

## Our Climate - Influenced by Humans?



image source: pixabay | geralt

### **Klaus Hasselmann, the Climate Detective**

*from Dr. Peter Kuehrt*

Klaus Hasselmann not only developed models for mapping and forecasting long-term climate changes at an early stage, he was also able to prove, in a groundbreaking study as early as 1979, that the rise in temperature in the atmosphere is largely due to human carbon dioxide emissions. Through numerous measurements, observations and modelling, he and his team of researchers were able to determine the influence of numerous factors, such as changes in solar radiation or volcanic eruptions. Finally, he succeeded in determining the "human fingerprint" from the natural random events of the Earth's atmosphere using the exclusion method. Figuratively speaking: Like a detective, Klaus Hasselmann tracked down the human fingerprint in the climate system and convicted it the 'culprit'.

The result was clear: the earth is warming up and the greenhouse gases produced by humans are contributing to this global warming.

The Earth's atmosphere contains gases that allow short-wave solar radiation to pass through to a large extent, but absorb long-wave thermal radiation and thus heat up the Earth's atmosphere system. Using a greenhouse analogy - which lets solar radiation through and retains the heat inside - these gases are also called greenhouse gases. Water vapour and carbon dioxide in particular absorb part of the heat radiation emitted by the Earth's surface and reduce the proportion of heat radiation emitted into space. Since industrialisation, however, it is humans who have caused a constant increase in atmospheric concentrations of greenhouse gases through their numerous activities (heating, transport, draining of moors, etc.). Hasselmann was able to prove on the basis of numerous comparative studies that the current global warming is not a natural fluctuation, but that in the extremely complex system of the earth's atmosphere it is above all the influence of man, who gains energy by burning fossil raw materials and thereby brings huge amounts of carbon dioxide and other greenhouse gases into the atmosphere. Without certain energy-intensive industries, without conventional heating plants and without petroleum-driven cars, air and shipping traffic, the current global warming would be far less.

Knowing this, Hasselmann warned as early as 1988 of the devastating consequences of man-made climate change: "In 30 to 100 years, depending on how much fossil fuel we consume, we will be facing a very significant climate change. Climate zones will shift, precipitation will be distributed differently. Then we will no longer be able to talk about random results." (quoted from [https://www.t-online.de/nachhaltigkeit/id\\_90921440/nobelpreistraeger-klaus-hasselmann-wer-ist-der-deutsche-klimaforscher-.html](https://www.t-online.de/nachhaltigkeit/id_90921440/nobelpreistraeger-klaus-hasselmann-wer-ist-der-deutsche-klimaforscher-.html))

Similar warnings can be heard in an audio file from 1995:

Link to audio file

The role of humans in global warming has long been disputed. Although the Intergovernmental Panel on Climate Change stated as late as 2021 that climate change is indisputably man-made, even today, many people refuse to acknowledge this scientific finding.

In a film analysis based on division of labour, we now want to comprehend and substantiate Klaus Hasselmann's findings.

### Tasks

1. Form six groups. Select one of the following YouTube links and collect all the arguments that support Klaus Hasselmann's claim of an accelerated rise in temperature and human responsibility.

Write down the arguments and use them to create a "pitch" with a maximum of three Power-Point slides for a short presentation. The short presentation should not exceed three minutes.

What is a "pitch"? A "pitch" presentation is a short presentation of an issue that requires one to three slides and lasts a maximum of one to three minutes (one minute per slide). The slides themselves should contain as little text as possible.

Video clips:

1. <https://www.youtube.com/watch?v=ouPRMLirt5k>



4. [https://www.youtube.com/watch?v=FoMzyF\\_B7Bg](https://www.youtube.com/watch?v=FoMzyF_B7Bg)



2. <https://www.youtube.com/watch?v=E5LimujifUo>



5. <https://www.youtube.com/watch?v=oJ1zm65u-ck>



3. <https://www.youtube.com/watch?v=5GIMoCMn0k0>



6. <https://www.outube.com/watch?v=tNZXy6hfvhM>



Following the evaluation of the videos, present your acquired knowledge through short presentations by all working groups and discuss your work results in the plenary.

2. Finally, consolidate your findings through simulated debates with climate change deniers. For this purpose, groups of three deniers and three supporters are drawn by lot, and after a short preparation time, they each simulate a short argument in front of the class. With the consent of the participants, the exchange could also be recorded as a video clip. The rest of the class then gives tips on how to refute the arguments of the climate opponents.

The "Physics for the climate and other complex systems" digital poster and the Lindau Online Matinee 2022 video are also helpful for these tasks:



<https://www.mediatheque.lindau-nobel.org/GetFile?id=39532>



<https://www.mediatheque.lindau-nobel.org/videos/39519/lindauer-matinee-2022>