Global Calculator Climate-KIC Project Committee meeting
25th June 2014

Attendees

Jeremy Woods, Imperial College	Lucy Hayes, DECC
Alexandre Strapasson, Imperial College	Erica Thompson, LSE
Nicole Kalas, Imperial College	Lenny Smith, LSE (by Skype)
Sophie Hartfield, DECC	Andrew Yool, National Oceanic Centre
Jason Lowe, Met Office	

Ocean Acidification

The group discussed Andrew Yool's paper on possible ways of presenting the ocean acidification analysis in the Global Calculator. Andrew showed a version of IPCC SPM-10 for ocean acidification, plotting the global mean pH change against the cumulative carbon emissions for a variety of CMIP5 models and RCP scenarios. This showed that the changes lie on a single well-constrained line up to the point of "peak acidification" and then diverge.

The web tool should include a message that acidification is not the worst thing that oceans will be affected by. For example, changes in ocean circulation related to climate change would have a big impact on fisheries, and over-fishing is a much larger non-climate ecosystem impact.

The group liked the burning embers diagram but decided against including it in the July version of the Calculator because it had not been published yet and so would be hard to defend and may be mistakenly perceived by users as equivalently robust as the IPCC burning embers diagram.

For the July version of the tool, the group agreed we should:

- Include the ocean acidification maps (cycling through various map images in the same manner as the global mean temperature and precipitation maps).
- The maps should be described as the *peak* ocean acidification during the 20th century associated with cumulative emissions. This is more accurate because we will remove the "ticks" from the ocean acidification / cumulative emissions charts which could present confusing messages. Peak acidification also represents the actual ecosystem impacts better than showing a value at 2100 which may have declined.

Note that the ocean acidification maps presented in the July tool would differ from the global mean temperature charts because they would not include a "model uncertainty" lever to widen the range from the IPCC models. (Although in any case, this widening would be minimal because there is much more agreement among models on ocean acidification. We will consider whether such a lever could be incorporated based on the existing literature.)

For the December re-release of the tool, we would attempt to say more about the impact on corals, etc arising from ocean acidification. (The impact of cumulative CO_2 emissions on ocean acidification is fairly certain, but the impact of acidification on sea life is much less certain as organisms can react in unexpected ways.) Kroeker (2013) present some nice diagrams which could be used directly but not quantitatively, to demonstrate sensitivity of various organisms to acidification rather than trying to predict quantitative impacts.

The group agreed that for the December re-release we would:

- Consider presenting some of the species sensitivity information in the Kroeker diagram, alongside the ocean acidification maps. We would select, say, three species about which there was fairly good information and which users may be familiar with. We probably would not include the whole Kroeker diagram because it is quite big and may not be immediately obvious to users how to interpret the information. But a carefully selected sub set of species could work well.
- Consider super-imposing "location of corals", etc on the maps. Ideally, we would choose the same, say, three species as above. Then the user could press a button to say "show location of corals, etc" and these would appear on the ocean acidification maps.
- Ideally, we would really like to include Phil Williamson's burning embers diagram in the December re-release. But to do so, the work would have to be published. So **the group strongly urged Phil Williamson to publish his excellent burning embers diagram on an open discussion forum as soon as possible**. Jason suggested that in his experience, open discussion forums are a good way of getting work peer reviewed quickly.
- Ideally, by December it would also be good if we could include a message about the possible impact on the world's fish stocks. This result would not flow from the ocean acidification analysis, rather from another evidence source (e.g. IPCC reports).
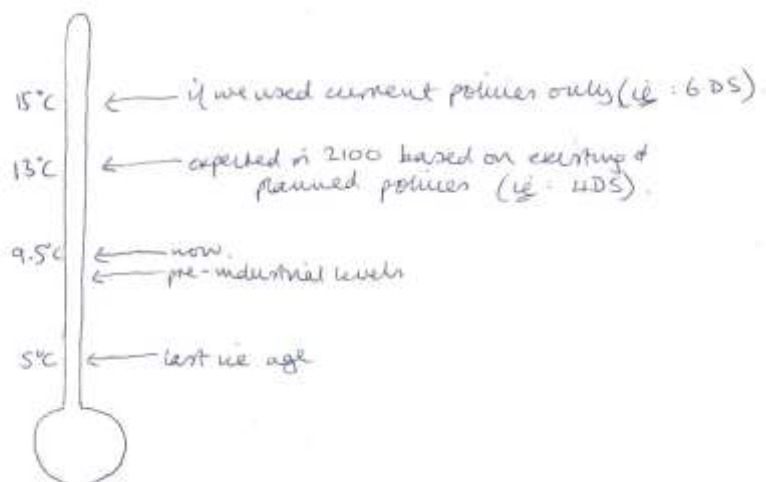
Climate impacts paper

The group discussed the paper by Nigel Arnell and Erica Thompson on possible ways of visualising climate impacts in the web tool.

The group agreed that for the July version of the web tool:

- We would try to include an ice age analogy in the "basic physics" page. 4.5C is the difference in global mean temperature between now and the last ice age. A graphical illustration of this (e.g. see below) could be an effective way of explaining to users the scale of climatic change associated with such a change in temperature.

Global mean temperature

15°C ← if we used current policies only (ie : 6 DS)

13°C ← expected in 2100 based on existing & planned policies (ie : 4 DS).

9.5°C ← now.
← pre-industrial levels

5°C ← last ice age

For the December version of the web tool:

- We should have a new tab on "extreme weather". We could include some links to videos of recent extreme weather events (carefully selected as those which the IPCC have suggested there is a link to man made climate change). Also, we could include a version of the extremes graph from Erica and Nigel's paper (see below).
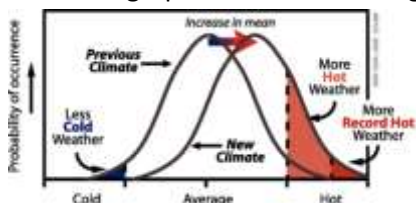
- For the "climate impacts" tab, the group liked figure 6.2 in Erica and Nigel's paper (cumulative emissions, see below). The group also suggested including the IPCC burning embers diagram.
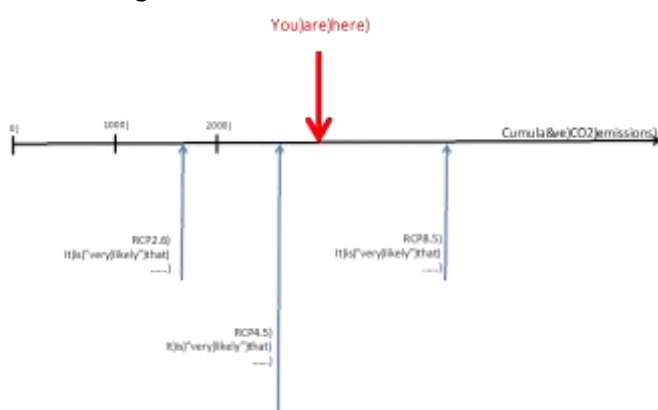
Action: Erica, Lucy, Nigel and Jason should meet in Reading to explicitly explore what other regional impacts could be included in the tool, e.g. using ISI-MIP. Also invite Kirsty (who's working on the FCO project) – so make the meeting after 16th July, as this is when the FCO work is launching.

Endogenising non-CO2 in temperature calculation

The July version of the tool uses option 1 (SPM-10 pink fan) to calculate global mean temperature change.

After July, Erica will try to implement option 2 (SPM-10 grey fan plus GTPs) and if she can get the result to within 0.5C of the option 1 result. If she can do this, we will implement the option 2 methodology. Erica will get further data / advice from Jason on doing this.

Prioritising edits in climate science

Before the July release, Erica would prioritise the ice age thermometer, ocean acidification maps, basic physics video and, if time, expressing the precipitation maps as % change (not absolute).

For the December re-release, the group agreed that Erica should prioritise:

- endogenising non-CO2 emissions (see above)
- extrapolating the temperature calculation to greater than 8000 GtCO2. Erica will try extending the SPM10 in the first instance (i.e. in order to extend the diagram using IPCC published model runs). Then we'll see what the curve looks like, and on that basis decide what to do.
- Consider including the IPCC burning embers diagram (e.g. as shown below).
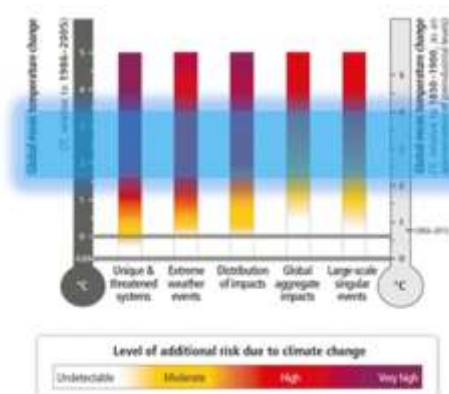
Land/bio/food

Alexandre summarised the next steps for the land/bio/food and GGR work after July.

Jeremy Woods summarised details of the four or five peer reviewers that are lined up to review the land/bio/food work.

Web tool presentational changes

The group agreed we should make the following small presentational changes to the web tool before release:

- Move whiskers to right hand side of thermometer.
- The emissions chart should say "CO2e emissions per year" and the energy supply and demand should say "EJ/year".

- The orange bar on cumulative emissions bar is perhaps not clear, e.g. an arrow beside it may help.
- Possible to see the totals as well as the sector values in the graph legends?

Outreach strategy for the Summer

The group gave Sophie some details of contacts in the list of businesses / NGOs. **Action**: Nicole to complete the table with further contact details. **Action**: Sophie to ask Mike Cherret if he had any contacts in these businesses / NGOs.