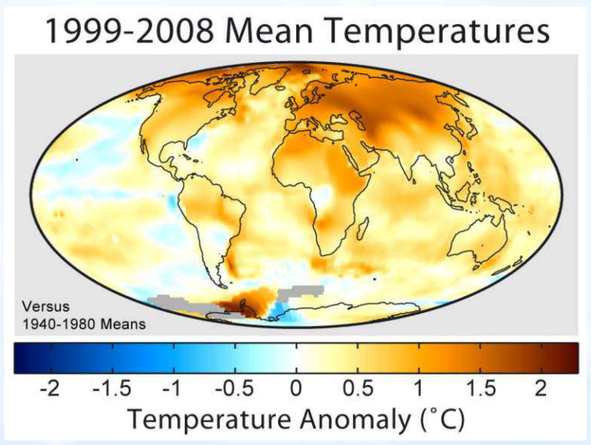
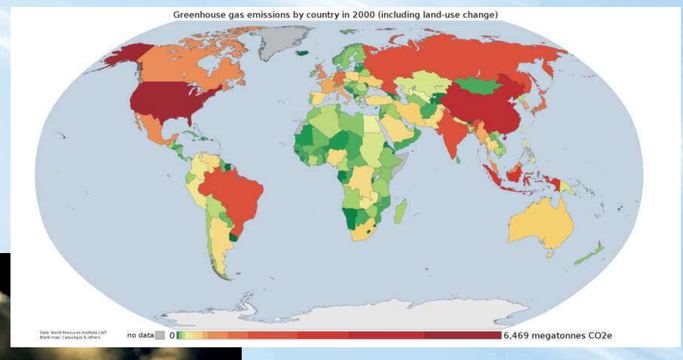
GLOBAL WARMING

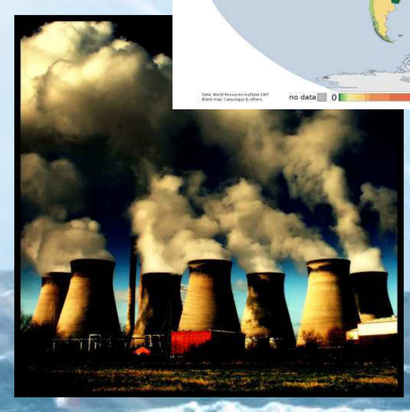
Climate change and global warming are a reality that mankind has come to grips with in order to survive. Although "Global Warming" has become a household term loosely used to refer to problems such as desertification, droughts or flooding, depending on geographic position, the assumption that in fact it is an "invention" of the 20th century is a common misapprehension. There has been global warming - and cooling - for as long as Earth has existed (i.e. more than 4 billion years) as is evident from a rock record showing alternating glacial and subtropical to tropical deposits. For instance, some 230 million years ago, towards the end of the Permian era, global warming led to a worldwide catastrophe, which only about 15 % of all then living organisms survived, leaving a barren and depopulated Earth to recover slowly from its impact. The natural causes behind this global disaster s (e.g. volcanic activity) still exist today, and just because during Man's short life span of less than 100 000 years the Earth's climate has been comparatively stable, it does not follow that change has stopped to happen - or that it is in our hands to prevent it! All we can do is try not to make it happen too quickly, so as to ensure amenable living conditions on this planet at least for some time to come!



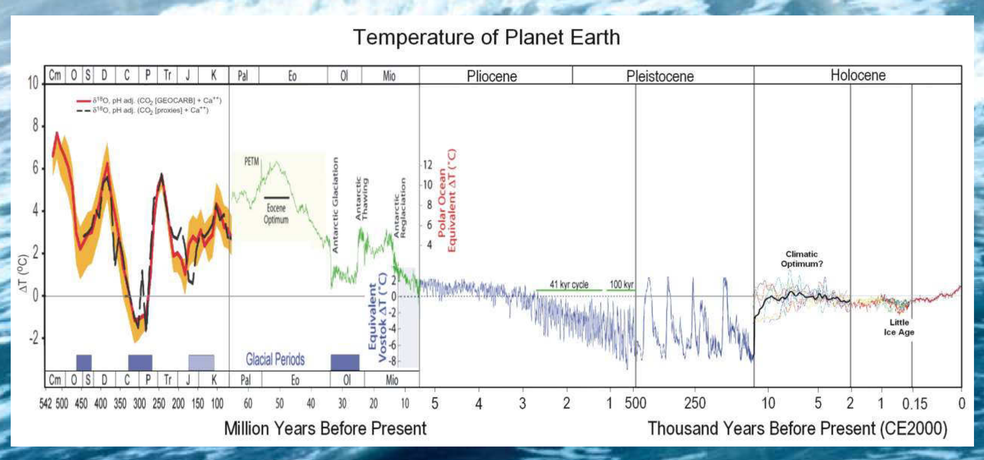
The global map showing regions most affected by temperature increases gives a good correlation with that of highest greenhouse gas emissions (right). Discrepancies prove that climate change is the product of not one but many factors with complex inter-relationships.

Although the climatic change we are experiencing today is no novelty in Earth's history, what is different this time round is the introduction of an entirely new set of contributing factors. While in the world of 230 million years ago all change, both good and bad, could be attributed to natural causes, such as variations in solar energy output or volcanic eruptions, today Man's inventions and innovations play a significant part in whatever happens to our planet. Human activities have led to large increases in heat-trapping gases over the past century with emissions from cars, factories and power stations, all of which are bare necessities of modern life. In consequence, global average temperatures and sea levels have increased measurably since 1960, and worldwide precipitation patterns have changed,while major storms are both more frequent and more severe than they used to be in the first half of the last century.



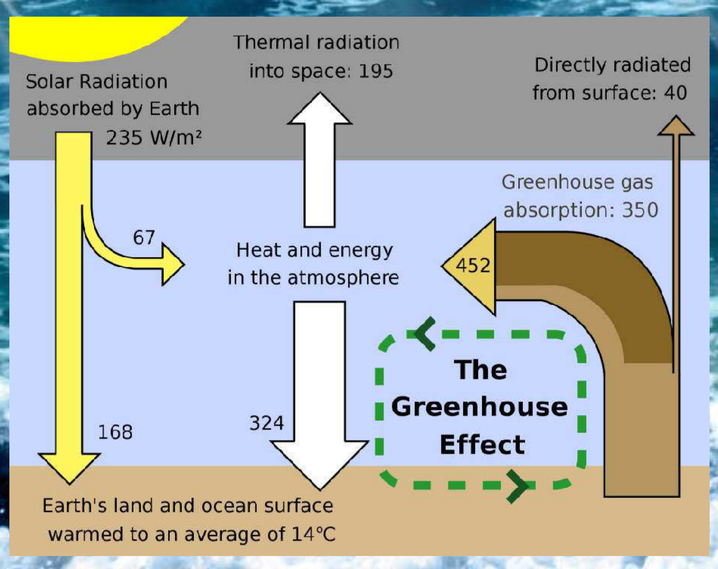


Alternative power in the place of huge fossil fuel burning power stations are one way of decreasing harmful emissions to the atmosphere.



The temperature chart for 550 million years of Earth's history (compiled from evidence in the rocks of each age) shows that colder and warmer periods have been alternating at more or less regular intervals. Note that the time scale on the horizontal axis is not linear, so that peaks in the Palaeozoic appear comparatively steeper than in the more recent past.

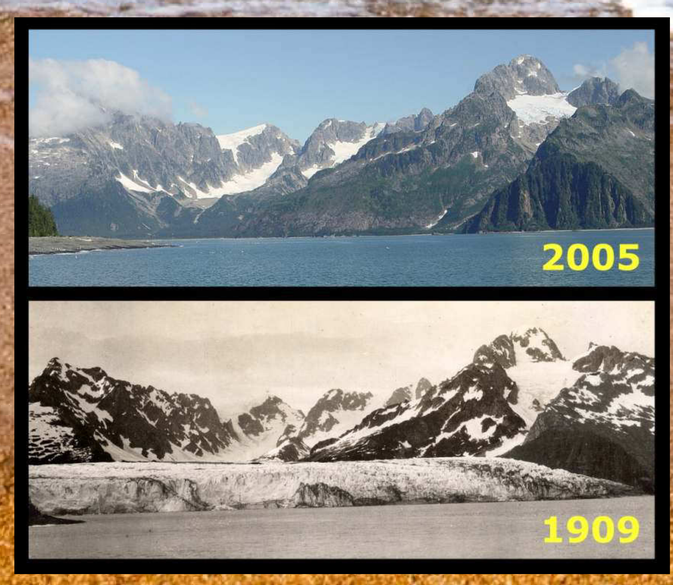
Schematic showing the energy flow between space, the atmosphere, and Earth's surface; energy exchanges are expressed in watts per square meter (W/m^2). Relatively small amounts of carbon dioxide and methane generate additional atmospheric heat, which allows the air to hold more water vapour, which in turn leads to further warming. A positive feedback loop is thus created magnifying the original effect.



It has been estimated that together the main producers of greenhouse gases, traffic, industry, deforestation and agriculture pump more than ten billion tons of carbon dioxide and methane into the atmosphere each year. Thus they contribute to and enhance the natural "background" emission of greenhouse gases that caused global warming in the past by absorbing a significant proportion of the solar energy reflected from the Earth's surface instead of venting into space... a phenomenon which has become known as the "greenhouse effect".

Desertification is another impact of global warming that especially affects the African continent. According to projections some 30% of the world's fertile land surface will turn into desert in the not too far future... a szenario that mankind will have to adjust to in order to avoid the fate of earlier victims!

Response to global warming can be divided into mitigation of causes and effects, adaptation to changing conditions, and geo-engineering to reverse global warming. Mitigation is accomplished through reduction in the rate of anthropogenic greenhouse gas release, which is, however, dictated by economic aspects. Models suggest that rigorous mitigation can quickly begin to slow global warming, but that temperatures will appreciably decrease only after several centuries. In contrast, adaptation measures range from water rationing and the abandonment of coastal settlements threatened by sea level rise to a revolution in transportation and Martian colonization, while geo-engineering projects look at greenhouse gas remediation and/or solar radiation management.



Since 1960 glacier around the world have experiences a net loss of more than 4000 km^3 of water. A global temperature increase of only 4°C would cause nearly all glaciers and icecaps to melt and lead to dramatically rising sea levels

But although the two latter approaches may offer long-term solutions for the survival of the human race, they are hardly within the sphere of practical politics at present. Indeed, at this stage the best chance of not making this planet too hot for ourselves too soon seems to be a common agreement of the peoples of this world to curb greenhouse gas output. Still as such a consensus has not only financial and economic implications on a national scale, but may impinge upon the convenience and comfort of the individual, the concept appears only marginally more hopeful of success...