

# The Tech We Want Online Summit

18<sup>th</sup>  
Oct,24



**#semanticClimate**  
Transforming information into actionable knowledge

DEMO by Parijat  
Bhadra

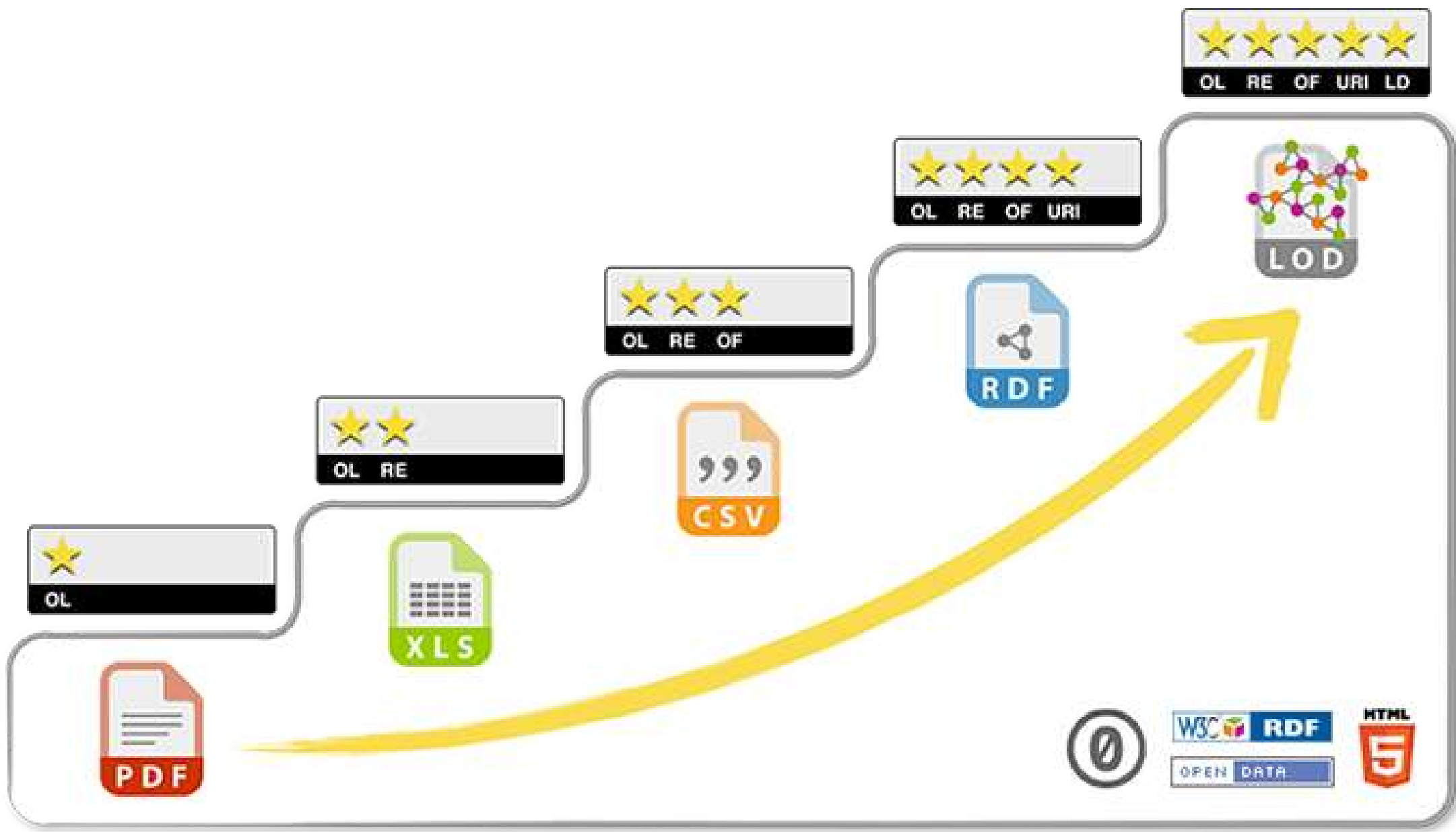
## Resources :-

- amilib - <https://github.com/petermr/amilib>
- docanalysis - <https://github.com/petermr/docanalysis>
- pygetpapers - <https://github.com/petermr/pygetpapers>

DEMO LINK  
[COLAB NOTEBOOK](#)

# CLIMATE CHANGE





# Why are we doing this ?

we believe that open climate knowledge will make contribution to solving the global climate crisis



Semantic  
document (HTML,  
machine readable  
and accessible)

# People and Activities

---

## DEVELOPERS

- 1.pygetpapers - Ayush Garg
- 2.amilib - Peter Murray-Rust
- 3.docanalysis - Shweata N Hegde
- 4.Jupyter notebooks - Parijat Bhadra, Renu Kumari

## Presenter

Parijat Bhadra



## Team



Gitanjali Yadav



Peter Murray-Rust



Simon  
Worthington



Renu Kumari



Shweata N  
Hegde



Parijat Bhadra

## Outreach



Engaging with  
highschool students,  
New Delhi



Hackathon at  
NIPGR, Delhi



Alumni reunion



Hackathon at  
Gujarat

# The Things We Have

Demonstrations on 24-10-18

| Name                 |  | Purpose                                                                  |
|----------------------|--|--------------------------------------------------------------------------|
| <b>SOFTWARE</b>      |  |                                                                          |
| pygetpapers          |  | Searching the Open Scientific Literature                                 |
| amilib               |  | Creates semantic dictionaries from words. Wikimedia lookup               |
| docanalysis          |  | Extracts semantic entities from documents                                |
| dictionaries         |  | Creates semantic dictionaries from words.<br>Wikipedia/Wiktionary Lookup |
| <b>DICTIONARIES</b>  |  |                                                                          |
| IPCC Glossary (DEMO) |  | 1000+ terms/abbreviations from IPCC linked to Wikidata                   |
| <b>CORPORA</b>       |  |                                                                          |
| IPCC Chapters        |  | Semantic content for 70+ chapters                                        |
| UNFCCC Reports       |  | "All" the COP reports for 30+ years                                      |

# Contents

1. Installation of the tools

**2. Scientific Literature Corpus**

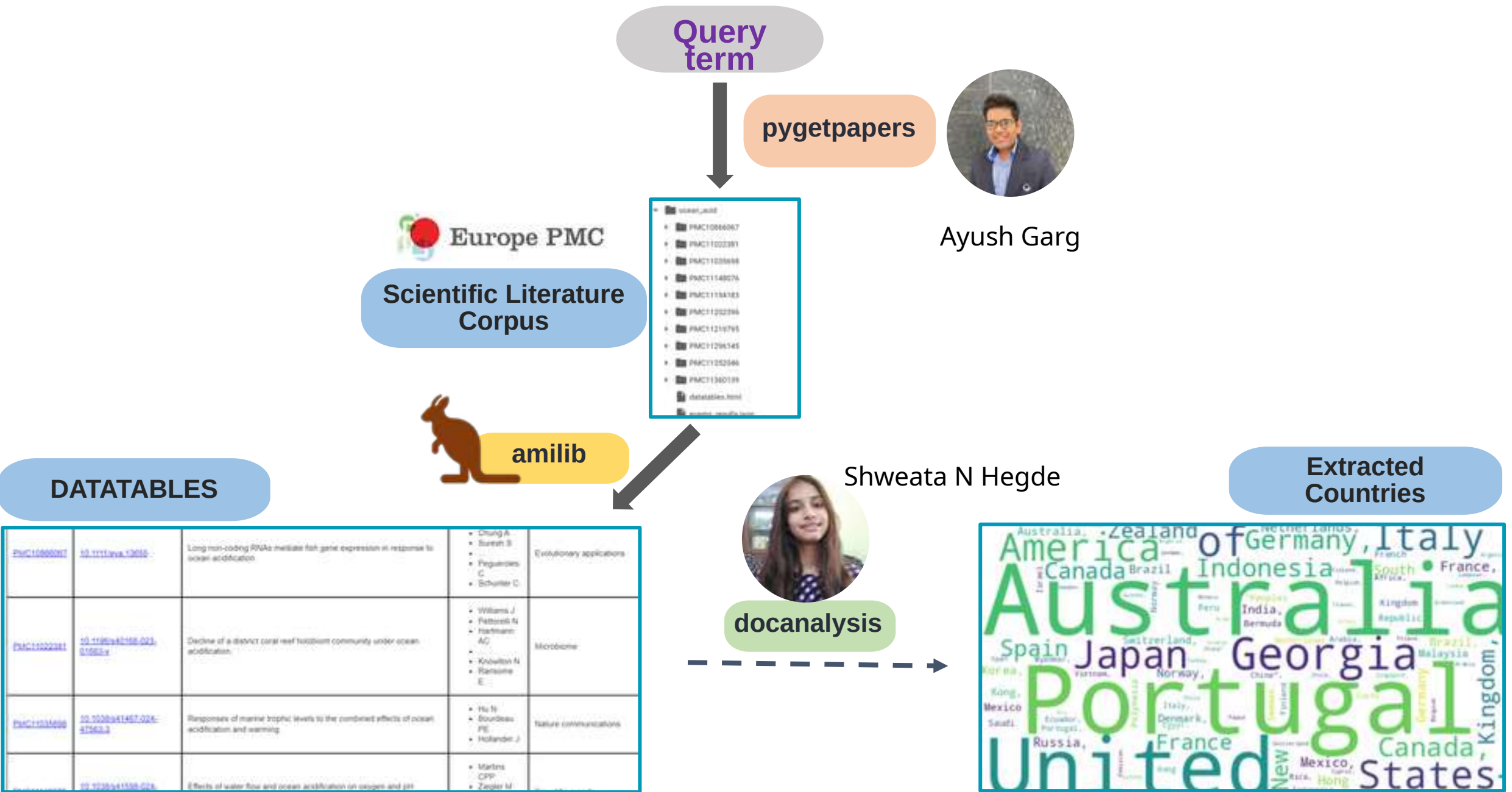
- pygetpapers
- Datatables

3. Extracting and displaying specific entities (for example COUNTRY names) with docanalysis

**4. IPCC Corpus**

- Wikimedia enhanced Dictionary for the wordlist extracted from the IPCC corpus with amilib

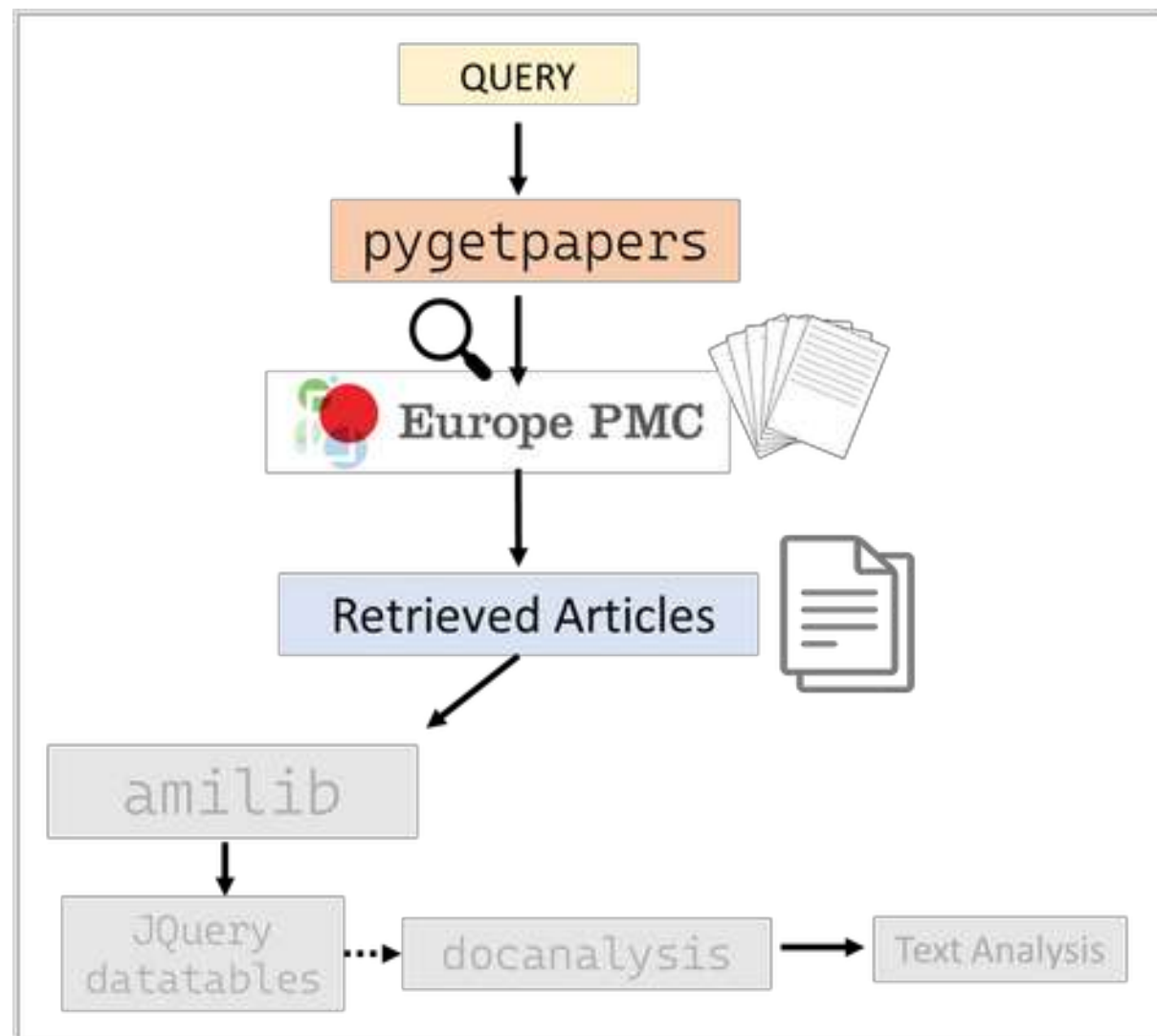




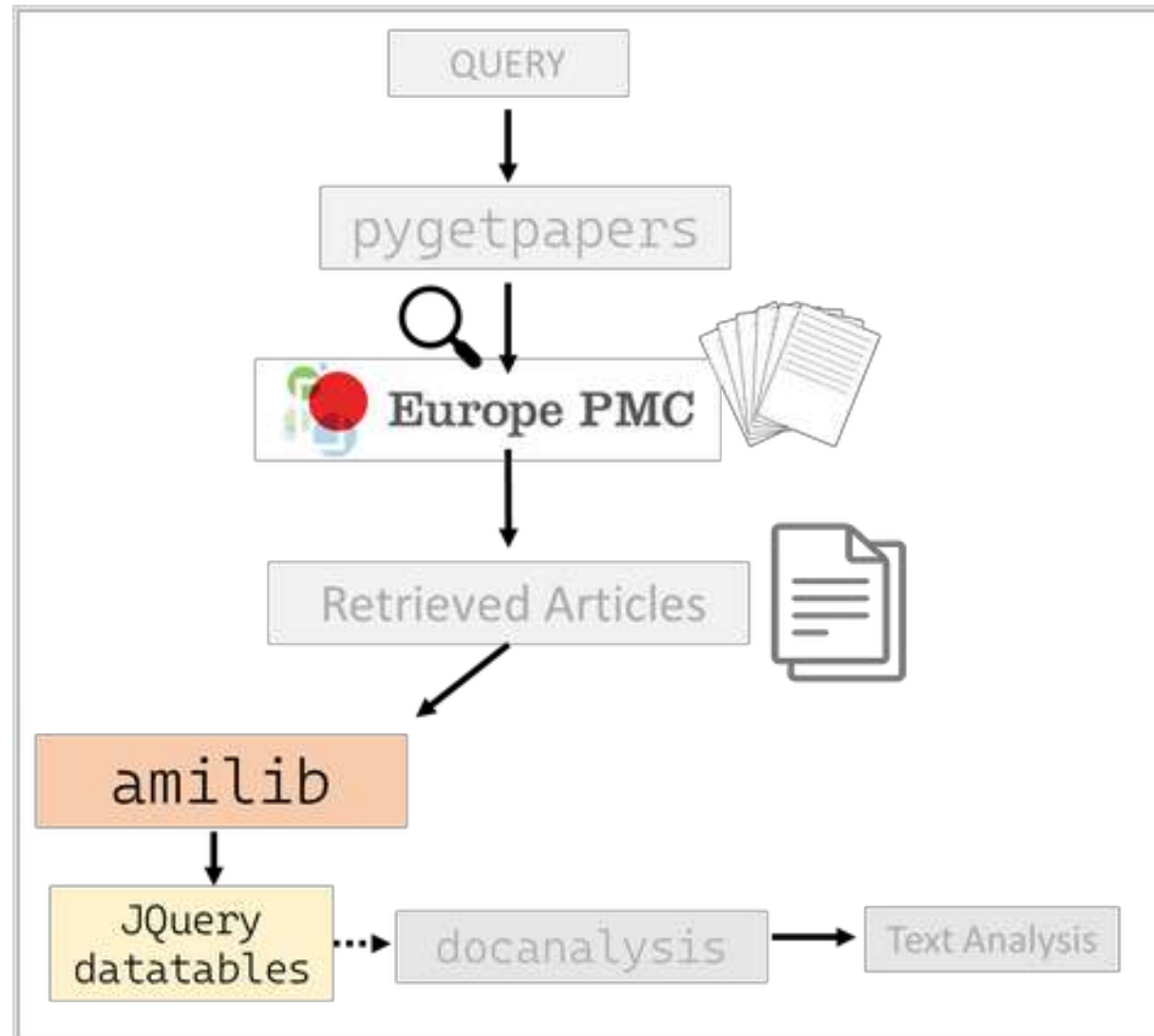
Installing our tools on the  
command line

```
pip install --pygetpapers  
pip install --amilib==0.3.9  
pip install --docanalysis
```

```
pygetpapers --query "Ocean Acidification" --xml --limit 20 --startdate "2010-04-05"  
--enddate "2011-04-05" --output ocean_acid --save_query
```



amilib HTML --operation DATATABLES --indir ocean\_acid

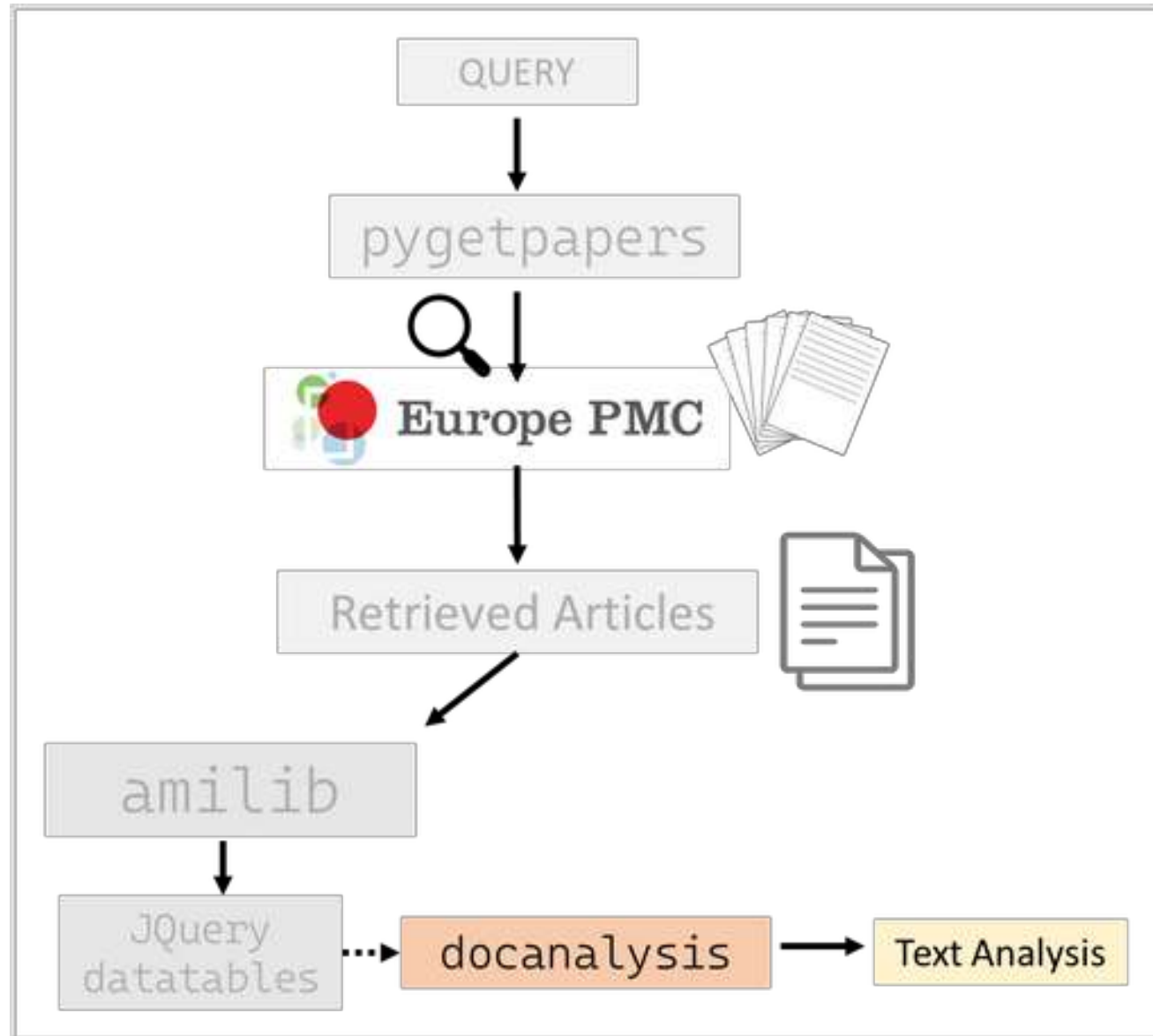




# Jquery datatable

| pmcid                      | doi                                          | title                                                                                                                                     | authorString                                                                                                                                             | journalInfo.journal.title                                                       | pubYear | abstractText                                                                                                                                                                                                                |
|----------------------------|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">PMC2884040</a> | <a href="#">10.1121/1.3425741</a>            | Internal waves as a proposed mechanism for increasing ambient noise in an increasingly acidic ocean.                                      | <ul style="list-style-type: none"> <li>• Rouseff D</li> <li>• Tang D.</li> </ul>                                                                         | The Journal of the Acoustical Society of America                                | 2010    | The effect on the ambient noise level in shallow water of the ocean growing more acidic is modeled. Because most noise sources are near the surface, high-order acoustic modes are preferentially excite                    |
| <a href="#">PMC2889361</a> | <a href="#">10.1073/pnas.0914065107</a>      | Calcium isotope constraints on the end-Permian mass extinction.                                                                           | <ul style="list-style-type: none"> <li>• Payne JL</li> <li>• Turchyn AV</li> <li>• Paytan A</li> <li>• ...</li> <li>• Yu M</li> <li>• Wei J.</li> </ul>  | Proceedings of the National Academy of Sciences of the United States of America | 2010    | The end-Permian mass extinction horizon is marked by an abrupt shift in style of carbonate sedimentation and a negative excursion in the carbon isotope ( $\delta^{13}\text{C}$ ) composition of carbonate minerals.        |
| <a href="#">PMC2894046</a> | <a href="#">10.1371/journal.pone.0011362</a> | Response of the Arctic pteropod <i>Limacina helicina</i> to projected future environmental conditions.                                    | <ul style="list-style-type: none"> <li>• Comeau S</li> <li>• Jeffree R</li> <li>• Teyssié JL</li> <li>• Gattuso JP.</li> </ul>                           | PloS one                                                                        | 2010    | Thecosome pteropods (pelagic mollusks) can play a key role in the food web of various marine ecosystems. They are a food source for zooplankton or higher predators such as fishes, whales and birds tha                    |
| <a href="#">PMC2894059</a> | <a href="#">10.1371/journal.pone.0011372</a> | Impact of ocean warming and ocean acidification on larval development and calcification in the sea urchin <i>Triplaneustes gratilla</i> . | <ul style="list-style-type: none"> <li>• Sheppard Brennd H</li> <li>• Soars N</li> <li>• Dworjanyn SA</li> <li>• Davis AR</li> <li>• Byrne M.</li> </ul> | PloS one                                                                        | 2010    | <h4>Background</h4> As the oceans simultaneously warm, acidify and increase in $\text{P}(\text{CO}_2)$ , prospects for marine biota are of concern. Calcifying species may find it difficult to produce their skeleton beca |
| <a href="#">PMC2898876</a> |                                              | The Beat                                                                                                                                  |                                                                                                                                                          | Environmental health perspectives                                               | 2010    |                                                                                                                                                                                                                             |
| <a href="#">PMC2951437</a> |                                              | In This Issue                                                                                                                             |                                                                                                                                                          | Proceedings of the National Academy of Sciences of the United States of America | 2010    |                                                                                                                                                                                                                             |

```
docanalysis --project_name ocean_acid --make_section --  
dictionary COUNTRY --output ocean_acid.csv
```





# Creating Wikimedia enhanced Dictionary for Climate wordlist extracted from IPCC Corpus



Climate Report

Keyword  
extraction

- 1 ocean acidification
- 2 carbon capture and storage
- 3 carbon sequestration
- 4 carbon dioxide removal
- 5 calcification
- 6 Habitat fragmentation
- 7 Marine ecosystem
- 8 Plankton
- 9 Aragonite
- 10 Coral bleaching

Climate terms

amilib

Dictionary  
creation



Dictionary



# Wikimedia enhanced dictionary

search term: ocean acidification [Wikipedia Page](#)

**Ocean acidification** is the ongoing decrease in the [pH](#) of the Earth's [ocean](#). Between 1950 and 2020, the average pH of the ocean surface fell from approximately 8.15 to 8.05.<sup>[2]</sup> [Carbon dioxide emissions](#) from human activities are the primary cause of ocean acidification, with [atmospheric carbon dioxide \(CO<sub>2</sub>\) levels](#) exceeding 422 ppm (as of 2024).<sup>[3]</sup> CO<sub>2</sub> from the [atmosphere](#) is absorbed by the oceans. This chemical reaction produces [carbonic acid](#) (H<sub>2</sub>CO<sub>3</sub>) which [dissociates](#) into a [bicarbonate ion](#) (HCO<sub>3</sub><sup>-</sup>) and a [hydrogen ion](#) (H<sup>+</sup>). The presence of free hydrogen ions (H<sup>+</sup>) lowers the pH of the ocean, increasing [acidity](#) (this does not mean that [seawater](#) is acidic yet; it is still [alkaline](#), with pH higher than 8). [Marine calcifying organisms](#), such as [mollusks](#) and [corals](#), are especially vulnerable because they rely on calcium carbonate to build shells and skeletons.<sup>[4]</sup>

search term: carbon capture and storage [Wikipedia Page](#)

**Carbon capture and storage (CCS)** is a process by which [carbon dioxide](#) (CO<sub>2</sub>) from industrial installations is separated before it is released into the atmosphere, then transported to a long-term storage location.<sup>[1]</sup><sup>2221</sup> With CCS, CO<sub>2</sub> is captured from a large [point source](#), such as a [natural gas processing plant](#) and typically is stored in a deep [geological formation](#). Around 80% of the CO<sub>2</sub> captured annually is used for [enhanced oil recovery](#) (EOR), a process by which CO<sub>2</sub> is injected into partially-depleted oil reservoirs in order to extract more oil and then is largely left underground.<sup>[2]</sup> Since EOR *utilizes* the CO<sub>2</sub> in addition to *storing* it, CCS is also known as **carbon capture, utilization, and storage** (CCUS).<sup>[3]</sup>

search term: carbon sequestration [Wikipedia Page](#)

**Carbon sequestration** is the process of storing carbon in a [carbon pool](#).<sup>[2]</sup><sup>2248</sup> It plays a crucial role in [limiting climate change](#) by reducing the amount of [carbon dioxide in the atmosphere](#). There are two main types of carbon sequestration: biologic (also called *biosequestration*) and geologic.<sup>[3]</sup>

search term: carbon dioxide removal [Wikipedia Page](#)

**Carbon dioxide removal (CDR)** is a process in which carbon dioxide (CO<sub>2</sub>) is removed from the atmosphere by deliberate human activities and durably stored in geological, terrestrial, or ocean reservoirs, or in products.<sup>[3]</sup><sup>2221</sup> This process is also known as **carbon removal**, **greenhouse gas removal** or **negative emissions**. CDR is more and more often integrated into [climate policy](#), as an element of [climate change mitigation](#) strategies.<sup>[4][5]</sup> Achieving [net zero emissions](#) will require first and foremost deep and sustained cuts in emissions, and then—in addition—the use of CDR ("CDR is what puts the *net* into *net zero emissions*"<sup>[6]</sup>). In the future, CDR may be able to counterbalance emissions that are technically difficult to eliminate, such as some agricultural and industrial emissions.<sup>[7]</sup><sup>114</sup>



## Datatables (An index for UNFCCC reports)

|                                                         |                                                                                                                                                                                            |                             |  |
|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|--|
| 10 entries per page                                     |                                                                                                                                                                                            | Search:                     |  |
| file                                                    | title                                                                                                                                                                                      | pdf                         |  |
| <a href="#">CMA_1/html/13_20_CMA_1/total_pages.html</a> | Report of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement on the third part of its first session, held in Katowice from 2 to 15 December 2018   | <a href="#">13_20_CMA_1</a> |  |
| <a href="#">CMA_1/html/1_CMA_1/total_pages.html</a>     | Report of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement on the first part of its first session, held in Marrakech from 15 to 18 November 2016 | <a href="#">1_CMA_1</a>     |  |
| <a href="#">CMA_1/html/2_CMA_1/total_pages.html</a>     | Report of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement on the first part of its first session, held in Marrakech from 15 to 18 November 2016 | <a href="#">2_CMA_1</a>     |  |
| <a href="#">CMA_1/html/3_12_CMA_1/total_pages.html</a>  | Report of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement on the third part of its first session, held in Katowice from 2 to 15 December 2018   | <a href="#">3_12_CMA_1</a>  |  |
| <a href="#">CMA_2/total_pages.html</a>                  | Report of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement on its second session, held in Madrid from 2 to 15 December 2019                      | <a href="#">1_9_CMA_2</a>   |  |
| <a href="#">CMA_3/total_pages.html</a>                  | Report of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement on its third session, held in Glasgow from 31 October to 13 November 2021             |                             |  |
| <a href="#">CMA_3/total_pages.html</a>                  | ?                                                                                                                                                                                          |                             |  |
| <a href="#">CMA_3/total_pages.html</a>                  | Report of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement on its third session, held in Glasgow from 31 October to 13 November 2021             |                             |  |
| <a href="#">CMA_4/total_pages.html</a>                  | Report of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement on its fourth session, held in Sharm el-Sheikh from 6 to 11 November 2022             |                             |  |
| <a href="#">CMA_4/total_pages.html</a>                  | Report of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement on its fourth session, held in Sharm el-Sheikh from 6 to 11 November 2022             |                             |  |
| 7 entries                                               |                                                                                                                                                                                            | 1 2 3 4 5                   |  |



United Nations  
Framework Convention on Climate Change

Conference of the Parties to the Paris Agreement

Report of the meeting of the part of its from 15 to 1

Addendum

Part two: the

### Reports in semantic HTML

### Reports in Pdf

|                                                                                                                                                                                            |   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| Conference of the Parties serving as the meeting of the Parties to the Paris Agreement                                                                                                     |   |
| Report of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement on the first part of its first session, held in Marrakech from 15 to 18 November 2016 |   |
| Addendum                                                                                                                                                                                   |   |
| Part two: Action taken by the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement                                                                       |   |
| Contents                                                                                                                                                                                   |   |
| Decisions adopted by the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement                                                                            |   |
| Decision Page                                                                                                                                                                              |   |
| 1/CMA.1 Matters relating to the implementation of the Paris Agreement                                                                                                                      | 2 |
| 2/CMA.1 Rules of procedure of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement                                                                   | 4 |
| Resolution                                                                                                                                                                                 |   |
| 1/CMA.1 Expression of gratitude to the Government of the Kingdom of Morocco                                                                                                                |   |

|                                                                                                                                                                                            |                                                                                                                  |                           |                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------|
| United Nations                                                                                                                                                                             | Framework Convention on Climate Change                                                                           | FCCLC/PA/CMA/2016/3/Add.1 | Date: General 31 January 2017<br>Original: English |
| Conference of the Parties serving as the meeting of the Parties to the Paris Agreement                                                                                                     |                                                                                                                  |                           |                                                    |
| Report of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement on the first part of its first session, held in Marrakech from 15 to 18 November 2016 |                                                                                                                  |                           |                                                    |
| Addendum                                                                                                                                                                                   |                                                                                                                  |                           |                                                    |
| Part two: Action taken by the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement                                                                       |                                                                                                                  |                           |                                                    |
| Contents                                                                                                                                                                                   |                                                                                                                  |                           |                                                    |
| Decisions adopted by the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement                                                                            |                                                                                                                  |                           |                                                    |
| Decision                                                                                                                                                                                   |                                                                                                                  |                           | Page                                               |
| 1/CMA.1                                                                                                                                                                                    | Matters relating to the implementation of the Paris Agreement                                                    |                           | 2                                                  |
| 2/CMA.1                                                                                                                                                                                    | Rules of procedure of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement |                           | 4                                                  |



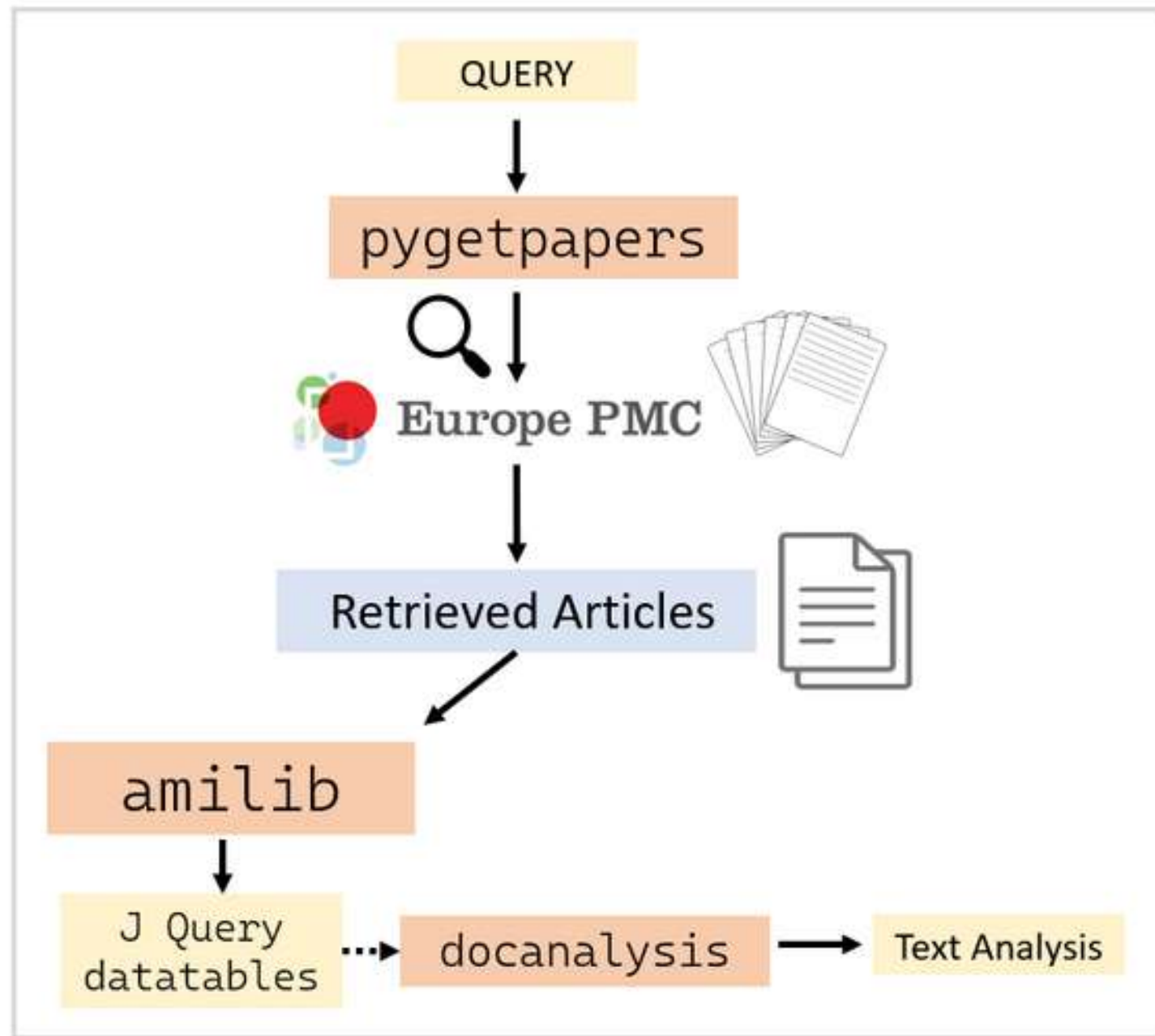
**#semanticClimate**  
Transforming information into actionable knowledge

Biosphere (terrestrial and marine) « WGI,WGII

Global-scale zones, generally defined by the type of plant life that they support in response to average rainfall and temperature patterns. For example, tundra, coral reefs or savannas (IPBES, 2019).

[illegible]

**semantic IPCC Glossary enhanced with pictures and descriptions from Wikimedia**







IPCC  
Report

Keyword Extraction



- 1 ocean acidification
- 2 carbon capture and storage
- 3 carbon sequestration
- 4 carbon dioxide removal
- 5 calcification
- 6 Habitat fragmentation

Wordlist

amilib



search term: ocean acidification [Wikipedia Page](#)

**Ocean acidification** is the ongoing decrease in the [pH](#) of the Earth's [ocean](#). Between 1950 and the primary cause of ocean acidification, with [atmospheric carbon dioxide \(CO<sub>2</sub>\) levels](#) exceeding which [dissociates](#) into a [bicarbonate ion](#) (HCO<sup>-3</sup>) and a [hydrogen ion](#) (H<sup>+</sup>). The presence of free pH higher than 8). [Marine calcifying organisms](#), such as [mollusks](#) and [corals](#), are especially vulnerable.

search term: carbon capture and storage [Wikipedia Page](#)

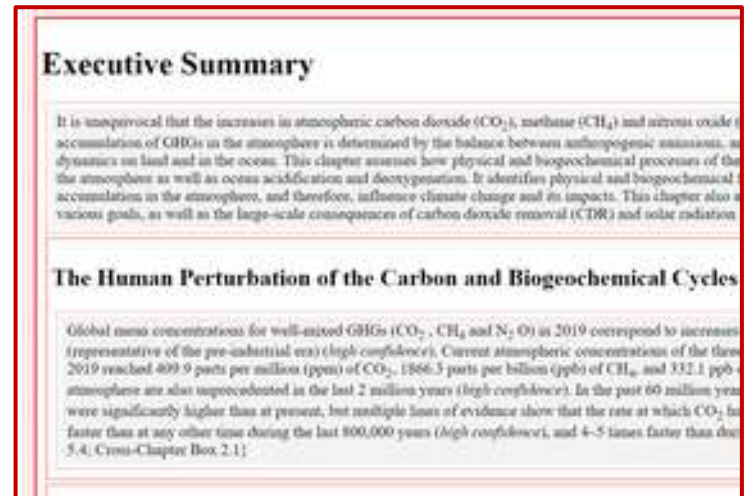
**Carbon capture and storage (CCS)** is a process by which [carbon dioxide](#) (CO<sub>2</sub>) from industrial CO<sub>2</sub> is captured from a large [point source](#), such as a [natural gas processing plant](#) and typically which CO<sub>2</sub> is injected into partially-depleted oil reservoirs in order to extract more oil and then [storage](#) (CCUS).<sup>[3]</sup>

Wikimedia  
enhanced  
Dictionary



| report              | remote_chapter            | remote_PDF                    | cleaned_chapter           | chapter_with_ids              |
|---------------------|---------------------------|-------------------------------|---------------------------|-------------------------------|
| <a href="#">wg1</a> | <a href="#">Chapter02</a> | <a href="#">Chapter02.PDF</a> | <a href="#">de_gatsby</a> | <a href="#">html_with_ids</a> |
| <a href="#">wg1</a> | <a href="#">Chapter03</a> | <a href="#">Chapter03.PDF</a> | <a href="#">de_gatsby</a> | <a href="#">html_with_ids</a> |
| <a href="#">wg1</a> | <a href="#">Chapter04</a> | <a href="#">Chapter04.PDF</a> | <a href="#">de_gatsby</a> | <a href="#">html_with_ids</a> |
| <a href="#">wg1</a> | <a href="#">Chapter05</a> | <a href="#">Chapter05.PDF</a> | <a href="#">de_gatsby</a> | <a href="#">html_with_ids</a> |
| <a href="#">wg1</a> | <a href="#">Chapter06</a> | <a href="#">Chapter06.PDF</a> | <a href="#">de_gatsby</a> | <a href="#">html_with_ids</a> |
| <a href="#">wg1</a> | <a href="#">Chapter07</a> | <a href="#">Chapter07.PDF</a> | <a href="#">de_gatsby</a> | <a href="#">html_with_ids</a> |
| <a href="#">wg1</a> | <a href="#">Chapter08</a> | <a href="#">Chapter08.PDF</a> | <a href="#">de_gatsby</a> | <a href="#">html_with_ids</a> |
| <a href="#">wg1</a> | <a href="#">Chapter09</a> | <a href="#">Chapter09.PDF</a> | <a href="#">de_gatsby</a> | <a href="#">html_with_ids</a> |
| <a href="#">wg1</a> | <a href="#">Chapter10</a> | <a href="#">Chapter10.PDF</a> | <a href="#">de_gatsby</a> | <a href="#">html_with_ids</a> |
| <a href="#">wg1</a> | <a href="#">Chapter11</a> | <a href="#">Chapter11.PDF</a> | <a href="#">de_gatsby</a> | <a href="#">html_with_ids</a> |
| <a href="#">wg1</a> | <a href="#">Chapter12</a> | <a href="#">Chapter12.PDF</a> | <a href="#">de_gatsby</a> | <a href="#">html_with_ids</a> |
| <a href="#">wg2</a> | <a href="#">Chapter01</a> | <a href="#">Chapter01.PDF</a> | <a href="#">de_gatsby</a> | <a href="#">html_with_ids</a> |
| <a href="#">wg2</a> | <a href="#">Chapter02</a> | <a href="#">Chapter02.PDF</a> | <a href="#">de_gatsby</a> | <a href="#">html_with_ids</a> |
| <a href="#">wg2</a> | <a href="#">Chapter03</a> | <a href="#">Chapter03.PDF</a> | <a href="#">de_gatsby</a> | <a href="#">html_with_ids</a> |

HTML with  
ids  
(semantic)



IPCC  
Chapters



PDF



de\_gatsby  
format



**#semanticClimate**  
Transforming information into actionable knowledge

**<http://semanticclimate.co.in>**

**Email: [semanticclimate@gmail.com](mailto:semanticclimate@gmail.com)**

**X: @semanticClimate**

**LinkedIn: @semantic Climate**

**Github: <https://github.com/semanticclimate>**