UK Climate Projections:
Using the User Interface – course 3

UK Climate Projections

No-one can know exactly what will happen in the future, but we must plan ahead and be ready to deal with the effects that our changing climate will bring. The UK Climate Projections (UKCP09), have been created by some of the UK's leading climate scientists in a project funded by Defra, to look at what the future climate of the UK might be like. The UK Climate Projections will underpin the Government's Adapting to Climate Change programme.

Having access to good information increases your ability to assess the risks faced by your business or organisation, allowing you to consider a range of options leading to sensible decisions. The exercises in this booklet allow you to better understand some of the more technical products within UKCP09, building on the products already introduced in the first UKCP09 User Interface course.

All the information from the UK Climate Projections (UKCP09) is available free of charge via the UKCP09 website.

Essential links

- UK Climate Projections (UKCP09):
  http://ukclimateprojections.defra.gov.uk

- UK Climate Projections User Interface
  http://ukclimateprojections-ui.defra.gov.uk

- Training resources for UKCP09:
  www.ukcip.org.uk/training

For more tools to help organisations adapt to climate change, including UKCP09, the UKCIP Adaptation Wizard and more go to: www.ukcip.org.uk and click on *Tools to help you.*

Structured routes through the UKCP09 User Interface (UI) – Marine Projections

The following exercises provide an opportunity to begin understanding how to generate and interpret outputs from the Marine projections of the UK Climate Projections. The areas covered include:

> Sea level rise (absolute and relative)
>
> Storm surge heights
>
> Multi-level ocean

Within the described routes, the text in bold represents the different sections within the User Interface. For each of the choices, select the option written next to it.

Remember to select next to progress to the next screen and if you need to, use the back button on your browser to move back though the UI to change your selections.

Sea Level Rise (SLR)

Within the UK Climate projections, Sea Level Rise (SLR) can be identified as either absolute or relative where the relative SLR takes into account land rise. Unlike the land based projections the marine projections are not probabilistic but refer to results as frequency of distribution. The results are displayed as a plume plot and can be interpreted in the same way as plume plots for the land based projections shown in course 1.

When creating a plume plot for sea level rise the only choice that you need to make is with regard to the Emissions scenario and whether you want relative or absolute change.

Greater detail on sea level rise can be found in the Marine and Coastal Projections (chapter 3).

Sea level rise (Absolute)

This exercise guides you through generating a plume plot to identify absolute sea level rise for the UK using a high Emissions scenario. From the output it is possible to see how the UK sea level could change under a particular emissions scenario through the century.

1. Start a new request: by selecting a data source

    - Data source: Projections of the sea level rise for UK waters

    - Variable: Absolute sea level rise (m)

    - Emissions scenario: High

    - Output type: Plume plot

> **?** The baseline period for SLR is 1980-1999, to translate the absolute SLR results to the 1961-1990 land based projections you add 2.7cm to the original sea level rise value.
>
> In this exercise what would the corrected absolute SLR results be at the 50% frequency level in the 2050's?

Sea level Rise (Relative)

Within the Marine Projections, sea level rise can also be calculated as a relative value where the change in land rise is considered. Unlike absolute sea level rise, relative sea level rise is location specific and so it is possible to identify the coastal grid cell you wan to identify change over.

This exercise guides you in how to generate a plot to identify change in relative sea level rise in the UK for the 21st century.

1. Start a new request: by selecting a data source

   - Data source: Projections of the sea-level rise for UK waters

   - Variable: Relative sea-level rise (m)

   - Emissions scenario: High

   - UK Location: Holyhead (Grid cell id: 18948)

   - Output type: Plume plot

> **?** To correct the relative SLR to reflect the 1961-1990 base line figure a further location dependant correction value needs to be applied to account for land movement. Currently these values are not available for free within the UK Climate Projections.

Storm surge height plots

This plot (Figure 1) presents the long term trend in skew surge from 1951–2099. The red bars indicate that the climate change signal is evident when compared with the climate variability component. In the case of a white bar (figure 2) it would indicate that the climate change signal is not distinct from the climate variability signal.

Each bar represents the range of the projections for each storm surge return period, from the 5th percentile to the 95th percentile. The 50th percentile (central estimate) is represented by the black line in the centre of the bar.

Figure 1 Example of a storm surge height plot generated using the user interface

Storm Surge Height plot exercise

The following exercise is designed to support your understanding of how to generate and interpret storm surge height plots

1. Start a new request: by selecting a climate variable

- Variable: Long-term trend in skew surge (1951-2099)

- Data source: Projections of Trend in Storm Surge for UK Waters

- Emissions scenario: Medium (note that unlike the land based projections there is only one emissions scenario available)

- UK Location: Aberdeen (Grid cell id: 7859)

- Output type: Return periods plot

> ? 2) What is the likely storm surge height for the 2020's, 50% central estimate level for a 10 year return period?

Replot the storm surge height plot for the grid cell id 12185

> ? 3) What do you notice about the significance in the climate change signal at the 5% level for the different return periods?

Multi-level Ocean Outputs

1. Start a new request: by selecting data source

- Data source: Past and Future Multi-level Ocean Model Simulations for UK Waters

- Climate change type: future climate change only

- Variable: Mean sea water potential temperature

- Emissions scenario: Medium

- Time period: 2080's

- Temporal Average: Winter

- Please select the ocean level: Near-surface level

- Location: any area

- Output type: Map

Note on location: On the location page, it shows that the grid cells extend beyond the immediate UK coastal margins, however, when the output is produced it does only display data for the UK coastal waters. Also it does not matter which portion of the UK coastal waters you choose as the UI produces data for the whole of UK but having 'zoomed in' on the original selection. This selection can be resized by drawing out a new printable area square (red square) around the desired portion of the UK.

Interpretation exercises check sheet

Absolute sea level rise

a. 2.9 cm

Storm surge height plot

a. yes, it is significant at the 5% level

b. 1.2 mm/yr

c. There is no significance in the climate signal for a 10, 20 and 50 year return period