# Greenhouse gases in the Earth system: Setting the agenda to 2030

**Monday 22 to Tuesday 23 February 2010**  
**Organisers:** Euan Nisbet, Peter Liss FRS, Andrew Manning and Ralph Keeling

## DAY 1

<table>
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<tr>
<th>Time</th>
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<tr>
<td>09.00</td>
<td>Welcome by Stephen Cox</td>
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| 09.05 | **Martin Manning**  
What Does Policy Need to Know About Greenhouse Gases?  
Pieter Tans  
What Have We Learned from the 50+ Year Measurement Records? |
| 13.30 | Marina Lévy  
Coupling Between Physics, Biology and Chemistry in the Ocean at Sub-Mesoscale |
| 13.55 | Discussion                                                             |
| 09.35 | **Euan Nisbet and Ed Dlugokencky**  
Methane – The Changing Global Budget and the Risk of Surprise  
Corinne Le Quéré  
Uncertainties in estimates of annual sources and sinks of CO₂ |
| 14.05 | Peter Rayner  
Process Modelling and Atmospheric Validation  
David MacKay FRS  
The Scale of the Decarbonization Challenge |
| 14.30 | Discussion                                                             |
| 10.05 | **Ingeborg Levin**  
The European Greenhouse Gas Perspective  
POSTER SESSION |
| 15.00 | POSTER SESSION                                                      |
| 11.00 | Discussion                                                             |
| 11.10 | **Ralph Keeling**  
What Have We Learned from Carbon Isotopes and O₂/N₂?  
Andrew Watson FRS  
Carbon Dioxide in the Oceans  
Alistair Manning  
What are the Challenges for Using Inversions at Regional Scales? |
| 15.50 | POSTER SESSION                                                      |
| 11.35 | Discussion                                                             |
| 16.15 | **Ray Weiss**  
Nitrous Oxide and Halogenated Greenhouse Gases  
Nicolas Gruber  
Ocean Acidification and Ocean Oxygen Changes  
Peter Cox  
Land Carbon Storage and Feedbacks |
| 16.25 | POSTER SESSION                                                      |
| 12.10 | Discussion                                                             |
| 12.30 | LUNCH                                                                  |

## DAY 2

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<tr>
<td>09.00</td>
<td><strong>Andrew Manning and Ingeborg Levin</strong></td>
</tr>
<tr>
<td>09.05</td>
<td><strong>Peter Liss FRS and Pieter Tans</strong></td>
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| 13.30 | Philippe Ciais  
Tipping Points in the Global Carbon Cycle: Policy Implications |
| 13.55 | Discussion                                                             |
| 09.35 | **Sir Crispin Tickell and Martin Manning**                             |
| 14.05 | Justus Notholt  
Upward and Downward Remote Sensing of Greenhouse Gases  
Robert Watson  
A Look to the Future: Marrying and Divorcing Science from Policy |
| 14.30 | Discussion                                                             |
| 11.00 | **John Ashton**  
The Politics of the Low Carbon Transition |
| 11.10 | **Alistair Manning**  
What are the Challenges for Using Inversions at Regional Scales?  
Sir Crispin Tickell  
Precaution and Expectation |
| 15.55 | Discussion                                                             |
| 11.35 | **Sir Crispin Tickell**  
Precaution and Expectation  
Ray Weiss  
Nitrous Oxide and Halogenated Greenhouse Gases  
Nicolas Gruber  
Ocean Acidification and Ocean Oxygen Changes  
Peter Cox  
Land Carbon Storage and Feedbacks  
GENERAL DISCUSSION  
Panel Convenors: Sir Crispin Tickell, Lord Oxburgh FRS |
| 16.00 | Discussion                                                             |
| 16.10 | **Ray Weiss**  
Nitrous Oxide and Halogenated Greenhouse Gases  
Nicolas Gruber  
Ocean Acidification and Ocean Oxygen Changes  
Peter Cox  
Land Carbon Storage and Feedbacks |
| 17.00 | CLOSE                                                                  |

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**CHairs:**  
Ralph Keeling and Euan Nisbet  
Andrew Manning and Ingeborg Levin  
Peter Liss FRS and Pieter Tans  
Sir Crispin Tickell and Martin Manning