

21.06.2015–13.09.2015

Transsolar + Tetsuo Kondo

Cloudscapes

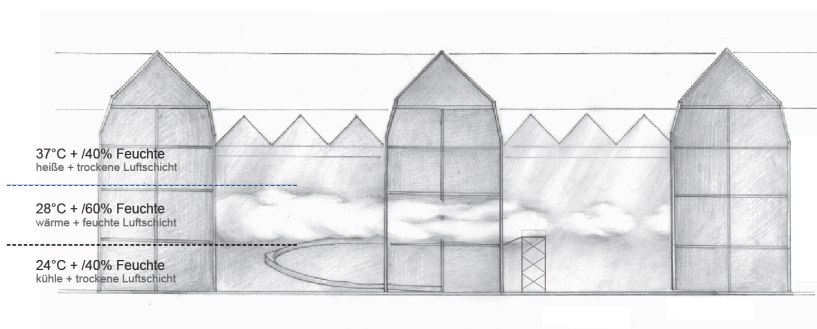
ZKM_Atrium 8 + 9

Opening: Sunday, 21.06.2015 from 14.00

A cloud in the ZKM. On over 7000 m² in Atriums 8 and 9, wide fogbanks extend over three storeys that are normally used to exhibit art. Using a bridge in Atrium 9 and a tower of clouds in Atrium 8, visitors have the chance to move through the different air layers of the cloud and look at the cloud from different perspectives. Using adapted physical principles, a central component of our natural atmosphere is brought to the closed exhibition space of the museum, showing how mankind is exerting ever-increasing influence on our nature and can simulate and control it.

A finely adjusted temperature and moisture layer together with the addition of cloud condensation nuclei as aerosol particles, which also play a central role in natural cloud formation, lead to the development of clouds. From a certain air humidity and temperature, the water in the air condenses on the particles and droplets begin to form, which creates clouds.

In comparison to the natural atmosphere, the materialisation of clouds in the Atriums of the ZKM occurs due to a positive thermal stratification, in which the air temperature significantly increases with height – on the ground floor, the air layer is cooled to 25°C, on the 2nd floor it is heated to 40°C. Through these temperature gradients and the thermodynamic properties of air, which determine the air density, the microclimatic conditions in the cloud layer are kept stable. In addition, it must be ensured that all three levels of the exhibition space are isolated from the adjoining parts of the building and the outside. In comparison to intuitive perception, moist air is lighter than dry air meaning the clouds can be kept stable in the air at a certain room height. Because the air above the cloud is lighter due to its high temperature, the cloud in the Atrium floats between two air cushions of different densities.



Press Release

May 2015

**Transsolar + Tetsuo Kondo
Cloudscapes**

**as part of
"GLOBALE. The new art event
in the digital era"**

Date
From 21st June 2015

Place
ZKM | Karlsruhe

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A project as part of the
city's birthday – 300 Years Karlsruhe



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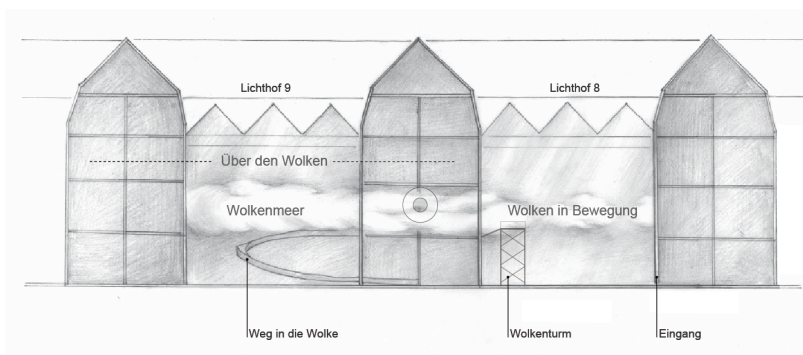
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Two central processes for the cloud production in the ZKM, the humidification of the air and the managed air flow, are neither visible nor discernible to observers in the first instance. Narrow textile sleeves ensure a consistent air supply at the height of the cloud layer. This air supply is provided in Atrium 8. Here, the air is humidified using two mechanisms – firstly, water is brought to the boil and evaporated, then it is sprayed with water using fine nozzles. The temperature compensation, which is achieved as a result, compensates for the supplied evaporation heat and leads to the moisture remaining at the height of the cloud layer.

Only through the additional use of fog machines, which replace the function of naturally occurring aerosols in our atmosphere, can individual clouds or compact cloud layers be created and brought to life for visitors in the exhibition space. Without the artificial condensation nuclei, the moisture of the air could not be made visible in a closed room.

By removing the air of the cloud layer in Atrium 9 after it has been supplied in Atrium 8, a slow drifting / suction effect is created in the rear Atrium. In this way, a moving cloud image is created in the ZKM, which is condensed into a sea of fog and clouds in Atrium 9 due to additional aerosols.



Clouds are fundamental to the global development of the climate. They are an important component of our Earth's water cycle by binding the water evaporated from the earth into the atmosphere and then returning it to the Earth through precipitation. This complex system of cloud formation requires extensive natural scientific, climatic competences from various disciplines and a high degree of technical commitment. What we perceive as obvious and natural can be recreated in its complexity in the museum.

In our cloud laboratory, different types of clouds are visible – from isolated cirrus clouds to a dense stratus cloud.

In addition, the installation shows what energy our earth, driven by the sun, applies on a daily basis in order to produce the sea of clouds around our blue planet. A fascinating, strong but sensitive system, which we should treat with respect.

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