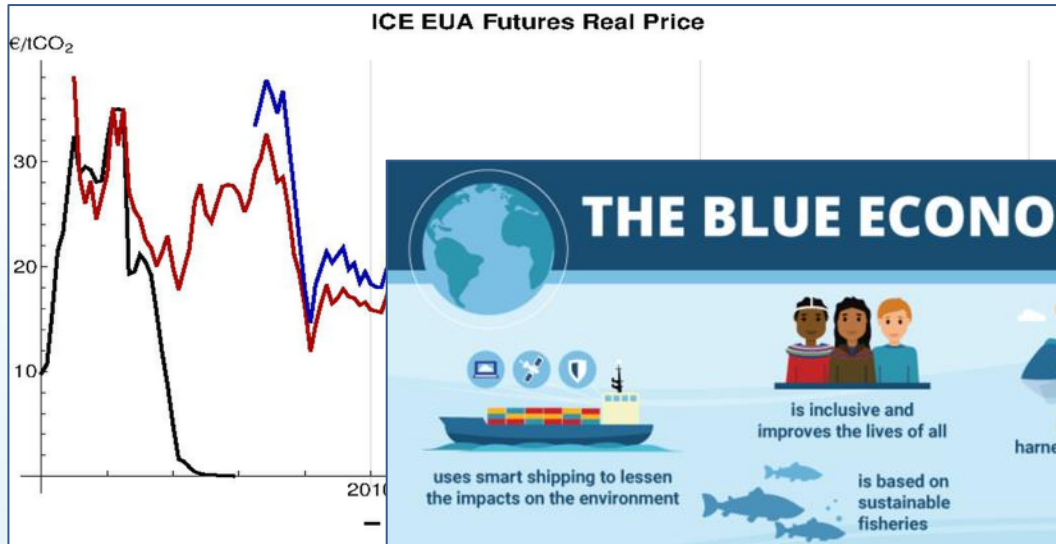


# Benefits and needs of a marine carbon indicator

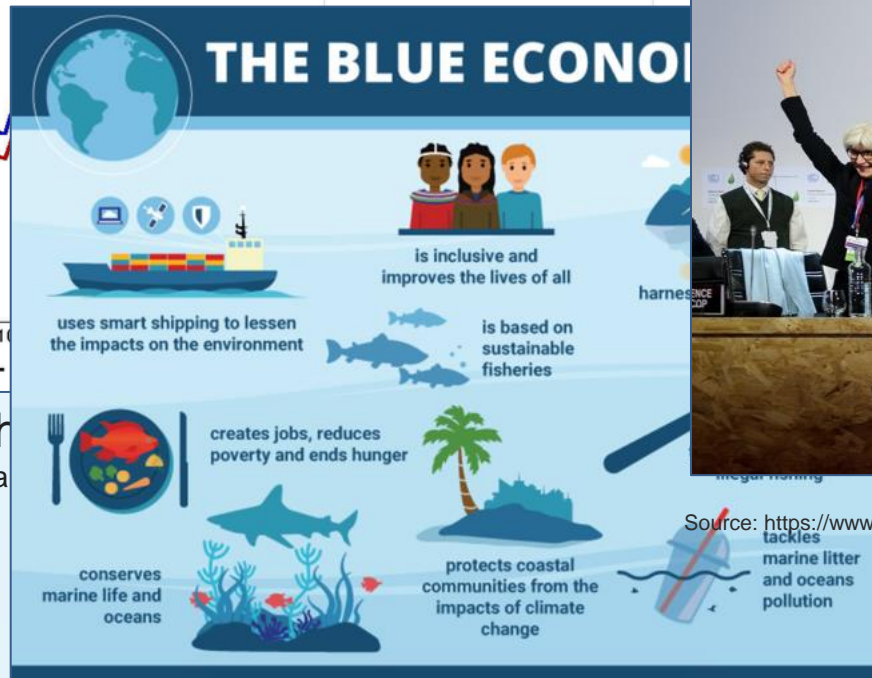
Benjamin Pfeil, Steve Jones and Julien Paul  
RI ICOS and Bjerknes Climate Data Centre,  
University of Bergen, Norway



# Overarching need



Price of CO<sub>2</sub> in the  
Source: <https://en.wikipedia.org>



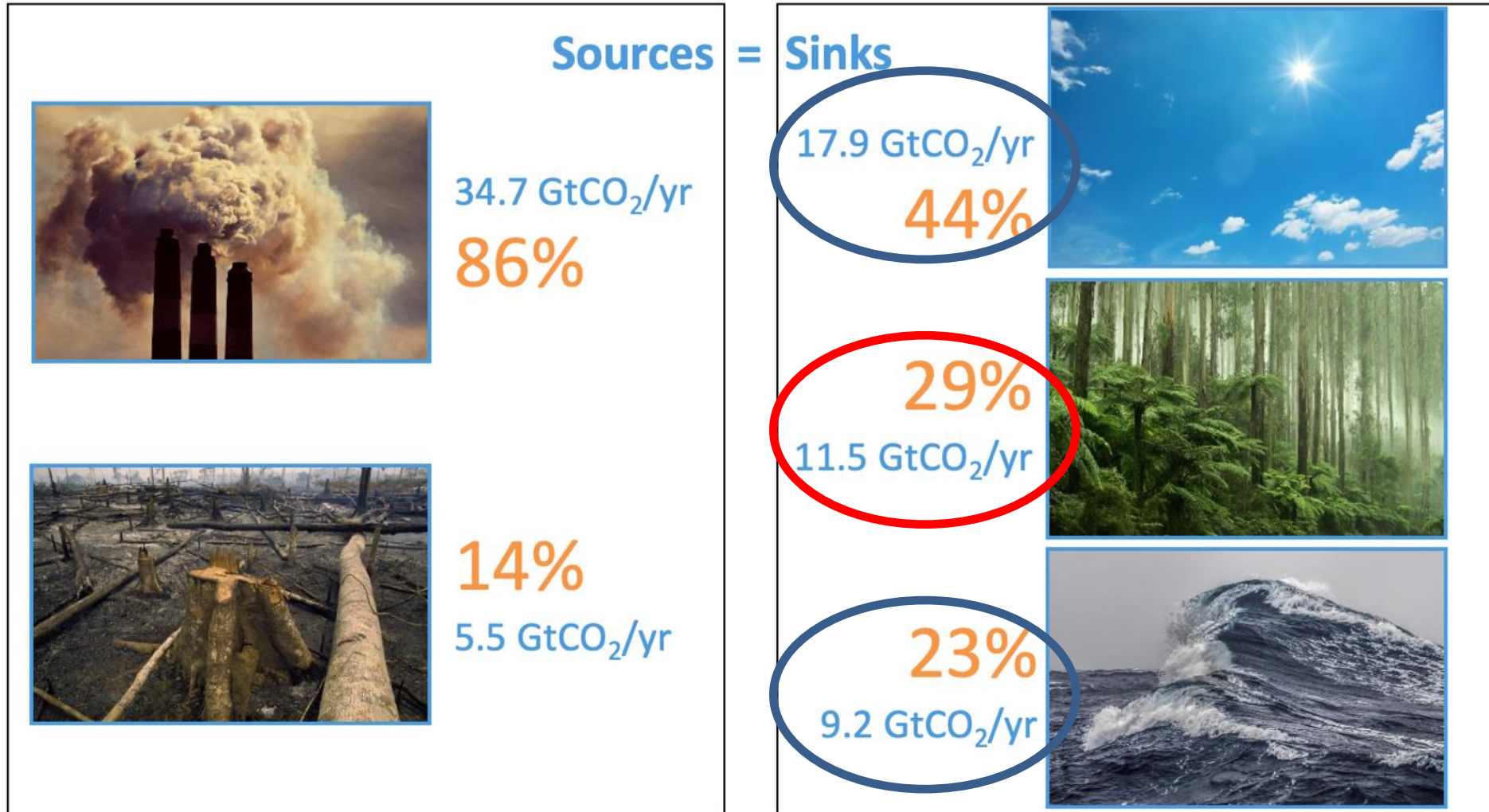
Source: <https://www.sustainableislandsplatform.org/about/blue-economy/>



Source: <https://www.zmescience.com/other/feature-post/what-is-paris-agreement/>




# Fate of anthropogenic CO<sub>2</sub> emissions (2009–2018)



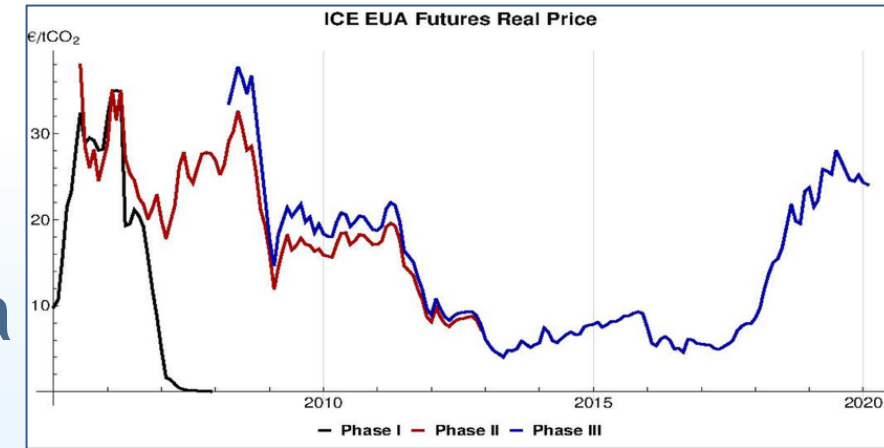
**Budget Imbalance:**  
(the difference between estimated sources & sinks)

**4%**  
1.6 GtCO<sub>2</sub>/yr

 = residual

# Financial implications and Paris agreement

- Using the current price set by the European Union Emissions Trading System (EU ETS) of 30.13 Euros/per tonne CO<sub>2</sub> (December 2020) resulting in a **value of the ocean sink at 277.2 billion Euros per year**
- If we reduce the emissions of CO<sub>2</sub> or improve geoengineering as a result of the Paris agreement— we need to be able to monitor the impacts



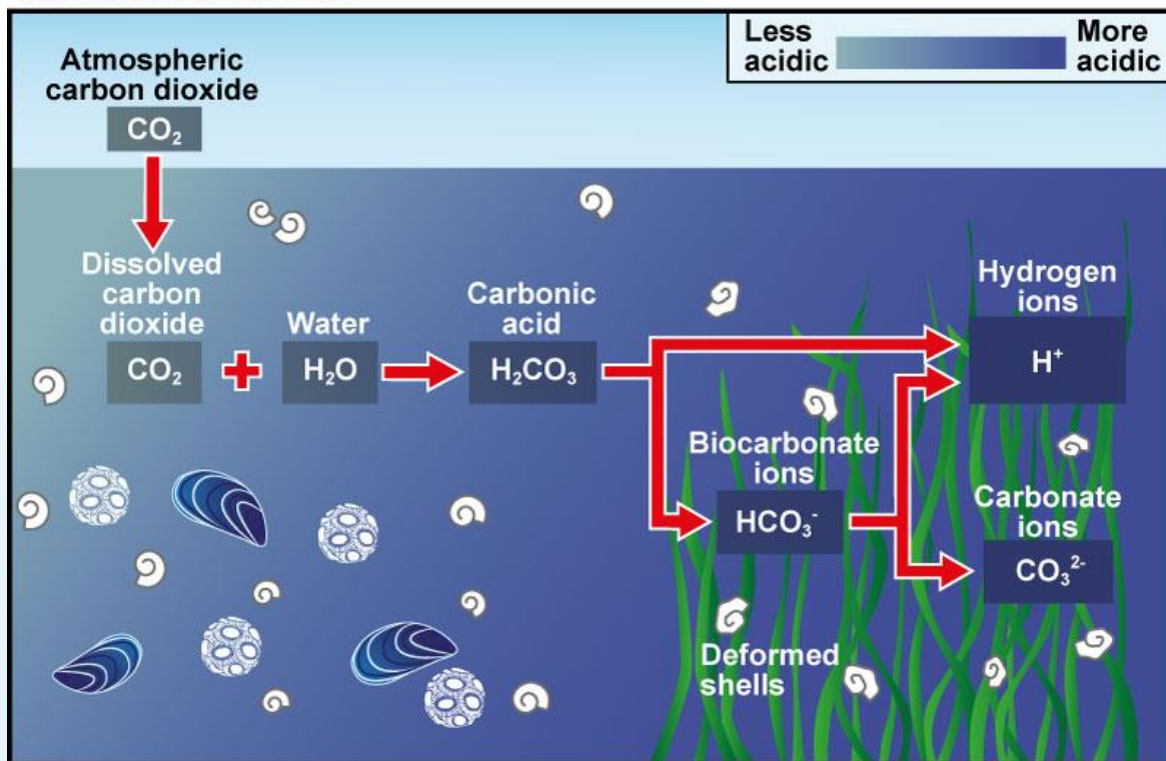
Price of CO<sub>2</sub> in the EU Emissions Trading System

Source: [https://en.wikipedia.org/wiki/European\\_Union\\_Emission\\_Trading\\_Scheme](https://en.wikipedia.org/wiki/European_Union_Emission_Trading_Scheme)



# Understanding the impact of Ocean Acidification for the Blue Economy

## OCEAN ACIDIFICATION



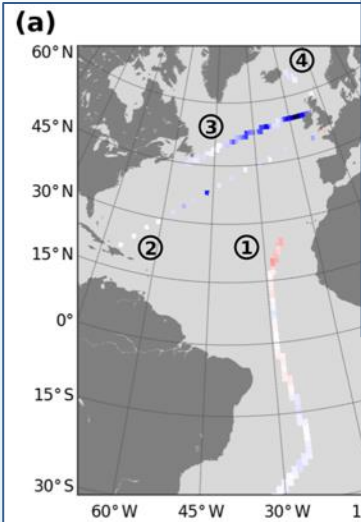
Source: <https://www.oceanacidification.org.uk>

- Changes in acidity have a direct impact on shellfish farming industry (example shell fish farms in North and South America)
- Direct impact on marine food chains -> fisheries
- Need for a European OA early warning system for Blue Economy as under development by NOAA, USA

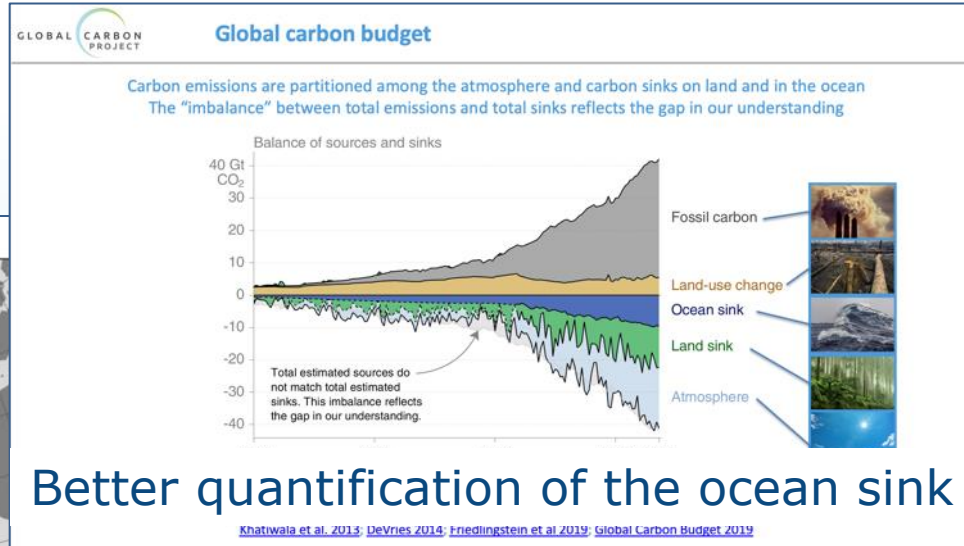
# Societal impact



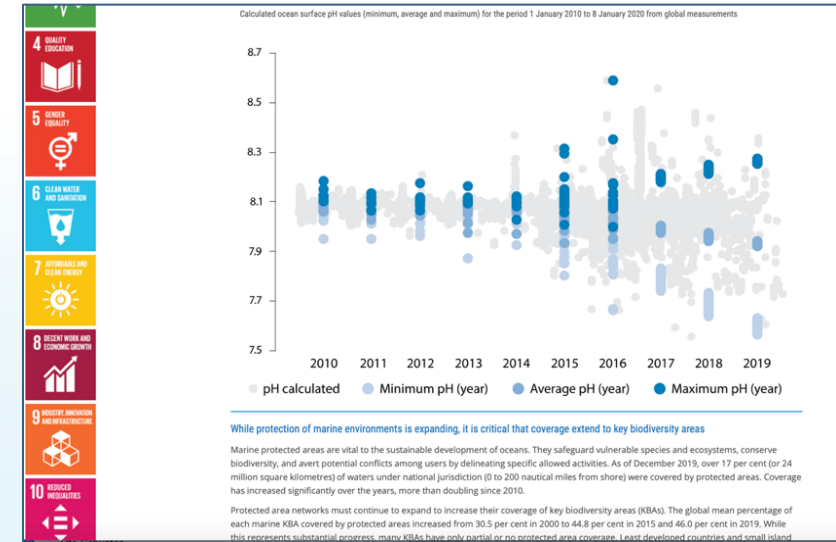
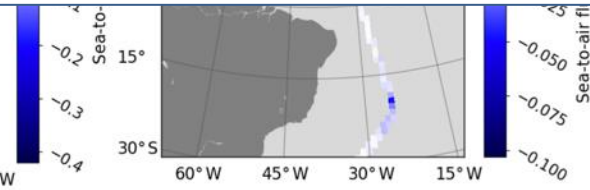
# Future possible services



FluxEngine air-sea gas flux toolbox  
from Holding, Shutler et al, Ocean  
Sciences, 2019



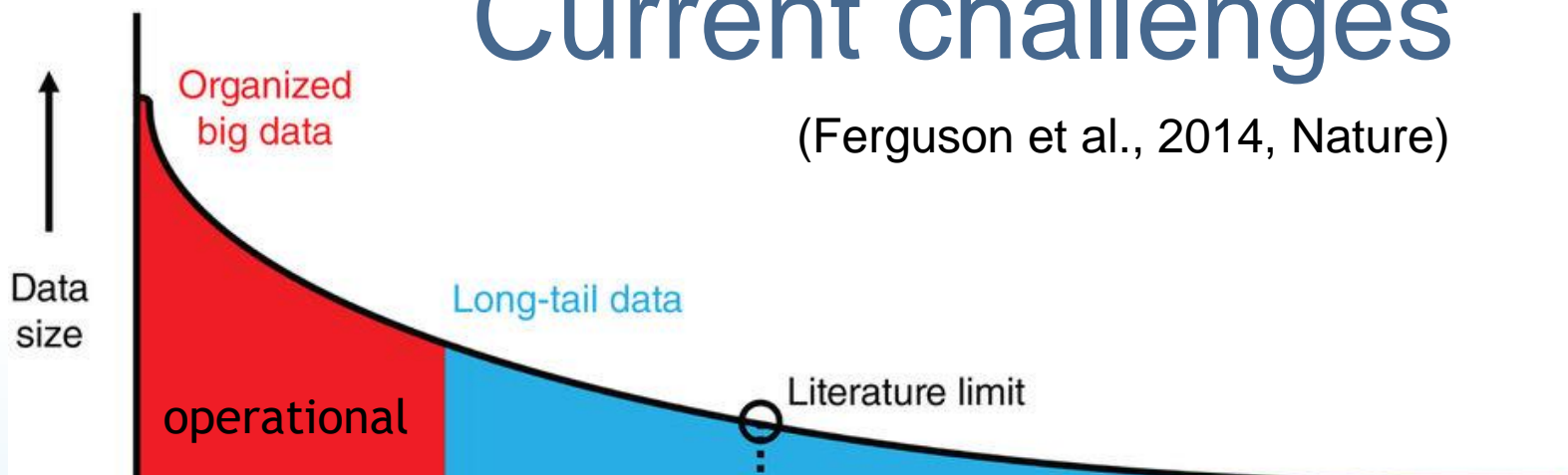
Better quantification of the ocean sink



European OA early warning system app

# Current challenges

(Ferguson et al., 2014, Nature)



International marine carbon data flow is mature and just becoming ready for higher level services

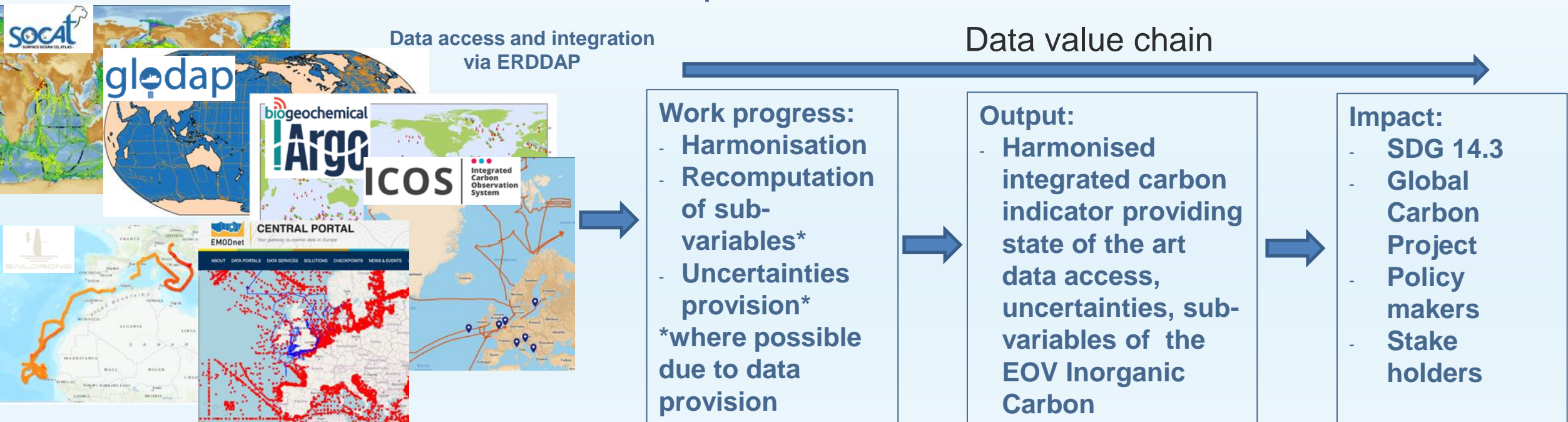
- Data access via numerous entities -> lack of reported uncertainties





# Marine carbon indicator

- Steps: integrating data via interoperable services, recomputation of missing EOVI Inorganic Carbon sub-variables\*, provision of uncertainties\*
- Harmonised data access is the baseline for future applications and services
- Make data Fit for Purpose



\* Where possible due to data availability

Thank you!

Feel free to send mails to  
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further questions or  
discussions