Natural Factors

External changes (from extraterrestrial systems)

1] Changes in Solar Output

The only source of energy for running the Earth's climate system is the Sun. As seen in Figure 1 below, solar activity has fluctuated with an overall increase within the 600 years from 1400 to 2000. The amount of solar energy received by the Earth does not remain constant. The changes in solar output have had influences on the total energy stored in the Earth's system, thereby causing the Earth's climate to change periodically.

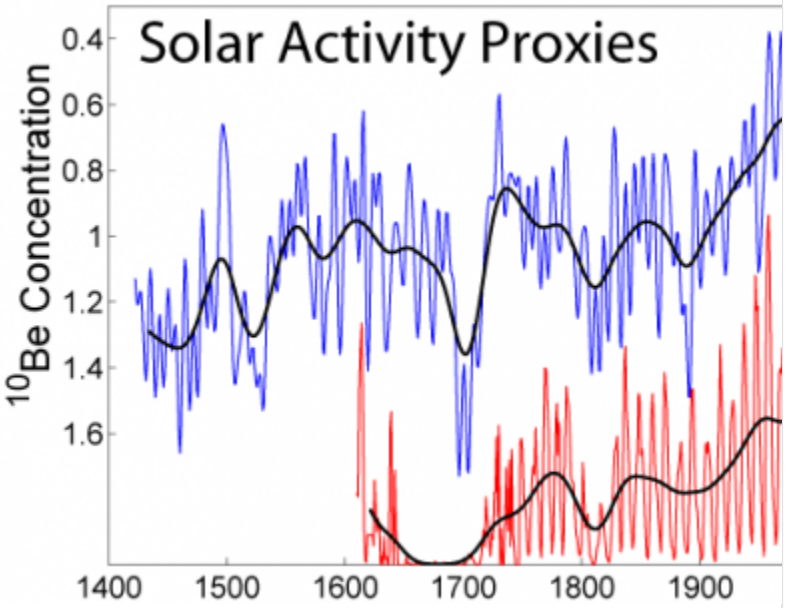

Figure 1: *Variations in solar activity over 6 centuries, based on observations of sunspots and beryllium(Be) isotopes.*

2] Variations in the Earth's Orbital Characteristics

The Earth travels around the Sun on a certain orbital. However, the orbital is not a standard circle and the Sun is not in the centre of the orbital. The relative position between the Earth and the Sun changes all the time, while the Earth travels along the orbital. As a result, distribution and abundance of sunlight reaching the Earth's surface changes. In particular, when the Earth is closer to the Sun in January, the energy received from the Sun will be greater. Therefore, variations in the Earth's Orbital Characteristics can also cause climate change.

Internal changes (from oceans, atmosphere and land systems)

1] Changes in the concentrations of atmospheric gases -- Greenhouse Effect

Greenhouse effect refers to the change in the global thermal temperature of a planet by the presence of an atmosphere containing gas that can absorb infrared radiation. Studies show that greenhouse effect plays a key role in the global climate change over the past 500 million years. Water vapour, carbon dioxide, methane and nitrous oxide are all gases which can absorb heat. The picture below shows the carbon dioxide variations during the last 500 million years.

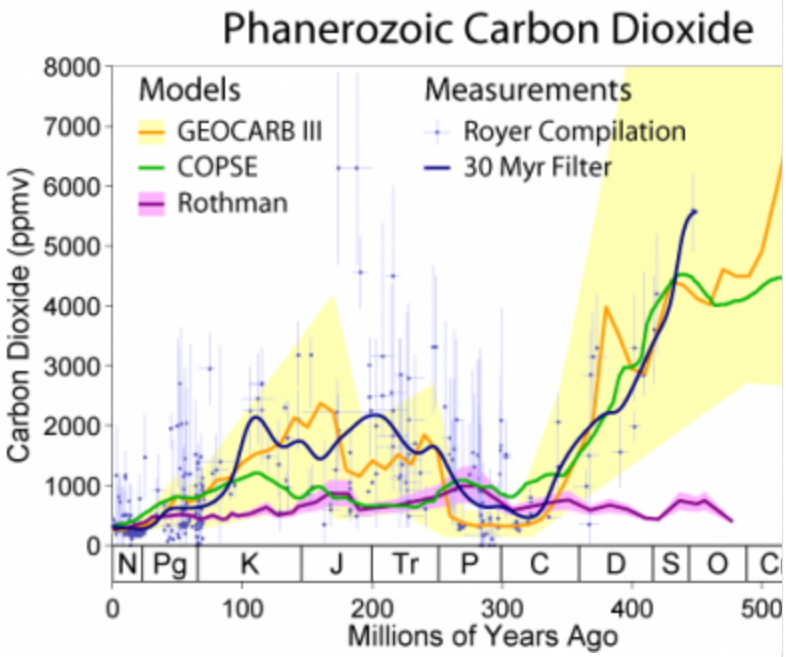

Figure 2: *Phanerozoic Carbon Dioxide concentrations*

2] Natural Processes

Natural activities, such as mountain building, continental drifts and volcanic eruptions also have great influence on the climate system. According to scientists' theories, dusts are emitted into the atmosphere when volcanic eruptions occur. The dust can block solar radiation from transmitting to the Earth. Consequently, the Earth's climate changes as it receives a varying amount of energy from solar radiation.

See Human Factors
Navigation Pane

1.	**Climate Change**
1.1	Definition
1.2	Causes
	1.2.1 Natural Factors
	1.2.2 Human Factor
1.3	Impacts of Climate Change
2.	**ICT as a Solution to Climate Change**

2.1	Achieving a Green Business through ICT 2.1.1 ICT in Manufacturing Sector 2.1.2 ICT in Transport Sector 2.1.3 ICT in Building Sector 2.1.4 ICT in Power Sector 2.1.5 Case Studies
2.2	Role of the Internet in Promoting Green Awareness 2.2.1 Government Websites
2.3	2.2.2 Other Internet Mediums Other Spinoffs from the Advancement in ICT 2.3.1 Change in Working Styles 2.3.2 Change in Lifestyles 2.3.3 Change in Teaching and Learning Styles
3.	**Limitations of ICT in Fighting Climate Change**
3.1	Freedom of Expression
3.2	ICT's Two-fold Role
3.3	Inability of ICT to stand as an Independent Solution
4.	**Ongoing Research and Development of ICT in fighting Climate Change**
4.1	Symposium
4.2	Conference Talk
4.3	Progress
5.	**Quotes on ICT and Climate Change**
5.1	Quotes
6.	**References**

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