



# Climate dice

(Resource ID: 213)

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This teaching resource is allocated to following University:

**BOKU - University of Natural Resources and Life Sciences Vienna**

Institution:

**Center for Global Change and Sustainability (BOKU Vienna)**

<http://www.sustainicum.at/en/modules/view/213.Climate-dice>



**Individual work**  
**Work in pairs**  
**Group work**  
**Plenum**



**Less than 5 students**  
**5 to 10 students**  
**More than 10 students**  
**Independent of the number of students**



**15 to 30 min**  
**Up to 3 lecture units**



**English, German**

Two dice illustrate the shift towards higher temperatures by simulating the natural year-to-year variability of cold, average or hot summer seasons, making it easy to comparing summers of earlier decades with today.

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according to a design by louli Andreev, based on a publication by James Hansen

If the summers between 1951 and 1980 of the Northern Hemisphere

mainland are categorized in "cold", "average" and "hot" summers and if the same categories are applied to the summers between 2001 and 2011, a shift towards warmer summers becomes apparent. These changes are illustrated by creating a "climate die" for each period to simulate the natural year-to-year variability of these three summer categories.



Two sides of the climate die, representing the period between 1951 and 1980, are used for each category. The climate die representing the period between 2001 and 2011, has half a side for cold, one side for average and four and a half sides for hot summers. Half a side is used for the new category of extremely hot summers.

The two climate dice can be used to discuss important problems and compare data without high statistical effort but nevertheless based on scientific data:

What exactly does it mean if we say, "the summers are getting hotter"?  
How can higher temperatures in summer be quantified?  
Can the more frequent occurrence of hot summers during the last decade be explained by the natural variability of climate or is it an indication of global warming?

The following files are attached to the building block:

Background information: [BackgroundInformation\\_ClimateDice.pdf](#)

Implementation in the course: [ClimateDice\\_Implementation.pdf](#)

Summer temperature distribution (graph): [Distributions.pdf](#) |

[Distributions.png](#) | [Distributions.gif](#)

Model of the climate dice that can be printed, cut out and stuck together: [Models.pdf](#)



Simulation program   Written material   Simulation

formteaching\_experiment

## Learning Outcomes

The students should gain an understanding of the quantitative results of global warming and be able to discuss the questions above based on the empirical data illustrated by the climate dice.

## Relevance for Sustainability

Empirically proven global warming – illustrated by the climate dice – as well as the forecast of the climate dice for the following decades based on climate models indicate that it is important to stop using fossil energy sources.

## Related Teaching Resources

No specific previous knowledge / related resources required

## Preparation Efforts

Low

## Access

Free

## Sources and Links

- The scientific article that is the foundation for this building block is: James Hansen, Makiko Sato and Reto Ruedy: Public Perception of Climate Change and the New Climate Dice und Perception of Climate Change, Proc. Natl. Acad. Sci., 109, 14726 – 14727, 2012. Online at [http://pubs.giss.nasa.gov/docs/2012/2012\\_Hansen\\_etal\\_1.pdf](http://pubs.giss.nasa.gov/docs/2012/2012_Hansen_etal_1.pdf)
- A more comprehensive version by the same authors (Public perception of climate change and the new climate dice) is available as a pre print at <http://arxiv.org/abs/1204.1286>

- A summary can be found at [http://www.giss.nasa.gov/research/briefs/hansen\\_17/](http://www.giss.nasa.gov/research/briefs/hansen_17/) .
- The original idea behind the climate dice came from a piece by Hansen et. al. from the year 1988 ([http://pubs.giss.nasa.gov/docs/1988/1988\\_Hansen\\_etal.pdf](http://pubs.giss.nasa.gov/docs/1988/1988_Hansen_etal.pdf) )

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