Rapport spécial du GIEC sur 1,5° C de réchauffement global

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valmasdel

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Invitation COP21 *(Dec. 2015)*

Décision plénière GIEC
(Avril 2016)

Cadrage du rapport
600 nominations
86 participants
(Août 2016)

Approbation de la structure
(Oct. 2016)

Approbation du rapport
(Oct. 2018)

Global Warming of 1.5°C

An IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.

Quel est le mandat du GIEC?

Evaluer l'information scientifique, technique et socio-économique pertinente, **sur la base des publications** :

- pour comprendre les bases scientifiques des risques du changement climatique dû à l'influence humaine
- ses impacts potentiels
- les options d'adaptation et d'atténuation

Exhaustivité
Objectivité
Transparence
Rigueur
Neutralité (non prescriptif)

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Chiffres clés

91 auteurs de **40** pays

133 contributeurs

6 000 publications

1 113 relecteurs

42 001 commentaires

Comprendre 1,5°C de réchauffement global

Ashley Cooper / Aurora Photos

Où en sommes-nous aujourd'hui?

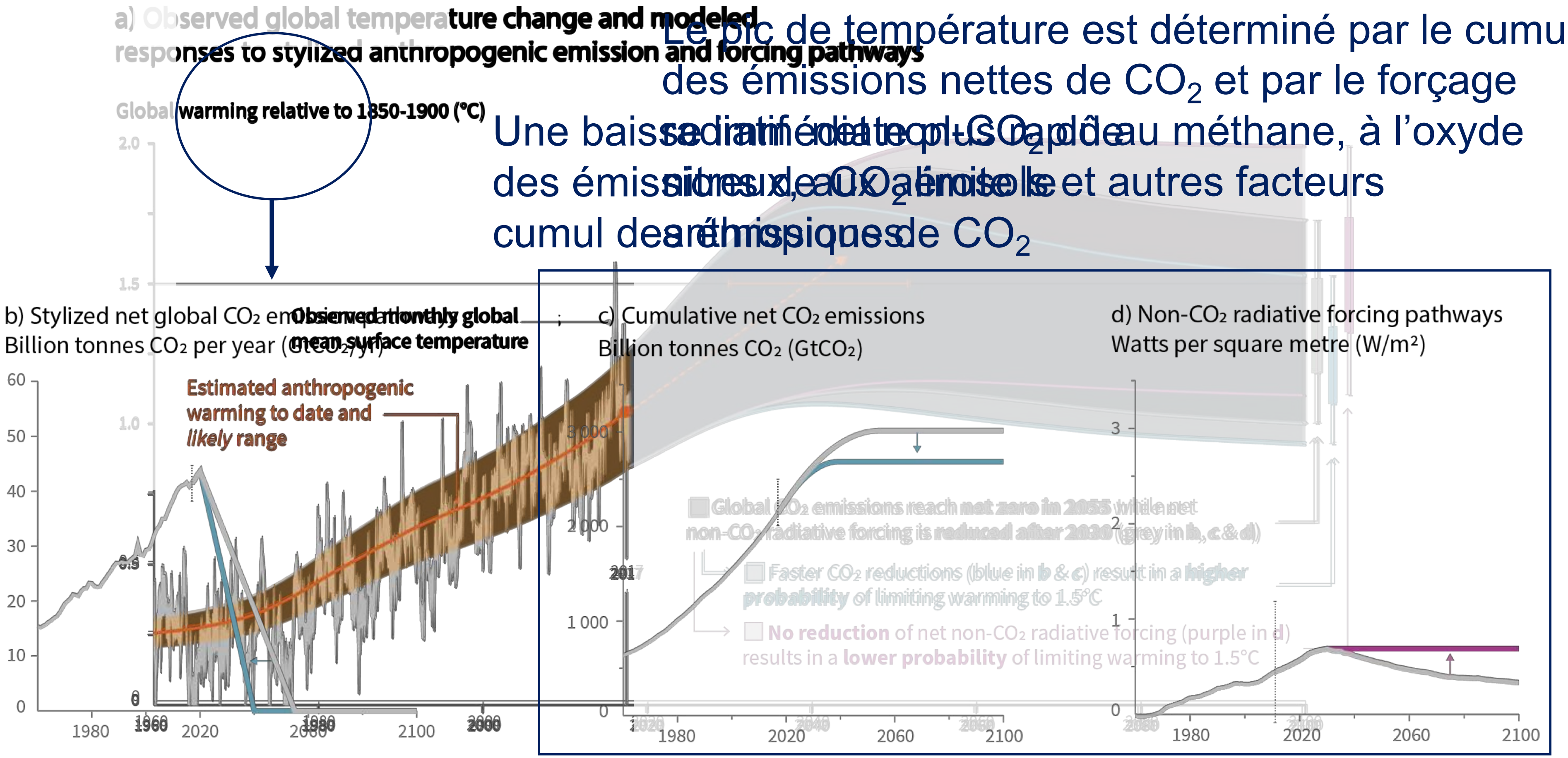
Depuis la période pré-industrielle, les activités humaines ont provoqué un réchauffement global d'environ 1°C

- Des effets déjà visibles
- Au rythme actuel, 1,5°C serait atteint entre 2030 et environ 2050
- Les émissions passées ne conduisent pas inéluctablement jusqu'à 1,5°C

Le cumul des émissions de CO_2 et le forçage radiatif futur non-CO_2 déterminent la probabilité de limiter le réchauffement à 1,5°C

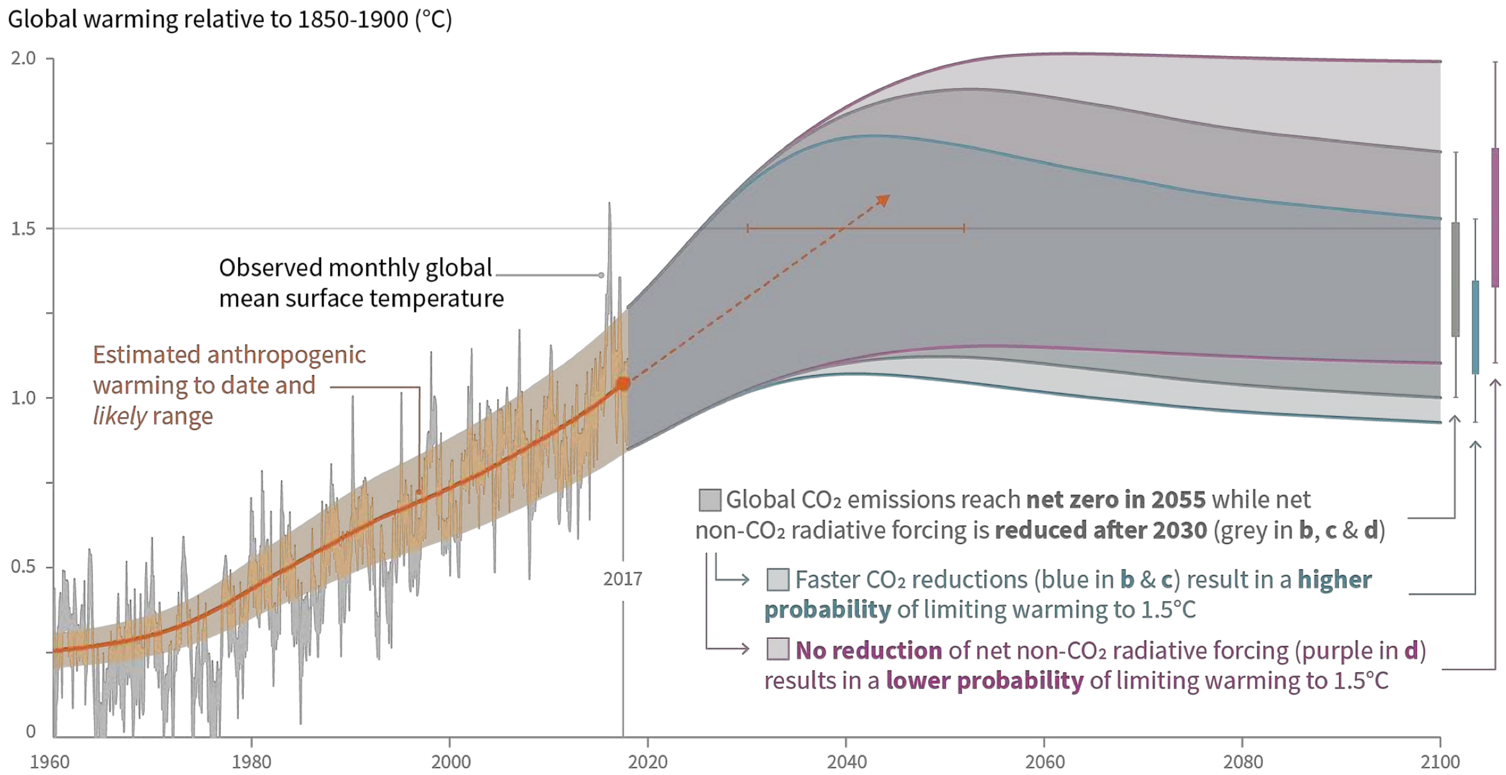
Le pic de température est déterminé par le cumul des émissions nettes de CO_2 et par le forçage radiatif non-CO_2 dû au méthane, à l'oxyde nitreux, aux aérosols et autres facteurs anthropiques

Une baisse immédiate plus rapide des émissions de CO_2 limite le cumul des émissions de CO_2



Le cumul des émissions de CO_2 et le forçage radiatif futur non-CO_2 déterminent la probabilité de limiter le réchauffement à 1,5°C

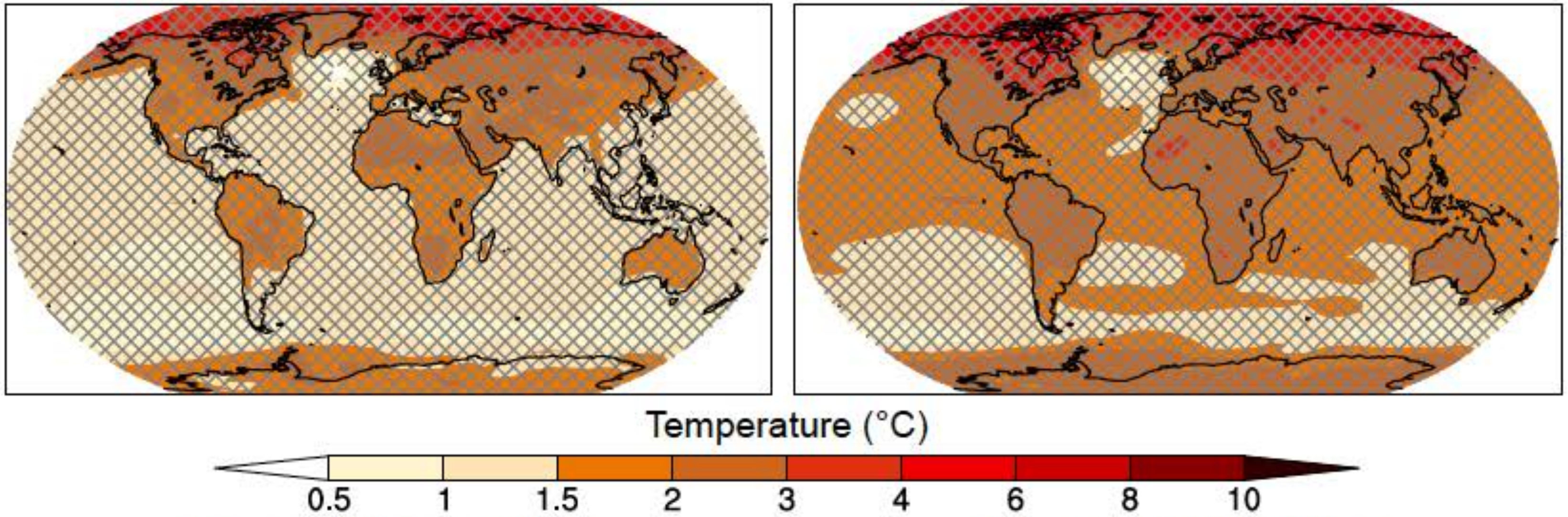
a) Observed global temperature change and modeled responses to stylized anthropogenic emission and forcing pathways



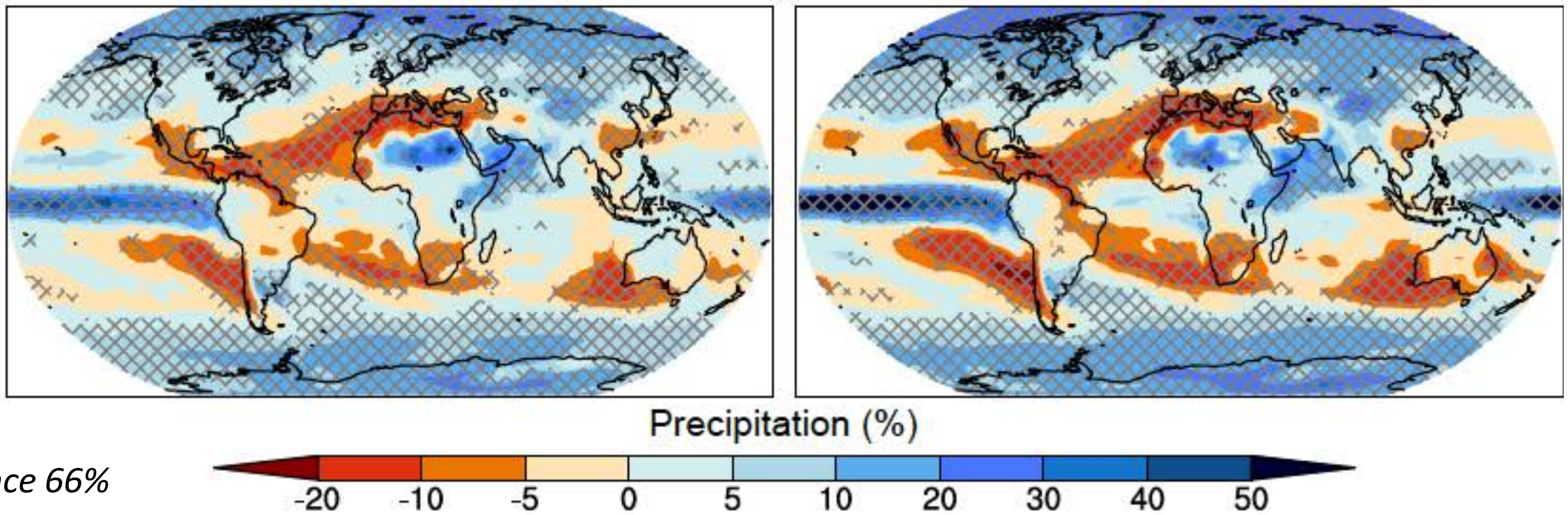
Projections du changement climatique, impacts potentiels et risques associés

Monde 1,5°C plus chaud | **Monde 2°C plus chaud**

Changement de température moyenne annuelle



Changement de précipitations annuelles

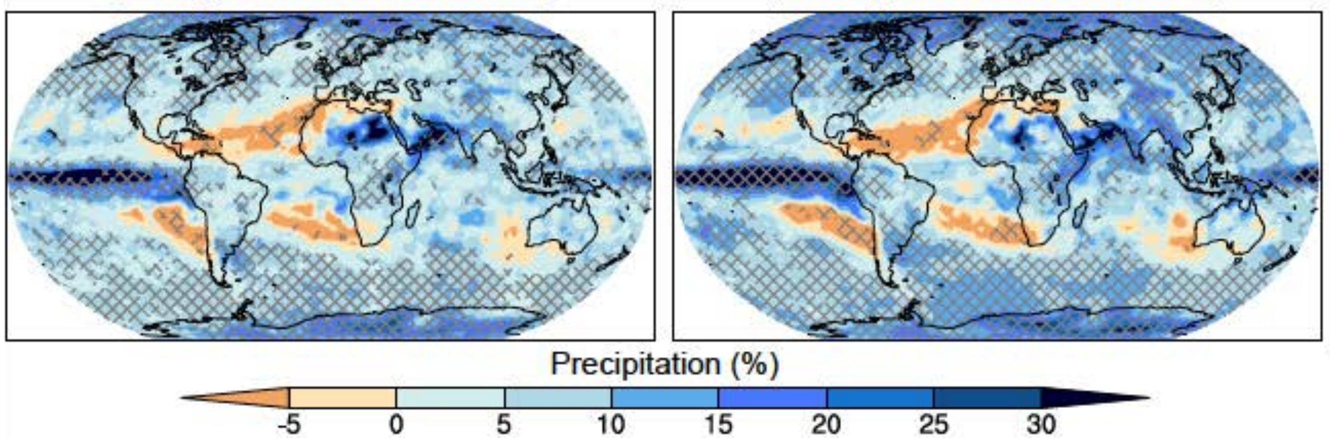


26 modèles CMIP5
hachures : cohérence 66%

Monde 1,5°C plus chaud

Monde 2°C plus chaud

Pluies les plus intenses



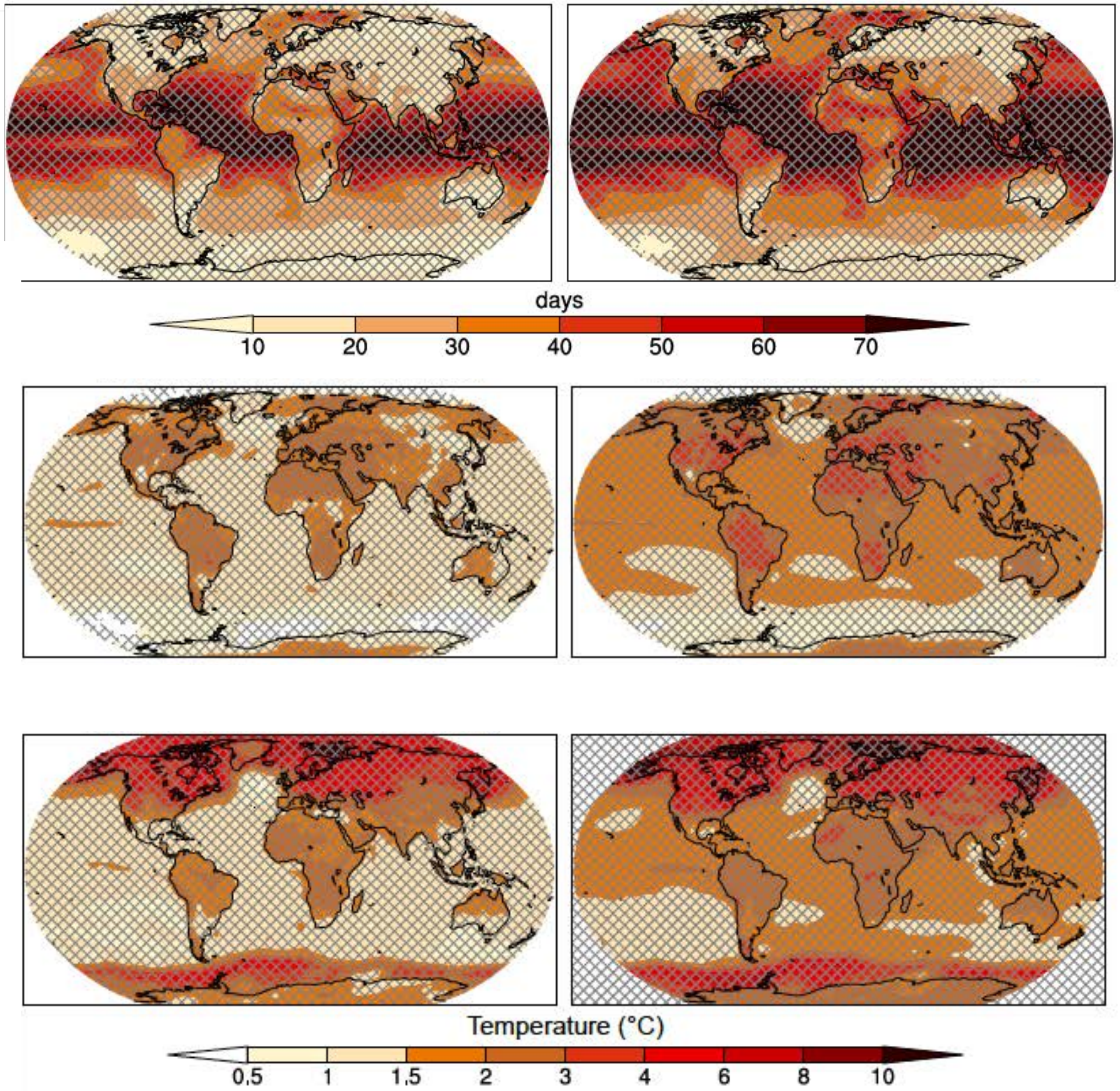
Monde 1,5°C plus chaud

Monde 2°C plus chaud

Nombre de jours très chauds

Température des jours les plus chauds

Température des nuits les plus froides



Jason Florio / Aurora Photos

Quels risques évités pour 1,5°C par rapport à 2°C de réchauffement?

- Des évènements extrêmes moins intensifiés, en particulier les vagues de chaleur, les pluies torrentielles et le risque de sécheresse
- D'ici à 2100, une différence de 10 cm de montée du niveau moyen des mers, qui continuera à augmenter
- 10 millions de personnes en moins exposées aux risques liés à la montée du niveau des mers

Jason Florio / Aurora Photos

Quels risques évités pour 1,5°C par rapport à 2°C de réchauffement?

- Un risque moins élevé de pertes de biodiversité et de dégradation d'écosystèmes
- Des chutes de rendement moins importantes pour le maïs, le blé et le riz
- Diminue de moitié la fraction de la population mondiale exposée au risque de pénurie d'eau


Jason Florio / Aurora Photos

Quels risques évités pour 1,5°C par rapport à 2°C de réchauffement?

- Des risques moins élevés pour les pêcheries
- Jusqu’à plusieurs centaines de millions de personnes en moins à la fois exposées aux risques climatiques et susceptibles de basculer dans la pauvreté

Jason Florio / Aurora Photos

Quels risques évités pour 1,5°C par rapport à 2°C de réchauffement?

- Des risques moins élevés pour la santé, les moyens d’existence, la sécurité alimentaire, la sécurité de l’approvisionnement en eau, la sécurité humaine, et la croissance économique

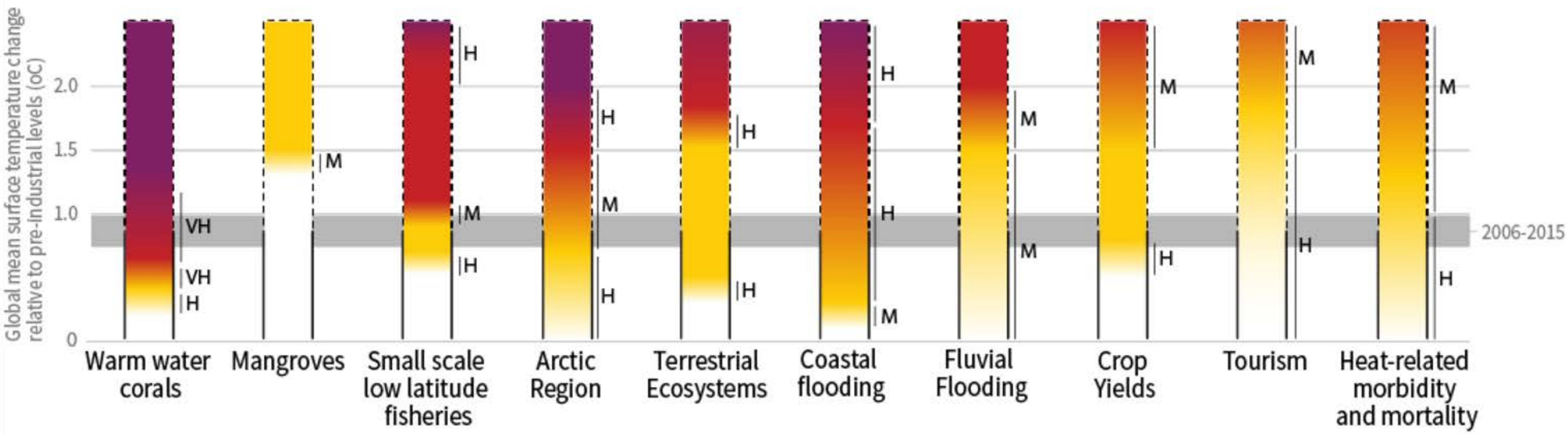
- Des risques disproportionnellement plus élevés pour l’Arctique, les zones arides, les petits états insulaires en développement, et les pays les moins avancés


Jason Florio / Aurora Photos

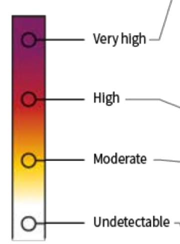
Quels risques évités pour 1,5°C par rapport à 2°C de réchauffement?

- Des limites à l'adaptation et aux capacités d'adaptation et des pertes associées existent pour 1,5°C
- Une large gamme d'options d'adaptation peut réduire les risques climatiques; des besoins d'adaptation moins importants à 1,5°C

Impacts and risks for selected natural, managed and human systems

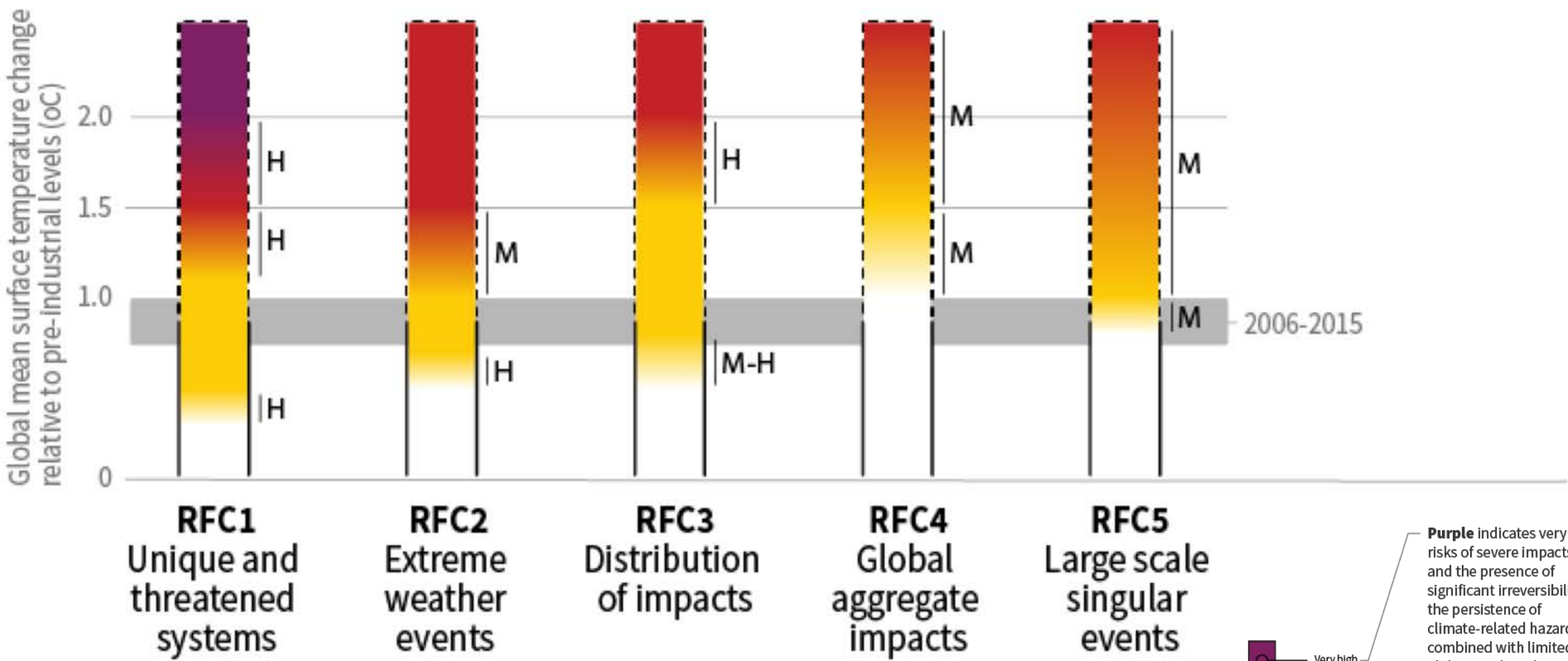


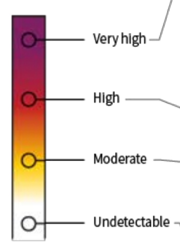
Confidence level : M, medium; H, high; VH; very high



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 associated with the Reasons for Concern (RFCs)





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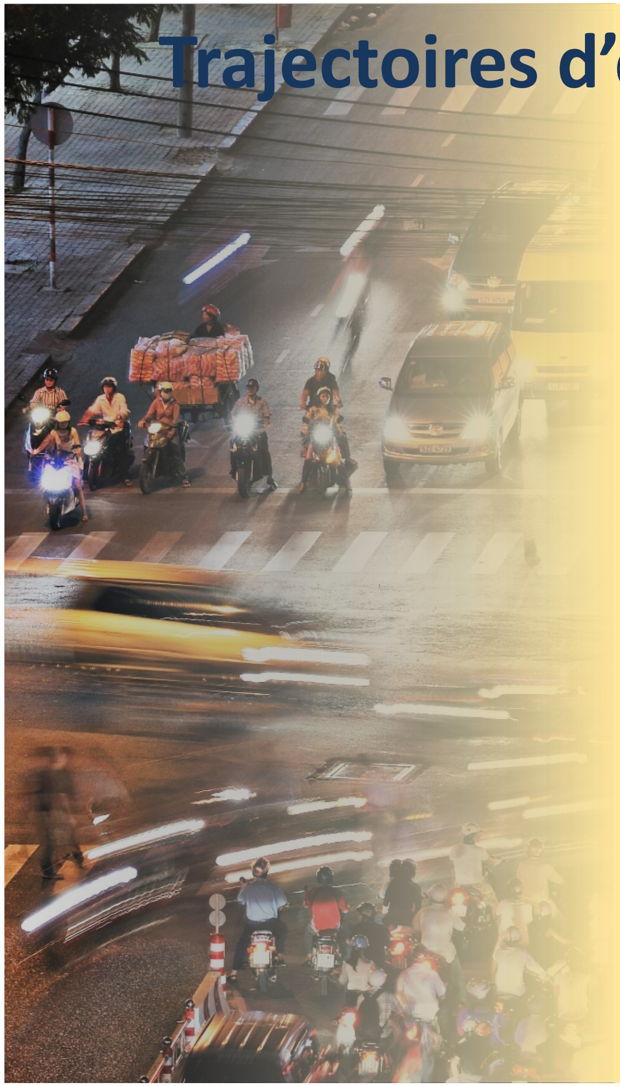
Confidence level : M, medium; H, high; VH; very high

Jason Florio / Aurora Photos

Chaque demi-degré compte

Trajectoires d'émissions et transitions de systèmes compatibles avec 1,5°C de réchauffement global

Trajectoires d’émissions de gaz à effet de serre



Gerhard Zwerger-Schoner / Aurora Photos

- Pour contenir le réchauffement global à 1.5°C, les émissions de CO_2 devraient diminuer de 45% en 2030 (par rapport à 2010)

  ⮡ *Pour comparaison, 20% pour 2°C*

- Pour contenir le réchauffement global à 1.5°C, les émissions de CO_2 emissions devraient atteindre le “net zéro” vers 2050

  ⮡ *Pour comparaison, 2075 pour 2°C*

- Réduire les autres émissions (non CO_2) aurait des bénéfices directs et immédiats pour la santé publique

Trajectoires d’émissions de gaz à effet de serre

Peter Essick / Aurora Photos

- Limiter le réchauffement planétaire à 1,5°C demanderait des changements à une échelle sans précédent
  - → transitions de systèmes : énergie, agro-foresterie, villes, industrie, infrastructures
  - → fortes baisses d’émissions dans tous les secteurs
  - → large palette de technologies
  - → et de changements de comportements
  - → augmentation des investissements dans les options bas carbone et l’efficacité énergétique (x5 en 2050)

Trajectoires d’émissions de gaz à effet de serre

Peter Essick / Aurora Photos

- Limiter le réchauffement planétaire à 1,5°C demanderait des changements à une échelle sans précédent

  → 2050 : 50-85% de l’électricité / renouvelables

  → diminution très rapide de l’utilisation du charbon

  → fortes baisses d’émissions : transport, bâtiments

  → changements usages des terres et urbanisme

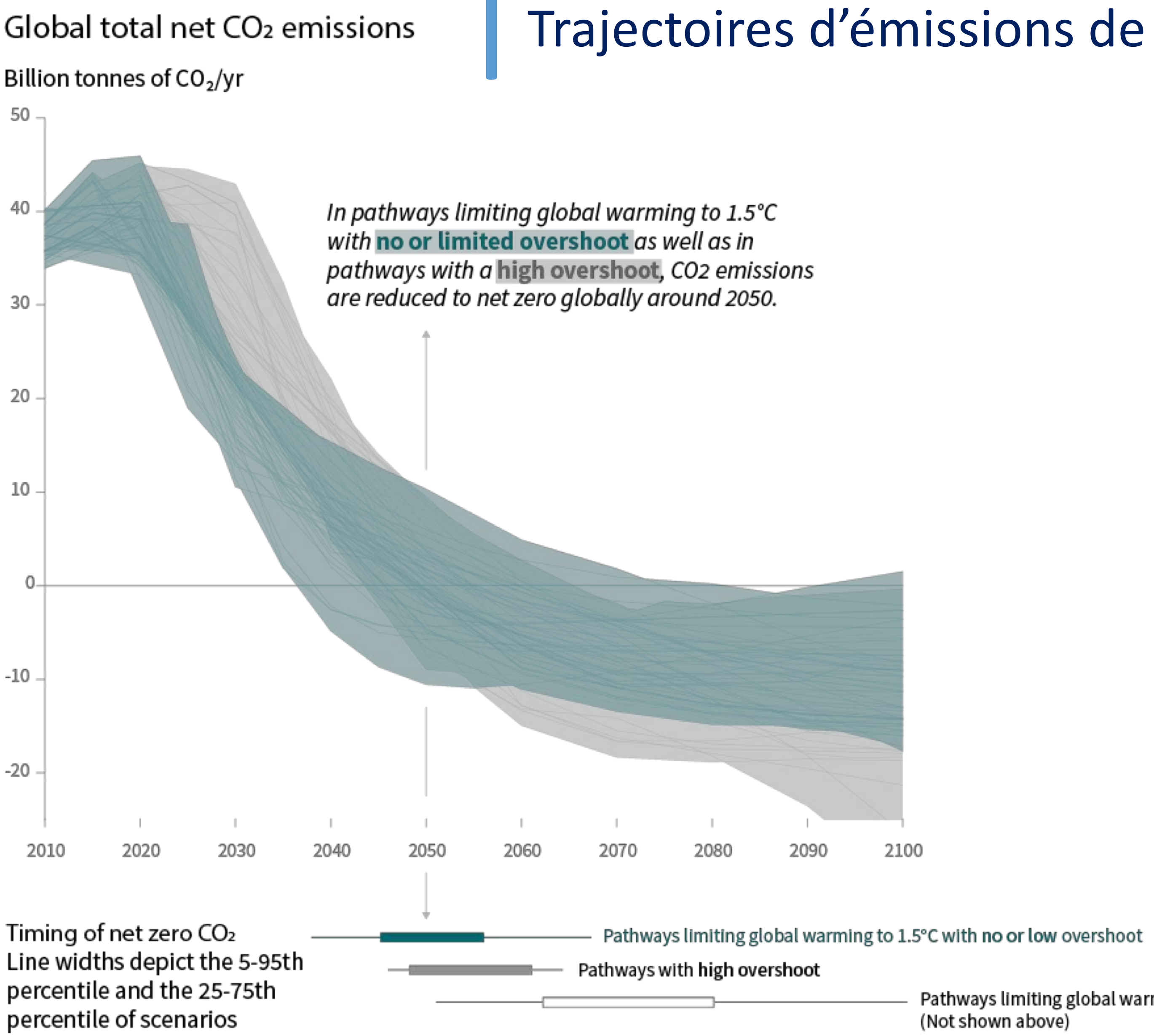
  → émissions négatives


Peter Essick / Aurora Photos

Elimination du CO_2 de l'atmosphère

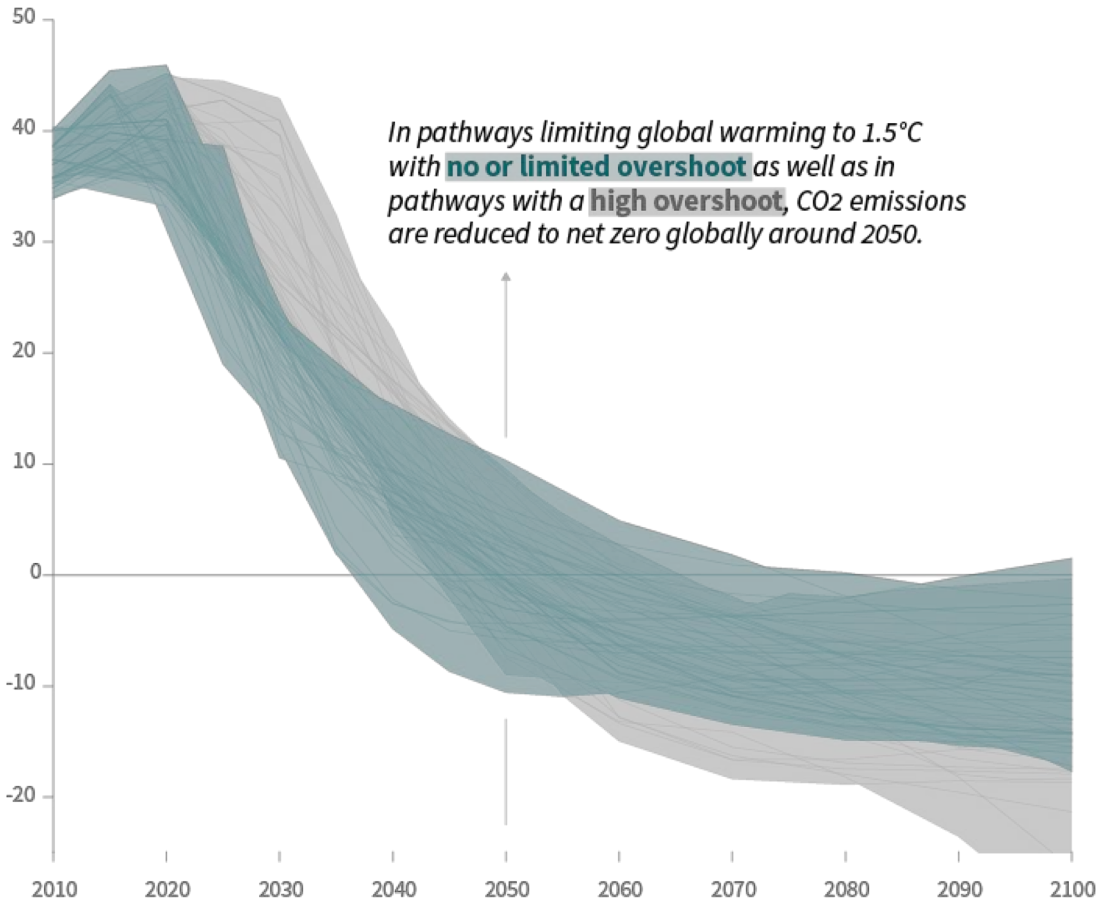
- Utilisée pour compenser les émissions résiduelles et atteindre des émissions nettes négatives
- Pour le retour du réchauffement à 1,5°C après un dépassement au-delà de 1,5°C
- BECCS (bioénergie avec captage et stockage) présent dans la plupart des trajectoires
- Implications pour la gestion des terres, la sécurité alimentaire, la sécurité en eau, et la biodiversité

Trajectoires d'émissions de gaz à effet de serre

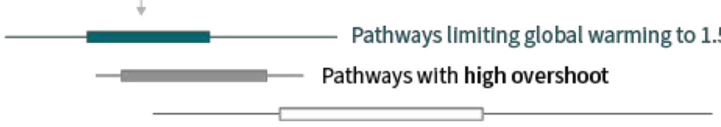


Trajectoires d’émissions de gaz à effet de serre

Global total net CO_2 emissions

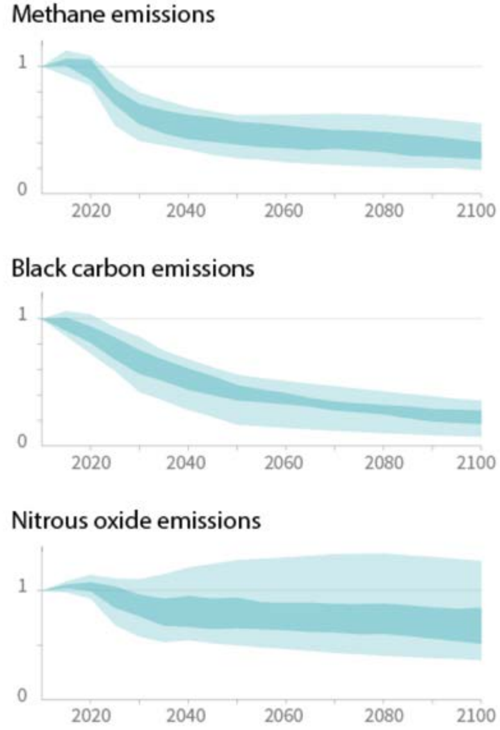


Timing of net zero CO_2
Line widths depict the 5-95th percentile and the 25-75th percentile of scenarios

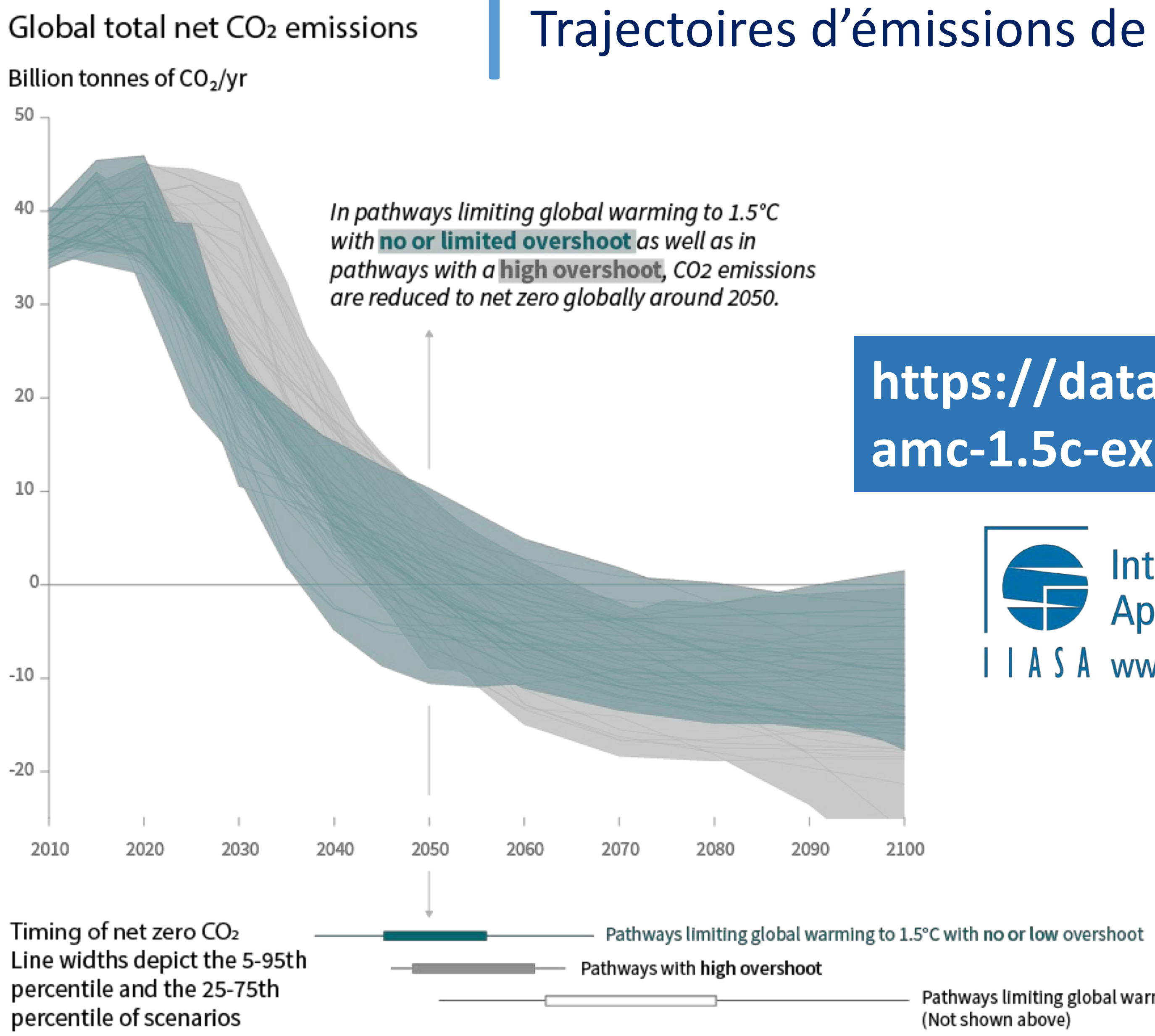


Non-CO_2 emissions relative to 2010

Emissions of non-CO_2 forcers are also reduced or limited in pathways limiting global warming to 1.5°C with **no or limited overshoot**, but they do not reach zero globally.



Trajectoires d'émissions de gaz à effet de serre



https://data.ene.iiasa.ac.at/iamc-1.5c-explorer/

International Institute for Applied Systems Analysis
IIASA www.iiasa.ac.at

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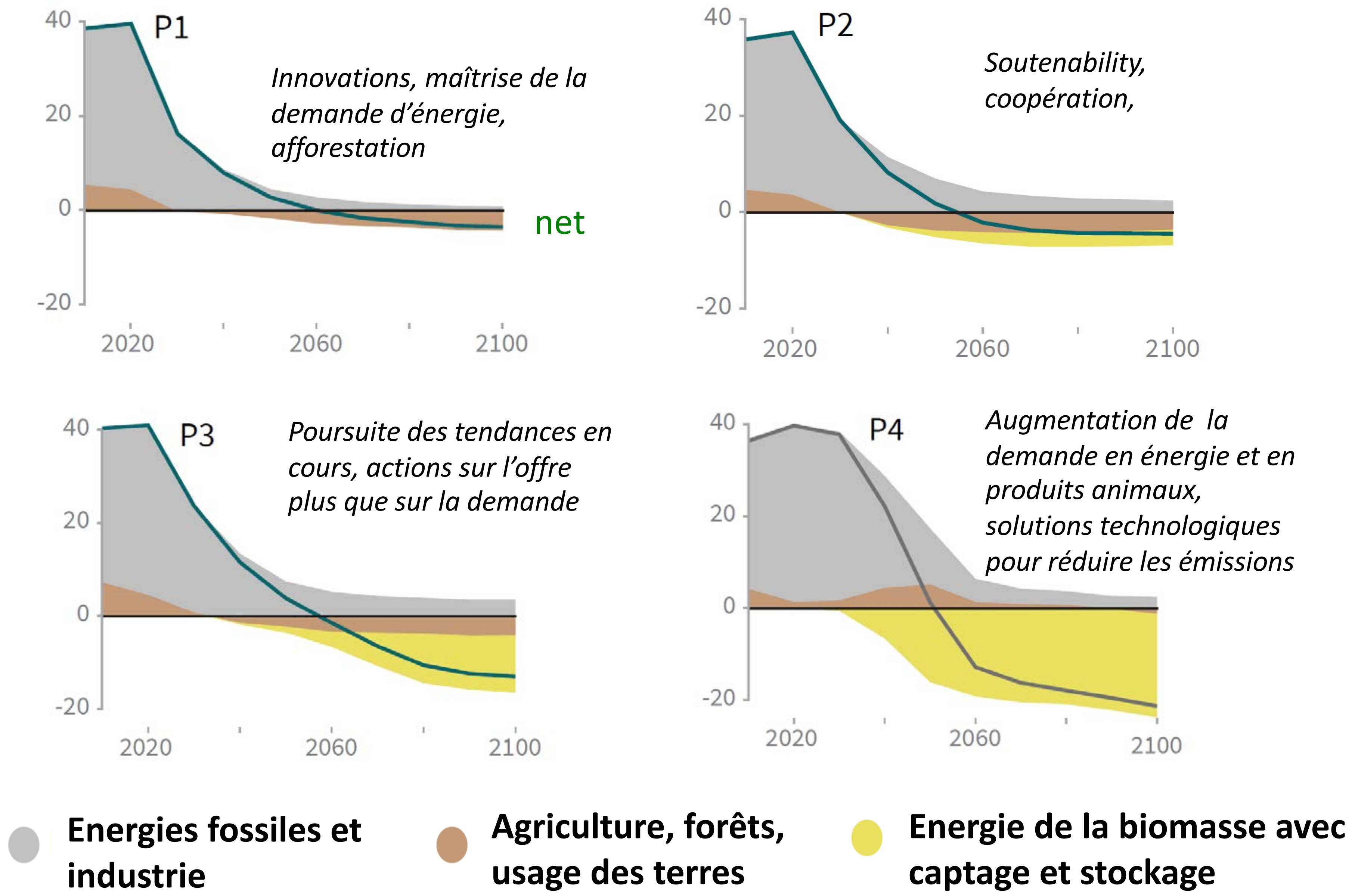
4 exemples de trajectoires et stratégies d'atténuation pouvant limiter le réchauffement à 1,5°C :



Peter Essick / Aurora Photos

Où en sommes-nous?

- Les engagements nationaux ne sont pas suffisants pour limiter le réchauffement planétaire à 1,5°C

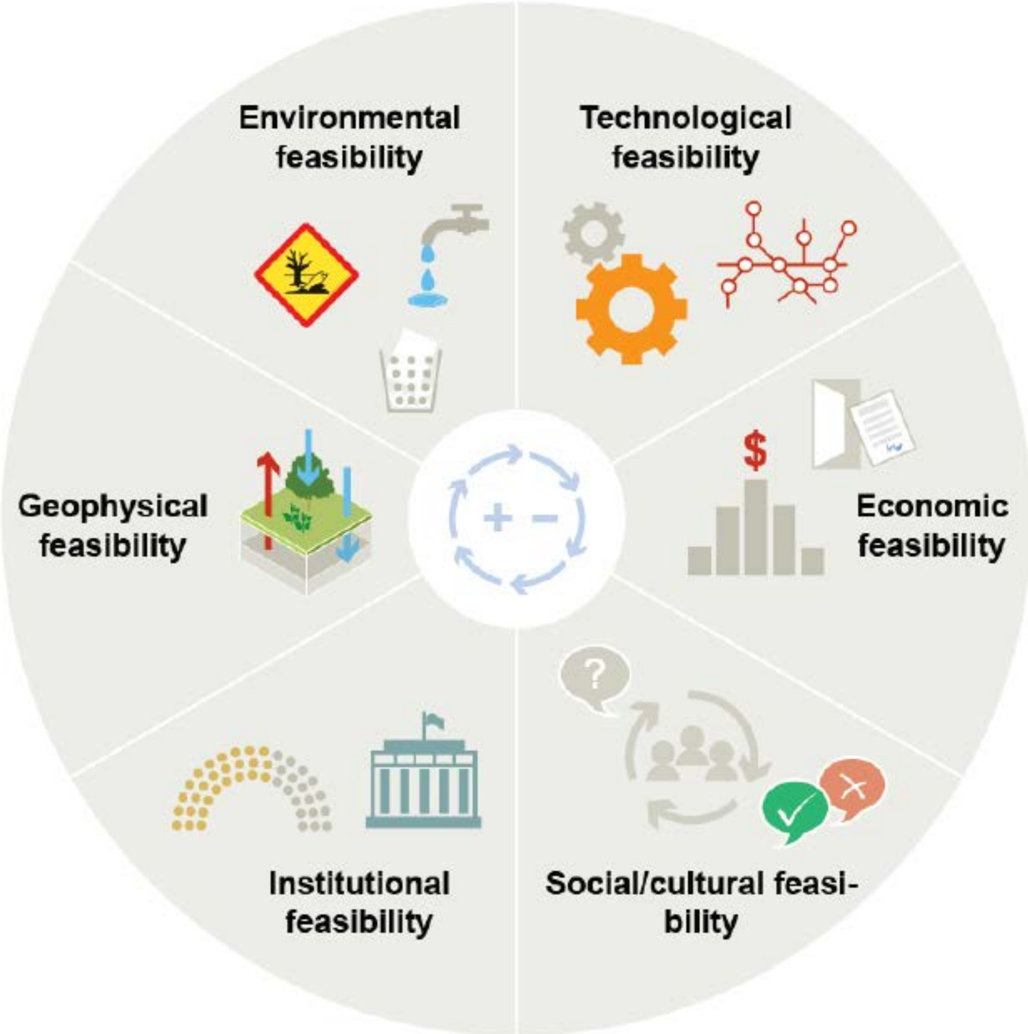
- Pour éviter de dépasser 1,5°C de réchauffement global, les émissions de dioxyde de carbone devraient diminuer de manière substantielle avant 2030

Peter Essick / Aurora Photos

Chaque année compte!

INTERGOVERNMENTAL PANEL ON climate change

Renforcer la réponse globale dans le contexte du développement durable et des efforts pour éradiquer la pauvreté



Environmental feasibility
Technological feasibility
Geophysical feasibility
Economic feasibility
Institutional feasibility
Social/cultural feasi-bility

FAQ4

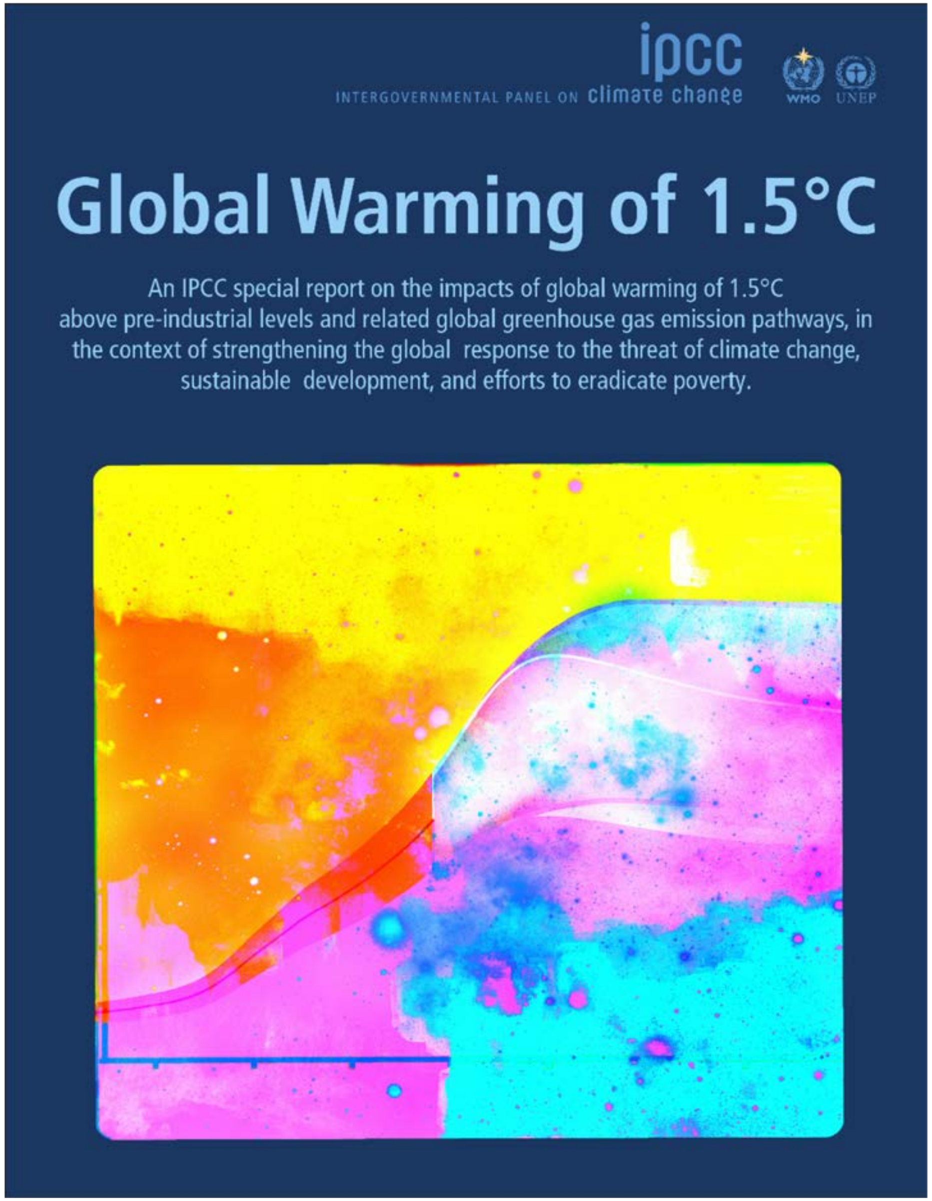
1.5°C et le développement durable

- Notion de transitions éthiques et justes
- Différentes trajectoires présentent différentes synergies ou compromis avec les autres objectifs du développement durable
- Un ensemble soigneusement choisi de mesures pour s'adapter et réduire les émissions peut permettre d'atteindre les objectifs du dév. durable
- Les bénéfices les plus larges sont identifiés pour les trajectoires agissant sur la demande (énergie, matériaux, nourriture bas carbone)
- Faisabilité : coopération, gouvernance, innovation, mobilisation des financements

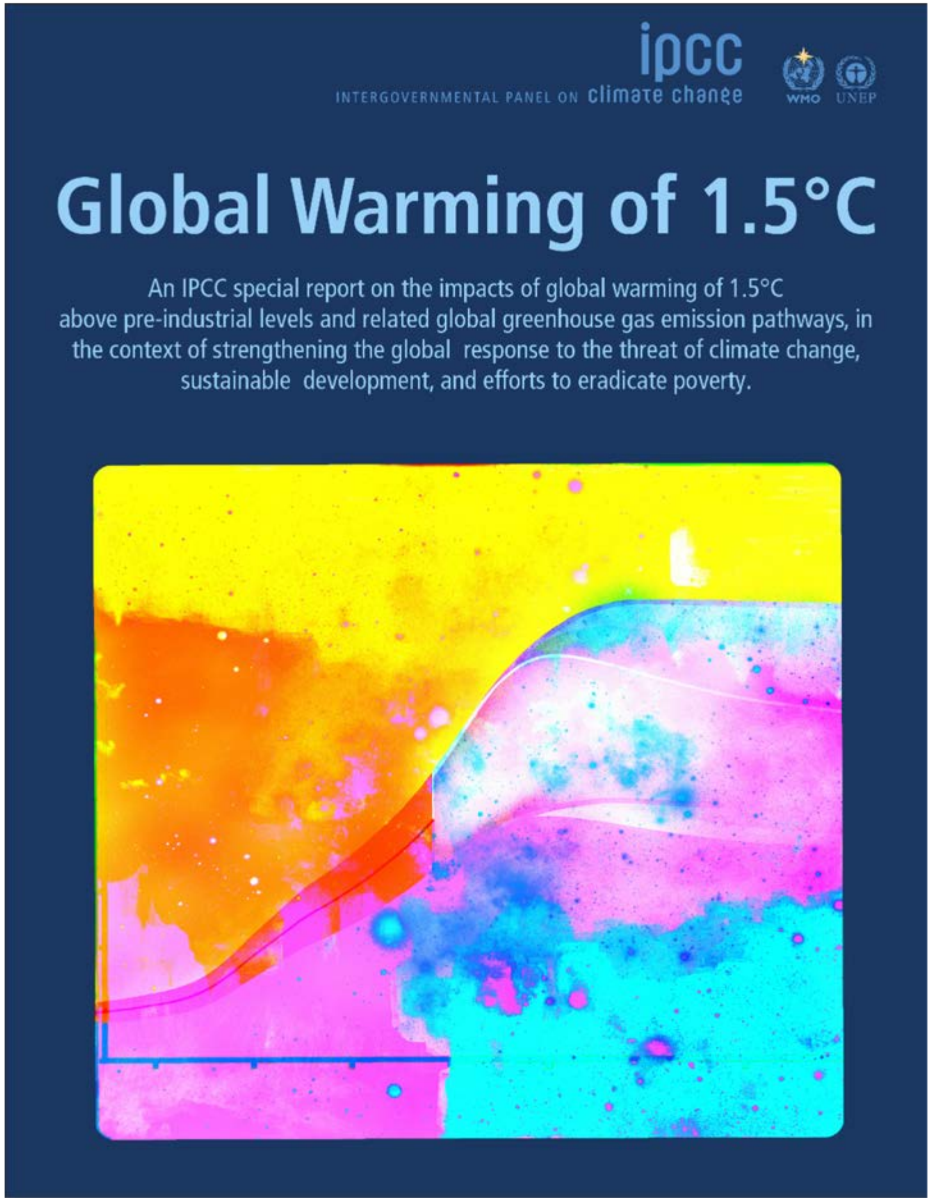
Ashley Cooper/ Aurora Photos


Ashley Cooper/ Aurora Photos

Chaque choix compte



- **Chaque demi-degré compte**
- **Chaque année compte**
- **Chaque choix compte**



Pour en savoir plus :

www.ipcc.ch/report/sr15

1: Framing and context

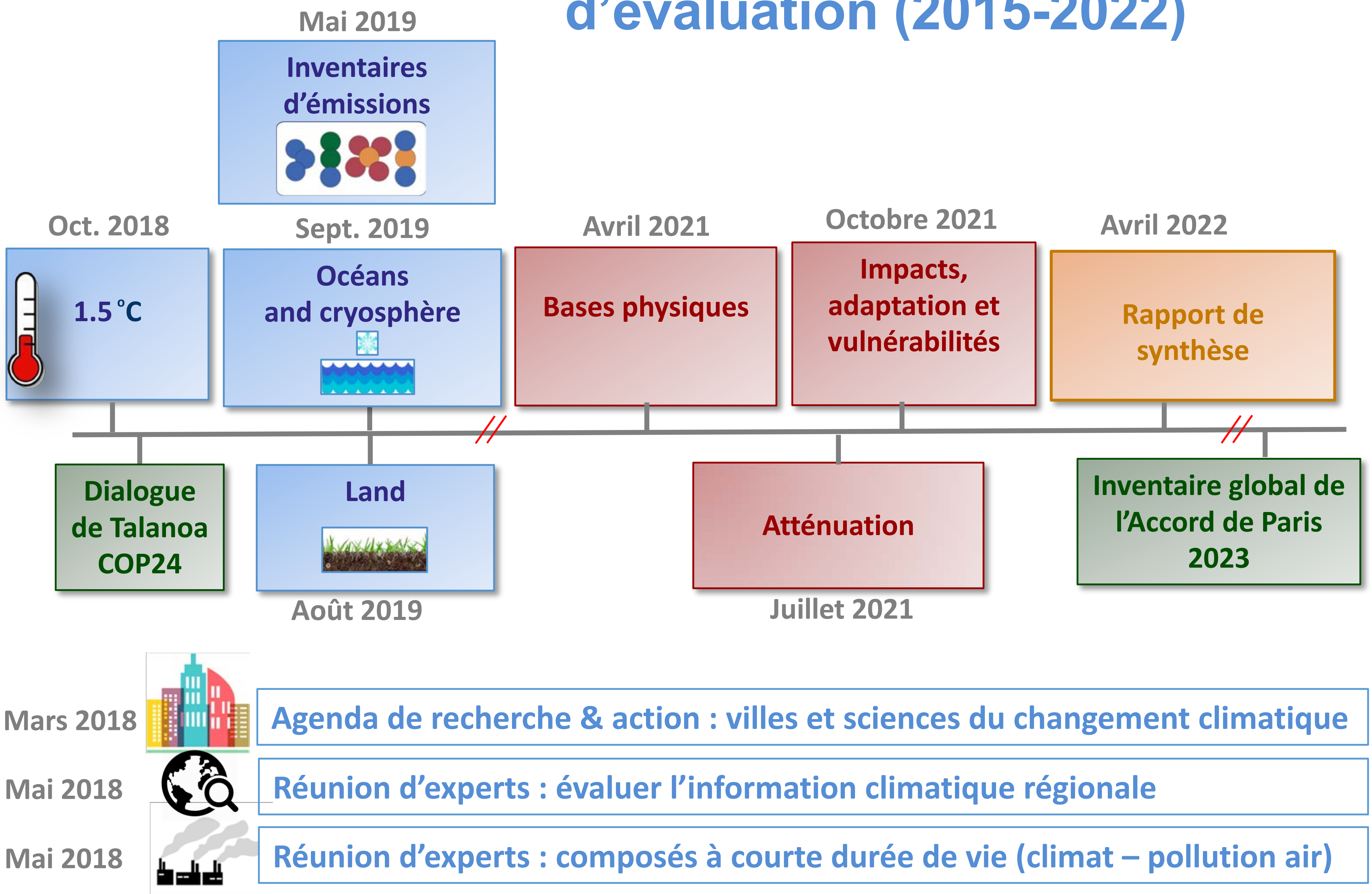
2: Mitigation pathways compatible with 1.5°C in the context of sustainable development

3: Impacts of 1.5°C global warming on natural and human systems

4: Strengthening and implementing the global response to the threat of climate change

5: Sustainable development, poverty eradication and reducing inequalities

Calendrier du 6ème cycle d’évaluation (2015-2022)



Merci de votre attention

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IPCC Secretariat: ipcc-sec@wmo.int
IPCC Press Office: ipcc-media@wmo.int

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IPCC Special Report on Climate Change and Land (SRCCL)

Including

- *ecosystems and their services*
- *socio-ecological systems*
- *competition for land*
- *land-based negative emissions*

Chapter 1: Framing and context

Chapter 2: Land-climate interactions

Chapter 3: Desertification

Chapter 4: Land degradation

Chapter 5: Food security

Chapter 6 : Interlinkages between desertification, land degradation, food security, and greenhouse gas fluxes : synergies, trade-offs and integrated response options

Chapter 7 : Risk management and decision making

in relation to sustainable development

IPCC Special Report on Climate Change and Land (SRCCL)

Cut-off dates
Manuscripts submitted before 28 Oct 2018
Papers accepted for publication before 7 April 2019

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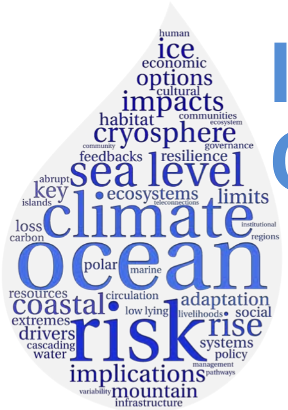
in relation to sustainable development

Expert and Government Review of the Second Order Draft
19 Nov 2018 – 13 Jan 2019



IPCC Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC)

Including
- *ecosystems*
- *blue carbon and nature-based solutions*

Chapter 1: Framing and context

Chapter 2: High mountain areas

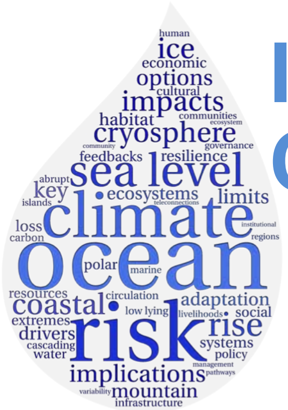
Chapter 3: Polar regions

Chapter 4: Sea level rise and implications for low lying islands, coasts and communities

Chapter 5: Changing ocean, marine ecosystems, and dependent communities

Chapter 6 : Extremes, abrupt changes and managing risks

Box : Low lying islands and coasts



IPCC Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC)

Cut-off dates
Manuscripts submitted before 15 Oct 2018
Papers accepted for publication before 15 May 2019

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Box : Low lying islands and coasts

Expert and Government Review of the Second Order Draft
16 Nov 2018 – 11 Jan 2019

Working Group I

Summary for Policy Makers
Technical Summary

Large-scale climate change

Chapter 1: Framing, context, methods
Chapter 2: Changing state of the climate system
Chapter 3: Human influence on the climate system
Chapter 4: Future global climate: scenario-based projections and near-term information
Chapter 5: Global carbon and other biogeochemical cycles and feedbacks
Chapter 6: Short-lived climate forcers
Chapter 7: The Earth's energy budget, climate feedbacks, and climate sensitivity
Chapter 8: Water cycle changes
Chapter 9: Ocean, cryosphere, and sea level change
Chapter 10: Linking global to regional climate change
Chapter 11: Weather and climate extreme events in a changing climate
Chapter 12: Climate change information for regional impact and for risk assessment
Atlas of Regional Climate Information

Annexes
Glossary

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Climate processes

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Regional climate information

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Annexes
Glossary

Working Group II

Chapter 1: Point of departure and key concepts

SECTION 1: Risks, adaptation and sustainability for systems impacted by climate change

Chapter 2: Terrestrial and freshwater ecosystems and their services

Chapter 3: Ocean and coastal ecosystems and their services

Chapter 4: Water

Chapter 5: Food, fibre, and other ecosystem products

Chapter 6: Cities, settlements and key infrastructure

Chapter 7: Health, wellbeing and the changing structure of communities

Chapter 8: Poverty, livelihoods and sustainable development

SECTION 2: Regions

Chapter 9: Africa

Chapter 10: Asia

Chapter 11: Australasia

Chapter 12: Central and South America

Chapter 13: Europe

Chapter 14: North America

Chapter 15: Small Islands

CROSS-CHAPTER PAPERS

- Biodiversity hotspots (land, coasts and oceans)
- Cities and settlements by the sea
- Deserts, semi-arid areas, and desertification
- Mediterranean region
- Mountains
- Polar regions
- Tropical forests

Working Group III

Framing (1 chapter)

1. Introduction and framing

Set up sustainable development as key framing concept

High-level assessment of emission trends, drivers and pathways (3 chapters)

2. Emissions trends and drivers
3. Mitigation pathways compatible with long-term goals
4. Mitigation and development pathways in the near- to mid-term

Balancing sources and sinks/warming levels

NDCs, emissions peaking, mid-century long-term low greenhouse gas emission development strategies

Sectoral chapters (8 chapters)

5: Demand, services and social aspects of mitigation

Orients sectors to human needs

6: Energy systems
7. Agriculture, Forestry, and Other Land Uses
8. Urban systems and other settlements
9. Buildings
10. Transport
11. Industry

The sectoral core: maps on to inventories

12. Cross sectoral perspectives

Responses not captured by sectoral framing

Institutional drivers (2 chapters)

13. National and sub-national policies and institutions
14. International cooperation

Institutions, policies and cooperation

Financial and technological drivers (2 chapters)

15. Investment and finance
16. Innovation, technology development and transfer

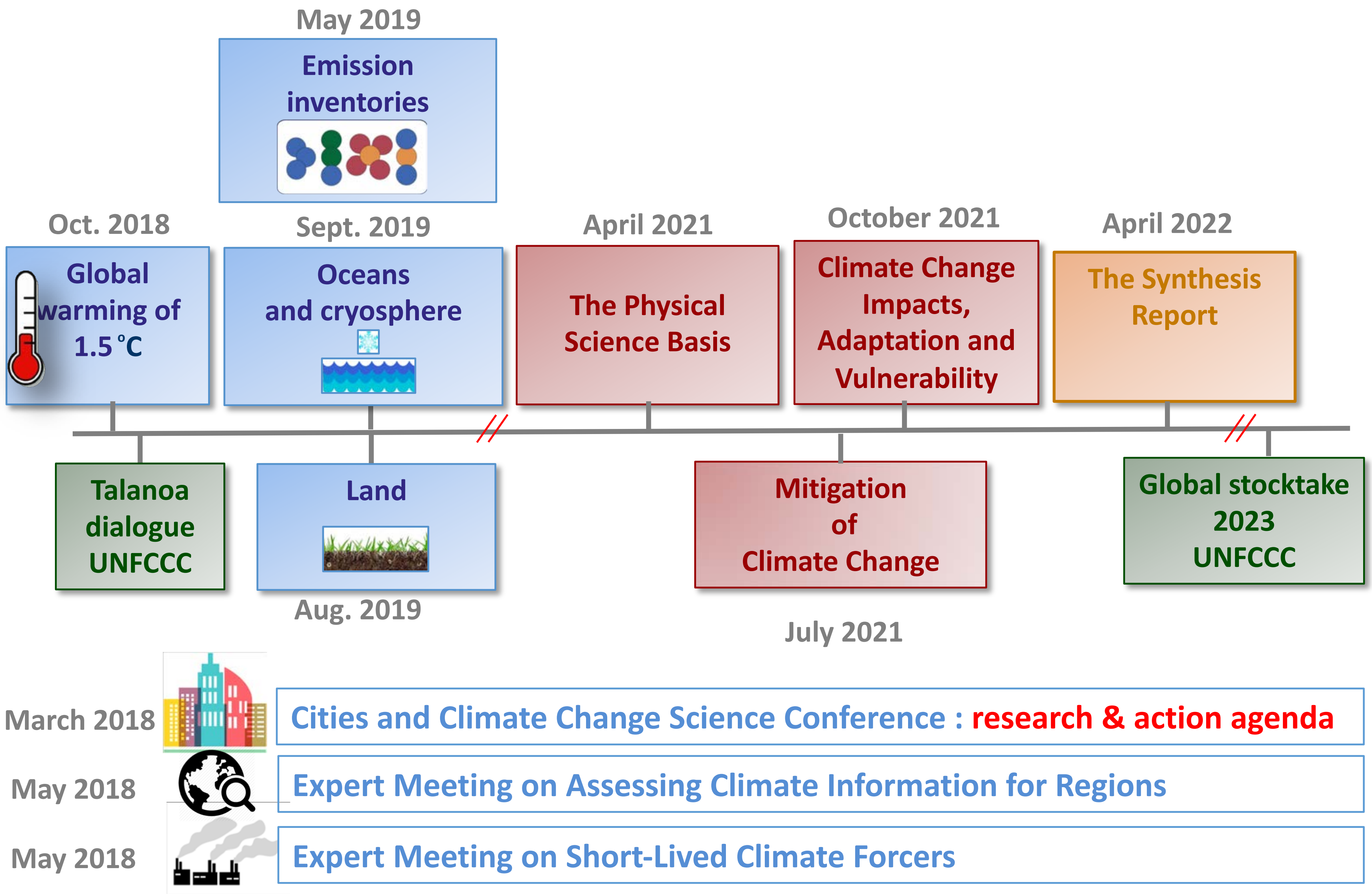
Financial flows + technological innovation

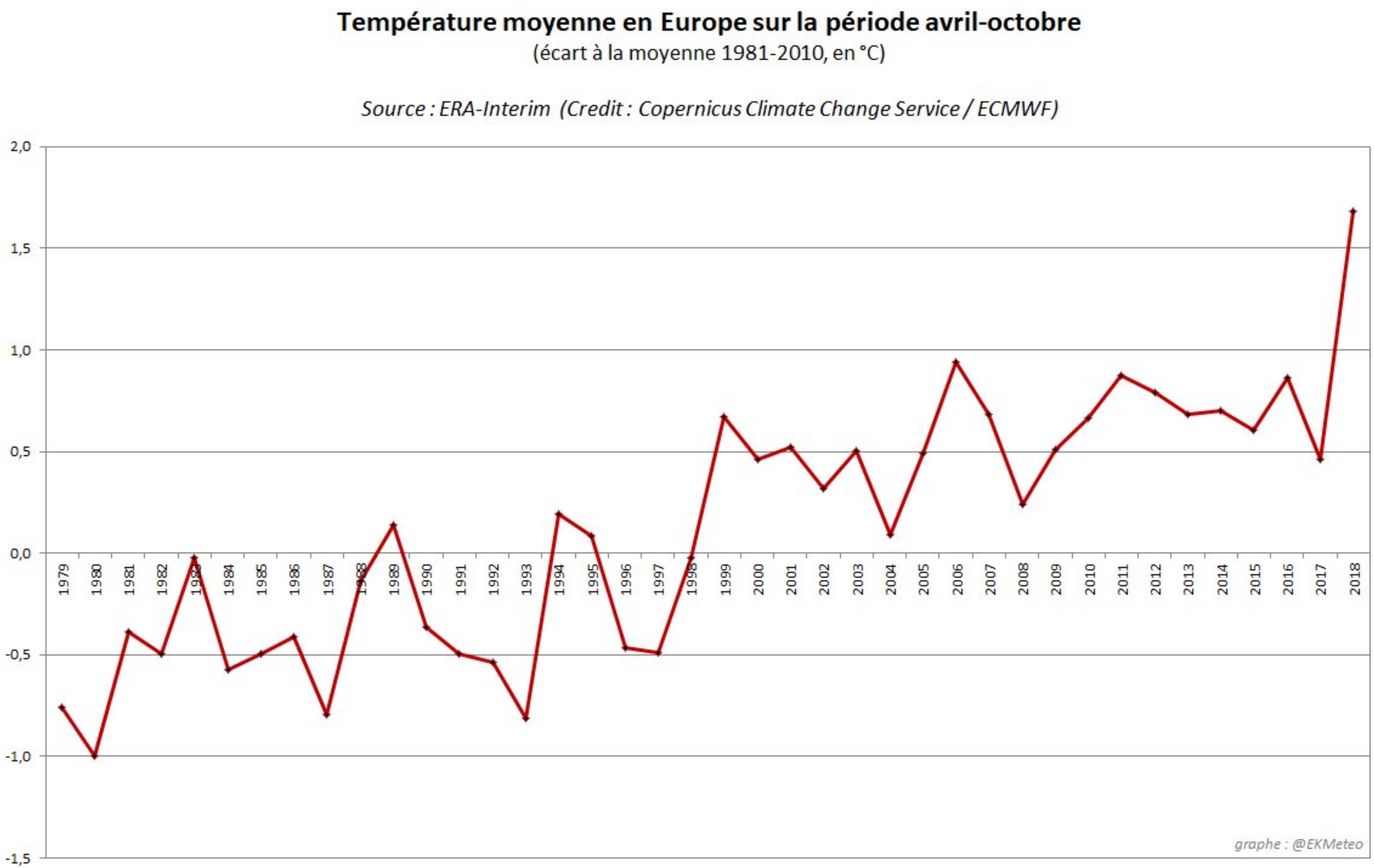
Synthesis (1 chapter)

17. Accelerating the transition in the context of sustainable development

Synthesis sustainable development in different geographical scales

AR6 timeline




Température moyenne en Europe sur la période avril-octobre
(écart à la moyenne 1981-2010, en °C)
Source : ERA-Interim (Credit : Copernicus Climate Change Service / ECMWF)
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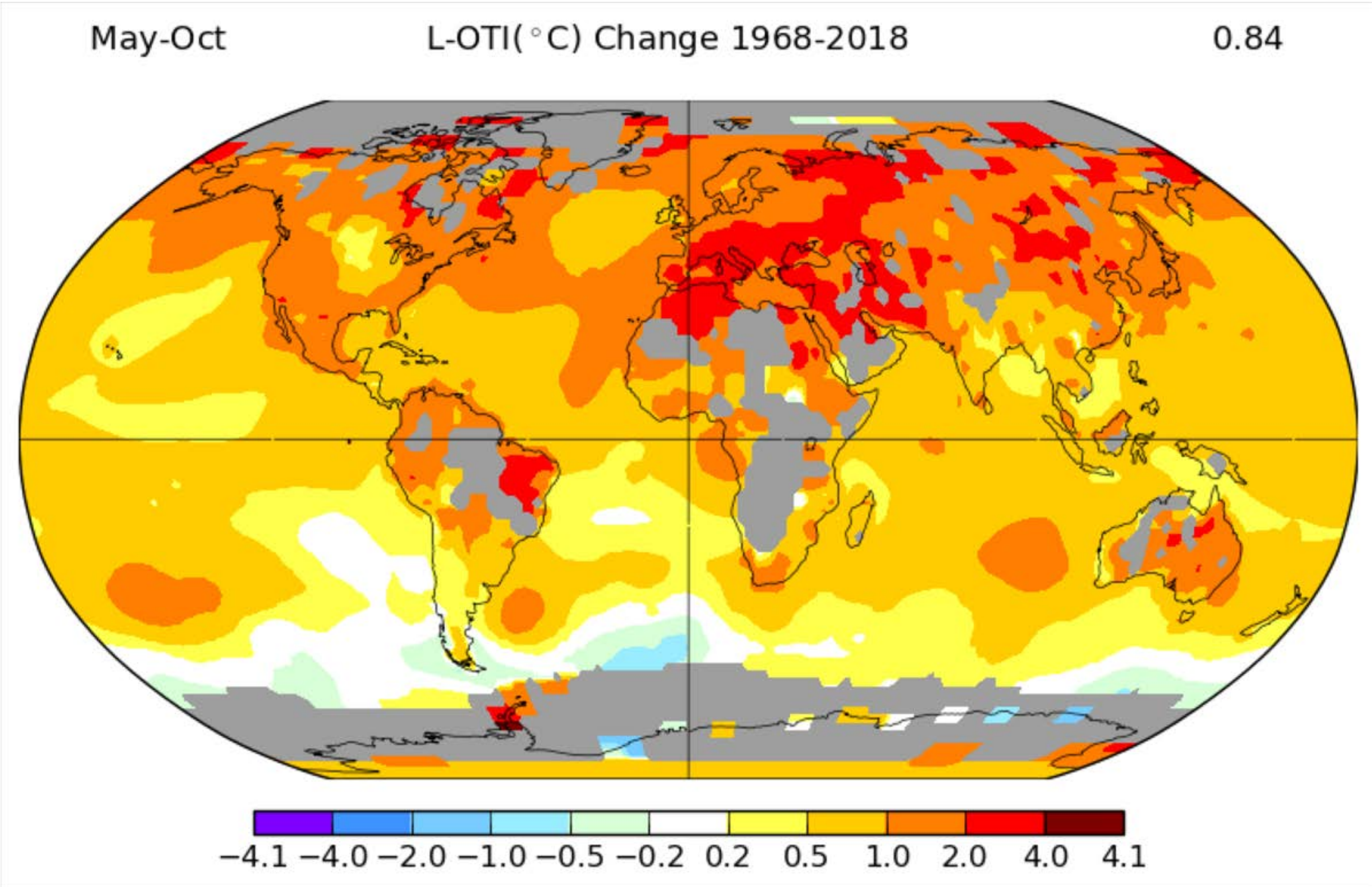
2018
graphe : @EKMeteo


May-Oct
L-OTI(°C) Change 1968-2018
0.84
−4.1 −4.0 −2.0 −1.0 −0.5 −0.2 0.2 0.5 1.0 2.0 4.0 4.1

Tipping point	Warming of 1.5°C or less	Warming of 1.5°C-2°C	Warming of up to 3°C
Arctic sea-ice	Arctic summer sea-ice is *likely* to be maintained. Sea-ice changes reversible under suitable climate restoration	The risk of an ice free Arctic in summer is ~ 50% or higher. Sea-ice changes reversible under suitable climate restoration	Arctic is *very likely* to be ice-free in summer. Sea-ice changes reversible under suitable climate restoration
Tundra	Decrease in number of growing degree days below 0°C Abrupt increases in tree-cover are *unlikely*	Further decreases in number of growing degree days below 0°C Abrupt increased in tree cover are *unlikely*	Potential for an abrupt increases in tree-fraction (*low confidence*)
Permafrost	21-37% reduction in permafrost 2 million km^2 more permafrost than under 2°C of global warming 0.08-0.16 Gt C a^{-1} released Irreversible loss of stored carbon	35-47% reduction in permafrost 0.12-0.25 Gt C a^{-1} released Irreversible loss of stored carbon	Potential for permafrost collapse (*low confidence*)
Asian Monsoon	*Low confidence* in projected changes	*Low confidence* in projected changes	Increases in the intensity of monsoon precipitation *likely*.
West African Monsoon and the Sahel	Uncertain changes, *unlikely* that a tipping point is reached	Uncertain changes, *unlikely* that tipping point is reached	Strengthening of monsoon and wettening and greening of Sahel and Sahara (*low confidence*) Negative associated impacts through increase in extreme temperature events
Rainforests	Reduced biomass, deforestation and fire increases pose uncertain risks to forest dieback	Larger biomass reductions than under 1.5 °C warming, deforestation and fire increases pose uncertain risk to forest dieback	Potential tipping point leading to pronounced forest dieback

Tipping point	Warming of 1.5°C or less	Warming of 1.5°C-2°C	Warming of up to 3°C
Boreal forests	Increased tree mortality at southern boundary of boreal forest *(medium confidence*)	Further increases in tree mortality at southern boundary of boreal forest (*medium confidence)*	Potential tipping point for significant dieback of boreal forest (*low confidence*)
Heat-waves, unprecedented heat and human health	Substantial increase in occurrence of potentially deadly heat-waves likely More than 350 million more people to deadly heat by 2050 under a midrange population growth scenario	Substantial increase in potentially deadly heat-waves likely Annual occurrence of heat-waves similar to deadly 2015 heat-waves in India and Pakistan	Substantial increase in potentially deadly heat-waves *very likely*
Key staple crops	Global maize crop reductions of about 10%	Larger reductions in maize crop production that under 1.5°C of about 15%	Drastic reductions in maize crop globally and in Africa *(high confidence*), of 20% or more; potential tipping point for collapse of maize crop in some regions (*low confidence)*
Livestock in the tropics and subtropics	Increased heat-stress	Onset of persistent heat-stress	Persistent heat-stress *likely*, *high confidence* of significant increased in risks.

Table 3.6: Emergence and intensity of climate change hot-spots under different degrees of global warming

Region and/or Phenomena	Warming of 1.5ºC or less	Warming of 1.5ºC-2°C	Warming of 2°C - 3°C
Arctic sea-ice	Arctic summer sea-ice is *likely* to be maintained. Habitat losses for organisms such as polar bears, whales, seals and sea-birds Benefits for arctic fisheries	The risk of an ice free Arctic in summer is ~ 50% or higher. Habitat losses for organisms such as polar bears, whales, seals and sea-birds may be critical if summers are ice-free Benefits for arctic fisheries	Arctic is *very likely* to be ice-free in summer. Critical habitat losses for organsims such as polar bears, whales, seals and sea-birds Benefits for arctic fisheries
Arctic land regions	Cold extremes warm by a factor of 2.5-3, reaching up to 5.5 °C *(high confidence)* Biome shifts in the tundra and permafrost deterioration is *likely*	Cold extremes warm by as much as 8 °C *(high confidence)* Larger intrusions of trees and shrubs in the tundra than under 1.5 °C of warming is *likely*; larger but constrained losses in permafrost are *likely*	Drastic regional warming is *very likely* A collapse in permafrost may plausibly occur (*low confidence*); a drastic biome shift from tundra to boreal forest is possible *(low confidence*).

Region and/or Phenomena	**Warming of 1.5ºC or less**	**Warming of 1.5ºC-2°C**	**Warming of 2°C - 3°C**
Alpine regions	Severe shifts in biomes are *likely* Reduced grassland net primary productivity	Even more severe shifts are *likely* Increased risks for reduced grassland net primary productivity	Critical losses in alpine habitats are *likely* Increased risks for significantly reduced grassland net primary productivity
Southeast Asia	Risks for increased flooding related to sea-level rise Increases in heavy precipitation events Significant risks of crop yield reductions are avoided	Higher risks for increased flooding related to sea-level rise *(medium confidence)* Stronger increases in heavy precipitation events *(medium confidence)* One third decline in per capita crop production *(medium confidence)*	Substantial increases in risks related to flooding from sea-level rise Substantial increased in heavy precipitation and high flow events Substantial reductions in crop yield

Region and/or Phenomena	Warming of 1.5ºC or less	Warming of 1.5ºC-2°C	Warming of 2°C - 3°C
Small Islands	Land of 40,000 less people inundated by 2150 on SIDS	Tens of thousands displaced due to inundation of SIDS	Substantial and wide-spread impacts through indundation of SIDS, coastal flooding, fresh water stress, persistent heat stress and loss of most coral reefs very likely
	Risks for coastal flooding reduced by 20-80% for SIDS	High risks for coastal flooding	
	Fresh water stress reduced by 25%	Fresh water stress from projected aridity	
	Increase in the number of warm days for SIDS in the tropics	Further increase of about 70 warm days per year	
	Persistent heat stress in cattle avoided	Persistent heat stress in cattle in SIDS	
	Loss of 70-90% of coral reefs	Loss of most coral reefs – remaining structures weaker due to ocean acidification	

Region and/or Phenomena	Warming of 1.5ºC or less	Warming of 1.5ºC-2°C	Warming of 2°C - 3°C
Mediterranean	Increase (about 7%) in dry-spells Reduction in runoff of about 9% (likely range: 4.5–15.5%) Risk of water deficit	*High confidence* of further increases (11%) in dry spells *High confidence* of further reductions (about 17%) in runoff (likely range 8–28%) Higher risks for water deficit	Substantial reductions in precipitation and reductions in runoff *very likely* Very high risks for water deficit
West African and the Sahel	Reduced maize and sorghum production is *likely*, with suitable for maize production reduced by as much as 40% Increased risks for under-nutrition	Negative impacts on maize and sorghum production *likely* larger than at 1.5 °C Higher risks for undernutrition;	Negative impacts on crop yield may result in major regional food insecurities (*medium confidence*) High risks for undernutrition

Region and/or Phenomena	**Warming of 1.5ºC or less**	**Warming of 1.5ºC-2°C**	**Warming of 2°C - 3°C**
Southern African savannahs and drought	*Likely* reductions in water availability High risks for increased mortality from heat-waves; High risk for undernutrition in communities dependent on dryland agriculture and livestock	Even larger reductions in rainfall and water availability *likely*; Higher risks for increased mortality from heat-waves (*high confidence*); Higher risks for undernutrition in communities dependent on dryland agriculture and livestock	Large reductions in rainfall and water availability are *likely* Very high risks for undernutrition in communities dependent on dryland agriculture and livestock
Tropics	Accumulated heat-wave duration up to two months *(high confidence)*; 3% reduction in maize crop yield.	Accumulated heat-wave duration up to three months *(high confidence)*; 7% reduction in maize crop yield.	Oppressive temperatures and accumulated heat-wave duration *very likely* to directly impact on human health, mortality and productivity Substantial reductions in crop yield *very likely*
Fynbos biome	About 30% of suitable climate area lost *(medium confidence)*	Increased losses (about 45%) of suitable climate area *(medium confidence)*	Up to 80%of suitable climate area lost*(medium confidence)*

Caractéristiques de ces 4 trajectoires modélisées illustratives

Global indicators	P1	P2	P3	P4	Interquartile range
Pathway classification	No or low overshoot	No or low overshoot	No or low overshoot	High overshoot	No or low overshoot
CO_2 emission change in 2030 (% rel to 2010)	-58	-47	-41	4	(-59,-40)
↳ in 2050 (% rel to 2010)	-93	-95	-91	-97	(-104,-91)
Kyoto-GHG emissions in 2030 (% rel to 2010)*	-50	-49	-35	-2	(-55,-38)
↳ in 2050 (% rel to 2010)	-82	-89	-78	-80	(-93,-81)
*Final energy demand** in 2030 (% rel to 2010)*	-15	-5	17	39	(-12, 7)
↳ in 2050 (% rel to 2010)	-32	2	21	44	(-11, 22)
Renewable share in electricity in 2030 (%)	60	58	48	25	(47, 65)
↳ in 2050 (%)	77	81	63	70	(69, 87)
Primary energy from coal in 2030 (% rel to 2010)	-78	-61	-75	-59	(-78, -59)
↳ in 2050 (% rel to 2010)	-97	-77	-73	-97	(-95, -74)
from oil in 2030 (% rel to 2010)	-37	-13	-3	86	(-34,3)
↳ in 2050 (% rel to 2010)	-87	-50	-81	-32	(-78,-31)
from gas in 2030 (% rel to 2010)	-25	-20	33	37	(-26,21)
↳ in 2050 (% rel to 2010)	-74	-53	21	-48	(-56,6)
from nuclear in 2030 (% rel to 2010)	59	83	98	106	(44,102)
↳ in 2050 (% rel to 2010)	150	98	501	468	(91,190)
from biomass in 2030 (% rel to 2010)	-11	0	36	-1	(29,80)
↳ in 2050 (% rel to 2010)	-16	49	121	418	(123,261)
from non-biomass renewables in 2030 (% rel to 2010)	430	470	315	110	(243,438)
↳ in 2050 (% rel to 2010)	832	1327	878	1137	(575,1300)
Cumulative CCS until 2100 ($GtCO_2$)	0	348	687	1218	(550, 1017)
↳ of which BECCS ($GtCO_2$)	0	151	414	1191	(364, 662)
Land area of bioenergy crops in 2050 (million hectare)	22	93	283	724	(151, 320)
Agricultural CH_4 emissions in 2030 (% rel to 2010)	-24	-48	1	14	(-30,-11)
in 2050 (% rel to 2010)	-33	-69	-23	2	(-46,-23)
Agricultural N_2O emissions in 2030 (% rel to 2010)	5	-26	15	3	(-21,4)
in 2050 (% rel to 2010)	6	-26	0	39	(-26,1)

NOTE: Indicators have been selected to show global trends identified by the Chapter 2 assessment. National and sectoral characteristics can differ substantially from the global trends shown above.

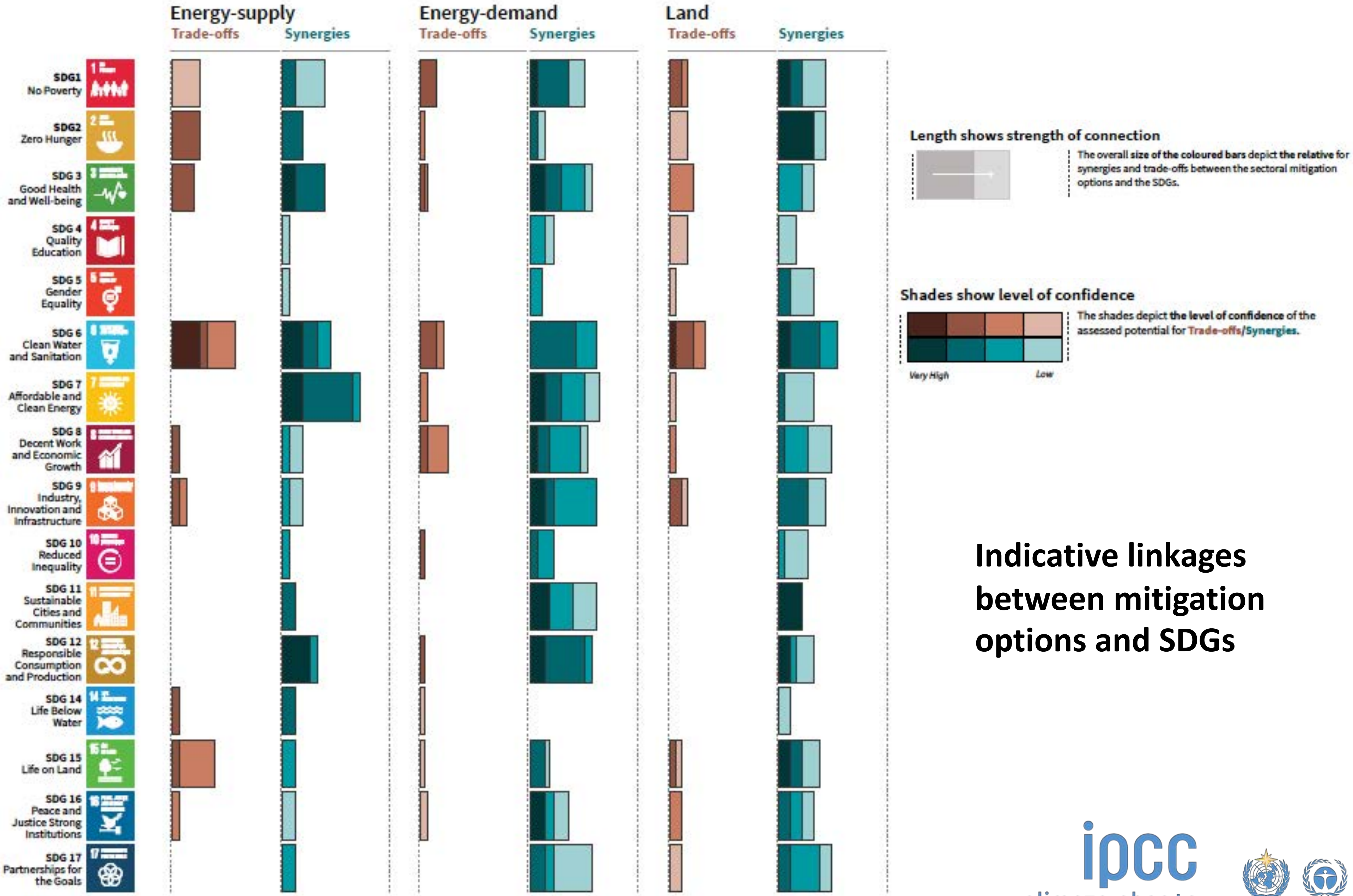
** Kyoto-gas emissions are based on SAR GWP-100*
*** Changes in energy demand are associated with improvements in energy efficiency and behaviour change*

Emissions de gaz à effet de serre

Systèmes énergétiques

Elimination du CO_2

Systèmes agricoles



Indicative linkages between mitigation options and SDGs