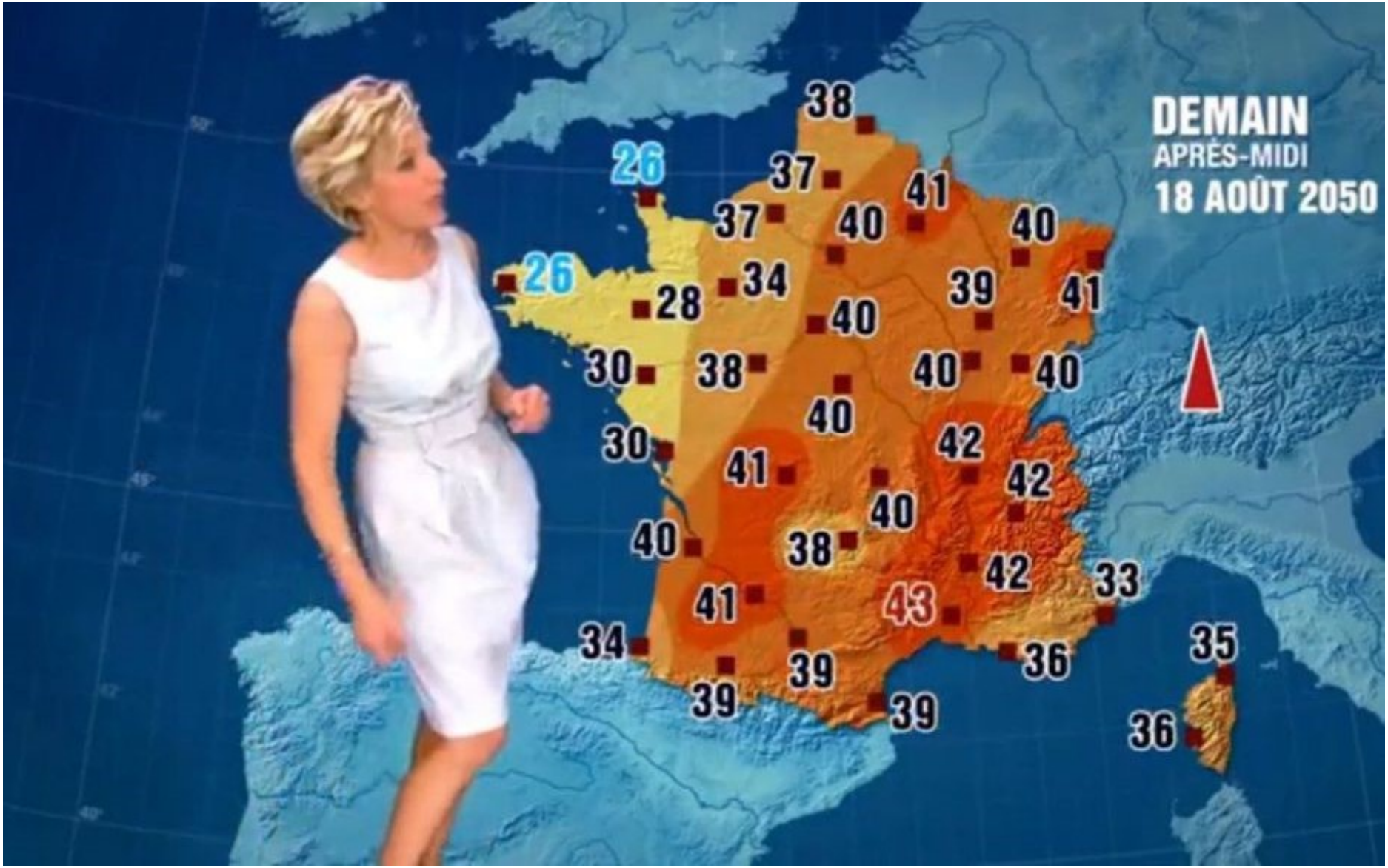
PEOR DE LO ESPERADO

Señorío de Berriz, 28/10/2019


DEMAIN
APRÈS-MIDI
18 AOÛT 2050
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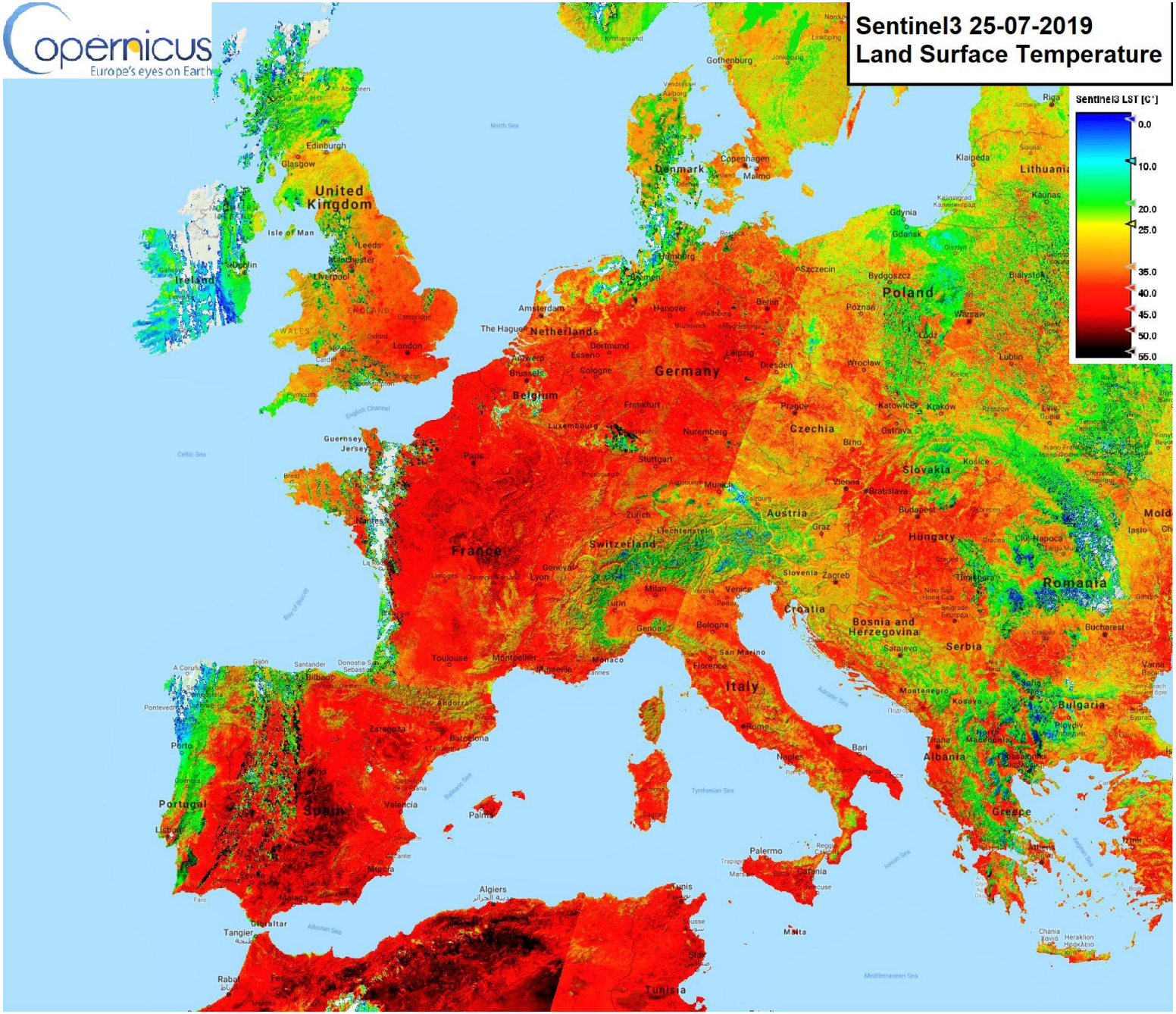
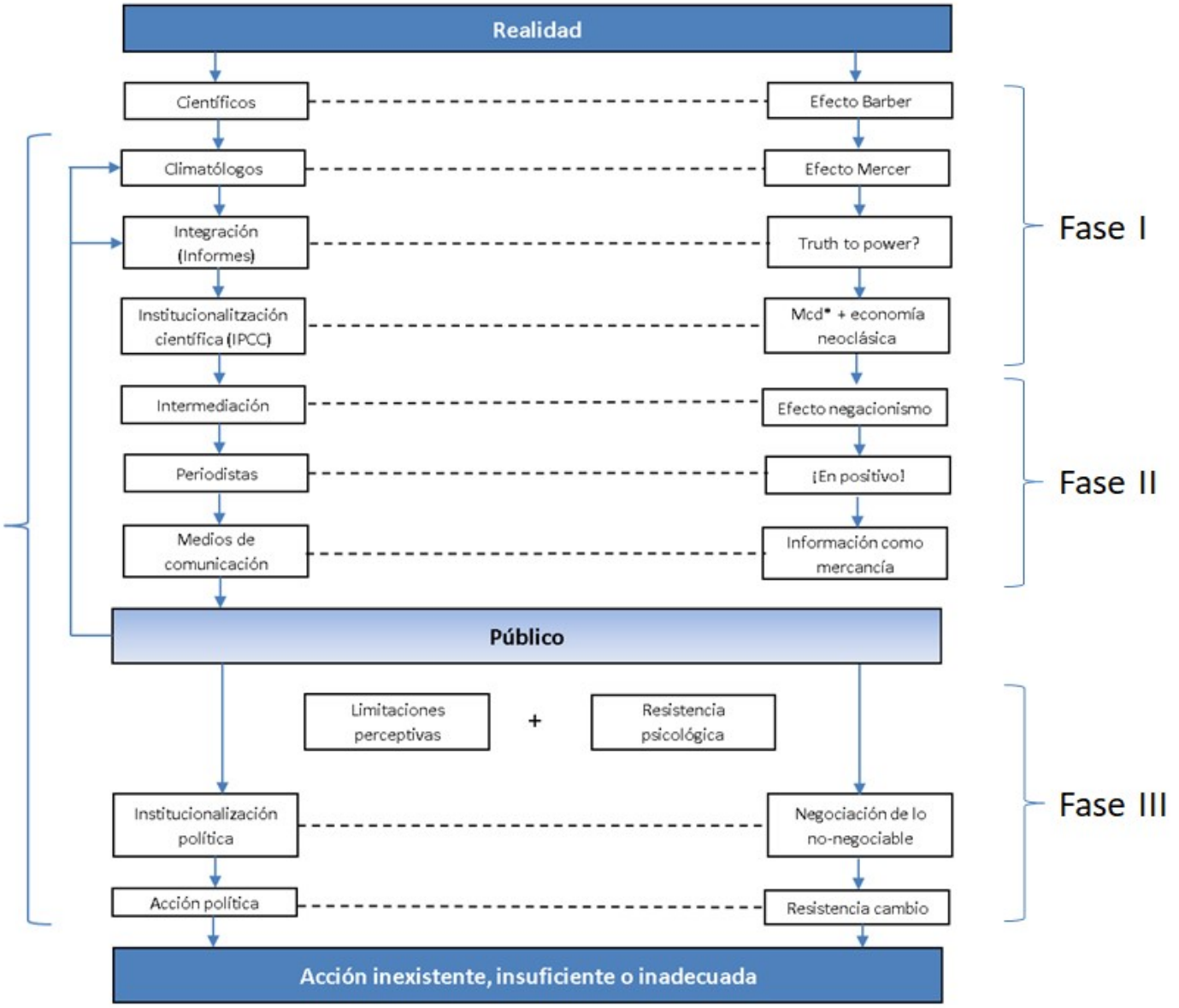

Copernicus
Europe's eyes on Earth
Sentinel3 25-07-2019
Land Surface Temperature
Sentinel3 LST [C°]
0.0
10.0
20.0
25.0
35.0
40.0
45.0
50.0
55.0
United Kingdom
Ireland
Netherlands
Belgium
Germany
France
Switzerland
Austria
Czechia
Slovakia
Poland
Denmark
Hungary
Romania
Croatia
Bosnia and Herzegovina
Serbia
Italy
Spain
Portugal
Albania
Greece
Bulgaria
Tunisia
Malta

La intervención de Dios en los +2 ºC: TWA

- Este origen, de carácter sólo aparentemente científico, parte de dos principios.
  - El físico. Reza, textualmente, *conservar la Creación*.
  - El socioeconómico: hacerlo al mínimo coste, con la condición de no superar una reducción máxima del 5% del PIB mundial a largo medio-plazo.
- Para definir lo que se considera por “normalidad” se toma en consideración el margen en el que se ha movido la temperatura media de la Tierra en la Era Cuaternaria: un mínimo de 10,4 ºC durante las edades de hielo y, se decía, un máximo de 16,1 ºC en el último interglacial. Nótese que, implícitamente, se declara que el Creador actuó en el día cero de esa Era.
- Superar estos límites sería inaceptable, pues la ruptura de los ecosistemas sería muy fuerte. Pero para empezar, y sin pedir permiso a quien corresponda, me elegiré un margen de 0,5 ºC no de seguridad, sino en el otro sentido, pues interpretaré el margen de incertidumbre en el sentido más laxo. De modo que la temperatura media de la Tierra no debe superar los 16,6 ºC.
- Puesto que la temperatura, en 1995, era ya de 15,3 ºC, concluyeron que era posible permitirse 1,3 ºC más sin estropear los designios de Dios, objetivo de referencia. Si consideramos que, en 1995, la temperatura había ya aumentado 0,7 ºC respecto al período preindustrial, hip, hop, ¡2 ºC!.
- Resulta interesante darse cuenta de que este organismo prefiera referirse a la *preservación de la Creación* en lugar de efectuar razonamientos de orden ético, de justicia intergeneracional o pudiendo darse cuenta simplemente, si no quiere llegar tan lejos, de lo diferentes que son los mundos incluso dentro del margen creacionista que plantean, y señalar que el tránsito de unos a otros no es precisamente suave sino que serían necesarias varias arcas de Noé para salvar sólo los muebles.

Ferran P. Vilar (2011) - Cambio climático: ¿cuánto es demasiado? 3: Historia de una cifra – 3.2. El origen religioso de la versión (supuestamente) científica – Usted no se lo Cree - https://ustednoselocree.com/2011/10/07/historia-de-una-cifra-2/

Fases y etapas de la dilución progresiva de la realidad



* Mínimo común denominador

Ferran Puig Vilar (2017) - De la realidad ontológica a la percepción social del cambio climático: el papel de la comunidad científica en la dilución de la realidad - Papeles de relaciones ecosociales y cambio global 136:55-73

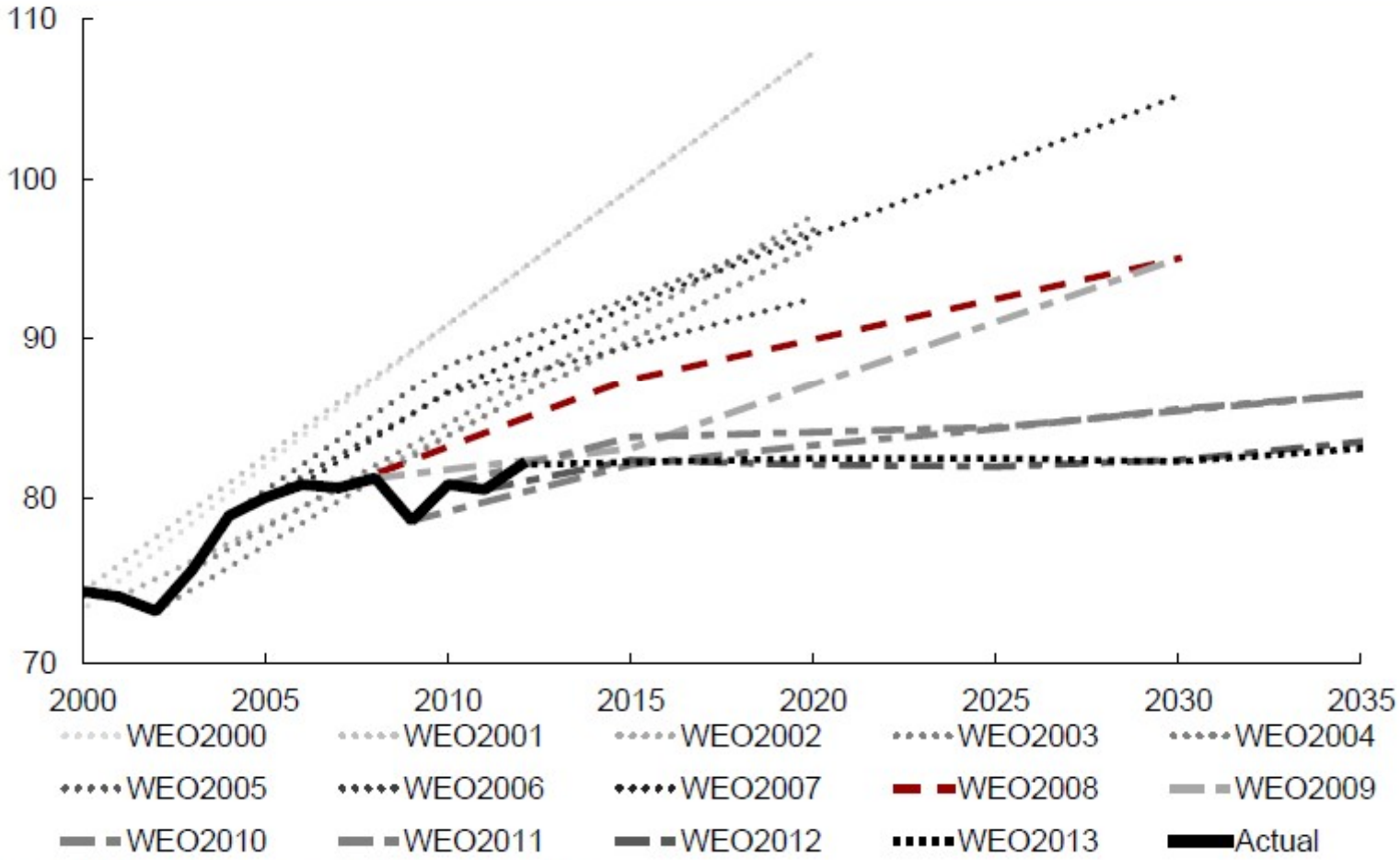
Ruth DeFries et al (2019) - The missing economic risks in assessments of climate change impacts - London School of Economics, 20/09/2019 - The Grantham Research Institute on Climate Change and the Environment; The Earth Institute, Columbia University; The Potsdam Institute for Climate Impact Research - http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2019/09/The-missing-economic-risks-in-assessments-of-climate-change-impacts-2.pdf - 14 autores

“Mi convivencia de larga duración con muchos colegas no me ofrece duda alguna: aunque trabajan con diligencia, a menudo con un telón de fondo de escepticismo organizado, muchos acaban censurando su propia investigación.”

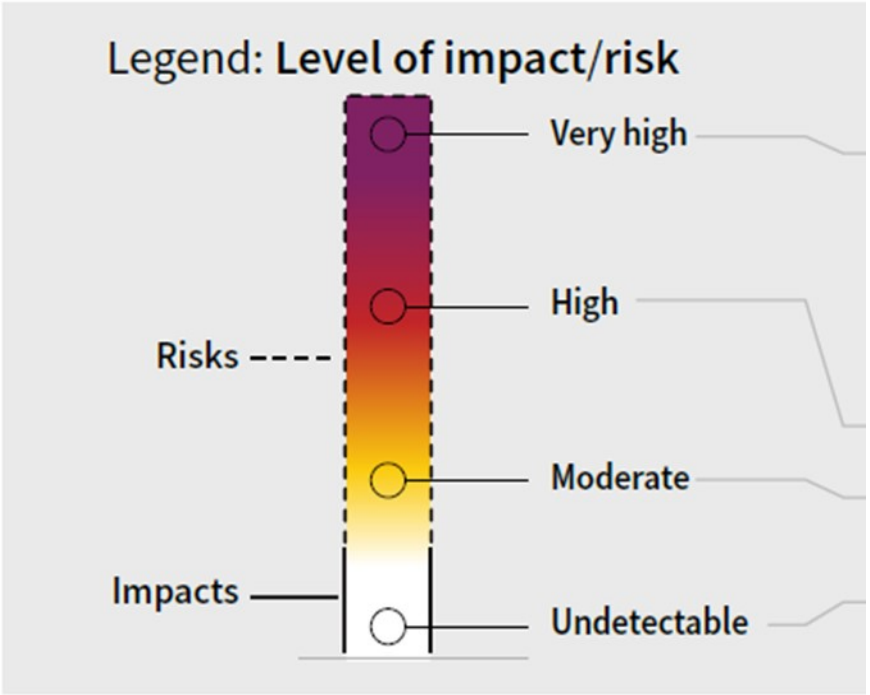
Kevin Anderson (2015) - Duality in climate science - Nature Geoscience 8:898–900 doi:10.1038/ngeo2559 – 12/10/2015 - Tyndall Centre for Climate Change Research, University of Manchester - http://goo.gl/gbWEWD

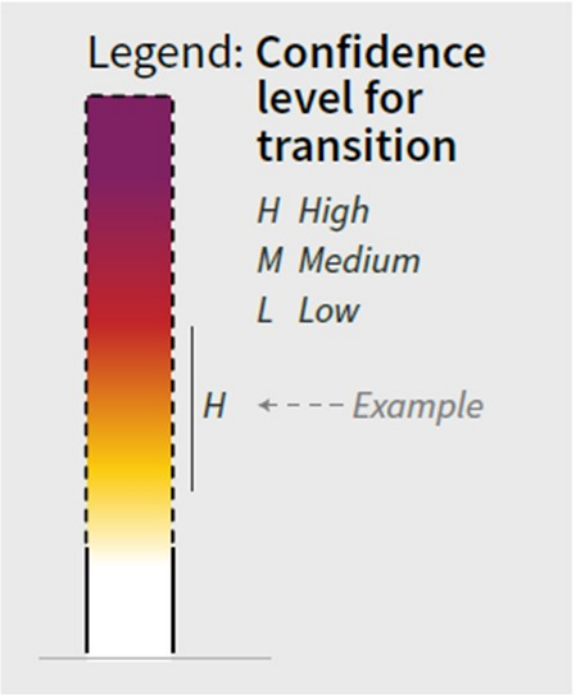
UPPSALA UNIVERSITET

Conventional outlook

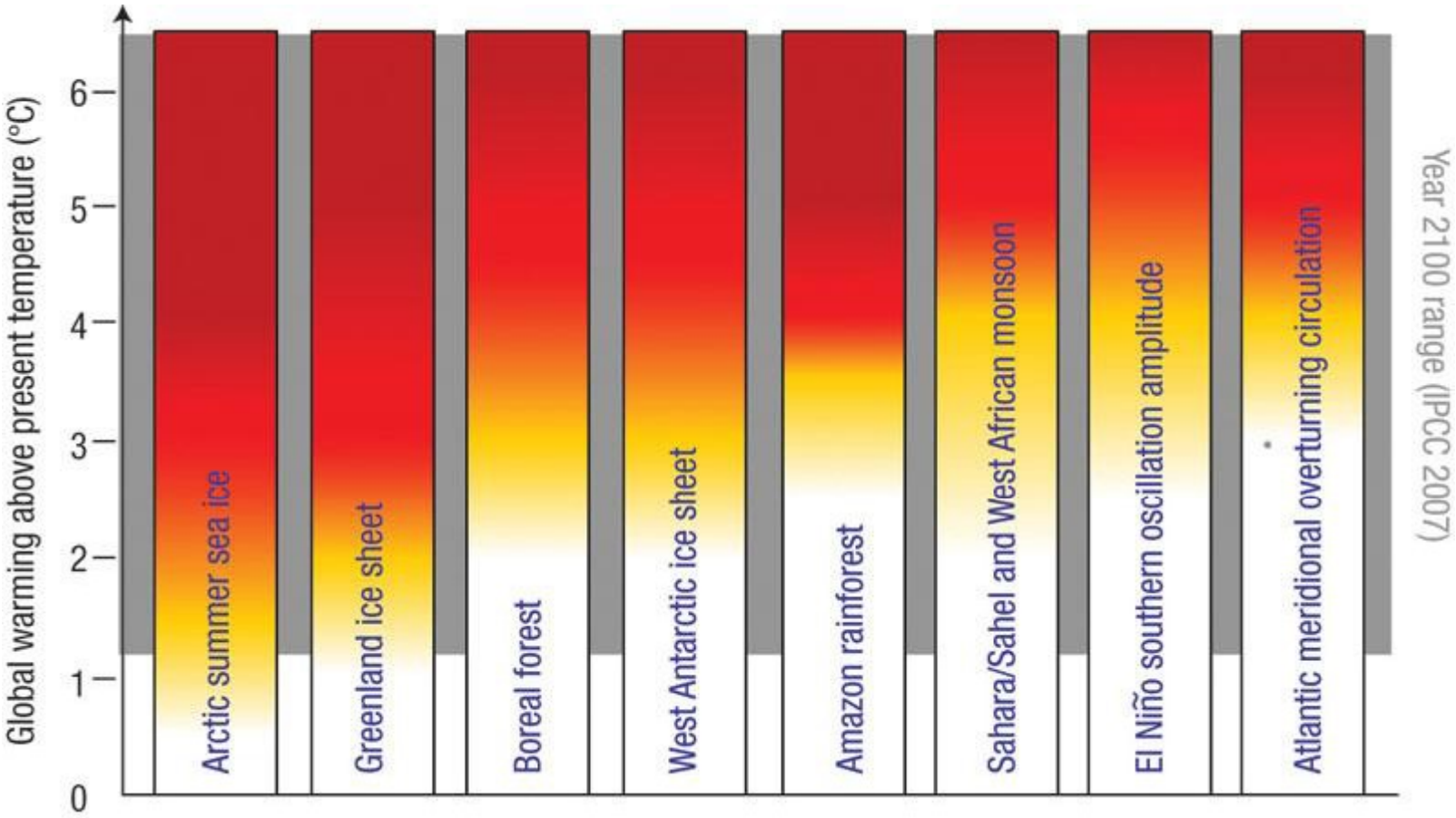


Sources: *IEA World Energy Outlook 2000-2013*



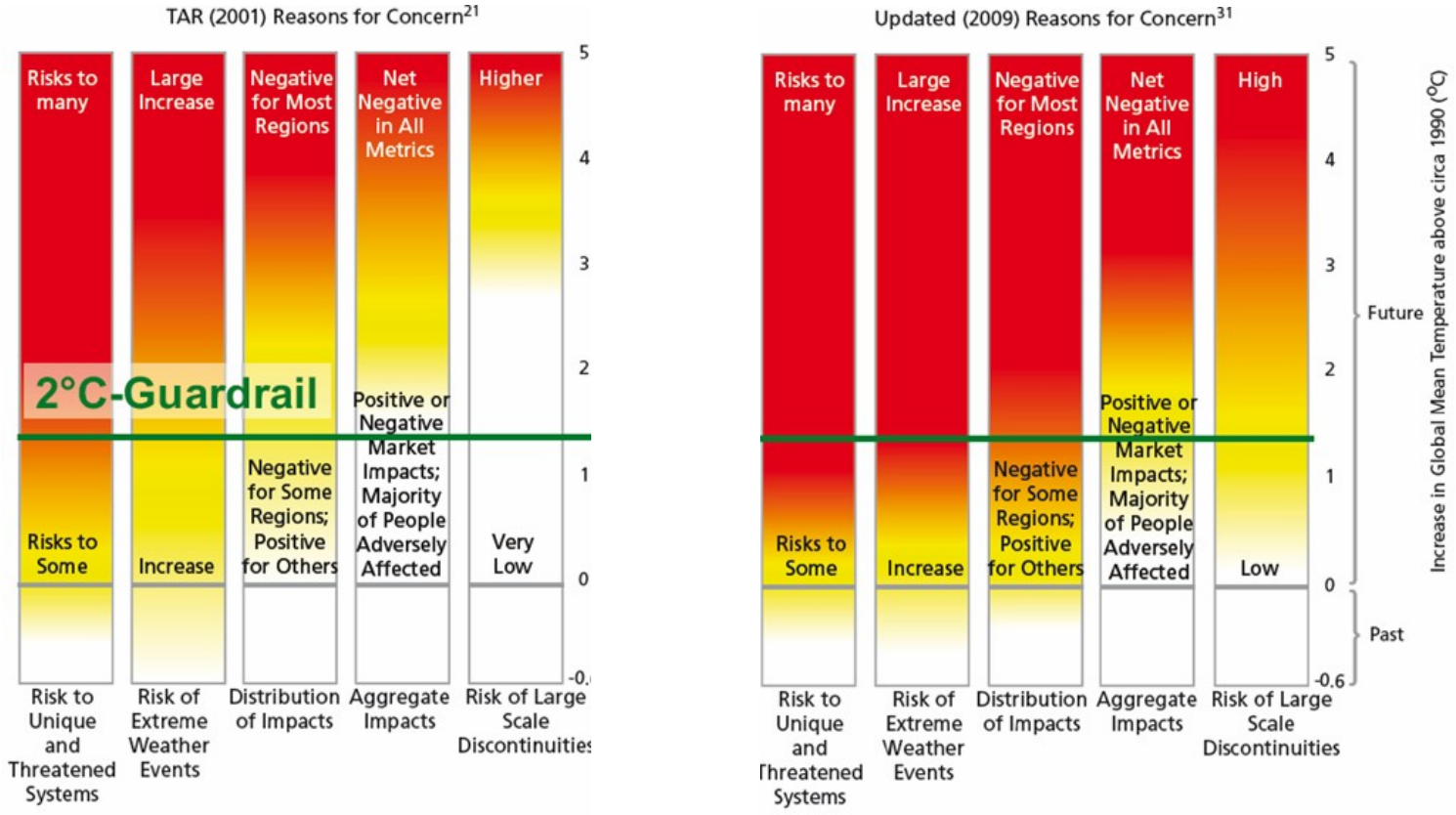


- **Purple**: Very high probability of severe impacts/ risks and the presence of significant irreversibility or the persistence of climate-related hazards, combined with limited ability to adapt due to the nature of the hazard or impacts/risks.
- **Red**: Significant and widespread impacts/risks.
- **Yellow**: Impacts/risks are detectable and attributable to climate change with at least medium confidence.
- **White**: Impacts/risks are undetectable.



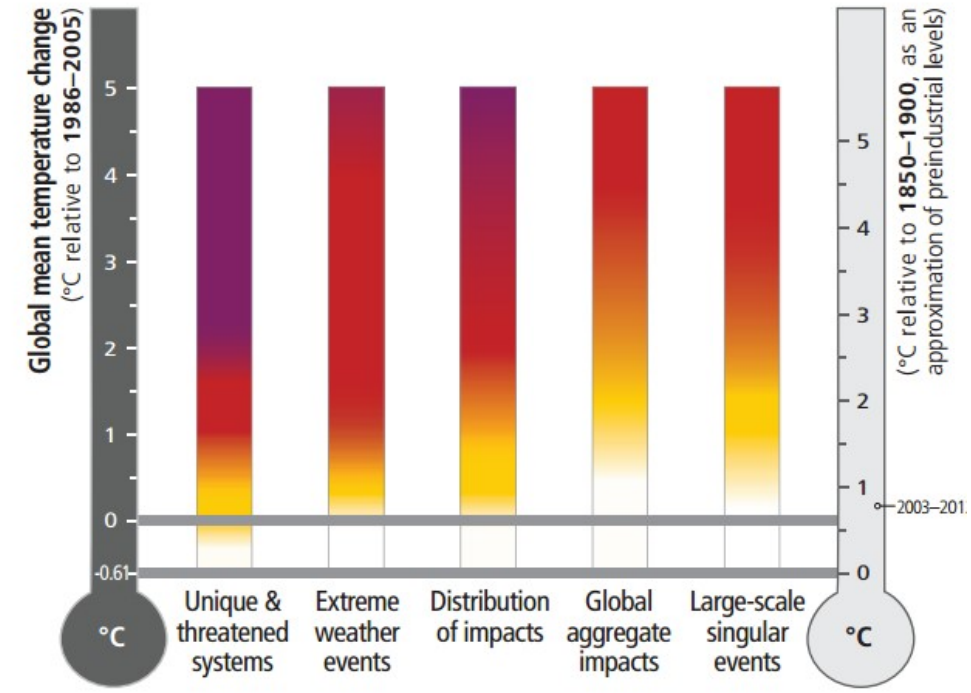
Timothy M. Lenton and Hans Joachim Schellnhuber (2007) - Tipping the scales - Nature Reports Climate Change 1:97-98 doi:10.1038/climate.2007.65 - School of Environmental Sciences, University of East Anglia; Potsdam Institute for Climate Impact Research - http://www.nature.com/climate/2007/0712/full/climate.2007.65.html

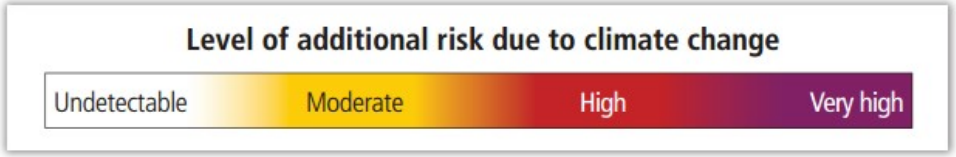
Son seguros + 2˚C?



Joel B. Smith et al (2009) – Assessing dangerous climate change through an update of the Intergovernmental Panel on Climate Change (IPCC) 'reasons for concern' - Proceedings of the National Academy of Sciences PNAS 106:4133–4137 doi:10.1073/pnas.0812355106 – 15 autores

IPCC AR5 WG II - 2014



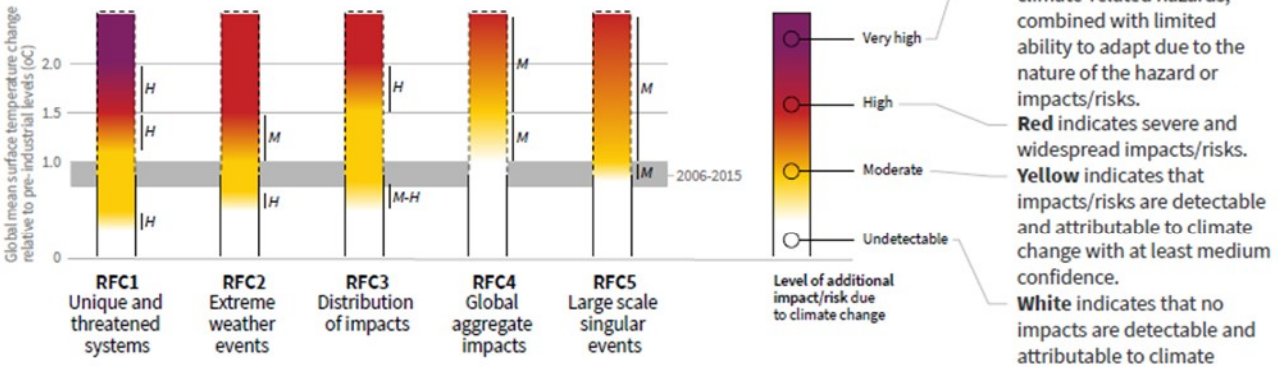


IPCC SR1.5 (2018)

How the level of global warming affects impacts and/or risks associated with the Reasons for Concern (RFCs) and selected natural, managed and human systems

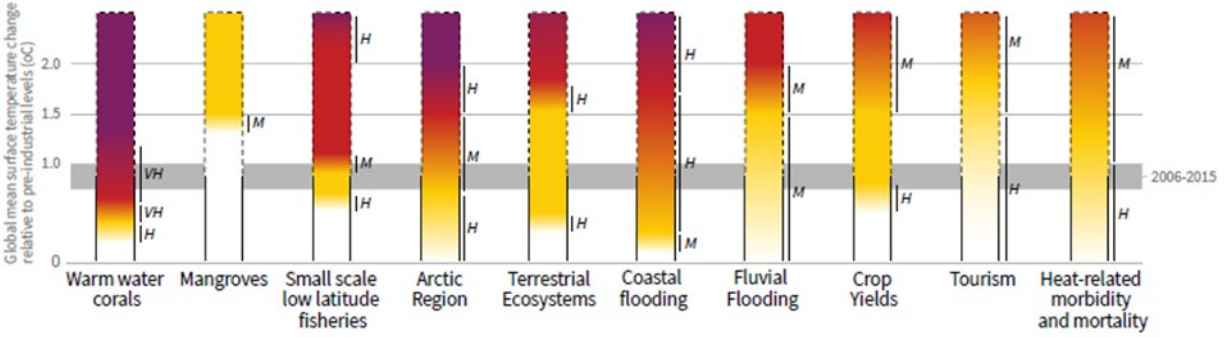
Five Reasons For Concern (RFCs) illustrate the impacts and risks of different levels of global warming for people, economies and ecosystems across sectors and regions.

Impacts and risks associated with the Reasons for Concern (RFCs)



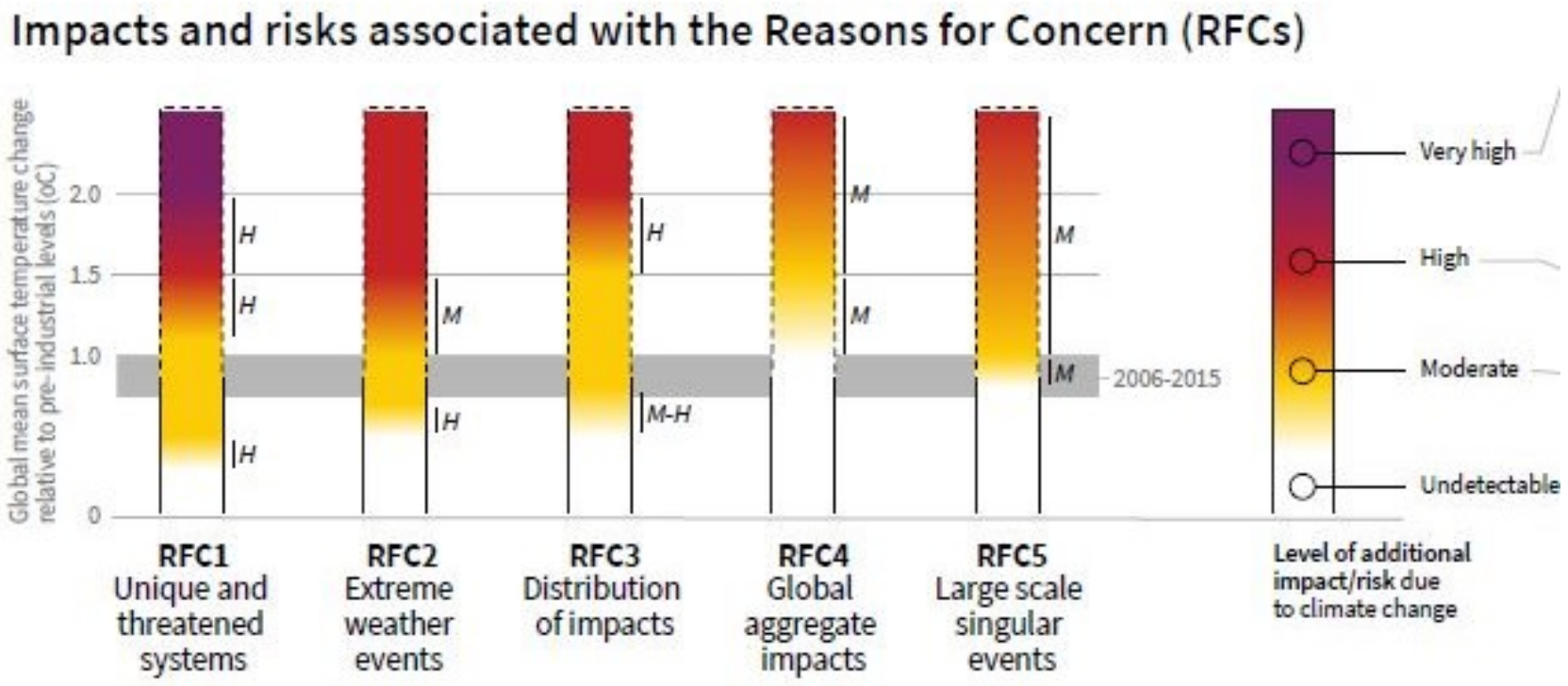
Purple indicates very high risks of severe impacts/risks and the presence of significant irreversibility or the persistence of climate-related hazards, combined with limited ability to adapt due to the nature of the hazard or impacts/risks.
Red indicates severe and widespread impacts/risks.
Yellow indicates that impacts/risks are detectable and attributable to climate change with at least medium confidence.
White indicates that no impacts are detectable and attributable to climate change.

Impacts and risks for selected natural, managed and human systems

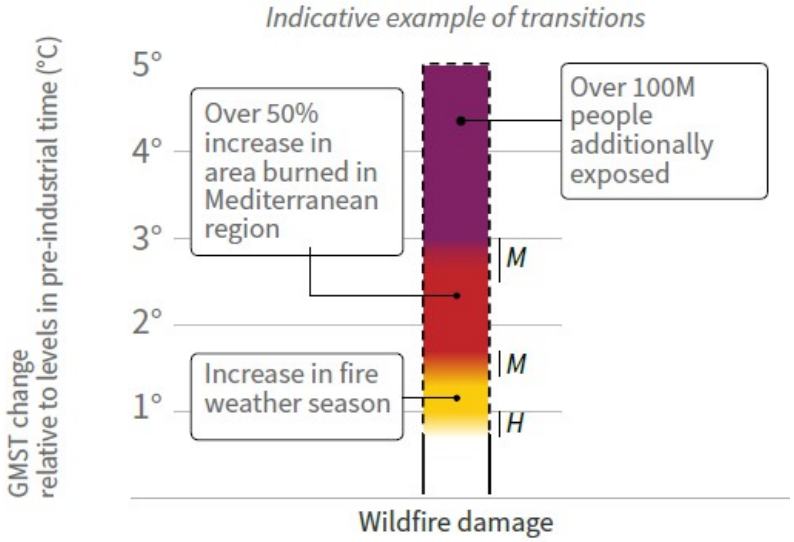


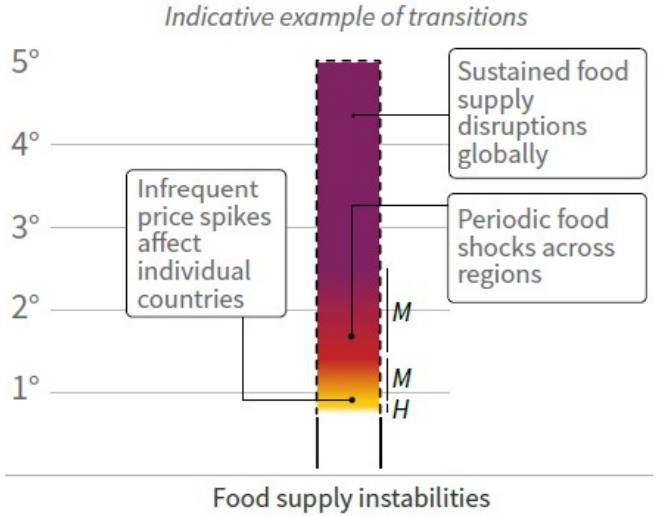
Confidence level for transition: *L*=Low, *M*=Medium, *H*=High and *VH*=Very high

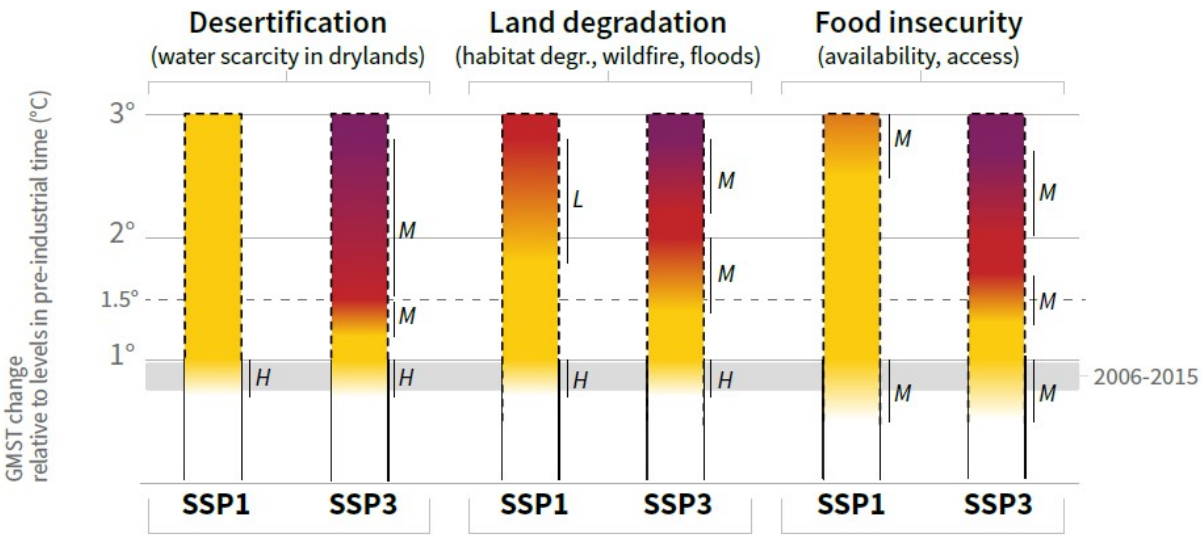
IPCC SR15


Impacts and risks associated with the Reasons for Concern (RFCs)
Global mean surface temperature change relative to pre-industrial levels (oC)
2.0
1.5
1.0
0
H
H
H
M
H
H
M-H
M
M
M
M
2006-2015
Very high
High
Moderate
Undetectable
RFC1
Unique and threatened systems
RFC2
Extreme weather events
RFC3
Distribution of impacts
RFC4
Global aggregate impacts
RFC5
Large scale singular events
Level of additional impact/risk due to climate change

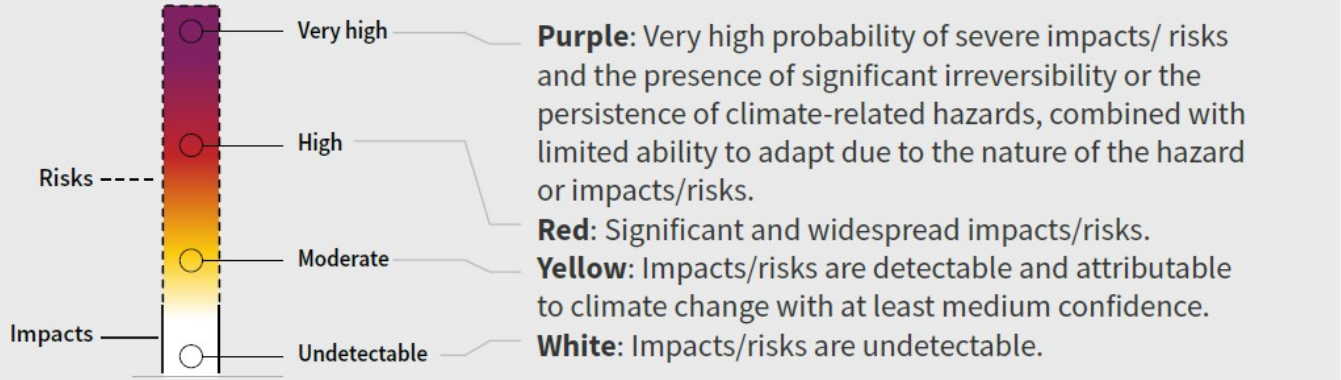
IPCC SRCCL

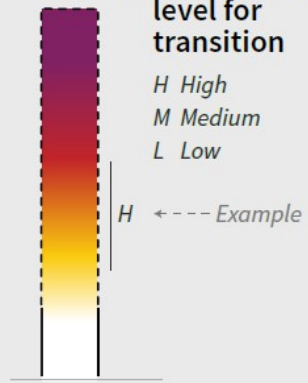

Indicative example of transitions
GMST change relative to levels in pre-industrial time (°C)
5°
4°
3°
2°
1°
Over 50% increase in area burned in Mediterranean region
Over 100M people additionally exposed
Increase in fire weather season
M
M
H
Wildfire damage


Indicative example of transitions
5°
4°
3°
2°
1°
Infrequent price spikes affect individual countries
Sustained food supply disruptions globally
Periodic food shocks across regions
M
M
H
Food supply instabilities



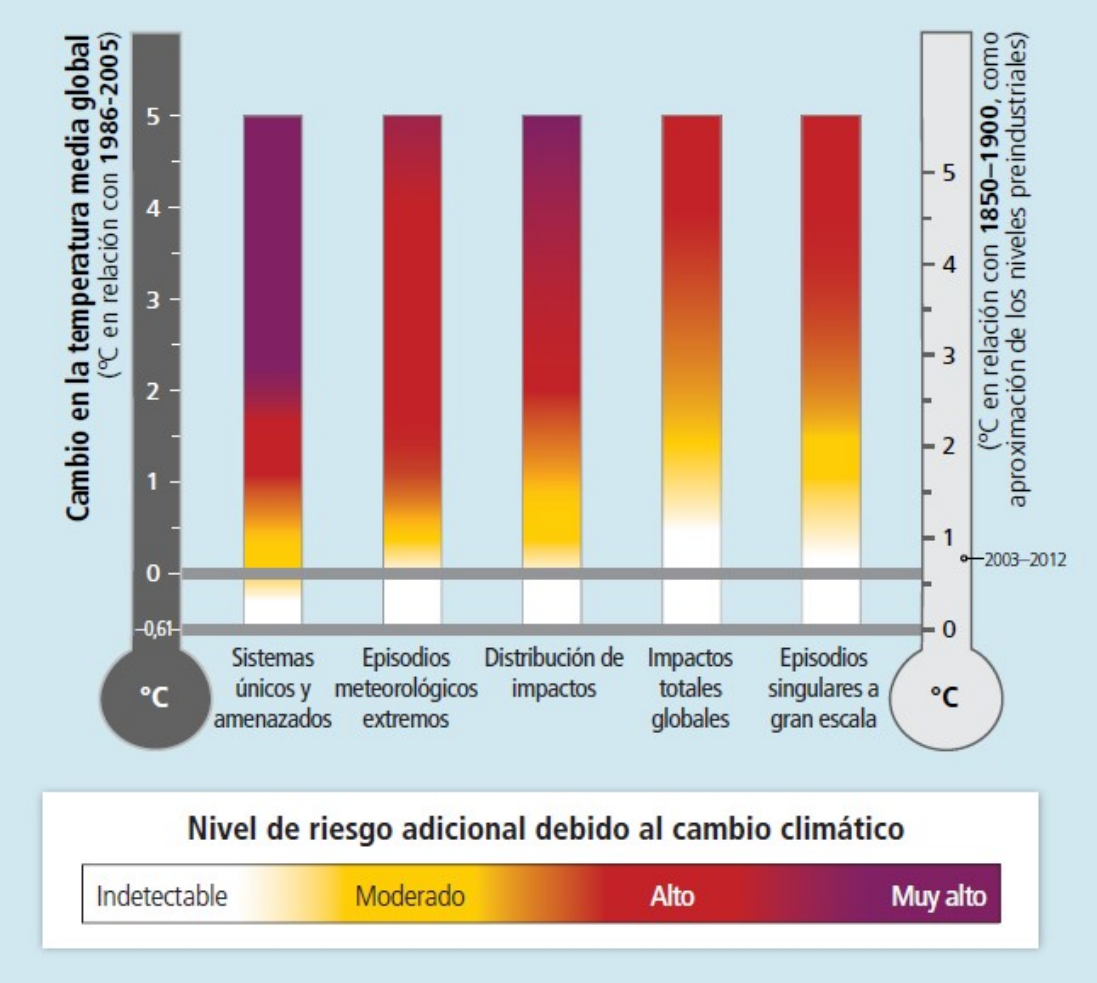
Socio-economic choices can reduce or exacerbate climate related risks as well as influence the rate of temperature increase. The **SSP1** pathway illustrates a world with low population growth, high income and reduced inequalities, food produced in low GHG emission systems, effective land use regulation and high adaptive capacity. The **SSP3** pathway has the opposite trends. Risks are lower in SSP1 compared with SSP3 given the same level of GMST increase.





Climate Change and Land

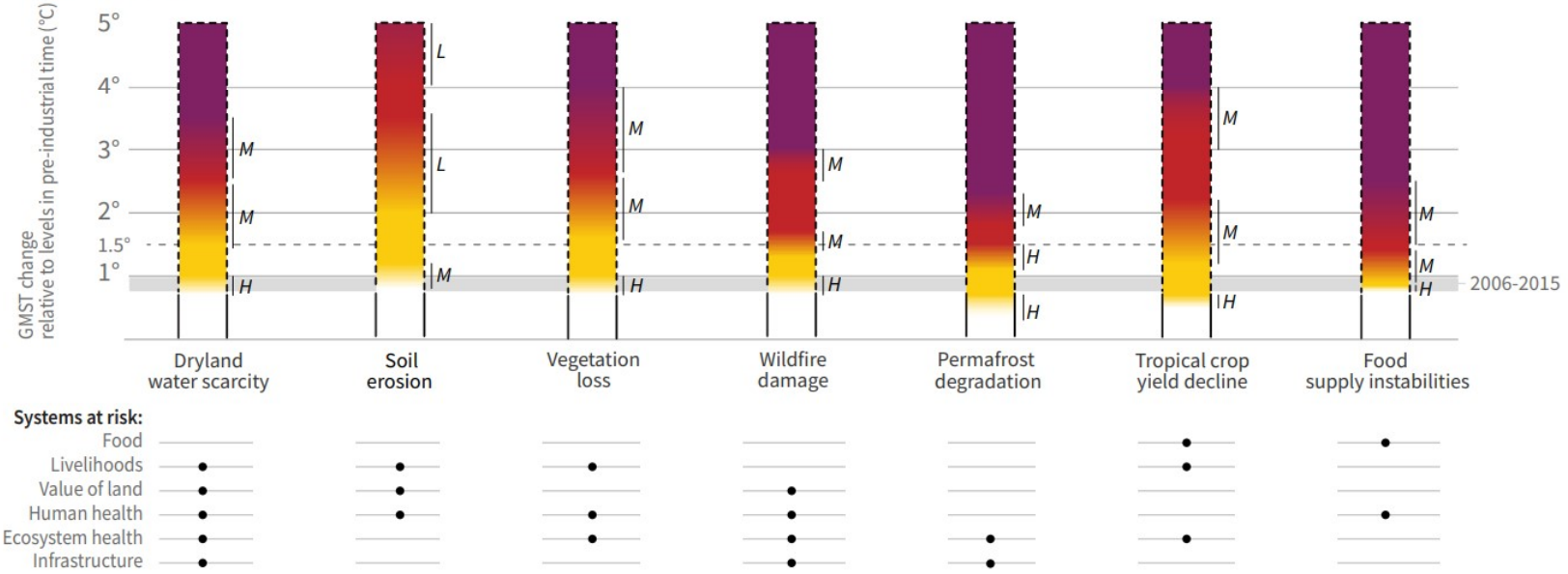
IPCC AR5 SYR


Cambio en la temperatura media global
(°C en relación con 1986-2005)
5
4
3
2
1
0
−0,61
°C
Sistemas únicos y amenazados
Episodios meteorológicos extremos
Distribución de impactos
Impactos totales globales
Episodios singulares a gran escala
(°C en relación con 1850–1900, como aproximación de los niveles preindustriales)
5
4
3
2
1
2003–2012
0
°C
Nivel de riesgo adicional debido al cambio climático
Indetectable
Moderado
Alto
Muy alto

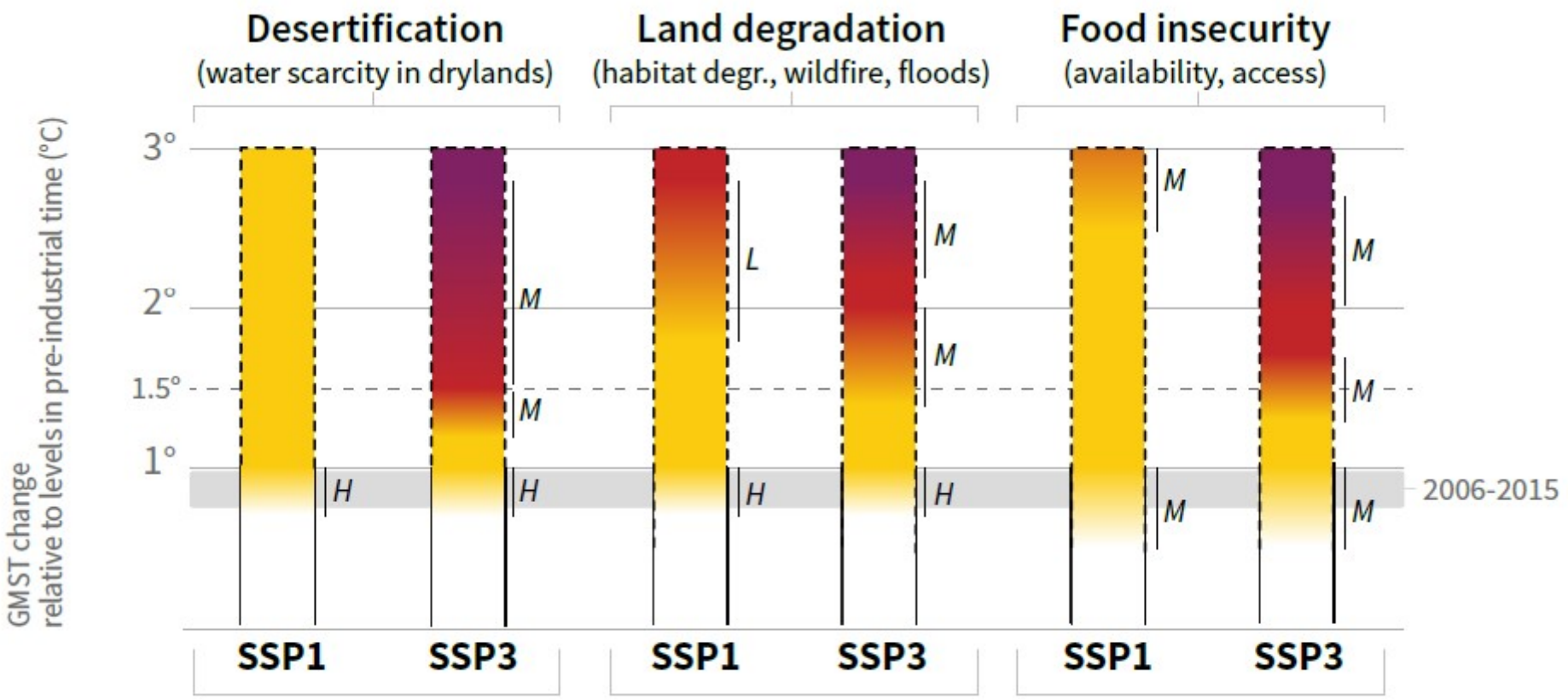
IPCC SRCCL

A. Risks to humans and ecosystems from changes in land-based processes as a result of climate change

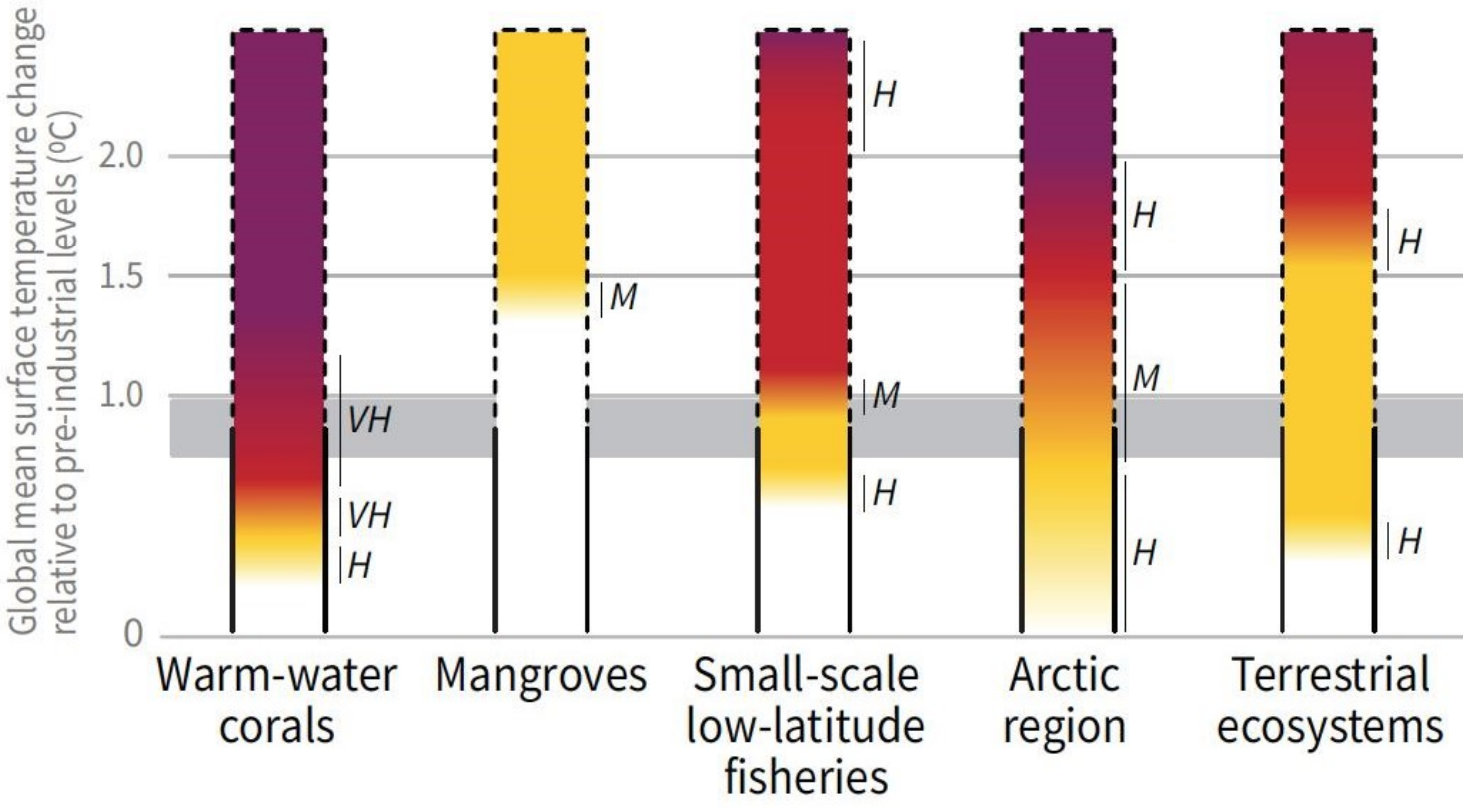
Increases in global mean surface temperature (GMST), relative to pre-industrial levels, affect processes involved in **desertification** (water scarcity), **land degradation** (soil erosion, vegetation loss, wildfire, permafrost thaw) and **food security** (crop yield and food supply instabilities). Changes in these processes drive risks to food systems, livelihoods, infrastructure, the value of land, and human and ecosystem health. Changes in one process (e.g. wildfire or water scarcity) may result in compound risks. Risks are location-specific and differ by region.



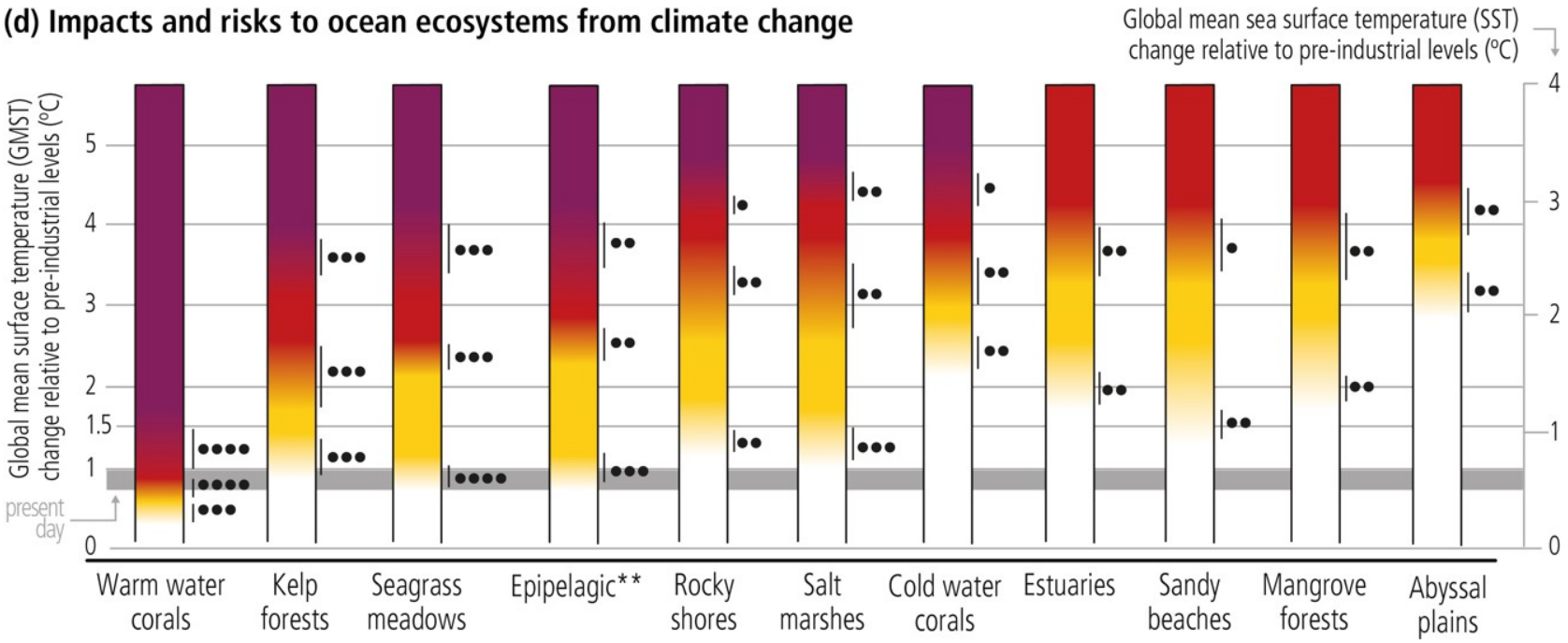
IPCC SRCCL


Desertification
(water scarcity in drylands)
Land degradation
(habitat degr., wildfire, floods)
Food insecurity
(availability, access)
GMST change
relative to levels in pre-industrial time (°C)
3°
2°
1.5°
1°
2006-2015
L
M
H
SSP1
SSP3

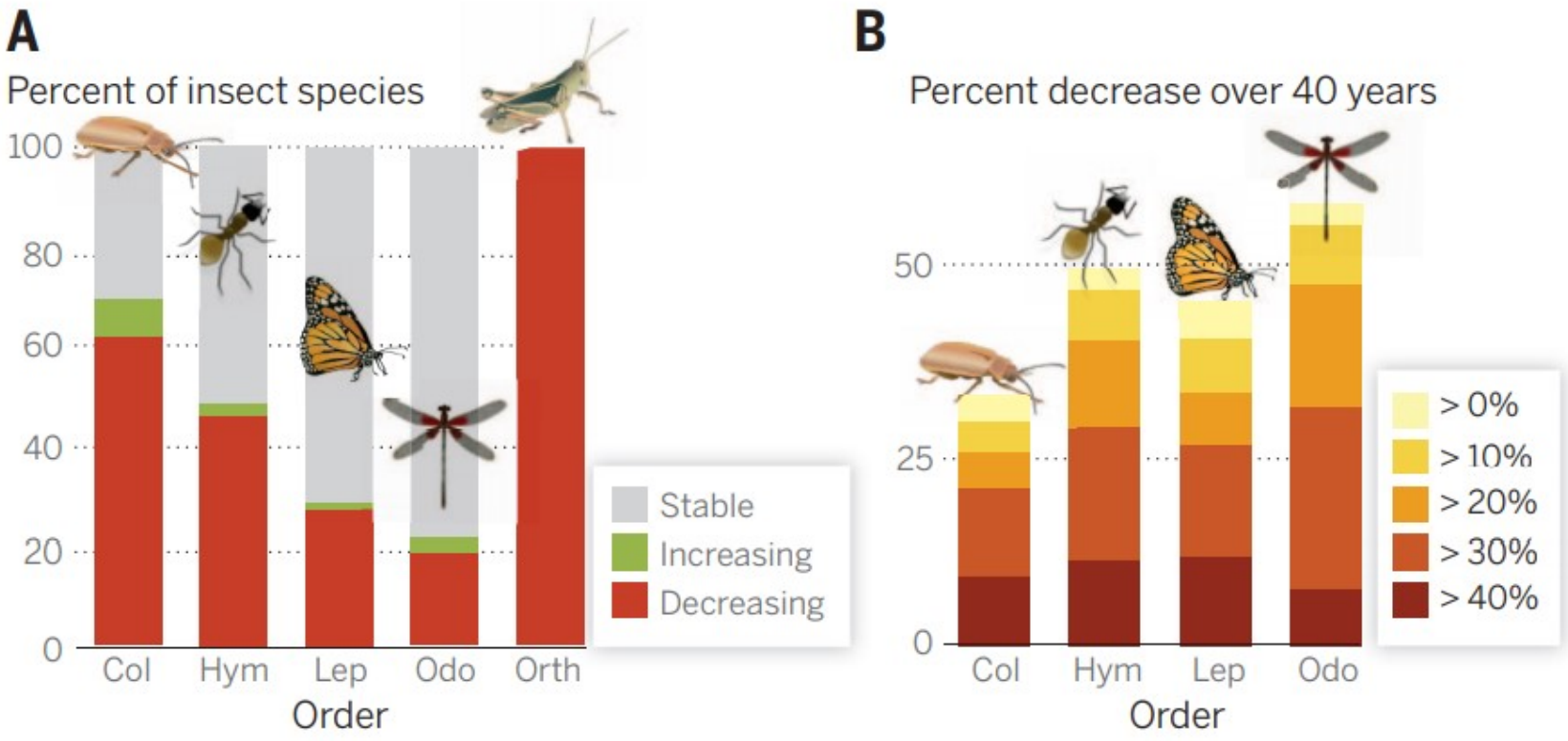
SROCC


Global mean surface temperature change relative to pre-industrial levels (°C)
2.0
1.5
1.0
0
VH
VH
H
M
H
M
H
H
M
H
H
Warm-water corals
Mangroves
Small-scale low-latitude fisheries
Arctic region
Terrestrial ecosystems

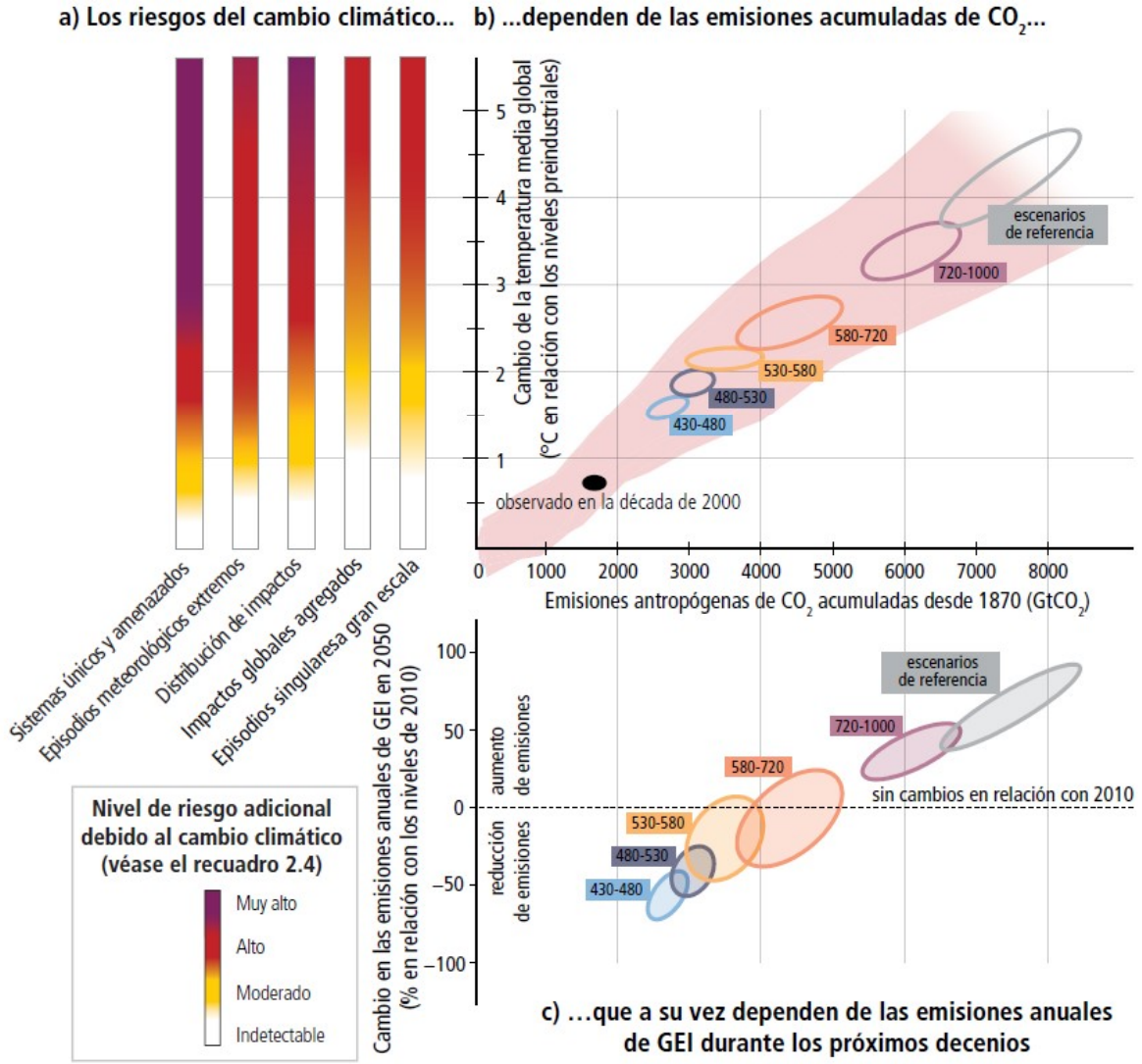
SROCC


(d) Impacts and risks to ocean ecosystems from climate change
Global mean surface temperature (GMST) change relative to pre-industrial levels (°C)
Global mean sea surface temperature (SST) change relative to pre-industrial levels (°C)
present day
0
1
1.5
2
3
4
5
Warm water corals
Kelp forests
Seagrass meadows
Epipelagic**
Rocky shores
Salt marshes
Cold water corals
Estuaries
Sandy beaches
Mangrove forests
Abyssal plains

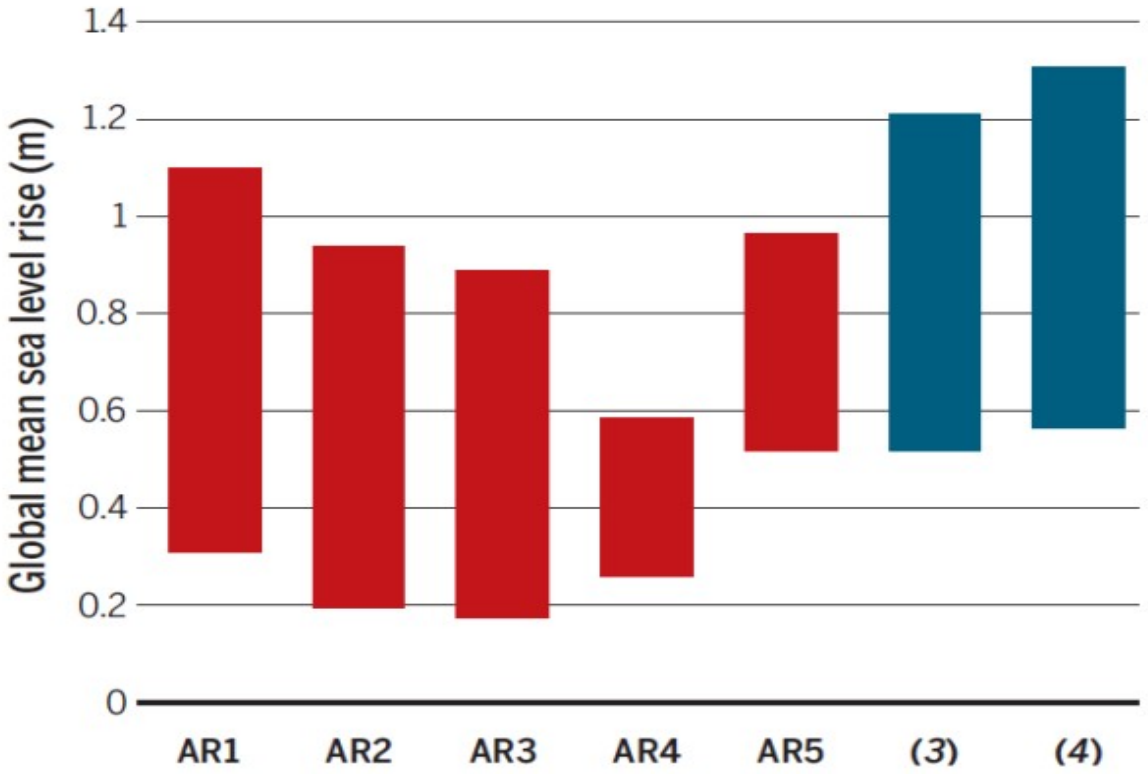
SROCC


A
Percent of insect species
100
80
60
40
20
0
Col
Hym
Lep
Odo
Orth
Order
Stable
Increasing
Decreasing
B
Percent decrease over 40 years
50
25
0
Col
Hym
Lep
Odo
Order
> 0%
> 10%
> 20%
> 30%
> 40%

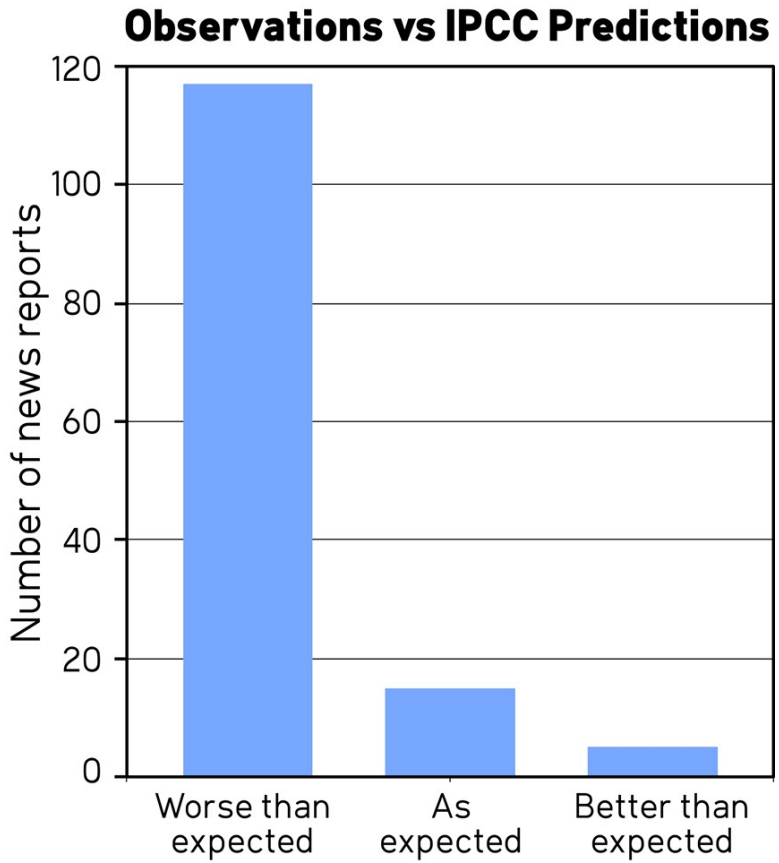
AR5 SYR


a) Los riesgos del cambio climático...
b) ...dependen de las emisiones acumuladas de CO_2...
Sistemas únicos y amenazados
Episodios meteorológicos extremos
Distribución de impactos
Impactos globales agregados
Episodios singulares a gran escala
Nivel de riesgo adicional debido al cambio climático (véase el recuadro 2.4)
Muy alto
Alto
Moderado
Indetectable
Cambio de la temperatura media global (°C en relación con los niveles preindustriales)
observado en la década de 2000
escenarios de referencia
720-1000
580-720
530-580
480-530
430-480
Emisiones antropógenas de CO_2 acumuladas desde 1870 ($GtCO_2$)
Cambio en las emisiones anuales de GEI en 2050 (% en relación con los niveles de 2010)
aumento de emisiones
reducción de emisiones
sin cambios en relación con 2010
c) ...que a su vez dependen de las emisiones anuales de GEI durante los próximos decenios

Previsiones IPCC Nivel del mar



John S. Hoffman, Dale Keyes and James G. Titus (1983) - Projecting Future Sea Level Rise: Methodology, Estimates to the Year 2100, and Research Needs - Environmental Protection Agency - 01/10/1983 - The Strategic Studies Staff, Office of Policy Analysis - https://nepis.epa.gov/Exe/ZyPDF.cgi/20011F9U.PDF?Dockey=20011F9U.PDF


Observations vs IPCC Predictions
Number of news reports
120
100
80
60
40
20
0
Worse than expected
As expected
Better than expected

PERSPECTIVE

Trajectories of the Earth System in the Anthropocene

Will Steffen[a,b,1], Johan Rockström[a], Katherine Richardson[c], Timothy M. Lenton[d], Carl Folke[a,e], Diana Liverman[f], Colin P. Summerhayes[g], Anthony D. Barnosky[h], Sarah E. Cornell[a], Michel Crucifix[i,j], Jonathan F. Donges[a,k], Ingo Fetzer[a], Steven J. Lade[a,b], Marten Scheffer[j], Ricarda Winkelmann[k,m], and Hans Joachim Schellnhuber[a,k,m,1]

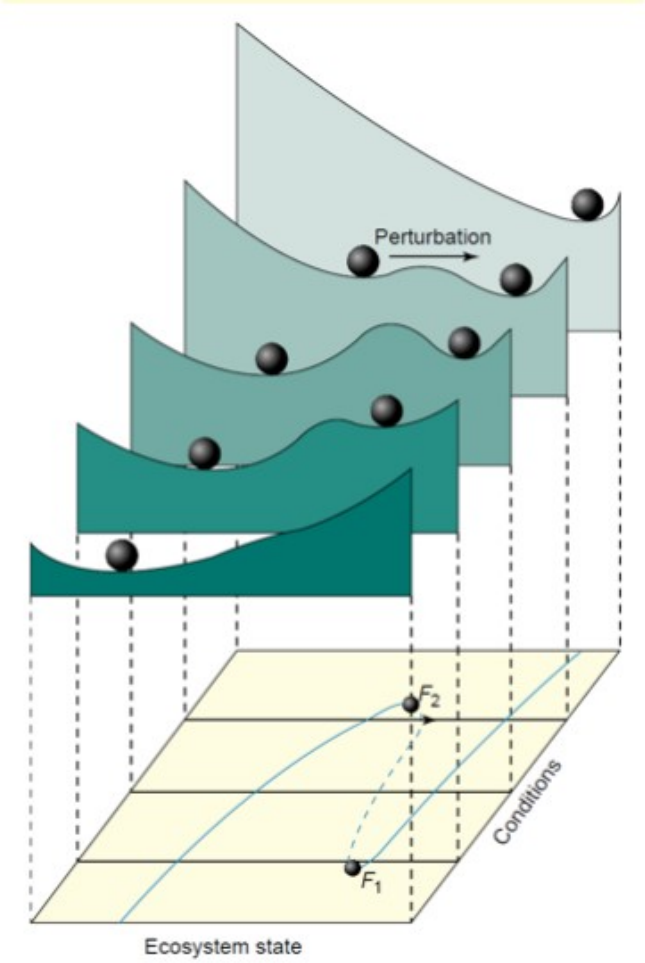
Edited by William C. Clark, Harvard University, Cambridge, MA, and approved July 6, 2018 (received for review June 19, 2018)

We explore the risk that self-reinforcing feedbacks could push the Earth System toward a planetary threshold that, if crossed, could prevent stabilization of the climate at intermediate temperature rises and cause continued warming on a "Hothouse Earth" pathway even as human emissions are reduced. Crossing the threshold would lead to a much higher global average temperature than any interglacial in the past 1.2 million years and to sea levels significantly higher than at any time in the Holocene. We examine the evidence that such a threshold might exist and where it might be. If the threshold is crossed, the resulting trajectory would likely cause serious disruptions to ecosystems, society, and economies. Collective human action is required to steer the Earth System away from a potential threshold and stabilize it in a habitable interglacial-like state. Such action entails stewardship of the entire Earth System—biosphere, climate, and societies—and could include decarbonization of the global economy, enhancement of biosphere carbon sinks, behavioral changes, technological innovations, new governance arrangements, and transformed social values.

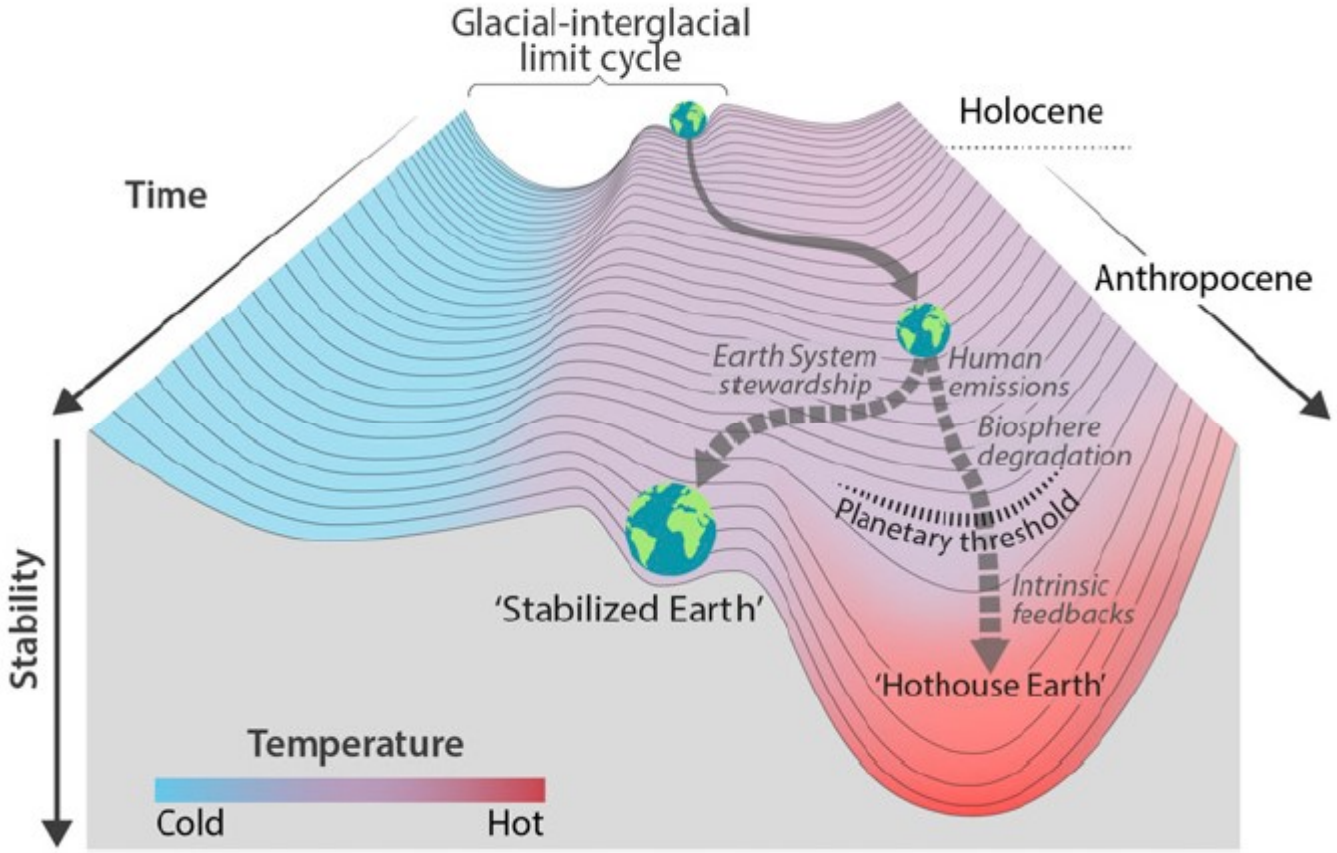
Earth System trajectories | climate change | Anthropocene | biosphere feedbacks | tipping elements

PERSPECTIVE

Catastrophic regime shifts in ecosystems

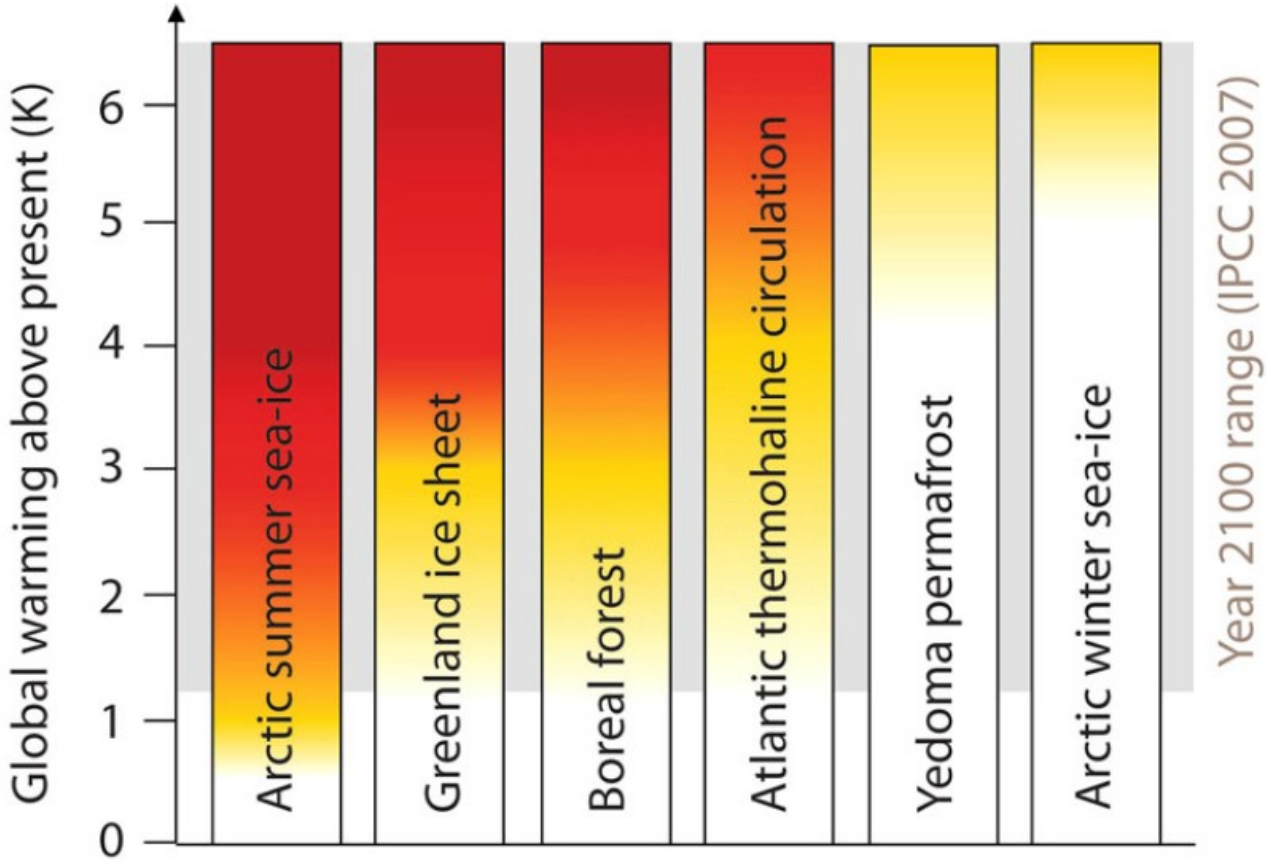


Marten Scheffer and Stephen R. Carpenter (2003) - Catastrophic regime shifts in ecosystems: linking theory to observation - TRENDS in Ecology and Evolution 18:648-656 doi:10.1016/j.tree.2003.09.002 - 01/12/2003 - Department of Aquatic Ecology and Water Quality Management, Wageningen University; Center for Limnology, University of Wisconsin - http://ib.berkeley.edu/labs/power/classes/2006fall/ib250/24.pdf



Will Steffen et al (2018) - Trajectories of the Earth System in the Anthropocene - Proceedings of the National Academy of Sciences PNAS 115:8252-8259 doi:10.1073/pnas.1810141115 - 06/08/2018 - Stockholm Resilience Centre - http://www.pnas.org/content/pnas/early/2018/07/31/1810141115.full.pdf - 16 authors

Tipping points en el Ártico



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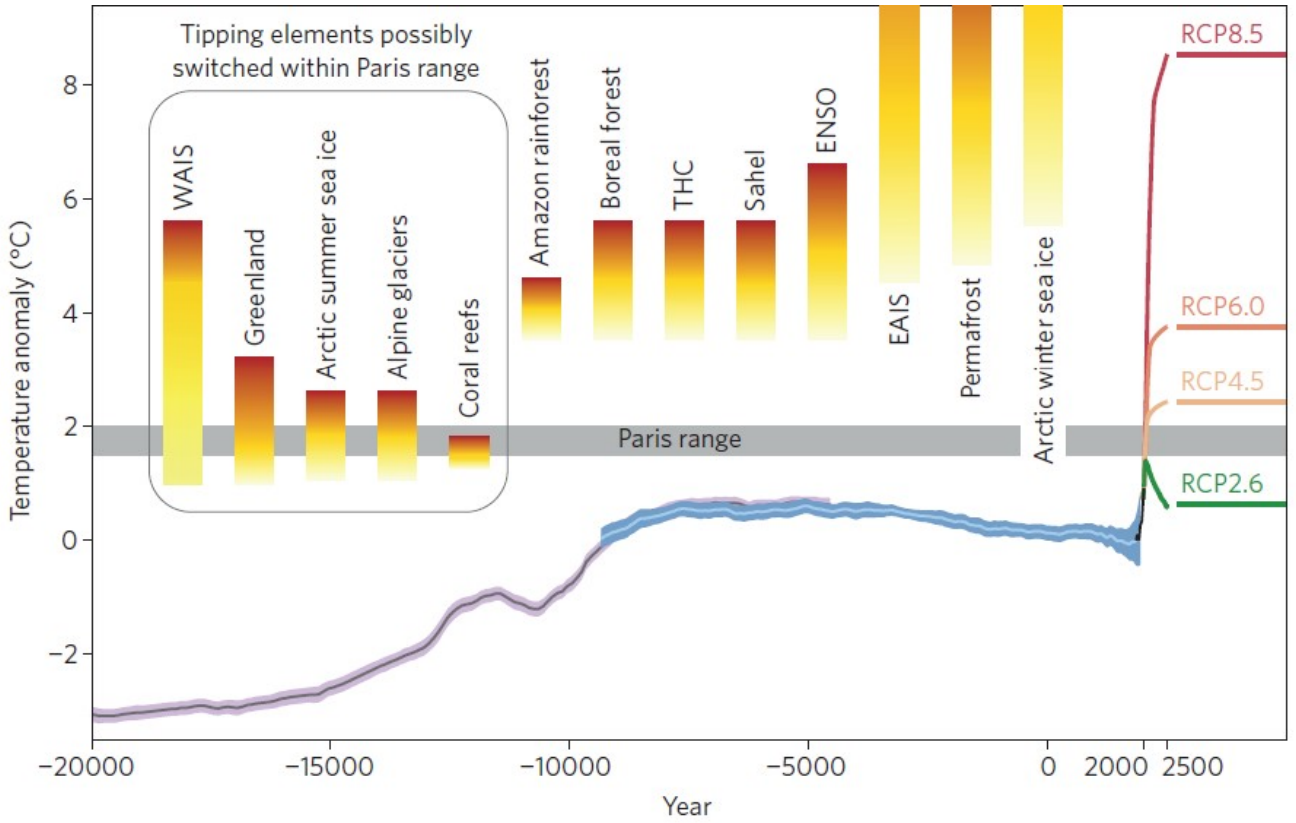
Tipping elements, points



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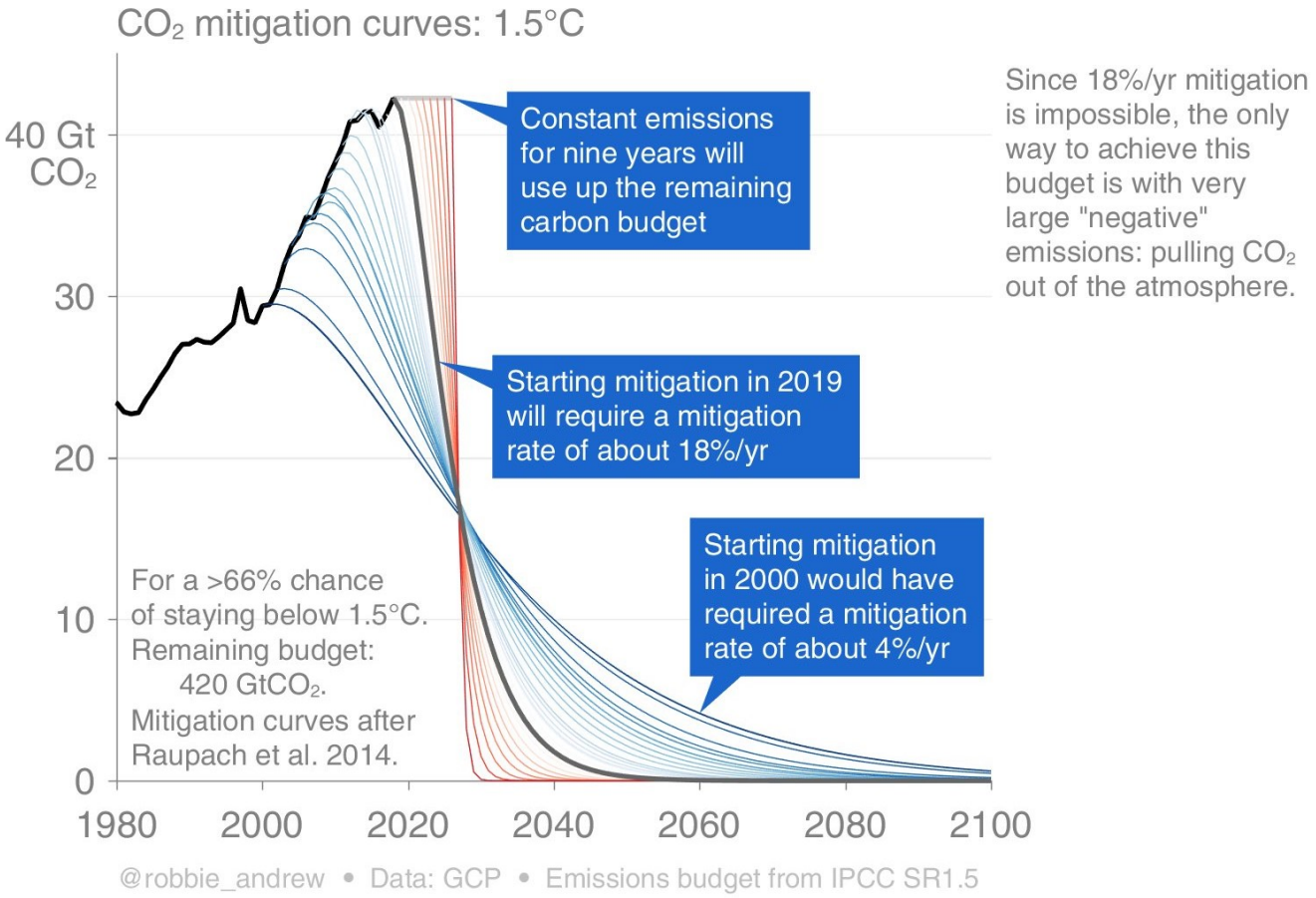
Reducciones necesarias



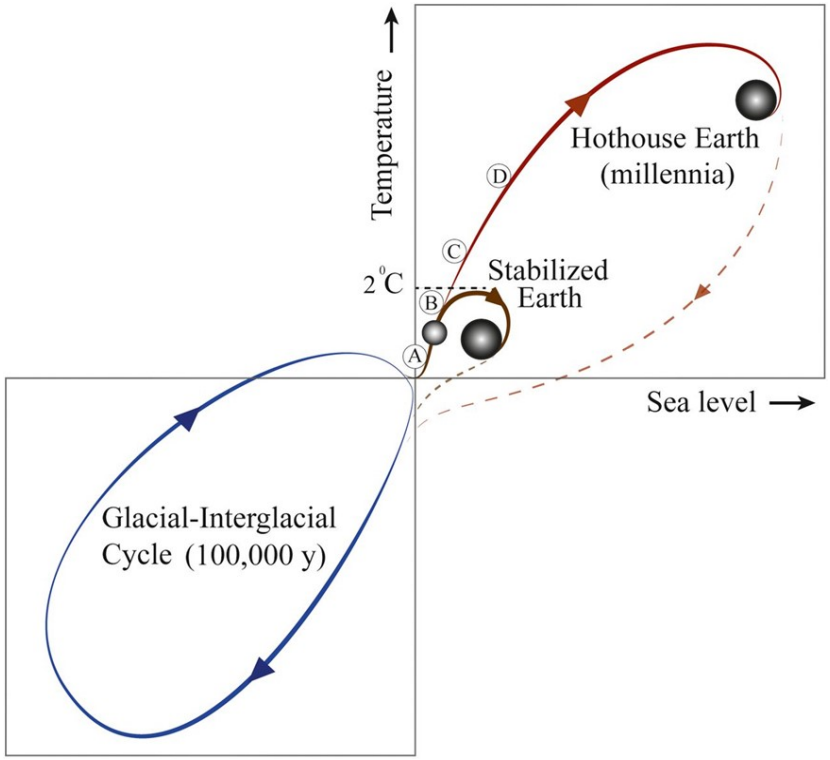
Narrativa de progresividad

"Incluso si se cumplieran los objetivos de 1,5 ºC a 2,0 ºC del Acuerdo de París, no podemos excluir el riesgo de una cascada de realimentaciones (*feedbacks*) que podrían empujar al Sistema Tierra irreversiblemente hacia una trayectoria de *'Hothouse Earth'.*"

"Una cuestión crítica es que, si se supera algún umbral planetario hacia la trayectoria que conduce a la 'Hothouse Earth', el acceso a la 'Stabilized Earth' se convertiría en muy difícil cualesquiera que fueran las acciones que las sociedades humanas emprendieran … una vez el Sistema Tierra se ha adentrado en la trayectoria hacia la 'Hothouse Earth', la alternativa 'Stabilized Earth' se convertiría muy probablemente en inaccesible."

Will Steffen et al (2018) - Trajectories of the Earth System in the Anthropocene - Proceedings of the National Academy of Sciences PNAS 115:8252-8259 doi:10.1073/pnas.1810141115 - 06/08/2018 - Stockholm Resilience Centre - http://www.pnas.org/content/pnas/early/2018/07/31/1810141115.full.pdf - 16 authors

Trayectorias del Sistema Tierra



Will Steffen et al (2018) - Trajectories of the Earth System in the Anthropocene - Proceedings of the National Academy of Sciences PNAS 115:8252-8259 doi:10.1073/pnas.1810141115 - 06/08/2018 - Stockholm Resilience Centre - http://www.pnas.org/content/pnas/early/2018/07/31/1810141115.full.pdf - 16 authors

Reestructuración social inevitable

"Las sociedades humanas y nuestras actividades deben ser reestructuradas para ser convertidas en un componente capaz de que interactuar con el sistema complejo adaptativo que es el Sistema Tierra."

"El reto de la humanidad es pues el de intervenir en las propiedades dinámicas del Sistema Tierra de tal manera que las emergentes condiciones de inestabilidad … se conviertan de facto en un estado estable intermedio (Stabilized Earth)."

"Esto requiere que los humanos realicen acciones deliberadas, integrales y adaptativas que reduzcan los impactos peligrosos sobre el Sistema Tierra, monitorizando constantemente y cambiando adecuadamente su comportamiento con el fin de crear lazos de realimentación que estabilicen este estado intermedio."

Will Steffen et al (2018) - Trajectories of the Earth System in the Anthropocene - Proceedings of the National Academy of Sciences PNAS 115:8252-8259 doi:10.1073/pnas.1810141115 - 06/08/2018 - Stockholm Resilience Centre - http://www.pnas.org/content/pnas/early/2018/07/31/1810141115.full.pdf - 16 authors

Environmental activism

School climate strike children's brave stand has our support

Wed 13 Feb 2019 12.05 GMT

2.987

We are inspired that our children, spurred on by the noble actions of Greta Thunberg and other striking students, are making their voices heard, say 224 academics

▲ Students protest for a climate-friendly policy in Frankfurt, Germany, on 1 February. This Friday children across

I agree with Jones *et al.* that enforcement is vital, but it must be implemented in a way that avoids overcriminalization of the rural poor. Fairer and more inclusive conservation policies would focus attention on important global drivers of environmental crime, including the role of complicit governments. Independent truth and justice commissions (*8*) adapted to specialize on international environmental crime could be used alongside in-depth investigations by United Nations special rapporteurs on human rights and the environment (*9*). Such programs are not meant to replace a country's judicial or enforcement systems, but rather

Concerns of young protesters are justified

The world's youth have begun to persistently demonstrate for the protection of the climate and other foundations of human well-being. (*1*, *2*). As scientists and scholars who have recently initiated similar letters of support in our countries, we call for our colleagues across all disciplines and from the entire world to support these young climate protesters (*3*). We declare: Their concerns are justified and supported by the

expensive. Examples include effective CO_2 prices and regulations; cessation of subsidies for climate-damaging actions and products; efficiency standards; social innovations; and massive, directed investment in solutions such as renewable energy, cross-sector electrification, public transport infrastructure, and demand reduction. A socially fair distribution of the costs and benefits of climate action will require deliberate attention, but it is both possible and essential (*8*).

The enormous grassroots mobilization (*2*) of the youth climate movement—including Fridays for Future, School (or Youth) Strike 4 Climate, Youth for (or 4) Climate, and Youth

Published by AAAS

Climate Strike (*7*)—shows that young people understand the situation. We approve and support their demand for rapid and forceful action. We see it as our social, ethical, and scholarly responsibility to state in no uncertain terms: Only if humanity acts quickly and resolutely can we limit global warming, halt the ongoing mass extinction of animal and plant species, and preserve the natural basis for the food supply and well-being of present and future generations. This is what the young people want to achieve. They deserve our respect and full support.

Gregor Hagedorn[1], Peter Kalmus[2]*, Michael Mann[3], Sara Vicca[4], Joke Van den Berge[4], Jean-Pascal van Ypersele[5], Dominique Bourg[6], Jan Rotmans[7], Roope Kaaronen[8], Stefan Rahmstorf[9], Helga Kromp-Kolb[10], Gottfried Kirchengast[11], Reto Knutti[12], Sonia I. Seneviratne[12], Philippe Thalmann[13], Raven Cretney[14], Alison Green[15], Kevin Anderson[16,17], Martin Hedberg[18], Douglas Nilsson[19], Amita Kuttner[20], Katharine Hayhoe[21]

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SUPPLEMENTARY MATERIALS

www.sciencemag.org/content/364/6436/139.2/suppl/DC1
List of signatories

10.1126/science.aax3807

Science

Gregor Hagedorn et al (2019) - Concerns of young protesters are justified - Science 364:139-140 doi:10.1126/science.aax3807 - 12/04/2019 - https://science.sciencemag.org/content/364/6436/139.2/tab-pdf - 22 authors

Credit: Louise Gardner

Credit: Alfredo Romero-Muñoz

Scientists must act on our own warnings to humanity

We face interconnected planetary emergencies threatening our climate and ecosystems. Charlie J. Gardner and Claire F. R. Wordley argue that scientists should join civil disobedience movements to fight these unprecedented crises.

Under current business-as-usual pathways, global heating will cause a temperature increase of 2.0–4.9 °C by 2100 (A. E. Raftery et al., *Nat. Clim. Change* 7, 637–641; 2017), and a simultaneous ecological crisis threatens the extinction of a million species over the next few decades (S. Díaz. et al., *Global Assesssment Report on Biodiversity and Ecosystem Services*; IPBES, 2019). We face the complete loss of sea ice, tropical rainforests and coral reefs, and will suffer heatwaves, droughts and changes of the past century were brought about in this way, and leading practitioners, such as Rosa Parks, Emmeline Pankhurst, Martin Luther King and Mohandas Ghandi, once reviled as dangerous dissenters, are today revered as heroes. Moreover, civil disobedience requires relatively few people to be effective, with sustained action by 3.5% of the population sufficient even to topple dictatorial regimes (E. Chenoweth and M. J. Stephan, *Why Civil Resistance Works: The Strategic Logic of Nonviolent Conflict*; activism. In April 2019, over 12,000 scientists signed a letter endorsing the global school strikes, which are acts of civil disobedience, and praising the movement as "justified and supported by the best available science" (G. Hagedorn et al., *Science* **364**, 139–140; 2019). We ask that scientists take this one step further, and themselves join civil disobedience movements.

This does not mean that all scientists must commit acts of civil disobedience — some have more privilege to risk arrest than

Charlie J. Gardner and Claire F. R. Wordley (1953) - Scientists must act on our own warnings to humanity - Nature Ecology & Evolution 3:1271–1272 doi: - 02/09/2019 - Durrell Institute of Conservation and Ecology, University of Kent - https://www.nature.com/articles/s41559-019-0979-y.pdf

Nuevas voces!

El cambio climático está llegando al final de la partida. Es ahora muy importante escuchar a voces no habituales que comprendan el problema y que estén más dispuestas a gritar “¡que viene el lobo!”. Desgraciadamente, el lobo puede estar ya en casa

Hans Joachim Schellnhüber, director del Potsdam Institute for Climate Impact Research

Climate change is now reaching the end-game … it is all the more important to listen to non-mainstream voices who do understand the issues and are less hesitant to cry wolf. Unfortunately for us, the wolf may already be in the house.” -
Hans Joachim Schellnhüber, Director