

# The Fundamental Principles

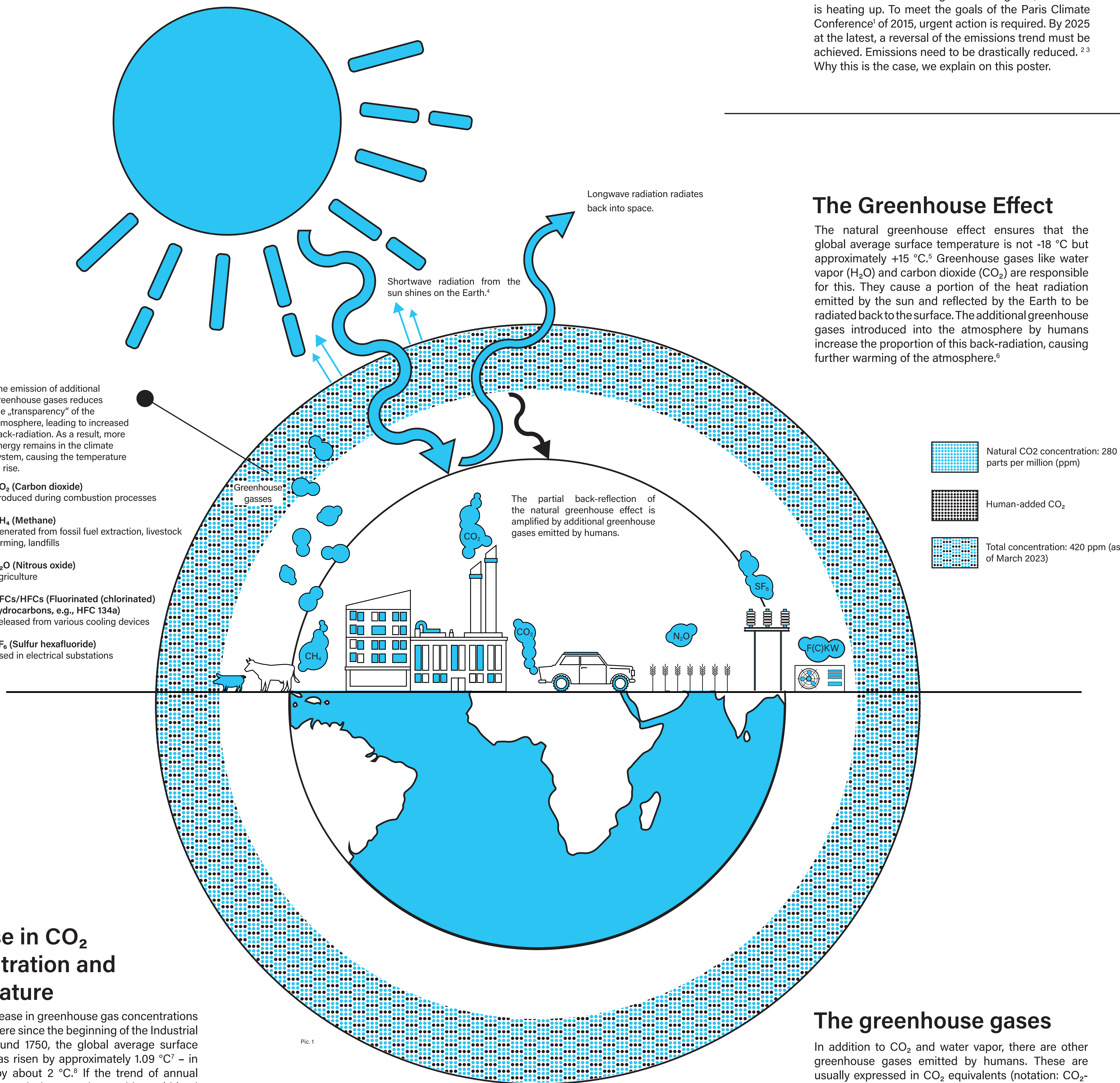
## The climate crisis

### What is it about?

Due to the emission of greenhouse gases, the Earth is heating up. To meet the goals of the Paris Climate Conference<sup>1</sup> of 2015, urgent action is required. By 2025 at the latest, a reversal of the emissions trend must be achieved. Emissions need to be drastically reduced.<sup>2,3</sup> Why this is the case, we explain on this poster.

### The Greenhouse Effect

The natural greenhouse effect ensures that the global average surface temperature is not -18 °C but approximately +15 °C.<sup>5</sup> Greenhouse gases like water vapor (H<sub>2</sub>O) and carbon dioxide (CO<sub>2</sub>) are responsible for this. They cause a portion of the heat radiation emitted by the sun and reflected by the Earth to be radiated back to the surface. The additional greenhouse gases introduced into the atmosphere by humans increase the proportion of this back-radiation, causing further warming of the atmosphere.<sup>6</sup>



### Increase in CO<sub>2</sub> concentration and temperature

Due to the increase in greenhouse gas concentrations in the atmosphere since the beginning of the Industrial Revolution around 1750, the global average surface temperature has risen by approximately 1.09 °C<sup>7</sup> – in Austria even by about 2 °C.<sup>8</sup> If the trend of annual greenhouse gas emissions continues, this could lead to a global warming of up to 5.7 °C by the end of the 21st century compared to the reference period 1850-1900.<sup>9</sup>

### The greenhouse gases

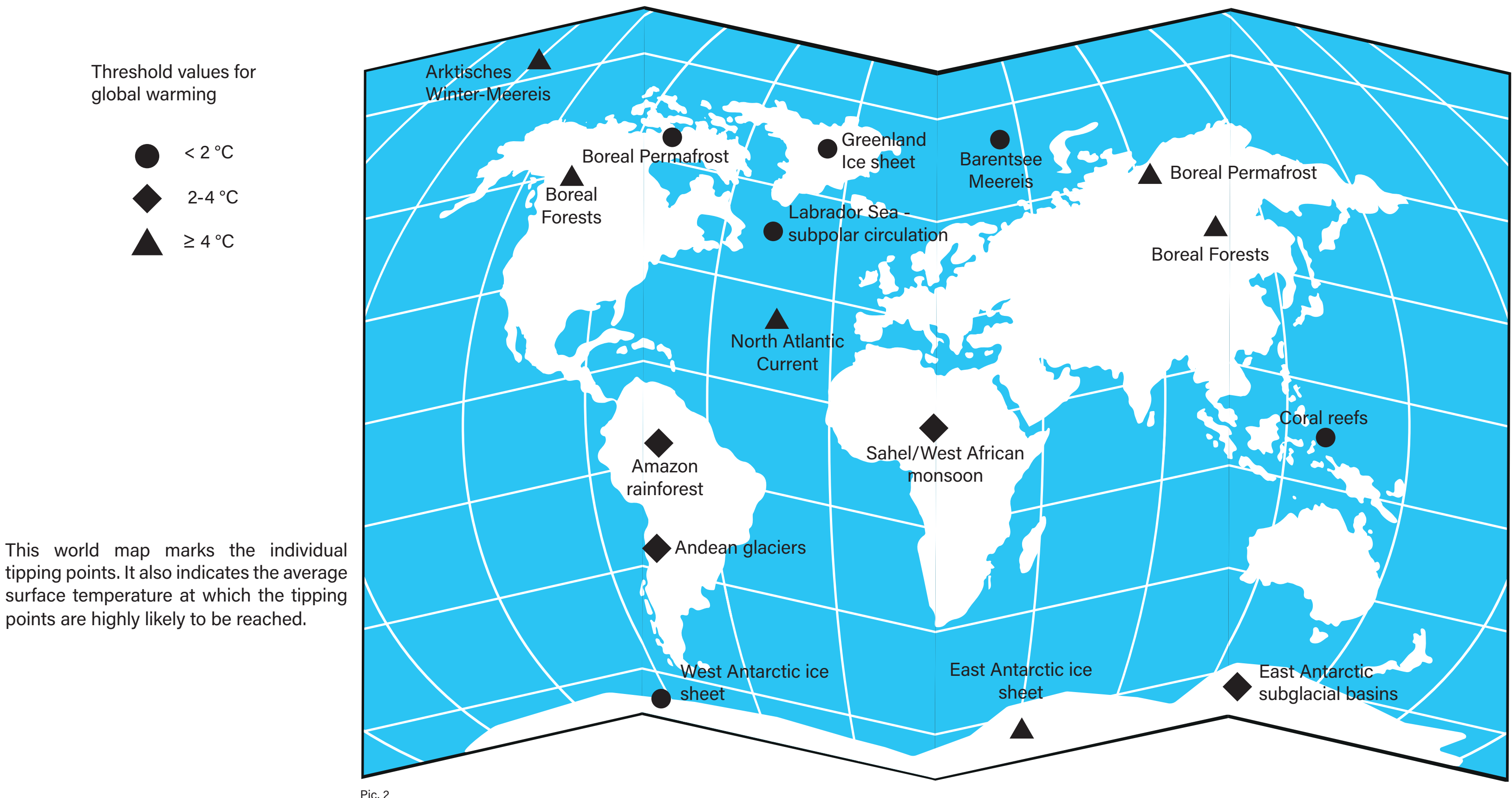
In addition to CO<sub>2</sub> and water vapor, there are other greenhouse gases emitted by humans. These are usually expressed in CO<sub>2</sub> equivalents (notation: CO<sub>2</sub>-eq.). This means that their contribution to the warming of the Earth's atmosphere is converted into the corresponding (equivalent in effect) amount of CO<sub>2</sub>. This is referred to as the greenhouse potential of the individual greenhouse gases.<sup>10,11</sup>

### Tipping points in the global climate system

Increasing temperatures could trigger effects that can no longer be reversed. These so-called tipping points are of critical importance because they can release additional emissions, contributing to or even accelerating global warming. The aim of limiting global warming to 1.5 °C or 2 °C is also linked to the feared crossing of these tipping points.<sup>12</sup>

The melting of polar ice masses contributes to sea-level rise and impacts ocean currents, such as the Gulf Stream, which brings relatively mild winters to Britain and Scandinavia at these latitudes. The thawing of boreal permafrost releases large quantities of stored methane (CH<sub>4</sub>). The dying off of coral reefs leads to the loss of important and some of the most biodiverse ecosystems. Deforestation of the rainforest and rising temperatures can alter the water cycle to the extent that the region becomes arid, releasing more CO<sub>2</sub> overall than it absorbs.<sup>13</sup>

### Worldmap of tipping points in the climate system



<sup>1</sup>vgl. UNFCCC, 2015  
<sup>2</sup>vgl. IPCC, 2023a, S. 12  
<sup>3</sup>vgl. UBA, 2023a, S. 28  
<sup>4</sup>vgl. IPCC, 2021, S. 506  
<sup>5</sup>vgl. IPCC, 2021, S. 934

<sup>6</sup>vgl. ZAMG, o. J. a  
<sup>7</sup>vgl. IPCC, 2021, S. 290  
<sup>8</sup>vgl. UBA, 2023a, S. 30  
<sup>9</sup>vgl. IPCC, 2021, S. 580ff.  
<sup>10</sup>vgl. IPCC, 2021, S. 302ff.

<sup>11</sup>vgl. IPCC, 2021, S. 1017  
<sup>12</sup>vgl. IPCC, 2022a, S. 2488  
<sup>13</sup>vgl. Armstrong McKay et al., 2022, S. 6

Pic. 1: Eigene Darstellung basierend auf NOAA, 2023  
Pic. 2: Eigene Darstellung basierend auf Armstrong McKay et al., 2022, S. 6