

Print whole document  
in DIN A3!

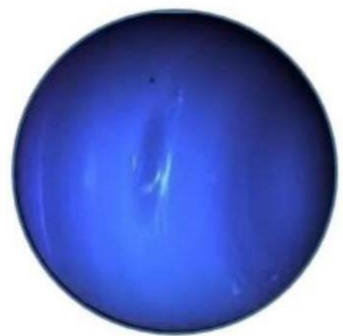
Material for activity 1



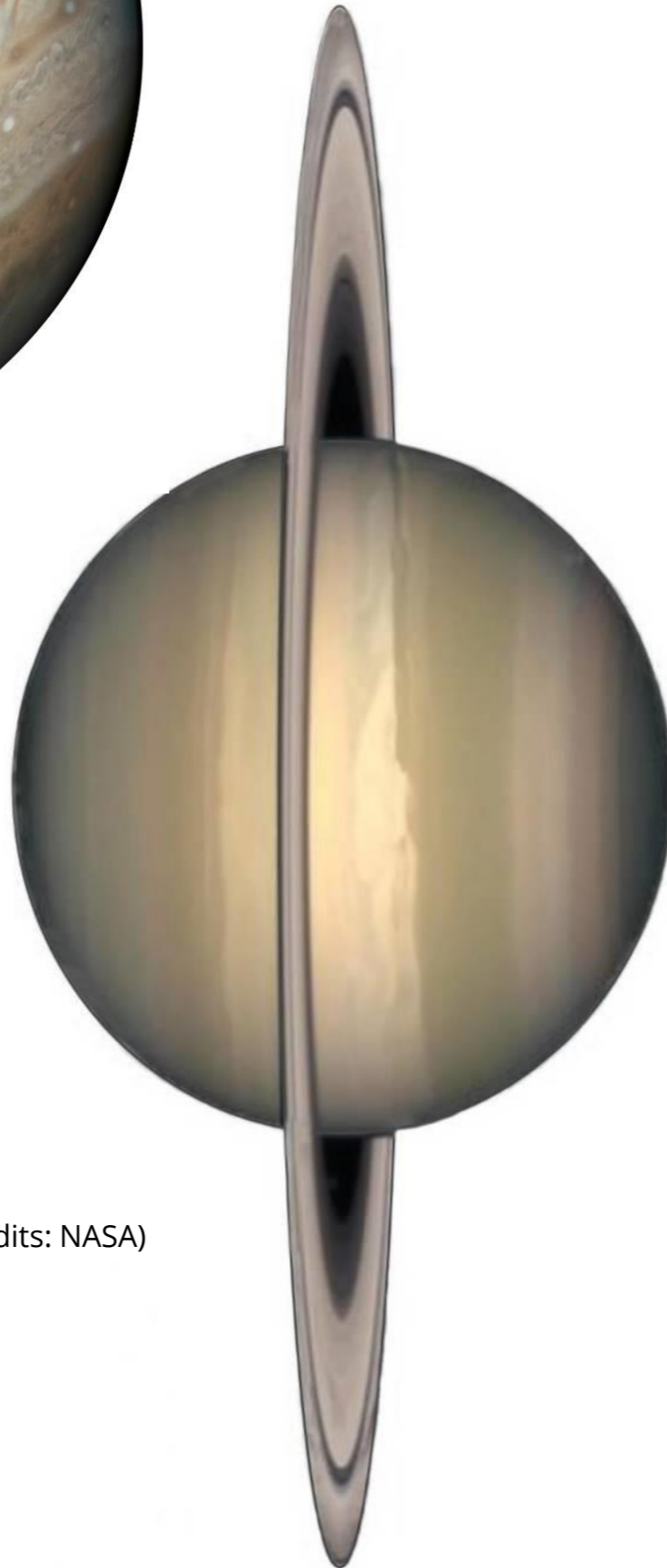
Jupiter (Credits: NASA)



Uranus (Credits: NASA)



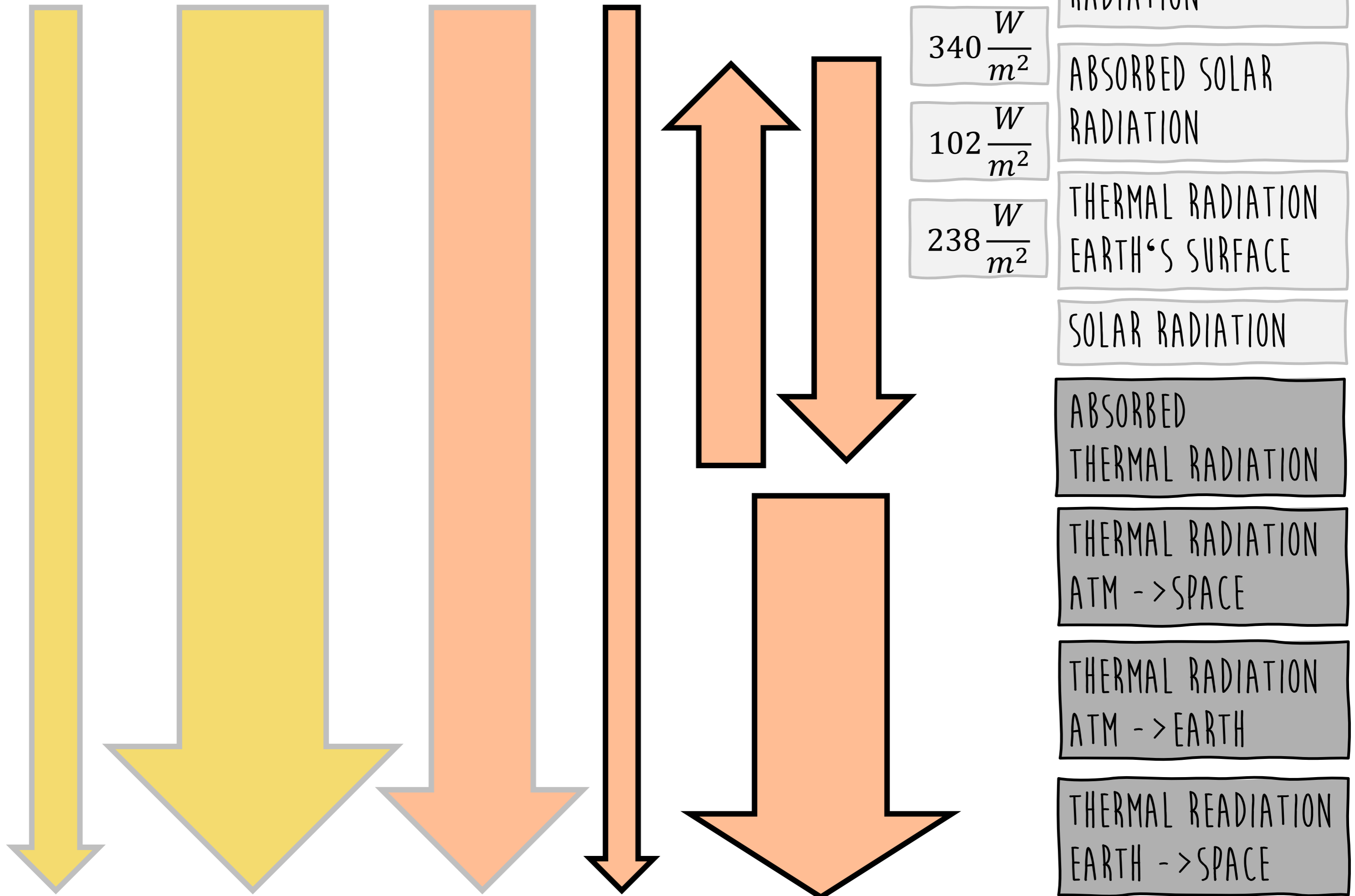
Neptun (Credits: NASA)



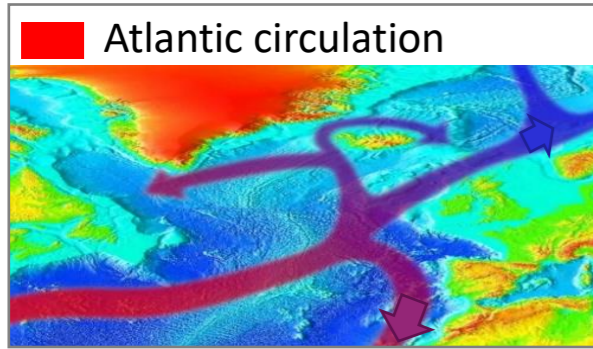
Saturn (Credits: NASA)



Material for activity 4



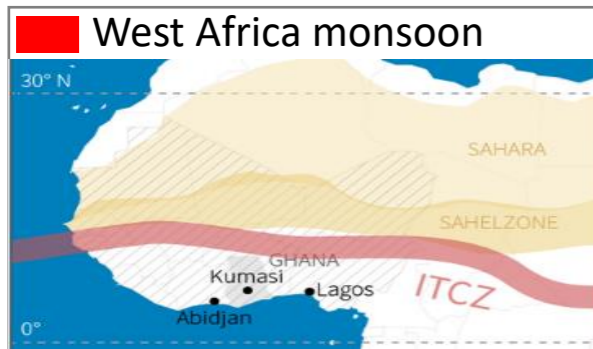
Playing cards for activity 12



**Too much fresh water**  
 The water currents in the North Atlantic are caused by temperature and salt concentration differences of the water. Denser salt water sinks. Melting ice on Greenland changes the salt concentration of the water. What happens then?



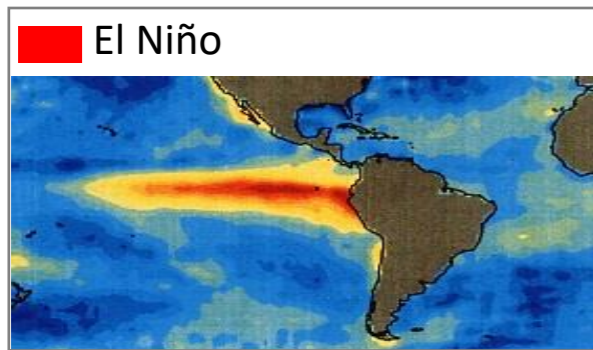
**The lungs of the world**  
 Tropical rainforests are a buffer in the Earth's climate system. Plants absorb CO<sub>2</sub> and store it in their biomass. Much of the precipitation comes from water evaporating above the forest. Global warming and deforestation are destroying parts of the Amazon. What happens then?



**Humid air from the Atlantic**  
 Hot air rises in West Africa, creating an area of low pressure. Humid air flows in from the Atlantic and rains down over the mainland. The Sahel could become even drier or greener as a result of a shift in the monsoon. What does this mean for the population?



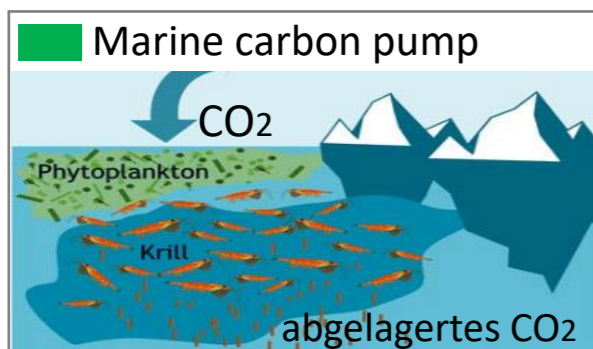
**Fading colors**  
 The coral reefs formed by cnidarians in the sea are unique ecosystems with an almost infinite variety of animal and plant species. They are very sensitive to temperature changes and water acidification. What will happen to them as a result of climate change?



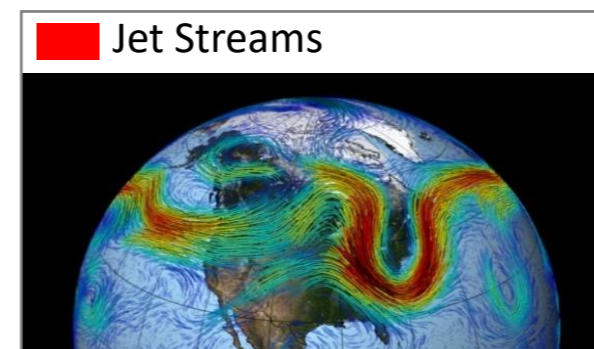
**Pacific current**  
 During El Niño, the ocean surface in the equatorial Pacific warms more than normal. This leads to heat in Australia, Southeast Asia and South Africa. The rain that is missing there falls abundantly over the west coast of South America. What happens when it gets warmer at the equator?



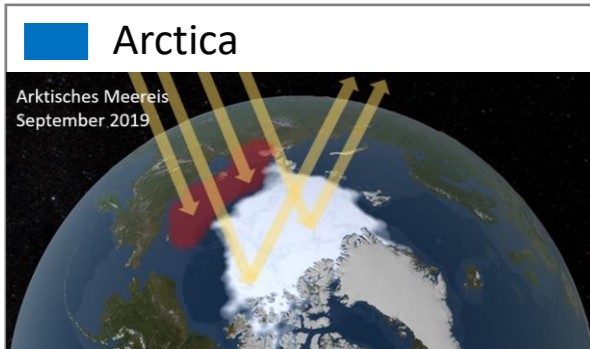
**Protective green**  
 The effects of climate change in the boreal forests are devastating. It is too warm and too dry. Infestations of insect pests, severe storms and fires are affecting the forests, and deforestation would finish them off. Are there feedback effects here?



**Stored CO<sub>2</sub>**  
 Plankton at the surface of the oceans absorbs CO<sub>2</sub>. Krill eat the plankton and deposit the CO<sub>2</sub> on the sea floor through their excretions. What are the consequences for the plankton when the water becomes warmer and thus less oxygenated? Are there feedback processes?

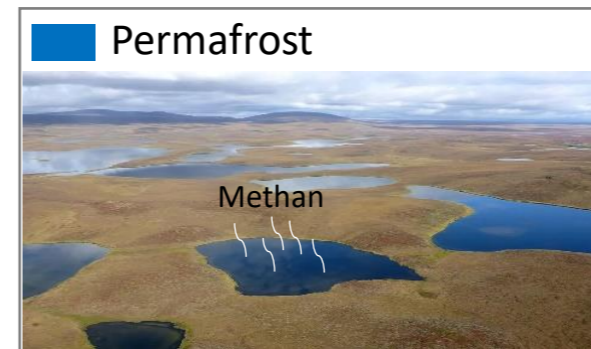


**North air currents**  
 At an altitude of seven to 12 kilometers, the jet stream winds its way around the northern hemisphere. It separates the cold air of the north from the warmer south. It is now so slow that major weather patterns such as cold and heat waves, heavy rain and droughts do not dissipate for many weeks.



**Albedo**

The reflectivity of surfaces is called albedo  $\alpha$  and is particularly high for ice and relatively low for water. What effect does global warming have on it? Is there a feedback here and what does it do?



**Methane hydrate I**

In the permafrost regions, large quantities of methane are stored in crystal form, so-called methane hydrates. At higher temperatures, these melt and the methane (a powerful greenhouse gas) is released into the atmosphere. Where are these areas and are there feedback effects here?



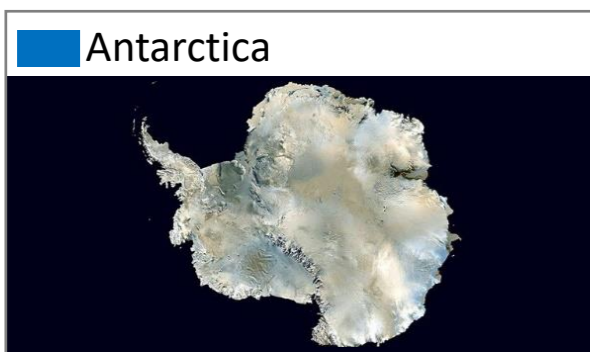
**Melting ice in the north**

As temperatures rise, the entire ice sheet on the mainland becomes unstable and slides into the sea. A lubricating film forms at the bottom of the ice sheet and grows due to meltwater. Where does this happen on Earth? And are there feedbacks in the process? Which ones?



**Methane hydrate II**

Large quantities of methane hydrate (methane trapped in frozen water) are stored at the bottom of oceans and lakes. They need low temperatures and high pressure to remain stable. What happens when the water gets warmer? Are there feedback effects?



**Melting ice in the south**

As temperatures rise, the entire ice sheet on land becomes unstable, but the ice on the sea also disappears. Then the mainland glaciers slide unchecked into the sea. Where is this happening on Earth? And are there feedbacks here?



**Floodings**

In summer, the air over the Indian subcontinent gets up to 50 °C hot. The air rises quickly, creating a low pressure area that attracts moist air from the Pacific Ocean. This air flows over land and rains down. What happens when it gets warmer? Are there feedbacks?

pH-color scale for activity 9 and 10

