## Learning Objectives/key questions
- To understand the main layers of the atmosphere
- To recognise key characteristics of each layer
- To consolidate and recognise key features of examination questions including command words

## Specification links
- Environmental Studies (Unit 2)

## Key resources
- Do we know where we are - starter cards (Word doc)
- The Structure of the Atmosphere.ppt
- Worksheet- Atmospheric structure summary questions.ppt
- Exam style questions - see Atmospheric Structure Exam Questions.ppt
- A bit of fun – Structure Bingo.ppt

## Suggested Activities
- Do we know where we are? Starter/ice breaker activity. Students are each given a planet/moon and they are to line up in order of how they appear in the solar system. You can add additional moons or pair students if necessary.

  - Teacher led discourse through The Structure of the Atmosphere.ppt highlighting key characteristics of the structure of the atmosphere. Focus on the main layers/key terms – and the Troposphere. To help consolidate – view the NASA clip (follow hyperlink). This will fly through the various layers – Students to identify each layer by the certain characteristics exhibited.

  - Worksheet – Atmospheric structure summary questions. Students to consolidate acquired knowledge and develop their understanding of key concepts and processes

  - Exam style questions (see Atmospheric Structure Exam Questions.ppt) – discuss command words with students and attempt exam style question. Give students the mark scheme and peer assess the answers given.

  - Structure Bingo – select 16 words of your choice (an example is given), then ask students to create a 3x3 grid selecting 9 of the 16 key terms.

## Outcomes
- Students should be confident in identifying the key atmospheric layers and the associated features of each.
- Students will develop an awareness of the requirements of an examination.

## Other links/media & resources
- NASA fly-through: http://svs.gsfc.nasa.gov/vis/a010000/a010000/a010014/
### MODULE 1 ‘Climate Science’ – session (2)  Atmospheric Composition

<table>
<thead>
<tr>
<th>Question</th>
<th>Resource</th>
<th>Task/Activity</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the importance of the atmosphere as a life support system?</td>
<td>Environmental Studies (Unit 2)</td>
<td>Teacher led discourse through The composition of the Atmosphere.ppt looking at all present gases and aerosols. Further exposition into ‘Greenhouse Gases’ to link atmospheric gases with issues surrounding Climate Change. See: Major Greenhouse Gases.ppt</td>
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<tr>
<td>What are the main gases and aerosols of the lower atmosphere?</td>
<td>The composition of the Atmosphere.ppt Major Greenhouse Gases.ppt Inert or not.ppt</td>
<td>Comprehension task – The ‘Case of the Missing Carbon’ article from National Geographic website. Students to read through the article and answer questions. This can be completed as a paired activity or group activity concluding in shared feedback. Inert or not.ppt – to summarise key points with regards to gases present in the atmosphere. Students are to complete the following tasks: - Look at the cards with gases and aerosols on which may or may not be present in the lower atmosphere. - In pairs – categorise the gases. You must choose your own categories (try to have no more than 5). Exam style questions to prepare/develop exam technique – see Atmospheric Composition Exam Questions.ppt</td>
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<tr>
<td>What are the main processes associated with such gases and aerosols which influence life on Earth?</td>
<td>Exam Style questions - see Atmospheric Composition Exam Questions.ppt</td>
<td>Students should be able to recognise the key gases and aerosols present in the atmosphere. Students should be confident in identifying greenhouse gases and their role within the atmosphere. Students should be able to discuss the concept of sinks/stores and residence times (using carbon as a worked example). Case of the Missing Carbon <a href="http://ngm.nationalgeographic.com/ngm/0402/feature5/index.html">http://ngm.nationalgeographic.com/ngm/0402/feature5/index.html</a></td>
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### MODULE 1 ‘Climate Science’ – session (3) Solar Radiation

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</tr>
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<tbody>
<tr>
<td>What is the importance of the sun for life on Earth?</td>
<td>Environmental Studies (Unit 2)</td>
<td>Teacher led discourse using Solar Radiation and the Atmosphere.ppt discussing the main points of Nuclear Fusion, Electromagnetic Spectrum (see image); Earth’s Energy Budget and links it</td>
<td></td>
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<tr>
<td></td>
<td>Solar Radiation and the Atmosphere.ppt em_spectrum image</td>
<td>Students should understand the basic principles of Nuclear Fusion in the sun.</td>
<td>Suggested resources for model making activity:</td>
</tr>
</tbody>
</table>

[Image of RMetS logo]
| What forms of radiation are emitted from the sun? | Exam style questions – see Solar Radiation Exam Questions.ppt | Students should be able to recognise the forms and types of radiation the Earth receives/emits. |
| What are the characteristics of insolation and factors which causes it to change? | | Students should be able to provide positive feedback on peers’ work in order to develop an awareness of key exam requirements. |

**MODULE 2 ‘Climate Feedback Mechanisms’**

| What are negative feedback mechanisms? | Environmental Studies (Unit 2) | Students should be able to recognise the difference between negative and positive feedback mechanisms. |
| What are positive feedback mechanisms? | Feedback Mechanisms.ppt | Students should be confident in giving examples of both types of mechanisms. |
| How do they operate on a global level to maintain a dynamic equilibrium? | Flow Chart_feedback systems.ppt | Students should be able to describe how feedback mechanisms work. |
| How can we use them to help predict Global Climate? | Exam style questions - see Feedback Mechanisms Exam Questions.ppt | |
### Change?

- Exam style questions - see Feedback Mechanisms Exam Questions.ppt – with use of an example, explain the process of a positive/negative feedback system.  
- mechanisms maintain a dynamic equilibrium – leading into how human activity can interfere with the mechanisms, upsetting the balance.

### MODULE 3 ‘Ozone Depletion’

| What is the Ozone Layer? | Ozone Depletion.ppt  
Environmental Studies (Unit 2)  
Antarctic Ozone Depletion.ppt  
Exam style questions – see:  
- Ozone Depletion A exam style questions.ppt  
- Ozone Depletion B exam style questions.ppt  
- Ozone Depletion C exam style questions.ppt | Teacher led discourse. Lead students through Ozone Depletion.ppt. Pay particular focus to concerns over Ozone Depletion and the effects on living organisms. The associated legislation is of equal importance ‘Montreal Protocol’. Students would benefit from knowledge of example countries from both MEDC and LEDC to highlight the phased approach to withdrawing CFC use. Some summary questions are included at the end of the powerpoint to test/consolidate student understanding.  
Antarctic Ozone Depletion.ppt – De Bono thinking hats exercise: see http://www.mindtools.com/pages/article/newTED_07.htm (This activity can also be conducted as an individual comprehension task). - Students are assigned different roles to extract certain pieces of information. - Students will then feedback in a group forum to draw all key points/aspects of Ozone depletion.  
Exam style questions – see:  
- Ozone Depletion A exam style questions.ppt  
- Ozone Depletion B exam style questions.ppt  
- Ozone Depletion C exam style questions.ppt | Students should be confident in recognising key features/importance of the Ozone Layer.  
Students should be able to describe why Ozone Depletion is greatest at Polar Regions.  
Students should be able to discuss the associated legislation which limits/controls CFC use in both MEDC and LEDC countries.  
http://www.youtube.com/watch?v=qUfVMoqlDr8&feature=player_embedded  
http://www.nasa.gov/topics/earth/features/world_avoided.html

### Italian Translation

- Cambio?  
- Exam style questions - vedere Feedback Mechanisms Exam Questions.ppt – con uso di un esempio, spiegare il processo di un sistema di feedback positivo/negativo.  
- meccanismi mantengono un equilibrio dinamico – passando alla vista dell’azione umana che interessa con i meccanismi, rovesciando l’equilibrio.

### MODULO 3 ‘Degrado dell’Ozono’

| Che cos’è il strato dell’ozono?  
Perché è essenziale per le specie viventi?  
Qual è la legislazione associata che controlla/limita l’utilizzo dei CFCs? | Ozone Depletion.ppt  
Antarctic Ozone Depletion.ppt  
Exam style questions – vedere:  
- Ozone Depletion A exam style questions.ppt  
- Ozone Depletion B exam style questions.ppt  
- Ozone Depletion C exam style questions.ppt | Turni discorsivi. Portare i studenti attraverso Ozone Depletion.ppt.付出 particolare attenzione ai criteri di preoccupazione riguardante il degrado dell’ozono e l’effetto sulle specie viventi. La legislazione associata è di importanza eguale ‘Montreal Protocol’. I studenti avrebbero beneficiato di conoscenza di esempi di paesi da entrambe le parti MEDC e LEDC per evidenziare il piano di rimozione progressivo dei CFC. Alcune domande di riepilogo sono incluse alla fine del materiale per verificare/consolidare la comprensione.  
Exam style questions – vedere:  
- Ozone Depletion A exam style questions.ppt  
- Ozone Depletion B exam style questions.ppt  
- Ozone Depletion C exam style questions.ppt | I studenti dovrebbero essere sicuri di riconoscere le caratteristiche/importanza del strato dell’ozono.  
I studenti dovrebbero essere in grado di descrivere perché il degrado dell’ozono è maggiore nelle Regioni Polari.  
I studenti dovrebbero essere in grado di discutere la figura della legislazione associata che regolamenta/controlla l’utilizzo dei CFC in entrambe le parti MEDC e LEDC.  
[http://www.youtube.com/watch?v=qUfVMoqlDr8&feature=player_embedded](http://www.youtube.com/watch?v=qUfVMoqlDr8&feature=player_embedded)  
[http://www.nasa.gov/topics/earth/features/world_avoided.html](http://www.nasa.gov/topics/earth/features/world_avoided.html)
| Specimen paper Unit 2 includes a good question on Antarctic Ozone Depletion. Use mark scheme as a peer assessment task. |  |  |