

Name: _____

Date: _____

Class: _____

IB ESS

6.1 Introduction to the Atmosphere

Significant ideas:

The atmosphere is a dynamic system which is essential to life on Earth.

The behaviours, structure and composition of the atmosphere influence variations in all ecosystems.

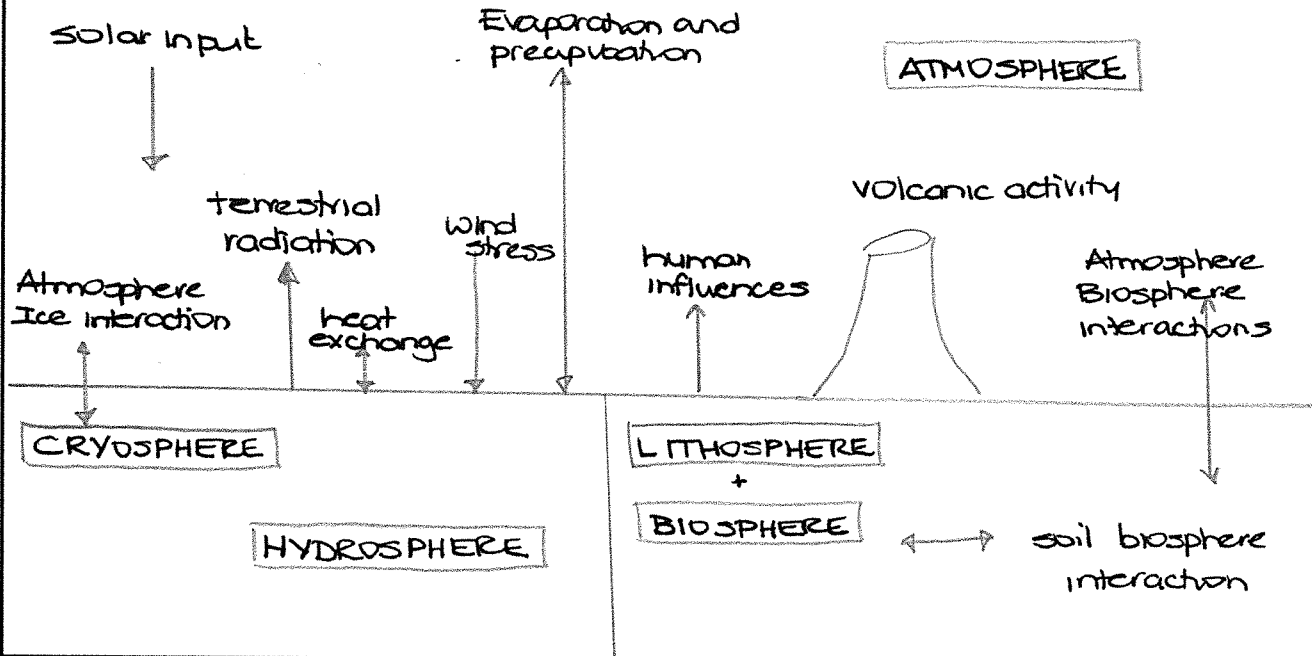


Structure of the Atmosphere

1. Outline why the atmosphere can be considered a "dynamic system".

Has inputs, outputs, flows and storages that have undergone changes in geological time. It is a closed system; the input is solar radiation and the output is heat energy

2. Draw a systems diagram for the Earth's atmosphere.



3. Outline the vertical structure of the atmosphere.

(Hints: include the temperature and pressure changes with altitude. Remember to name the different sections.)

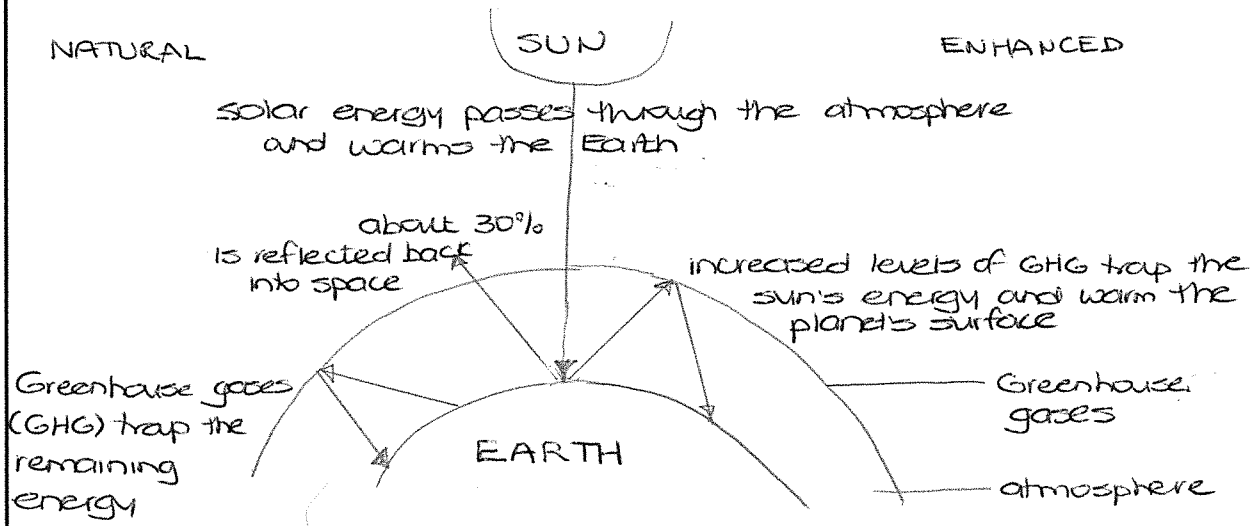
The troposphere is the lowest part of the atmosphere (Pearson p 316) next part is the stratosphere - the 2 are separated by the tropopause. Above the stratosphere is the mesosphere separated by the stratopause and the highest layer is the thermosphere, separated by the mesopause. From the Earth's surface to 11-12km the temperature decreases as the atmosphere thins. The stratosphere lacks dust and water vapour; increase in temperature with height due to absorption of solar radiation. In the mesosphere the temperature decreases because decreasing density prevents the absorption of energy. In the thermosphere there is an increase in temperature with increasing height due to absorption of energy. Pressure decreases rapidly with height in troposphere, stabilizes in stratosphere



The Greenhouse Effect and Human Influences on the Atmosphere

Before you go any further, be clear of one thing: "the greenhouse effect" is not a bad thing. The greenhouse effect maintains a suitable temperature on Earth for living organisms. The enhanced greenhouse effect, which results in global warming, has potentially disastrous consequences, however. Don't use "greenhouse effect" and "global warming" interchangeably; they are not the same thing. Unfortunately, it is common to see these two phrases mixed up in the media.

1. Draw a diagram to summarise the greenhouse effect



2. Describe the ways in which human activities are influencing the atmosphere. Use the subheadings to guide your answer.

Carbon dioxide concentration

Burning fossil fuels (coal, oil, natural gas) releases CO_2

Deforestation - process adds CO_2 but also removes the trees which would take up CO_2

Ozone levels

Man-made chemicals - ozone depleting substances (ODS) eg CFCs, have led to a reduction in stratospheric ozone.

Water vapour (Hint: think about feedback cycles)

When we heat the planet, the ability of the atmosphere to hold moisture increases so there is more water vapour in the air which is a GHG and warms the atmosphere → Positive feedback



4. State the parts of the atmosphere (name and altitudes) in which the majority of chemical reactions relating to living organisms occur.

Troposphere 11-12 km above sea level

5. Outline factors that have influenced atmospheric composition over geological time.

Note: "Geological time" suggests that human-related effects are not relevant here.

Geological factors - volcanoes, forest fires

6. Outline what is meant by the term "albedo effect".

A measure of the reflecting power of a surface in relation to the amount of short-wave radiation received

Lighter coloured surfaces have greater albedo.

7. Summarise the role of clouds with regards to their influence on Earth's albedo.

Clouds increase albedo reflecting more light away from the earth especially low thick clouds such as stratus clouds

