

## **cGENIE MINI-WORKSHOP:**

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

**13<sup>th</sup> July 2013; Urbino**

This session will give a very brief introduction to and practical hands-on learning in Earth system modelling. It will provide a chance to explore the dynamics of the Earth’s climate system as well as of global carbon cycling and the biogeochemical impacts of fossil fuel CO<sub>2</sub> emissions. The workshop will foster a critical appreciation of the nature and limitations of climate and Earth system models in trying to understand and predicting global change. But you will also see how numerical models can be utilized to address scientific questions, test hypotheses, and quantify the past and future relationship between global carbon cycling and climate and associated feedbacks. You will learn new computer skills and gain experience with some data visualization packages.

In summary:

- You will have prescribed fun.
- You will lose all respect for climate (and other complex) models.
- But ... you will also appreciate how essential models are as tools for testing hypotheses, quantifying impacts, and exploring the possible behaviours of climate and carbon cycling to (e.g. human) disruption, and generally: learning how the Earth system ‘works’.
- You will get a ‘hands-on’ appreciation of the nature (in terms of carbonate chemistry) and spatial pattern of anthropogenic ocean acidification.

There are no ‘pre-requisites’ in terms of computer programming skills or knowledge.

*START (ca. 9 am)*

- **Part Ia – Getting started**  
Accessing the computing cluster; directory structure (‘where everything is’).  
Model output; Panoply and MATLAB visualization.  
Setting up experiments: configuration files and setting parameter values.  
Concept of a ‘restart’; experiment started from ‘cold’ vs. from end of previous run.
- **Part Ib – A ‘real’(!) experiment**  
Setting up experiments: configuration files and setting parameter values.  
Exploring the behaviour of the Earth system: Snowball Earth.
- **Part II – ‘Poking the climate beast’**  
Geochemical ‘forcings’ of cGENIE and tracing ocean circulation.  
Exploring the stability of the Atlantic meridional overturning circulation (AMOC).
- **Part III – Poking the carbon cycle (if time)**  
CO<sub>2</sub> emissions, future ocean acidification, and carbon-climate feedbacks.