A Machine-Assisted Systematic Map of Climate Impacts Evidence

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1 Introduction

Chapter 18 of working group II's fifth assessment report[ref] presented emerging evidence on the detection and attribution of the impacts of recent changes in climate on natural and human systems. Evidence collected from hundreds of sources is synthesised in a world map of high-level regional impacts (figure 1).

This paper aims to use the studies and their labels given in chapter 18 to

- Develop a query to capture literature on detection and attribution
- Develop a machine-learning approach to predict unseen labels and classify unlabelled literature (that which has been published since AR5 or was not included in AR5 chapter 18)
- Reproduce an updated, more detailed, more systematic and interactive version of the map produced by IPCC
- Point to literature, themes and locations that will help the IPCC to reproduce a similar map in further assessment reports

2 Approach

[Current to-do list]

- Download literature list from WGII tables 18.5-18.9
- Develop a query that captures it all
- Test query for coverage of other literature, false positives, etc.
- Develop coding scheme based on table
- Code chapter 18 documents using table
- Machine-learning using document classifications
  - Test on heldback sample
  - Apply to unseen documents
- interactive map/database?

large enough N? Code some unseen documents?

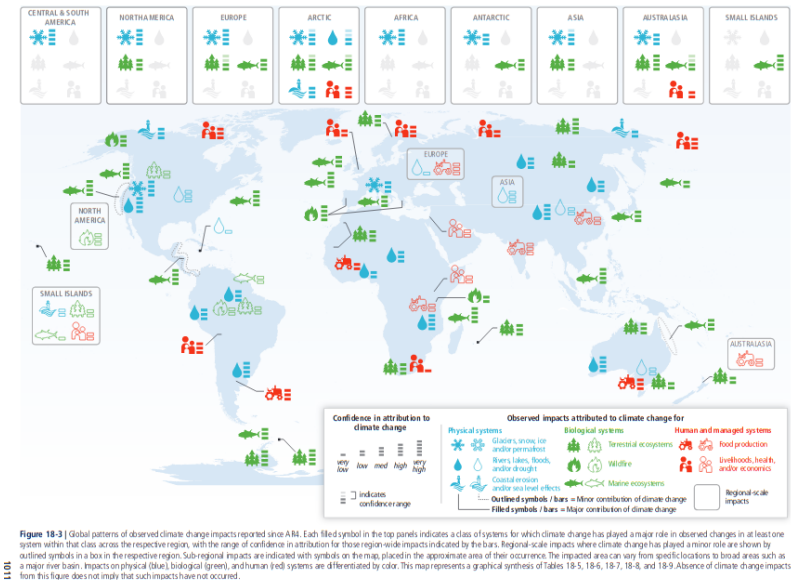

Figure 18-3 | Global patterns of observed climate change impacts reported since AR4. Each filled symbol in the top panels indicates a class of systems for which climate change has played a major role in observed changes in at least one system within that class across the respective region, with the range of confidence in attribution for those region-wide impacts indicated by the bars. Regional-scale impacts where climate change has played a minor role are shown by outlined symbols in a box in the respective region. Sub-regional impacts are indicated with symbols on the map, placed in the approximate area of their occurrence. The impacted area can vary from specific locations to broad areas such as a major river basin. Impacts on physical (blue), biological (green), and human (red) systems are differentiated by color. This map represents a graphical synthesis of Tables 18-5, 18-6, 18-7, 18-8, and 18-9. Absence of climate change impacts from this figure does not imply that such impacts have not occurred.

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Figure 1: AR5 WGII Chapter 18 synthesis map

3 Coding

3.1 Table variables

Region: Africa, Europe, Asia, Australasia, North America, South and Central America, Polar Regions
System: Mountains, snow and ice; Rivers, lakes and soil moisture; Terrestrial Ecosystems; Coastal and Marine Ecosystems; Human and Managed Systems
Specific Impact: Retreat of tropical highland glaciers in East Africa; Increase in rock slope failures in western Alps …
Confidence in detection: *Very high, High, Medium, Low*
Role of Climate: *Major, Minor*
Climate Driver: Change in Precipitation; Warming; Change in snow cover
Reference behaviour: No change; Changes due to land use; etc.
Confidence in attribution: *Very high, High, Medium, Low*

Is it best to predict having learnt the regions, or to look for place words, or a combination of both?

Intermediate categorisation? Floods, wildfires etc.?