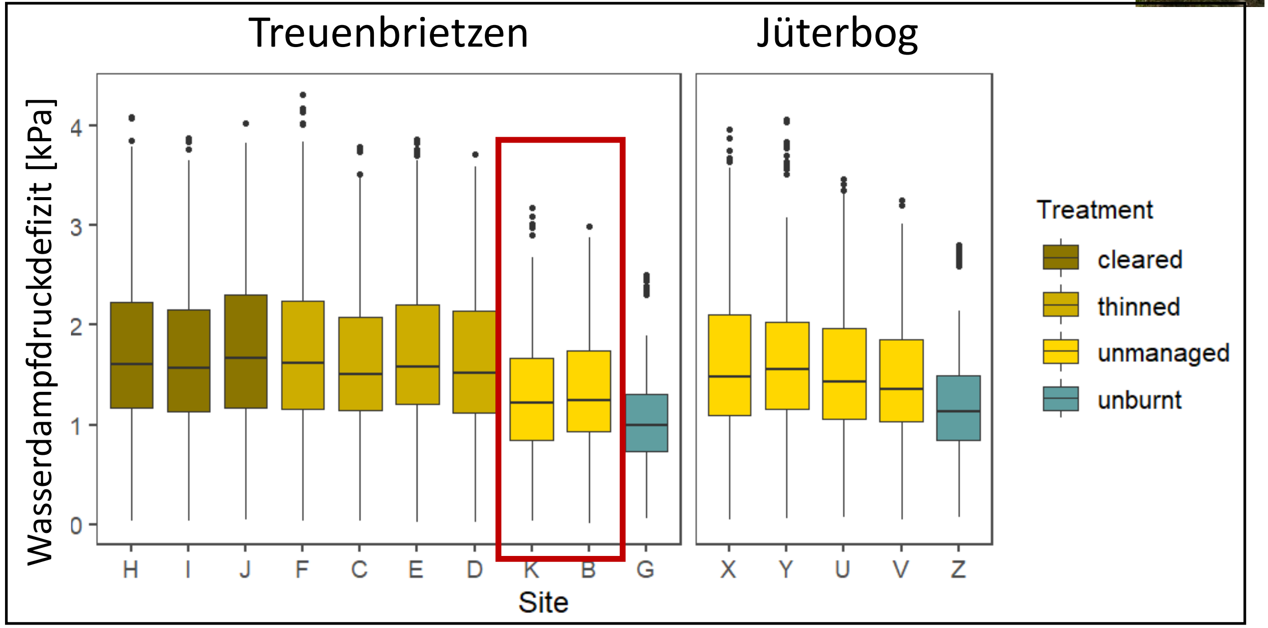
- 150 Temperaturmesspunkte auf 1,3 m
- 45 Messpunkte zur relativen Luftfeuchte auf 0,1 m

Hier Fokus: heißeste Tage 2021
(44 Tage zwischen 19. Mai und 25. August 2021 mit einer Tagesmitteltemperatur > 20°C bzw. relative Luftfeuchte < 70 %)

Maximaltemperatur im Verhältnis zum Kronenschlussgrad



Wasserdampfdruckdefizit -> Austrocknungspotential



Hochschule für nachhaltige Entwicklung Eberswalde
Centre for Econics and Ecosystem Management

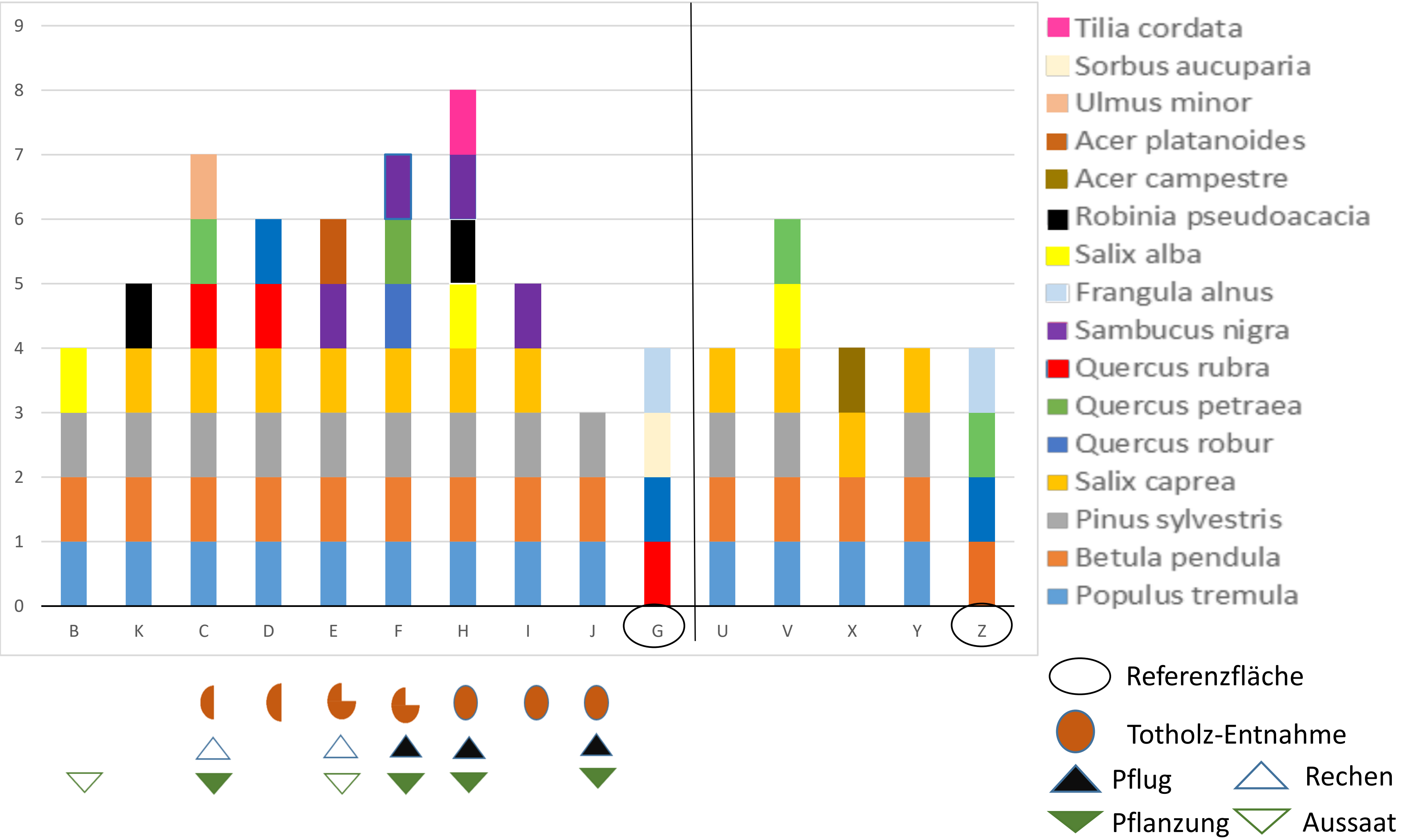
Tree regeneration

HNEE: Prof. Dr. Pierre Ibisch, Dr. Jeanette Blumröder, Anja Binder; LFE: Prof. Dr. Jens Schröder, Marina Schirrmacher, Danica Clerc

Hochschule für nachhaltige Entwicklung Eberswalde | Centre for Econics and Ecosystem Management | FORST Brandenburg

- 15 Laubbaumarten durch Naturverjüngung
- Flächendeckendes Vorkommen der Espe auf der Brandfläche
- Neben der Espe kommt die Birke auf allen Brandflächen vor

Anzahl der Naturverjüngung nach Arten



frontiers | Frontiers in Forests and Global Change

TYPE Original Research
PUBLISHED 08 December 2022
DOI 10.3389/ffgc.2022.1070958

OPEN ACCESS

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Tufts University, United States

REVIEWED BY
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Earth Island Institute, United States
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Earth Is

*CORRES
Jeanett
j.blumr

Ecosystemic resilience of a temperate post-fire forest under extreme weather conditions

Jeanette S. Blumroeder*, Frederic Schmidt, Anat Gordon, Stefanie Grosse and Pierre L. Ibisch

vegetation compared to the unlogged control (Donato et al., 2006; Robichaud et al., 2011; Wagenbrenner et al., 2016). Beghin et al. (2010) showed that even when logging was conducted 4 years after the fire, it contributed to a prolonged soil disturbance. Other post-fire research projects have obtained similar results of increased soil compaction and erosion and a decrease in seedling recruitment and soil cover following post-fire logging operations (Inbar et al., 1997; Martínez-Sánchez et al., 1999; Spanos et al., 2010; de las Heras et al., 2012; Marañón-Jiménez et al., 2013; Moya et al., 2015; Malvar et al., 2017; Urretavizcaya and Defossé, 2019). Further studies have observed an increased fire risk due to fine woody debris left on the site after logging (Ne'eman et al., 1997; Donato et al., 2006), a reduction in soil nutrients (Merino et al., 2005), a decrease in seedling height growth (Martínez-Sánchez et al., 1999), and a decrease in species richness and diversity (Leverkus et al., 2014). In a study comparing different treatment methods in a mountain forest in Hungary, large cleared areas also experienced a limited seed dispersal, apparently due to the lack of seed sources on the stand as well as the lack of habitat for seed-dispersing animals (Tinya et al., 2020). The microclimatic conditions induced by salvage logging, such as decreased soil moisture and increased surface and soil temperature, have been commonly observed as unfavorable for woody species regeneration (Castro et al., 2011; Ginzburg and Steinberger, 2012; Marcolin et al., 2019; Tinya et al., 2020) but favorable for competing ground vegetation (Sessions et al., 2004; Beghin et al., 2010). In combination, this can result in seedling dehydration and mortality.

Deadwood retention

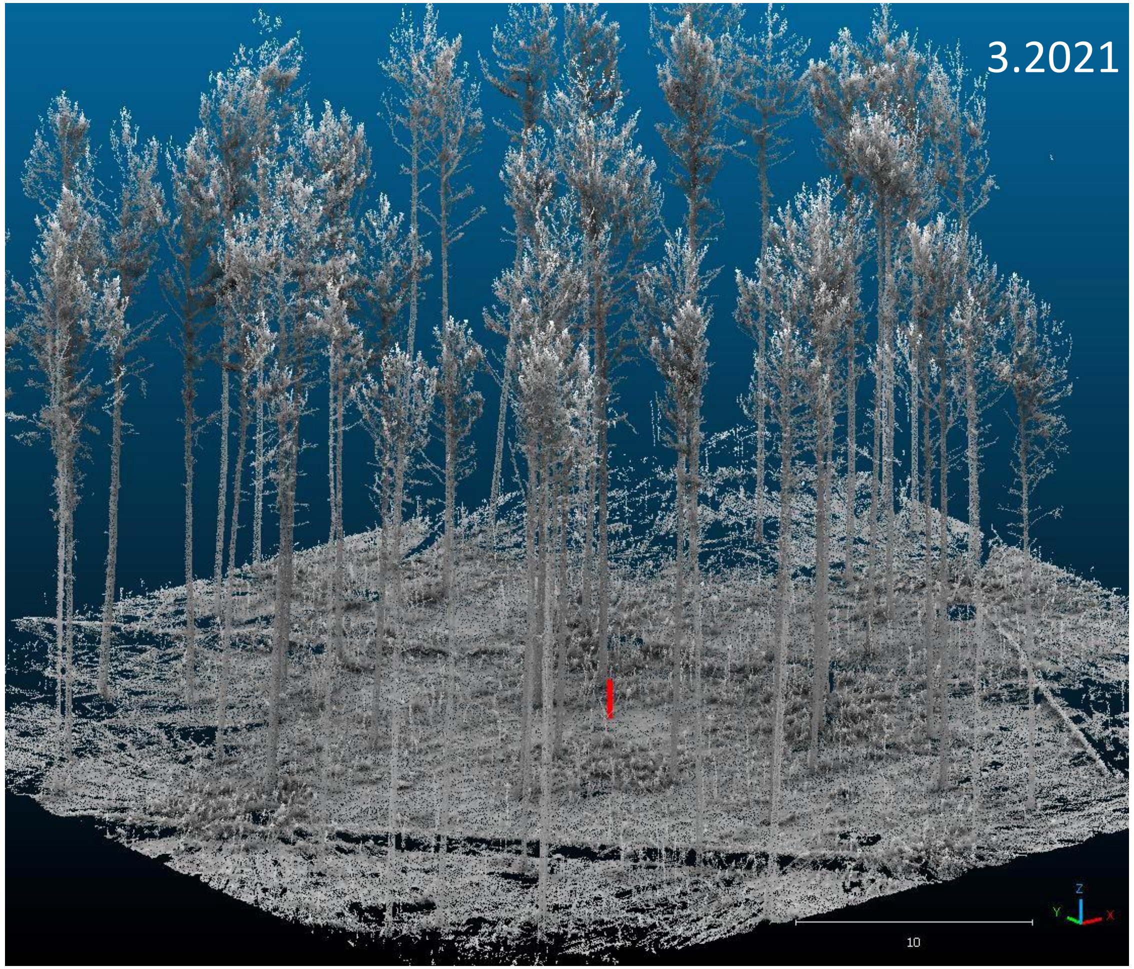
Passive restoration favors natural succession and prescribes no artificial intervention in the natural processes of the ecosystem. Apart from natural rejuvenation, this also includes leaving burned residual wood on site, regardless of its state, size, or position. Organic materials remaining from the pre-disturbed stand are also called biological legacies, defined by Franklin et al. (2000) as "...the organisms, organic materials, and organically generated environmental patterns that persist through a disturbance and are incorporated into the recovering ecosystem." In burned forests, they are represented by surviving living trees, standing charred trees, standing dead snags as well as lying deadwood in different sizes and degrees of combustion (Franklin and Agee, 2003; Noss et al., 2006). Post-fire ecosystems are rich in biological legacies that are considered essential for post-fire recovery processes, especially in the initial regeneration phase (Franklin and Agee, 2003; Beschta et al., 2004; Noss et al., 2006; Leverkus et al., 2014). Many researchers have described the positive effects of biological legacies on regenerating ecosystems (DellaSala and Hanson, 2015). One major benefit provided through the sheltering effect of both standing and lying residual deadwood is the amelioration of the stands' microclimatic conditions—keeping temperatures stable, protecting the soil and vegetation from direct solar radiation, and retaining soil moisture levels more favorable for germination and for the establishment of natural regeneration (Martínez-Sánchez et al.,

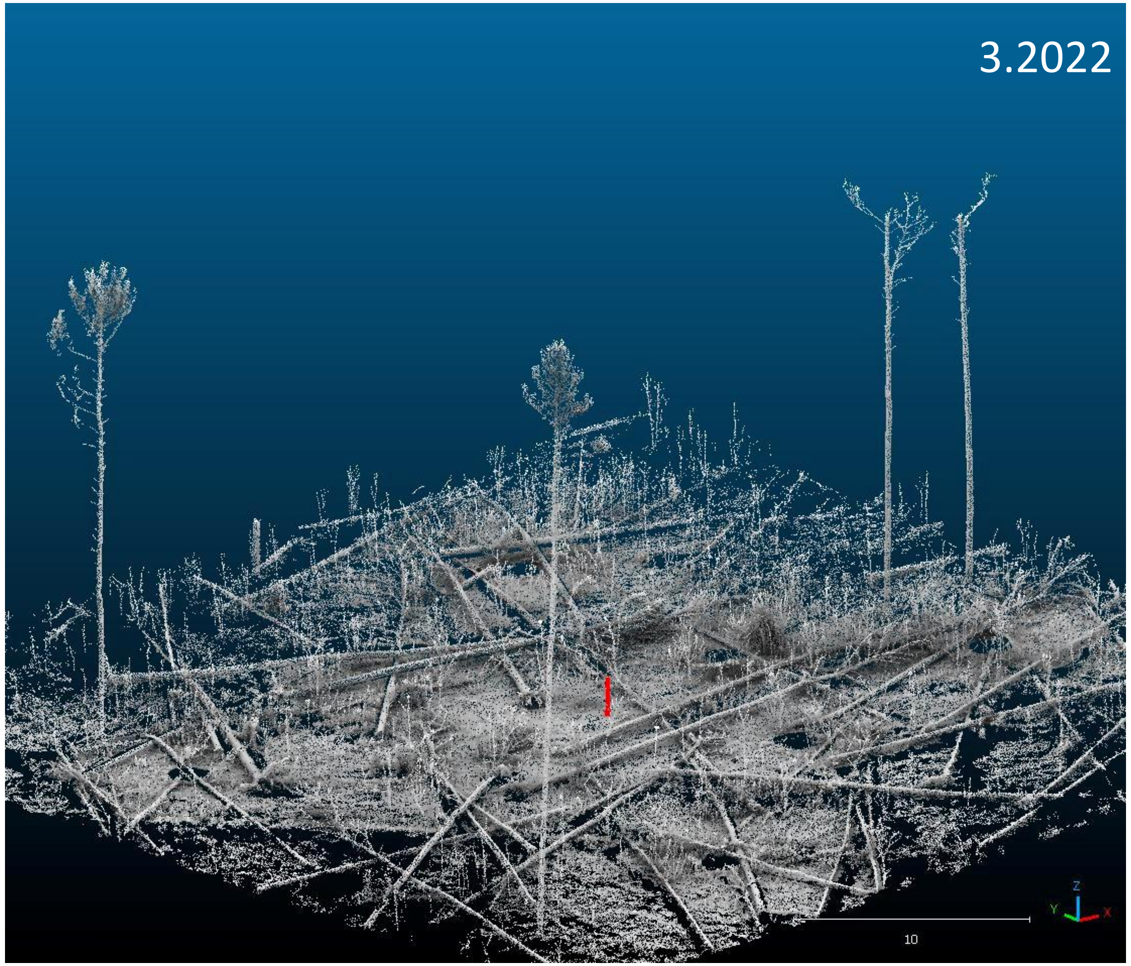
ful establishment of planted saplings over natural
they also acknowledged the negative effects of pine
n various ecosystem services like habitat provision
sity maintenance and concluded that seeding or
eration should be preferred over plantations in
ration.
countries, reforestation by planting after site
s considered as the most successful reforestation
ferred over seeding (Espelta et al.,
Ginzburg and Steinberger, 2012;
5). This could not be confirmed by
mportant to ensure that sufficient
cially pioneer tree species that can
rapidly. It is therefore advisable
hese species in regions with large
an become, calamity prone areas.
important role in conversion of
mmable forests.
possible reforestation strategy used
cheaper and considered to have a
t than planting. Broadcast seeding
n the air, representing an option
e areas (Lamb and Gilmour, 2003;
ian et al., 2005; Vallejo et al., 2009).
research performed after a wildfire
ly successful germination rate (circa
aerial seeding. It is also argued

Post-fire salvage logging

Post-fire salvage logging is the most common post-fire activity, and often the first measure applied after fire in various forest types around the world (Ne'eman et al., 1997; McIver and Starr, 2001; Beschta et al., 2004; Lindenmayer and Noss, 2006; Peterson et al., 2009; Vallejo et al., 2012b; Ascoli et al., 2013; Leverkus et al., 2014). This strategy seems to be especially attractive for private forest owners dependent on the revenues from charred wood and on the subsidies often granted by the state for post-fire salvage logging operations (Vallauri, 2005; Vallejo et al., 2012b). However, the harvested charred logs have often only very little economic value, sometimes not even covering the operation costs (Ibisch, 2019). This was the case in post-fire studies conducted in Mediterranean forests in Italy and Spain, where the high costs for post-fire logging resulted in no economic benefits (Beghin et al., 2010; Leverkus et al., 2012). Nevertheless, economic output will depend on the level of damage caused to the trees, harvesting technologies, and market conditions (Pereira et al., 2018). Further arguments in favor of post-fire salvage logging are fuel reduction on the forest floor reducing the risk of future fires, the prevention of pest outbreaks, the safety of forest visitors, and the facilitation of further restoration measures (like planting) planned for the stand (Ne'eman et al., 1997; McIver and Starr, 2001; Lindenmayer and Noss, 2006; Beghin et al., 2010; Castro et al., 2011; Leverkus et al., 2012; Ascoli et al., 2013). Additionally,

Schätzung und Verteilung der Biomasse: Lebende Biomasse, Totholz, und Entwicklung über die Zeit





Carsten Hess, NWA


Treuenbrietzen, Frohnsdorf, 1. September 2023


Treuenbrietzen, Frohnsdorf, 1. September 2023

Second forest fire 2022

17.06. – 22.06.2022, 200 ha

Treuenbrietzen south of road B102

Orthomosaic in RGB

Acquisition date: 27.06.2022
Aquisition by: UAV (Mavic Pro)
Flight height: 120 m

Legend
- Pyrophob_Sites
- VIP plots

Orthomosaic:
University of Potsdam
Institute of Environmental Science and Geography

Background:
© OpenStreetMap-Mitwirkende

CRS:
WGS84 / UTM Zone 33N (EPSG 32633)

D
K
B
E
0
100


Treuenbrietzen, Frohnsdorf, 1. September 2023


Treuenbrietzen, Frohnsdorf, 1. September 2023

Second forest fire 2022

17.06. – 22.06.2022, 200 ha

Comeback of *Populus tremula* after only 2 months

RE-storation?
PRO-storation?

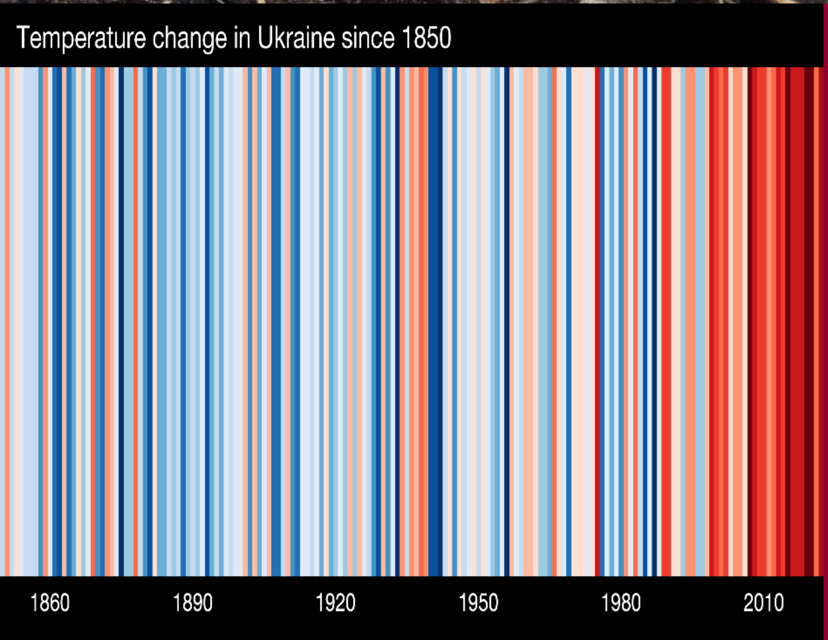
- Reforestation?
- Proforestation?
- Ecosystem design?

  (incl. assisted migration)

Реставрація

Лісовідновлення?
Лісорозведення?
Дизайн екосистем?
(в т.ч. сприяння міграції)

„Pro-storation“ ?
„Про-ставрація“?



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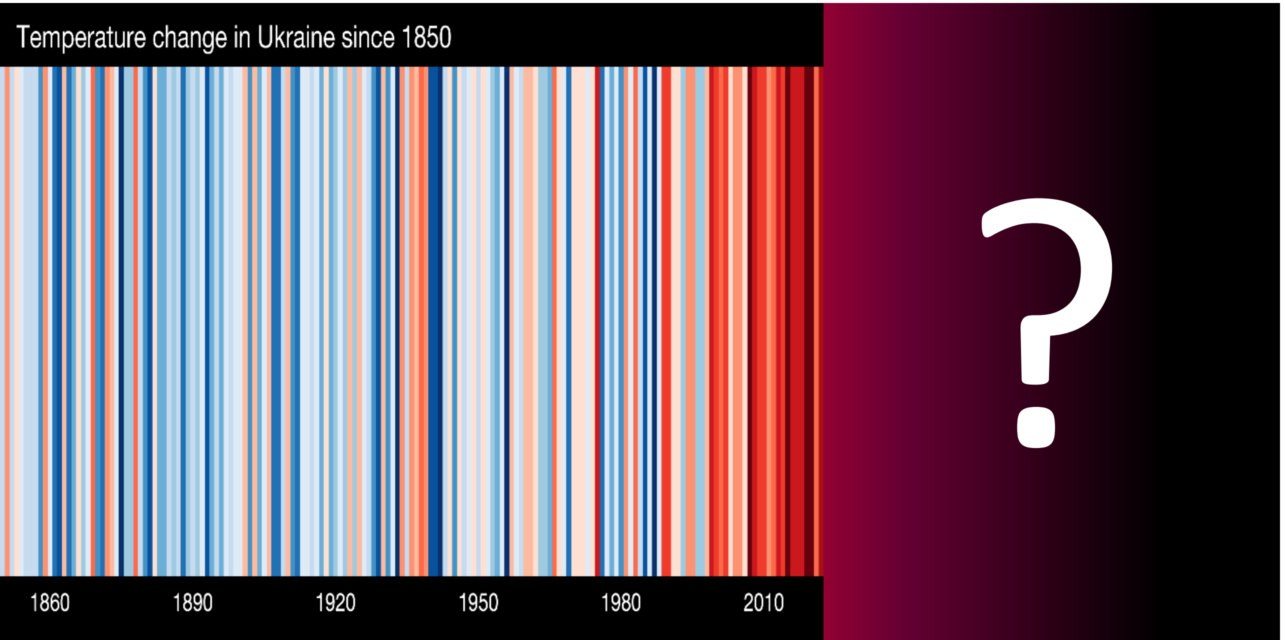
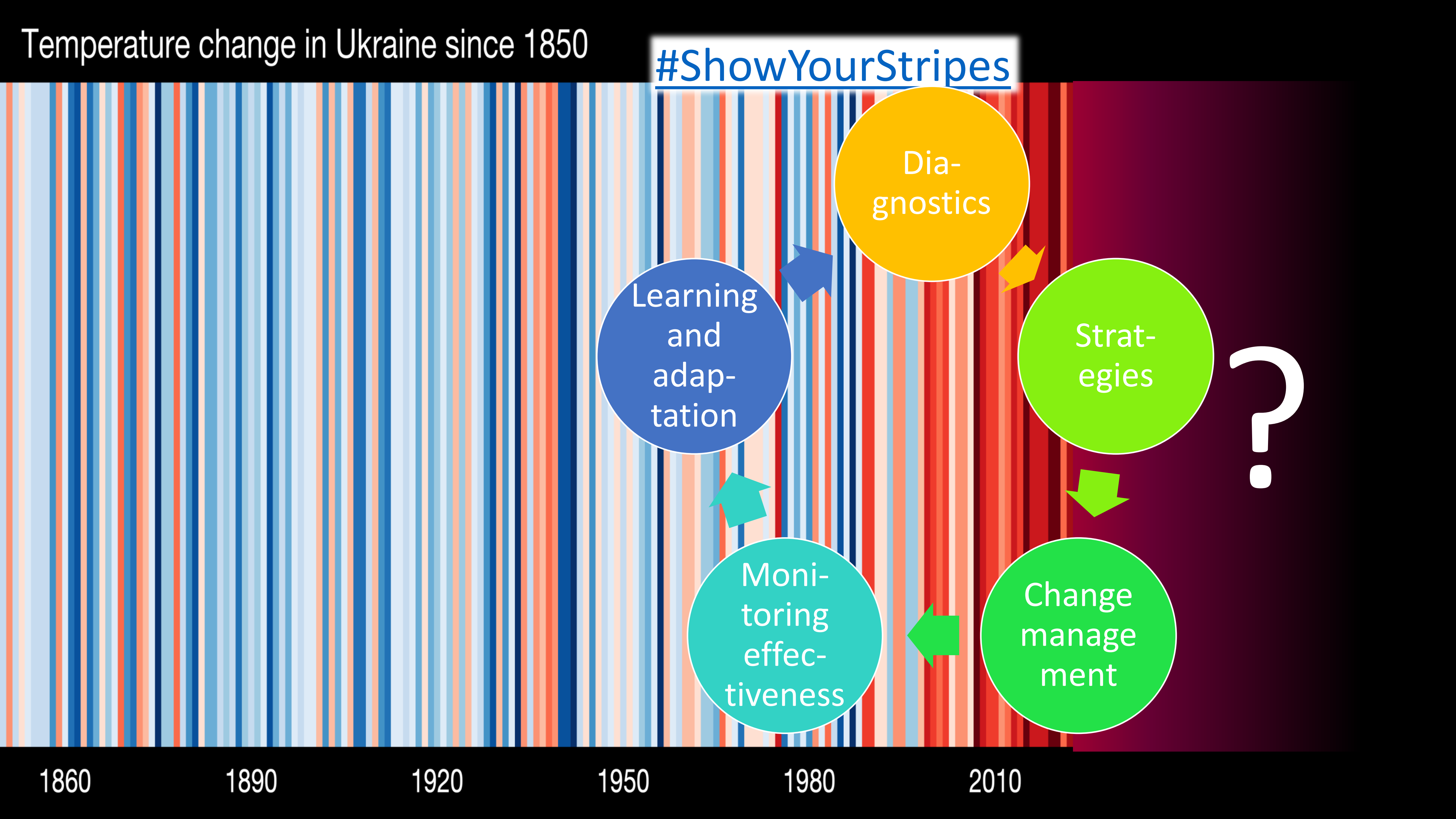
General questions for discussion
Загальні питання для обговорення

- In times of rapid global/ environmental/ socioeconomic change, does it make sense and is it possible to restore a system to the state it once was?
- Restoration of specific components vs. restoration of functions / functionality?
- How can a higher level of resilience be achieved while a system must adapt to rapid change?

У часи швидких глобальних/екологічних/соціально-економічних змін, чи має сенс і чи можливо відновити систему до того стану, в якому вона була колись?

- Відновлення окремих компонентів чи відновлення функцій/функціональності?
- Як можна досягти вищого рівня стійкості, коли система повинна адаптуватися до швидких змін?

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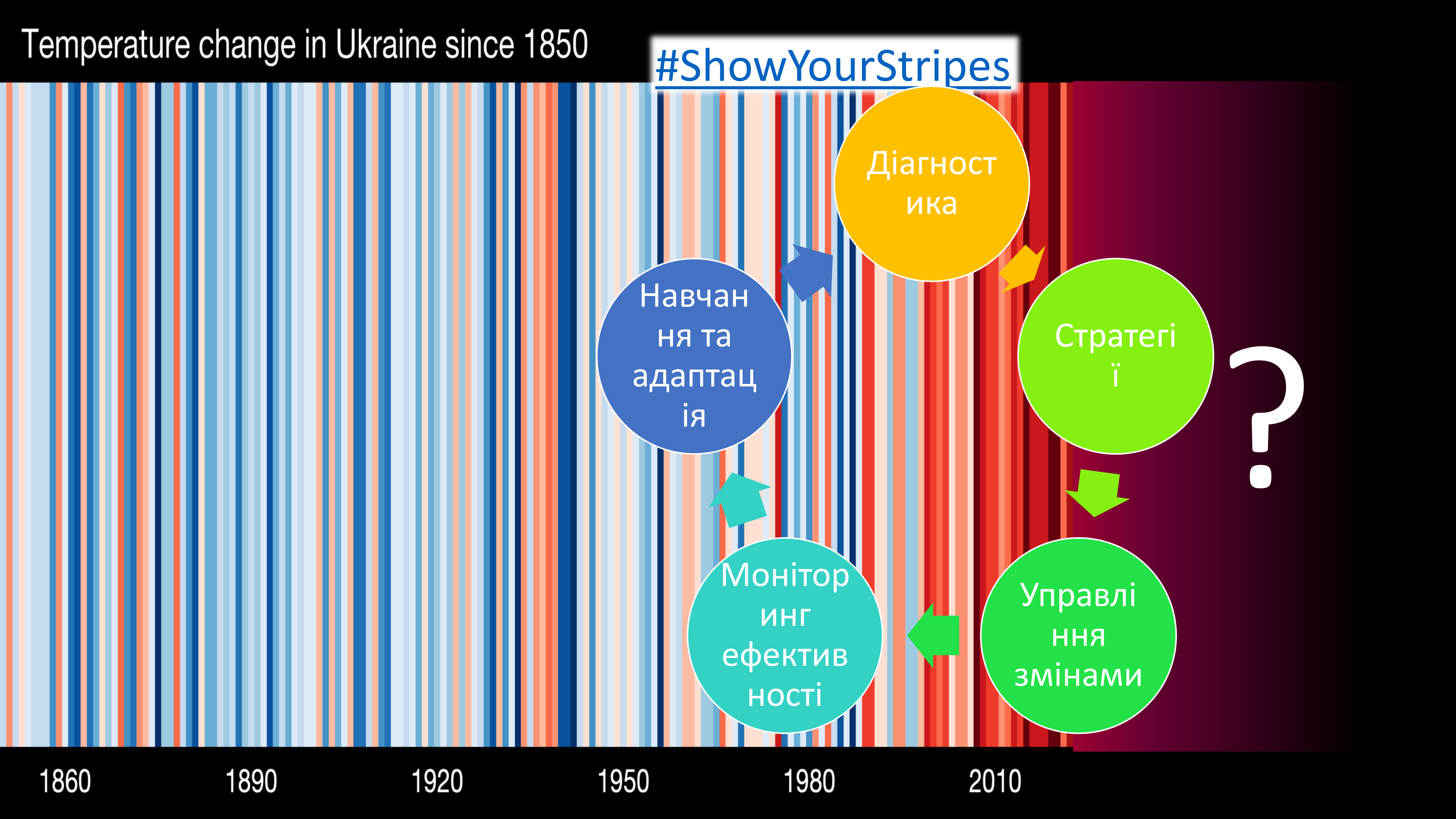

Temperature change in Ukraine since 1850
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