

# A Hitchhikers Guide to the Black Arts of Earth system modelling (‘or why you should not want know what is in a sausage’) AWI 2013

## Day 1 – Earth system modelling for ‘newbies’\*

- **Presentation – (Earth system) modelling and the consequences of massive CO<sub>2</sub> release in the past**
- **Session #0000 – Getting started**  
Accessing the computing cluster; installing and compiling cGENIE; directory structure (‘where everything is’).  
Command-line operation; how to submit jobs to a cluster queue. Use of ‘restart’ experiments and modelling methodologies.  
Visualization of model output: time-series and time-slice (2D and 3D) output.
- **Session #0000` – A ‘real’(!) experiment**  
Setting up experiments: configuration files and setting parameter values.  
Exploring Earth system dynamics: ‘Snowball Earth’ and climate feedback.

## Day 2 – Getting your hands dirty with carbon

- **Session #0001 – ‘Poking the climate beast’**  
Applying perturbations and tracing ocean circulation.  
Exploring the stability of the Atlantic meridional overturning circulation (‘AMOC’).
- **Session #0100 – Poking the carbon cycle**  
CO<sub>2</sub> emissions and the spatial patterns of ocean acidification.
- **Session #0101 – Engineering the carbon cycle [if time]**  
Sensitivity of atmospheric  $p\text{CO}_2$  and ocean acidification to changes in the ocean’s biological pump and ‘weathering’. Ocean carbon cycle geoengineering.

## Day 3 [advanced] – Models of past and future carbon cycling

- **Session #0101 – Engineering the carbon cycle [continued]**  
Sensitivity of atmospheric  $p\text{CO}_2$  and ocean acidification to changes in the ocean’s biological pump and ‘weathering’. Ocean carbon cycle geoengineering.
- **Session #0110 – Long-term controls on atmospheric  $p\text{CO}_2$**   
Role of deep-sea sediments and the long ‘tail’ of fossil fuel CO<sub>2</sub> release.  
Mechanisms of glacial atmospheric  $p\text{CO}_2$ .
- **Session #1000 – Addressing the geological record**  
Past climates and carbon cycling.

\* [Google it]