

#### Veðurstofa Íslands

#### National Knowledge Centre for Climate Change Adaptation



INTERGOVERNMENTAL PANEL ON Climate change

Climate Change 2021 The Physical Science Basis Summary for Policymakers



IDCC

Climate Change 2022 Impacts, Adaptation and Vulnerability Summary for Policymakers



INTERGOVERNMENTAL PANEL ON CLIMATE CHARGE

Climate Change 2022 Mitigation of Climate Change





#### Hvítbók um aðlögun að loftslagsbreytingum Drög að stefnu



#### Í ljósi loftslagsvár

Stefna um aðlögun að loftslagsbreytingum

Júní 2021



#### **Climate Change 2021** The Physical Science Basis

Summary for Policymakers



Working Group I Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change



## The science behind climate change

• IPCC WG1

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Human influence has warmed the climate at a rate that is unprecedented in at least the last 2000 years

Changes in global surface temperature relative to 1850-1900 °C °C 2.0 2.0 Warming is unprecedented in more than 2000 years 1.5 1.5 www.www. 1.0 1.0 0.5 0.5 0.0 0.0 -0.5 -0.5 -1 500 1000 1500 1850 2020 1850 1900 1950 2020 1 2000

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**1000 years** 

2000 years

#### SIXTH ASSESSMENT REPORT

Working Group I – The Physical Science Basis

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Heavy rainfall More frequent

More intense

Increase in some regions

Drought



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**Fire weather** More frequent



Ocean Warming Acidifying Losing oxygen

Photo Credits from left: 1. Luiz Guimaraes 2. Jonathan Ford 3. Peter Burdon 4. Ben Kuo 5. NOAA

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## With every additional amount of global warming, changes get larger.

Simulated changes...





Projected changes in annual sea surface temperature at 1.5°C, 2°C, and 4°C (in rows) global warming relative to 1850–1900.

Results are based on simulations from the CMIP6 multi-model ensemble (26 global climate models) using the SSP5-8.5 scenario to compute the warming levels. IDCC

## With every additional amount of global warming, changes get larger.



**Extreme rainfall** intensifies by 7% for each additional 1°C

#### SIXTH ASSESSMENT REPORT

Working Group I – The Physical Science Basis

Observed warming is driven by emissions from human activities, with greenhouse gas warming partly masked by aerosol cooling





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**IOCC** 





### Human influence, main driver of...

- ...Hot extremes, which have become more frequent and more intense
- ...ocean warming since the 1970s, and ocean acidification.
- ...changes we see in the frozen areas of the planet:
  - global retreat of glaciers since the 1990s
  - 40% decrease in Arctic sea ice since 1979
  - decrease in spring snow cover since the 1950s



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#### **Changes to the Water cycle**



#### With warmer temperature

#### Atmosphere can hold more water

#### More and faster evaporation

#### Heavier precipitation

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#### **Changes to the Water cycle**



#### More global warming

#### Heavier rainfall

Intensifying dry seasons and droughts

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#### **Ocean and ice sheets**



**Ocean temperature** 

Increasing



**Greenland Ice Sheet** 

Melting



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Sea level

Rising

Human activities affect all the major climate system components, with some responding over decades and others over centuries



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#### **Climate Change 2022** Impacts, Adaptation and Vulnerability Summary for Policymakers



WGII

Working Group II contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change



#### Impacts, Adaptation, and Vulnerability

• IPCC WG2

## Climate risk = probability x impact



# Climate risk = probability of a disaster x impact of a disaster

 $\frac{df}{dt} = \lim_{h \to 0} \frac{f(t)}{f(t)}$ 

 $F_{I} = G_{I} \frac{m}{I}$ 

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#### Simultaneous extreme events compound risks

Multiple extreme events that compound the risks are more difficult to manage



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#### **Biodiversity loss at different warming levels**



Loss of biodiversity

0-25%	>25-50%	>50-75%	>75-100%

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#### **Biodiversity loss at different warming levels**





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Loss of biodiversity

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#### **Biodiversity loss at different warming levels**





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## MINGATION



## ADAPTATON.

#### There is a rapidly narrowing window of opportunity to enable climate resilient development



Illustrative climatic or non-climatic shock, e.g. COVID-19, drought or floods, that disrupts the development pathway

Narrowing window of opportunity for higher CRD



# 1,5°C



Skýrsla vísindanefndar um loftslagsbreytingar 2018 Climate change and the impact of climate change on Iceland

#### • 2018 report

new report expected in 2023



#### Warming of the "Iceland box"

**Icelandic Met** 

Office

Temperature change (° C) from the average of 1986 – 2005





#### **The Icelandic context**



#### Warming will lead to continued change in Iceland



#### Climate change is affecting natural hazards

 Flood risk increases due to heat and precipitation changes, snow layers and sea level rise

 There is an increased risk of repercussions in areas where permafrost thaws as well as glacial changes can cause repercussions

 Increased magma production could lead to more or larger volcanic eruptions

Risk of vegetation and forest fires

#### Sólheimajökull 1997 & 2010





Photo: Oddur Sigurðsson)

#### Thinning glaciers lead to uplift



Icelandic Met Office

#### **Sea level rise**



AR6

#### Sea level rise around Iceland as a fraction of global sea level rise



### Uncertainty about the rate of sea level rise is high

Landshluti	Landhæðar- breyting (cm)	Hækkun sem hlutfall af hnattrænni	Hnattræn hækkun 50 cm	Hnattræn hækkun 75 cm	Hnattræn hækkun 100 cm
			Staðbundin hækkun sjávarstöðu (cm)		
Suðvesturland að Norðvesturlandi	-20 til -10	30 til 34 %	25 til 37	33 til 45	40 til 54
Norðvestanlands og innarlega í fjörðum norðanlands	10 til 30	28 til 30 %	-16 til 5	-9 til 13	-2 til 20
Austanverður Tröllaskagi að Flateyjarskaga	-30 til -10	28 til 30%	24 til 45	31 til 53	38 til 60
Skjálfandaflói og Öxarfjörður	0 til 20	30% til 32%	-5 til 16	3 til 24	10 til 32
Melrakkaslétta að Langanesi	0 til 10	32 til 38%	6 til 19	14 til 29	22 til 38
Austurland	0 til 20	38 til 40%	-1 til 20	9 til 30	18 til 40
Suðausturland	100 til 200	20 til 28%	–190 til –86	–185 til –79	–180 til –72
Suðurland	20 til 40	30 til 32%	-25 til -4	-18 til 4	-10 til 12
Sunnan- og vestanverður Reykjanesskagi	-30 til -10	32 til 34%	26 til 47	34 til 56	42 til 64



Future sea level rise is certain.

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It is not a question of **how much** but **when** 

(up to some meters)



Icelandic Met Office