

We need to talk

What is the situation of the global climate now?
 What's the situation down the road?
 What can we do?

Slide 2: Talk sections

Talk sections

What's the situation now?

- Temperature rise
- Examples of weather extremes
- Video of the Arctic
- Our way to tipping points

What are we going to face soon and further in the future?

- Temperature prediction under business as usual
- Food, welfare state, conflicts, extinction
- Talk by Prof. Rockström

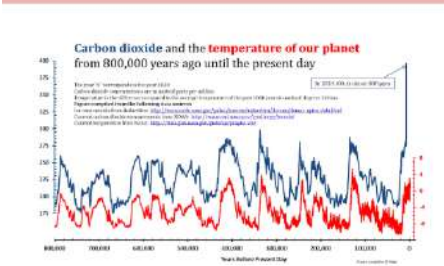
What can be done?

- Voting, demonstrations, petitions, civil disobedience
- In academia

Slide 2: Talk sections

- There will be Videos and Statements included. I probably won't have time to explain in detail who these people are, but please google them. And be sure that those are people who know what they are talking about.

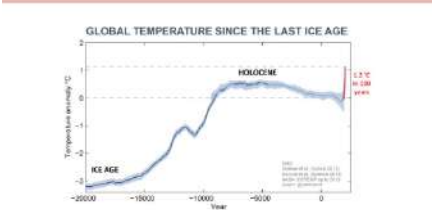
Slide 3: Carbon Dioxide and the temperature on our planet



Slide 3: Carbon Dioxide and the temperature on our planet

- People have been very fond of digging and burning fossil fuels
 - Highest CO2 concentration in the atmosphere for at least 800 000 yrs

Slide 4: Global temperature since the last ice age

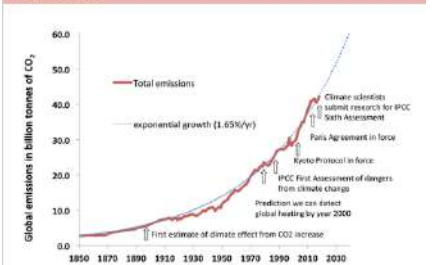


"In just 100 years, fossil fuel use has more than undone 5000 years of natural cooling. It's hotter now than any time in the history of human civilisation. We are catapulting ourselves out of the Holocene into uncharted territory. Current life on Earth is not adapted to this."
 (Prof. Stefan Rahmstorf, PIK)

Slide 4: Global temperature since the last ice age

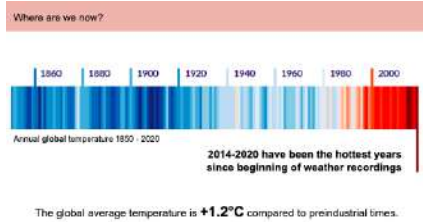
- Let's zoom in a bit... The Holocene was actually characterized by steady cooling.
 - However, we managed to flip ourselves out of the Holocene into the Anthropocene in just 100 yrs.
 - It is now warmer than ever before in human history.
 - Current life on Earth is simply not adapted to this.

Slide 5: Summits and agreements were ineffective in reducing CO2 emissions



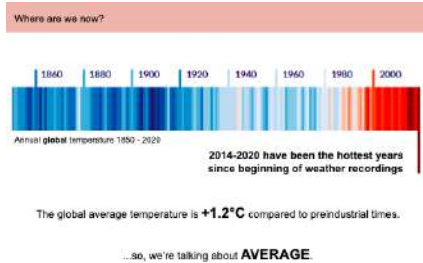
Slide 5: Summits and agreements were ineffective in reducing CO2 emissions

- At some point people became aware of their share in this situation and started meeting up, having conferences and summits.
 - All the agreements settled didn't stop the carbon emissions from rising.
 - The carbon emissions are rising exponentially. We double them every 39 yrs. Still!



Slide 6: The past years have been the hottest

- The bars show the global average temperatures and it becomes very clear that the past years have been extremely hot.
- In fact, the past 7 yrs have been the hottest since the beginning of the weather records.
- We now reached +1.2°C compared to preindustrial times. The average provides a useful overall indicator of the magnitude of climate change.



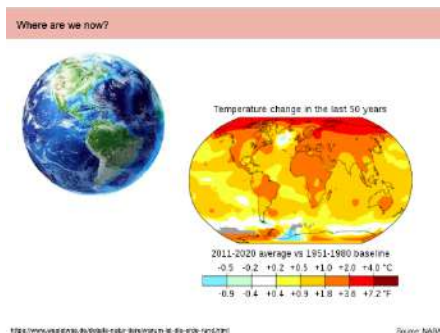
Slide 7: The past years have been the hottest

- But let's don't forget that we are talking about an average temperature.



Slide 8: We live on a blue planet

- However! We live on a blue planet and water has a different heat capacity than land. Water buffers down the average, which means land can become significantly hotter. (... generally greater surface warming of land areas than of the oceans typically by about 40% compared with the global average. Germany is already at 1.6°C)



Slide 9: We live on a blue planet

- Here you see this phenomenon. The continents are much warmer.
- The Arctic heats up fastest. It is subject to the so-called albedo effect. Ice reflects back a lot of sunlight (>80%) and kind of cools itself but this mechanism. Whereas sea is the darkest surface you can have on Earth and reflects only about 15%. Less ice means more heat means less ice and so on.

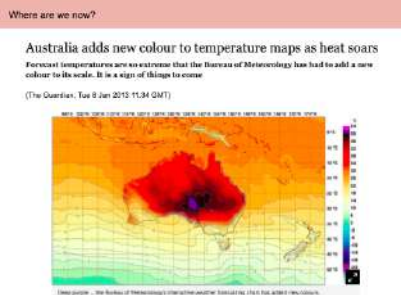


Slide 10: Impact of greenhouse gas emissions

- Due to this +1.2°C we have more evaporation.
- This leads to drier lands but also more water vapour in the atmosphere.
- The atmosphere is kind of fueled with more energy through heat and water.
- This water is often not released in a drizzly type of rain, which would have the ability to slowly soak into the dry

ground.

- It is released more punctually in the form of heavy rainfall or snowfall. This leads to floods and run-offs.
- The large amounts of water cannot soak into the dry ground and wash off the ground, leading to floods, erosion, salinity changes in coastal waters affecting life dependent on a certain salt level



Slide 11: Australia adds new color to heat map

- Here you see an example of the great heat already on continents.
- Already in 2013 Australia had to introduce a new color to their weather heat map. It turned so hot that the normal scale was not sufficient anymore.
- Animals that are native to Australia and adapted to heat couldn't cope anymore.



Slide 12: Heatwaves kills animals

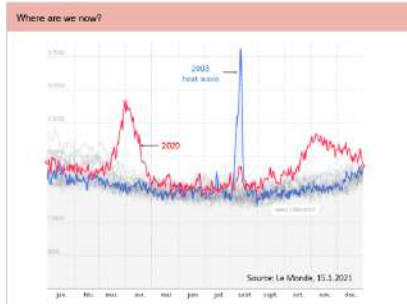
- Animals like bats and birds were just dropping dead from the trees.
- This was visible for the bats because they live in large gatherings in urban areas and you could just see them dead in the streets. No one knows how many individuals of more secretive species died.
- I am not even talking here about the disastrous and heart-breaking wildfires Australia experienced.
- But the heat today does not only affect animals, also

humans.

"This sort of event has not happened in Australia this far north since European settlement," says Dr Welbergen, who is also the president of the Australasian Bat Society, a not-for-profit conservation group. Flying foxes often experience fatal heat stress when temperatures eclipse 42C, scientists say. During November's heatwave, Cairns recorded its highest-ever temperature of 42.6C.

(<https://www.bbc.com/news/world-australia-46859000>)

(<https://www.qt.com.au/news/birds-falling-dead-from-trees-in-heat/3908210/>)



Slide 13: People die due to heat too

- This is a chart from France.
- It shows the number of deaths from Jan to Dec for 21 years (2000-2020).
- For 2020 you can see the two COVID19 waves.
- For 2003 you see a sharp peak in summer. These were days of extreme heat (>30°C) causing a high number of deaths. Death due to heat is caused by circulation problems, lung disease, kidney failure and stroke.
- The number of deaths is represented by the area under the curve. Due to COVID19 more people died in

France than in the heatwave 2003, nevertheless:

- During the heatwave in 2003, ca. 70 000 people died in Europe.
- The number of deaths due to heat corresponds to the number of days of extreme heat (> 30°C).



Slide 14: Stronger storms

- +1.2°C also causes already much stronger storms.
- Also here a new category had to be added to the existing scale which normally goes up to 5. However, we are seeing now storms that would be of category 6 or 7.

<https://www.theguardian.com/environment/2018/feb/22/category-six-storms-cyclones>
<https://blogs.scientificamerican.com/eye-of-the-storm/hurricane-dorian-was-worthy-of-a-category-6-rating/>

“The energy for such storms largely comes from the latent heat of the water which has been evaporated from the warm ocean surface and which condenses in the clouds within the storm, releasing energy. It might be expected that warmer sea temperatures would mean more energy release, leading to more frequent and intense storms. However, ocean temperature is not the only parameter controlling the genesis of tropical storms ; the nature of the overall atmospheric flow is also important.”

<https://www.edf.org/climate/climate-change-and-extreme-weather>



Slide 15: Melting ice

- As mentioned before, the Arctic is warming fastest.
- It is actually melting much faster than expected.
- The rate of warming is now in line with the worst-case scenarios predicted by the IPCC (Intergovernmental Panel on Climate Change, dt. “Weltklimarat”)
- We have seen now all these headlines which are just examples. The list is much longer.

- But often moving pictures are just more powerful in describing the tragedy:



Slide 16: Clip from “Our Planet”

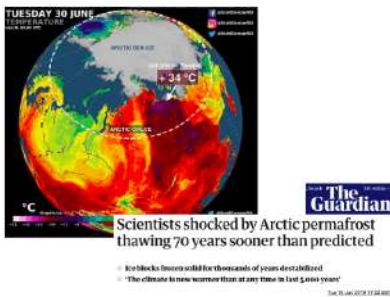
- I hand over the word to Sir David Attenborough. He is the one truly skilled in describing what’s going on in the natural world.
 - This is a video about the situation in the Arctic. It’s about 8 mins long.
- (YouTube, Netflix Our Planet, Frozen Worlds, min 43:00 - 51:10)

“Animals are more than ever a test of our character, of mankind’s capacity for empathy and for decent, honorable conduct and faithful stewardship. We are called to treat them with kindness, not because they have rights or power or some claim to equality, but in a sense because they don’t, because they all stand unequal and powerless before us.”

— Matthew Scully, Director of *The Power of Music, the Suffering of Animals, and the Call to Mercy*

Slide 17: Quote by Matthew Scully

- (leave a minute for silence and reading)
- The reason why I included this video is because I think there is a difference between understanding the climate crisis and REALLY understanding it. There is a difference between feeling it and REALLY feeling it. We live very often very disconnected from the consequences of global warming and biodiversity loss. It is very easy to go on with daily life and lose awareness of this incredible tragedy. And the question is what makes you going to do something about it.



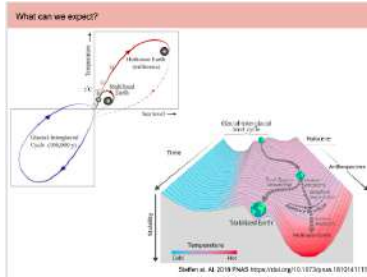
Slide 18: Permafrost thaws faster

- So. To where is all this leading? The point is that the Arctic is very close located to the permafrost ground in Siberia.
- And this one is also melting much faster than predicted. 70 years sooner!!!
- The Arctic and the Permafrost ground are so called tipping elements.



Slide 19: Climate tipping points

- Tipping elements are by definition “large-scale components of the Earth system, which are characterized by a threshold behavior. When relevant aspects of the climate approach a threshold, these components can be tipped into a qualitatively different state by small external perturbations. To compare them with the human body, tipping elements could be described as organs which drastically alter or stop functioning normally if certain requirements, such as oxygen supply, are not met. The threshold behavior is often based on self-reinforcing processes which can continue without further forcing. There is the possibility that the system remains tipped, even if the background climate falls back below threshold.”
- <https://www.pik-potsdam.de/en/output/infodesk/tipping-elements/kippelemente>
- They are all strongly interconnected. If one tips, it triggers others to tipp.



Slide 20: Earth must be stabilized

- Even +1.5°C might be enough to trigger some dramatic change.
- +2°C would be very dangerous and to keep to a comfortable level of risk, we should cut emissions so as to limit temperature change to max. +1.5°C.
- We have already flipped Earth out of the glacial-interglacial cycle and we MUST divert Earth back on a track which keeps risks manageable
- Otherwise we might trigger a chain reaction that will unleash forces which are simply not controllable anymore.
- With everything we have we must avoid reaching tipping points.

What can we expect?

1.5°C and 2°C Warmer Worlds

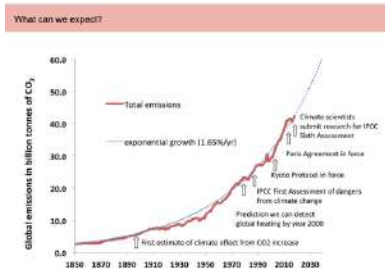
The global climate has changed relative to the pre-industrial period, and there are multiple lines of evidence that these changes have had impacts on organisms and ecosystems, as well as on human health and well-being. The global climate is expected to warm further, and the magnitude of the warming will depend on the amount of greenhouse gas emissions. The Paris Agreement calls for global emissions of CO₂ must start trending in 2020 and be cut globally by half in the coming ten years (until 2030) net zero by 2050.

to have a reasonable chance of staying well below 2°C of global warming (compared to pre-industrial global mean temperature) (IPCC, 2018) (SR1.5)

warming has resulted in an increase in the frequency and duration of marine heatwaves. Further, there is substantial evidence that human-induced global warming has led to an increase in the frequency, intensity and/or amount of heavy precipitation events at the global scale (extreme precipitation), as well as an increased risk of drought in the Mediterranean region (extreme dryness).

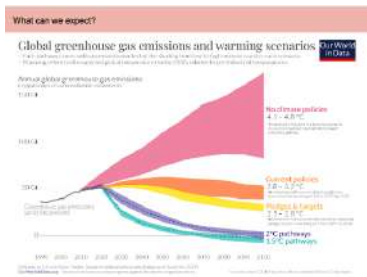
Slide 21: IPCC on targets

- That's why the IPCC recommended these targets.



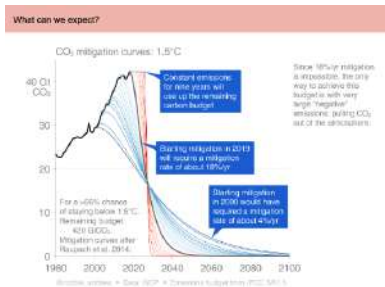
Slide 22: Agreements are failing

- However, at the moment there is simply no room for hope.
- CO₂ emissions are still rising.



Slide 23: Developments of CO₂ emissions

- Even if all measures of the Paris agreement are taken, we will end up way above 2°C.
- All these calculations do not factor in tipping points!
- We might be much earlier at a far higher temperature than we think now.



Slide 24: We must act fast

- Because we waited too long to take determined action, we have a bit of a stressful situation now.
- We have to reduce emission drastically very soon.

we moved beyond triggering tipping points, and this will be rather soon, I will not be able anymore to spend time in the wild without being sad. Without being sad because I will be aware that I can't do anything for nature anymore. That I will be watching a dying planet for decades! For the entire rest of my life which will still be such a long time. I am so afraid of this irreversible damage.

- To sum up this first half of the talk, I let Prof. Johan Rockström speak. He is the director of the Potsdam Institute for Climate Impact Research:



<https://www.youtube.com/watch?v=8SI28fkrozE>

Slide 29: Video Prof. Rockström

<https://www.youtube.com/watch?v=8SI28fkrozE>

What can we do?

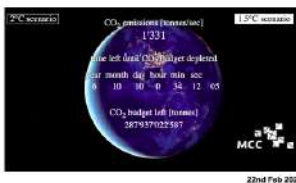
So, what can WE do?

Slide 30: What can we do?

- What can each of us do?
- The challenge is so big that we should do whatever we can on all levels.
- I hope it has become clear that system change is what is required.
- To make decisions on that we should do, please keep in mind how little time we have left.

What can we do?

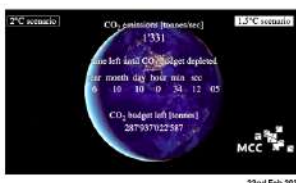
The timeframe for significant change is extremely small.



Slide 31: Repeat slide with CO2 budget and ticking clock

What can we do?

The timeframe for significant change is extremely small.



**We have to get priorities straight!
... on what to spend time and energy.**

Slide 32: We have to set the right priorities on what to spend our time and energy.

What can we do?

PhD projectthesis: Average time according to subject

Fachbereich	Durchschnittliche Promotionsdauer
Mathematik/Naturwissenschaften	4,3 Jahre
Erziehungswissenschaften/Psychologie	4,3 Jahre
Rechts-, Wirtschafts- und Sozialwissenschaften	4,6 Jahre
Ingenieurwissenschaften	5 Jahre
Geisteswissenschaften	5,3 Jahre

Quelle: Studie "Promotionszeiten", © Studinet

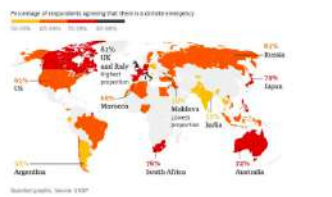
https://www.academicsonline.de/berufsweg-in-der-forschung

Slide 33: The time needed for research projects

- Some of you who work in the biomedical sciences said it would be nice to do something with research projects.
- But if you look at the duration for e.g. a PhD project with > 4 yrs, it becomes clear quickly that there is no point in trying this approach.
- I will come back to scientists later.
- A lot of people also already know that there is something like a climate crisis (if you wanted to raise awareness by research projects).

What can we do?

Two-thirds of people around the world said climate change is a global emergency





trigger system change.

Slide 42: Arte.tv survey (400.000 participants in different countries on how they see the future)

- The results are far from clichés.
- 82% want governments to force their citizens into environmentally friendly behavior. 78% consider violation of laws in the form of civil disobedience as necessary or even inevitable when fighting for environmental protection. 68% of French people and 52% of Germans would participate in an uprising.
- And in fact, the social sciences have shown that non-violent civil disobedience is an extremely efficient way to



Slide 43: Video on non-violent direct action (NVDA)

<https://www.youtube.com/watch?v=2yBkKwjy8Do&list=PL5J1RWtZjjiU3oEwKkiMOWDx7WavueKqg&index=10&t=739s>

The XR Talk: Climate Crisis + Social Science for change | Extinction Rebellion Global
min 11:19 - 12:19



Slide 44: Literature support the efficiency of NVDA

- Please feel free to dig into the original literature.
- Actually, this research backs only up what common sense tells us anyway: to stand up for the right thing. To fight for a future under livable conditions on planet Earth.

What can we do?

"It's time to participate in non-violent political movements wherever possible. ... Civil disobedience is not only a moral choice, it is also the most powerful way of shaping world politics."
Christiana Figueres (former UN climate chief)

"The activists of Extinction Rebellion are leading the way in confronting this immense challenge, with courage and integrity, an achievement of historic significance that must be amplified with urgency."
Noam Chomsky (American linguist, philosopher, cognitive scientist, historian, social critic, and political activist)

Slide 45: Quotes of famous people supporting NVDA

- There's more and more people speaking up for peaceful civil disobedience.
- Among those famous people, people who have been fighting for very long for a better world (and were ignored to a large extent).

What can we do?

"It's not at all surprising that people in this urgent situation feel they have got to take non-violent direct action. They've got to find a way of putting the case for the human race before those in power."
Dr Rowan Williams (Archbishop Canterbury)

"I was slipping into despair before I went to D.C. I spent a year depressed about climate change and feeling I wasn't doing enough. Fonda tells USA TODAY. "Once I went to D.C. and began that action, my despondency disappeared."
Jane Fonda (Actress and activist)

Slides 46: more quotes

- As Jane Fonda says, participating in activism is also a very useful thing to deal with eco-anxiety.
- You find like-minded people and you get the feeling really to do something.

What can we do?



Slide 47: quote Mark Ruffalo

- The naked facts about global warming and environmental destruction are so bleak and and just terrible, that there really is no room for hope.
- We must create hope ourselves by taking action. And action inspires for action.
- Governments depend on cooperation and obedience. If you refuse these essentials, you have the chance to build up a lot of pressure. Due to governments inadequate action regarding the climate emergency for decades, we have to level

up and do the right thing.



Slide 48: Examples of rebels

- So are more and more people thinking worldwide. Many Extinction Rebellion groups are forming. There's a lot of old folks involved who do not want to leave the planet in this state, who want to fight for their children and grandchildren.
- This kind of activism has to become mainstream. We all must develop a zero tolerance attitude towards crimes against nature by corporations and governments. Then it will become increasingly hard to commit those crimes.

What can we do?

Scientists!

You don't press the alarm and walk away before everyone got the message!

Slide 49: Scientists role in all this

- What about us scientists?
- Let's sum it up like this: You don't press the alarm and then just walk away before everyone has heard that alarm.
- Even when we are no climate scientists, we were still educated to understand these facts and that makes us keepers of the knowledge.
- If the keepers of the knowledge don't behave like there's an emergency, why would anyone else bother?
- You are all intelligent, funny people who all have people

in your surroundings who look up to you. You are all leaders! Take the lead, go ahead and live the emergency! Speak about whenever, wherever you can.

- Today, in 2021, we all must make ourselves heard. This utter tragedy of the climate crisis is also a crisis of silent approval. It could develop to this extent only because too many haven't already spoken up. We MUST change that. Now is the time. Now or never. These are the decisive years.
- Everyone alive today, and especially scientists, have a huge responsibility. We must be aware of this.
- If we don't fight now, the breakdown of the global climate will rob the meaning off everything we work for. Our pensions won't be secure and no one will be interested in our research results.
- Whom do you want to develop fancy drugs for, based on the knowledge we create, when people starve to death?
- What world do you want to create knowledge for?
- There is no point in working hard 40-50 hrs/week and not having any time left for climate education and activism, when we mess this up and reach the point of no return.
- If you take one thing from this talk, then it is me begging you to educate yourselves properly on the climate crisis, its causes and what needs to be done! Form your own

opinion! Read about it, watch videos, listen to podcasts, but please educate yourselves and others!

- To sum everything up, I'd like to finish the talk with a more arty video which puts it all together:

What can we do?



The Turning point | A film by Steve Cutts <https://www.youtube.com/watch?v=EDzEdj3wyJM>

Slide 50: Summary video

The Turning point | A film by Steve Cutts

<https://www.youtube.com/watch?v=EDzEdj3wyJM>

Slide 51: Thank you!