

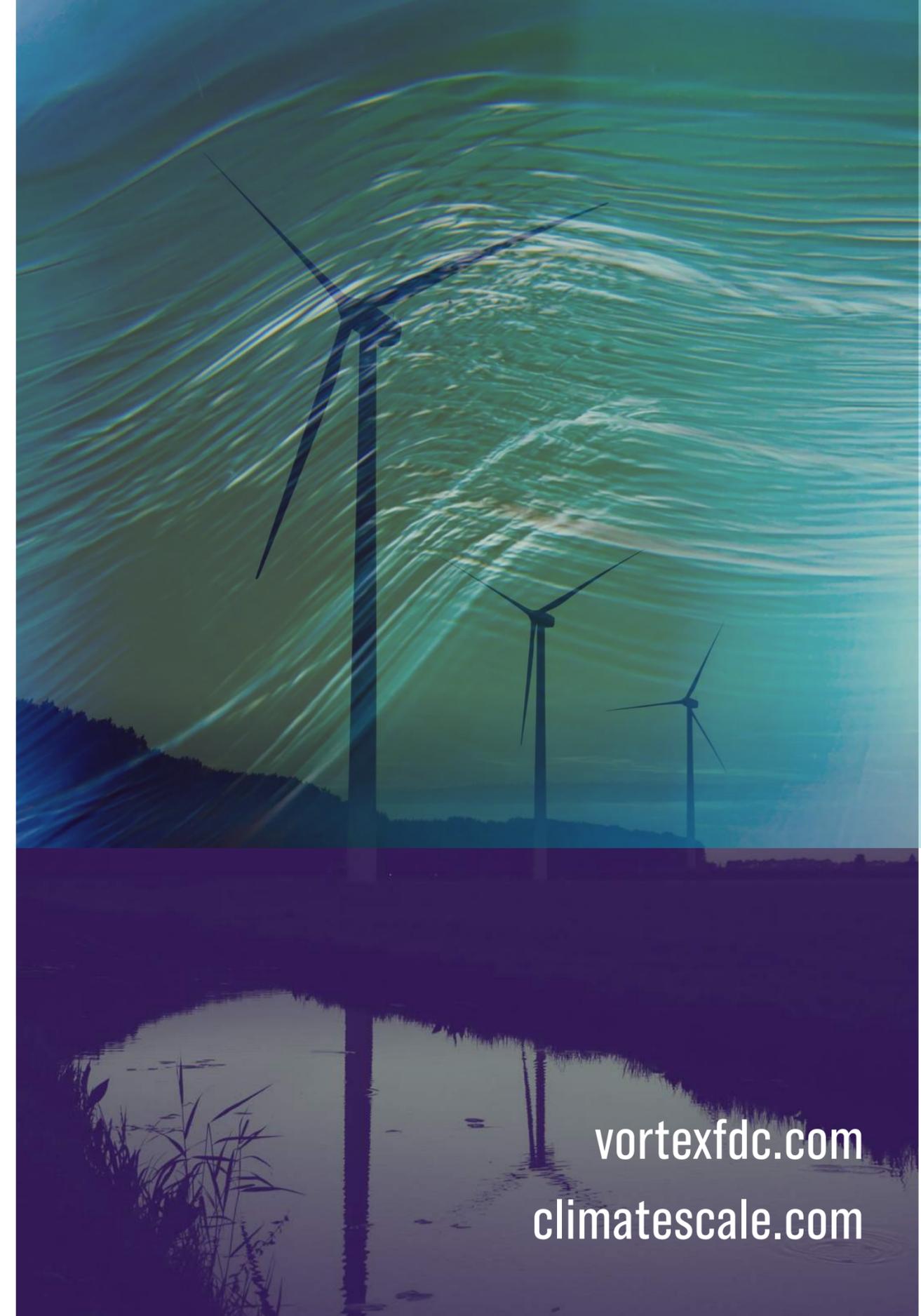
Emerging commercial applications based on public data

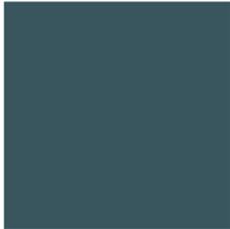
Gil Lizcano - Vortex & Climate Scale

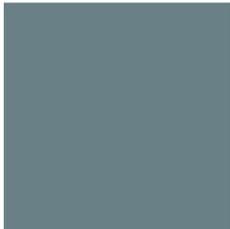
US CLIVAR Reanalysis Workshop webinar series



vortexfdc.com
climatescale.com



 **Downstreaming of Reanalysis for wind industry applications**

 **Evolution of the use of the Reanalysis**

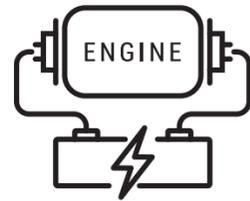
 **Questionnaire**

 **Final comment**

Wind Resource Modeling Service



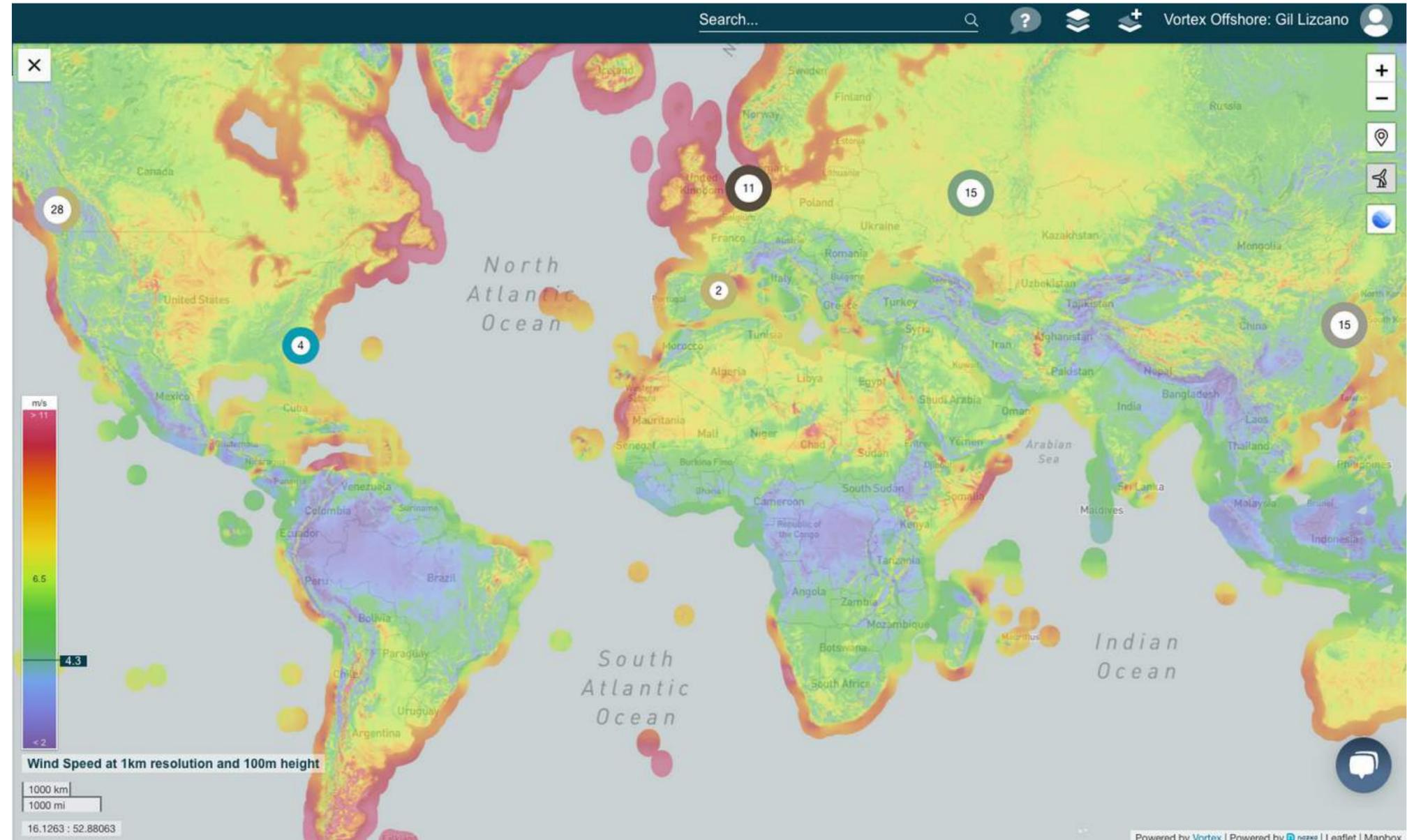
Global Data - Reanalysis



Downscaling Engine
(WRF, WRF-LES, MPAS)



Interfaz Web - API - Cluster

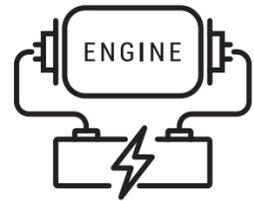


source: interface.vortexfdc.com

Wind Resource Modeling Service



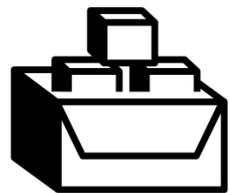
Global Data - Reanalysis



Downscaling Engine
(WRF, WRF-LES, MPAS)



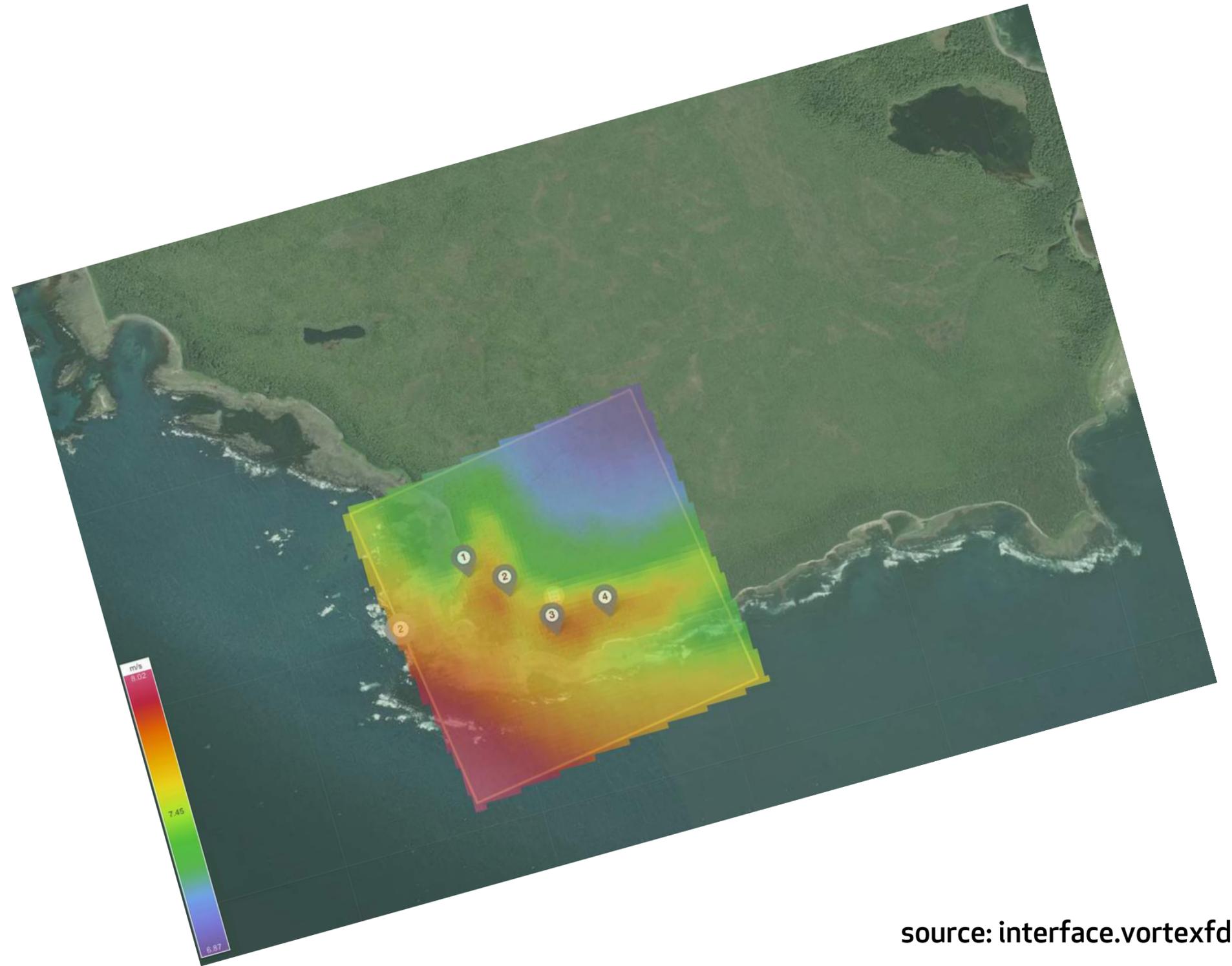
Interfaz Web - API - Cluster



Packaging



Support

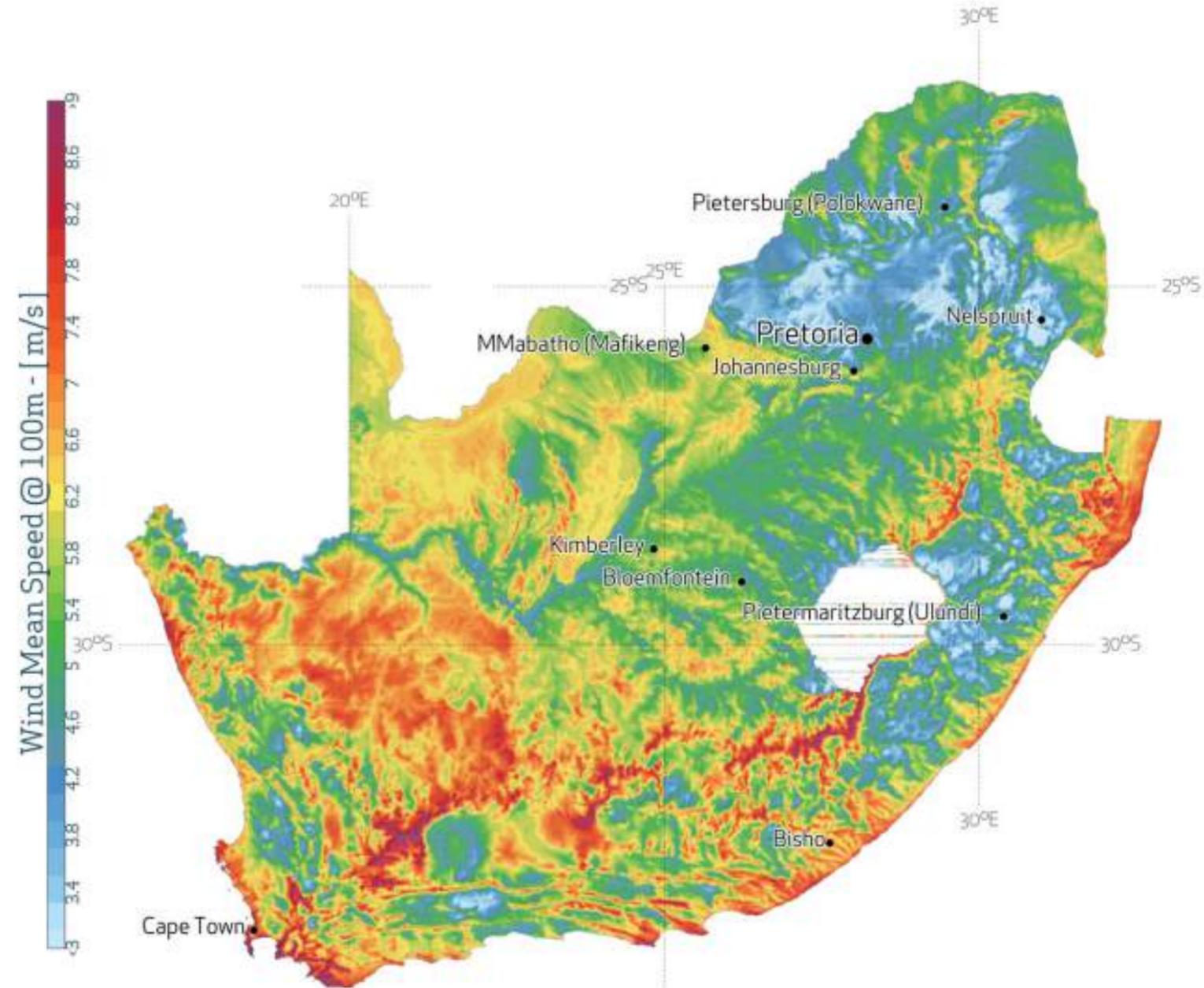


source: interface.vortexfdc.com

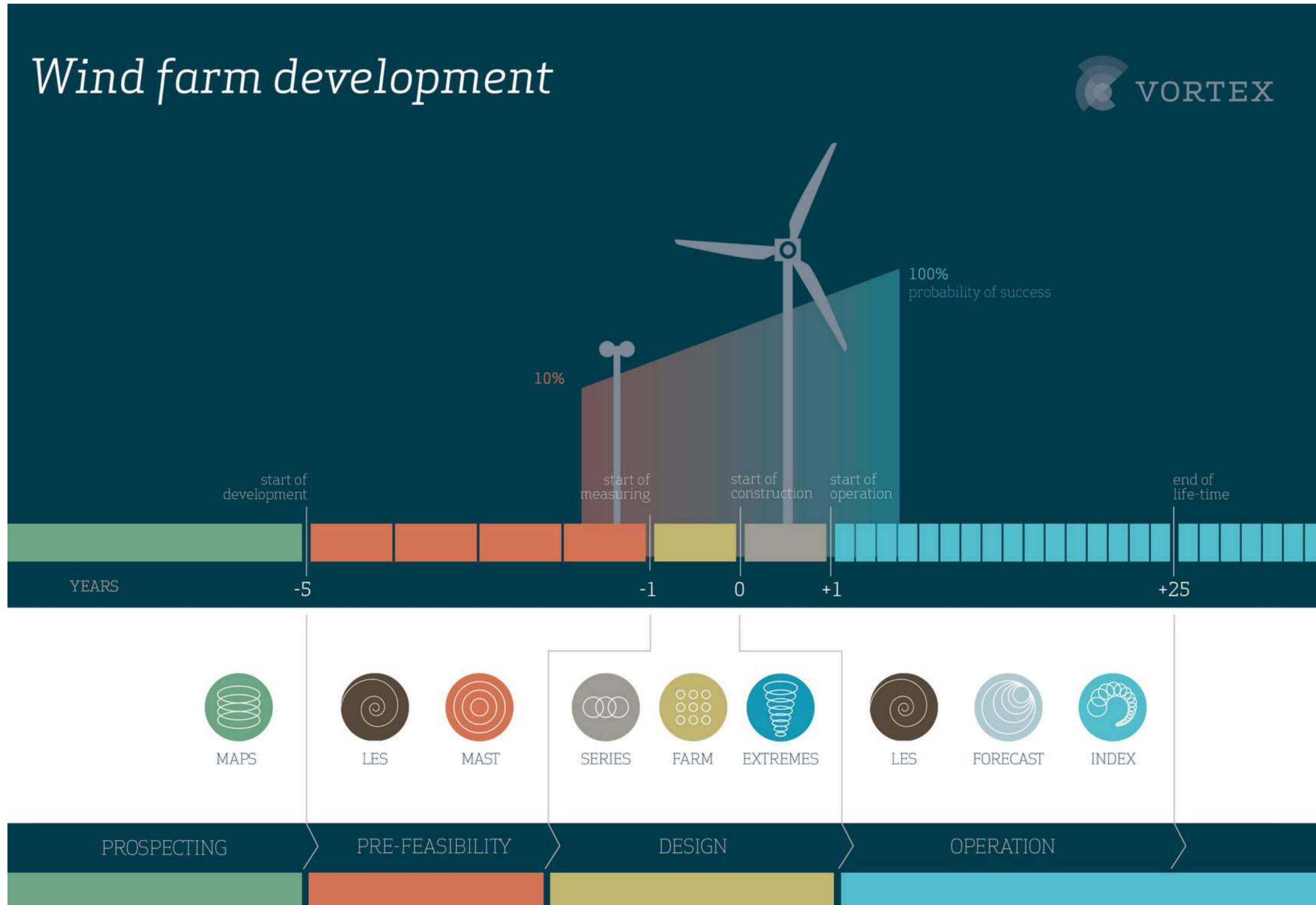
Added Value

UPTAKE TRUST ACCESS

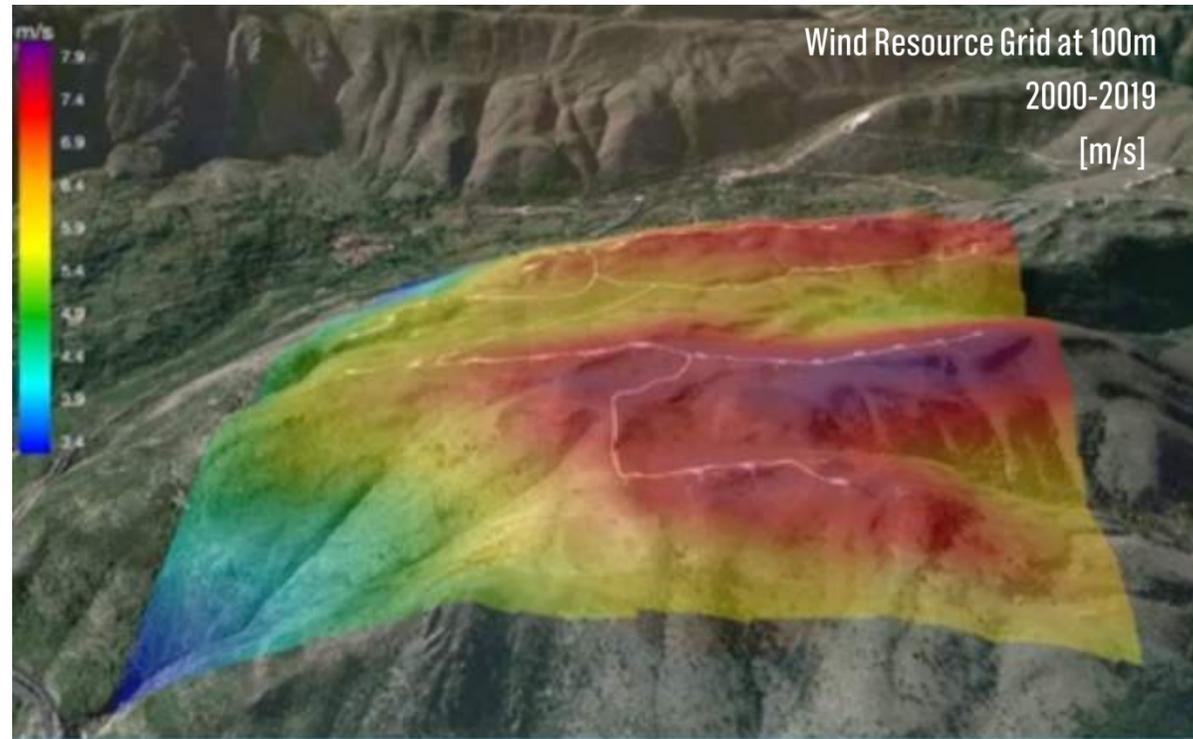
- #resolution (spatial, time)
- #sector specific variables
- #formats
- #easy to get #localisation
- #verified
- #language
- #fora
- #integration
- #updated
- #support
- #customisation
- #fast & robust



Packaging



Real Applications



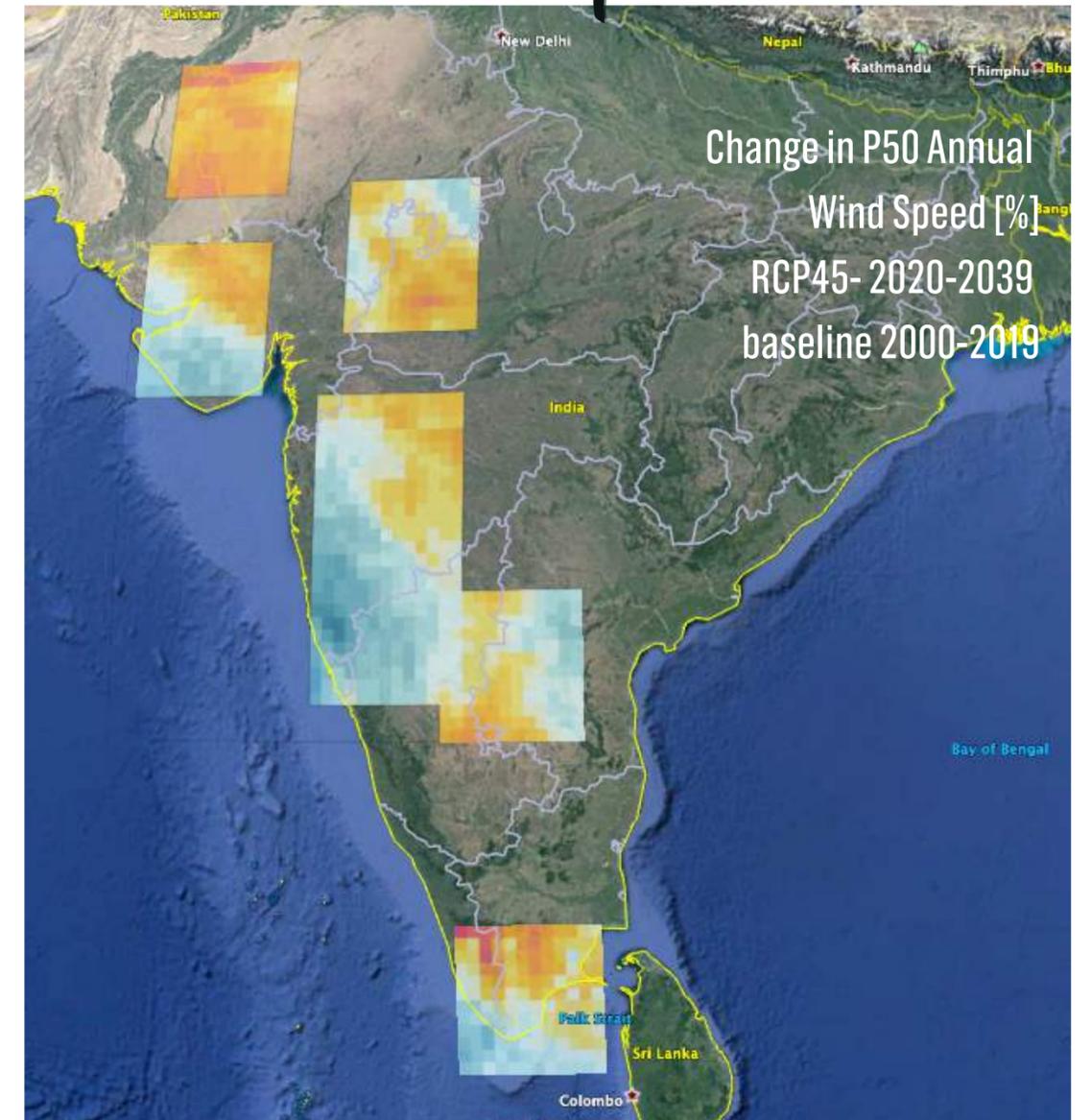
ERA5
MERRA2

CMIP5/6

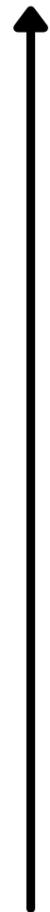
Downscaling

Feasibility of Wind Farm Projects

Climate Change Physical hazards



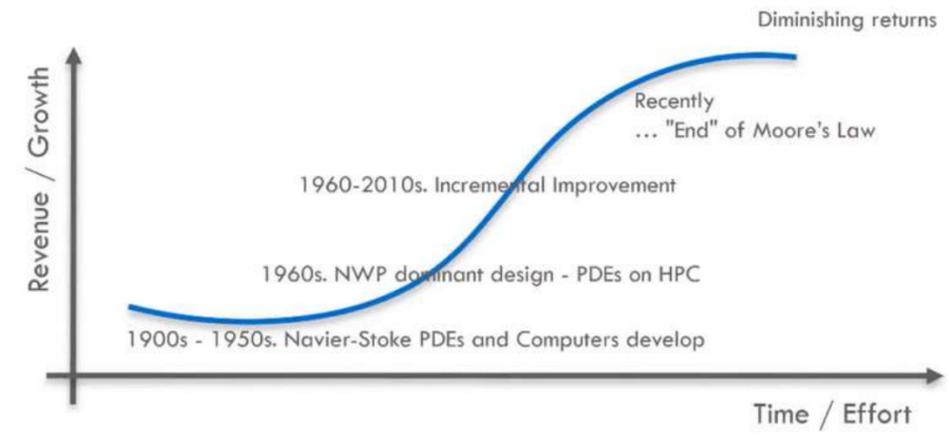
adoption

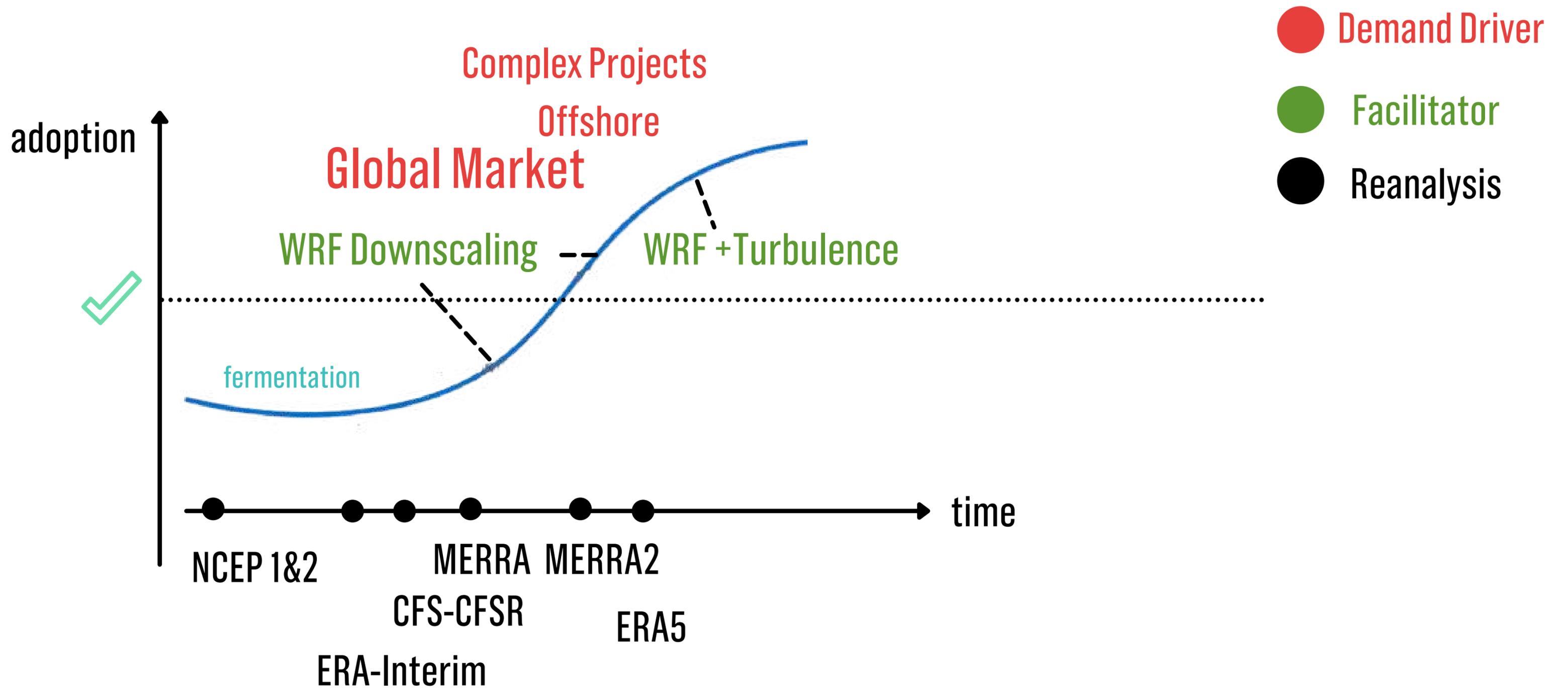


time

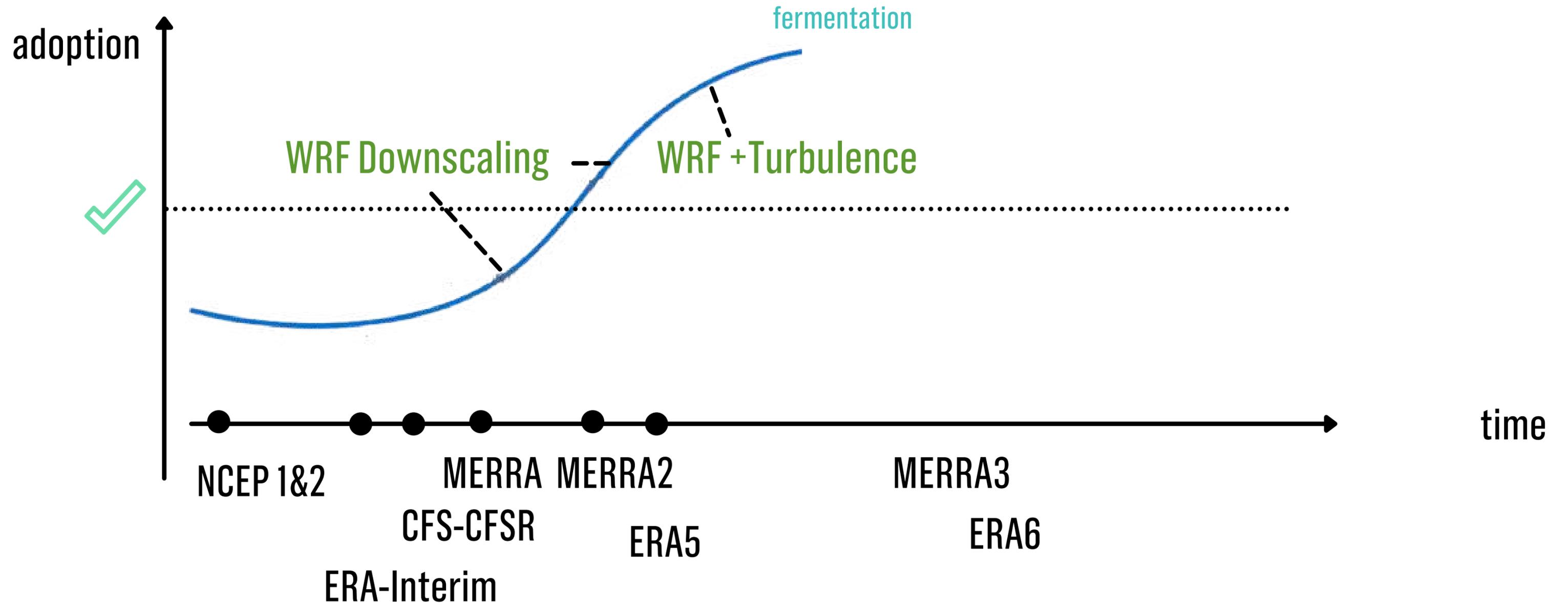
NCEP 1&2
ERA-Interim
CFS-CFSR
MERRA
MERRA2
ERA5

(*) Inspired by A. Arribas Diagram
AI in Weather & Climate: doing better , doing different

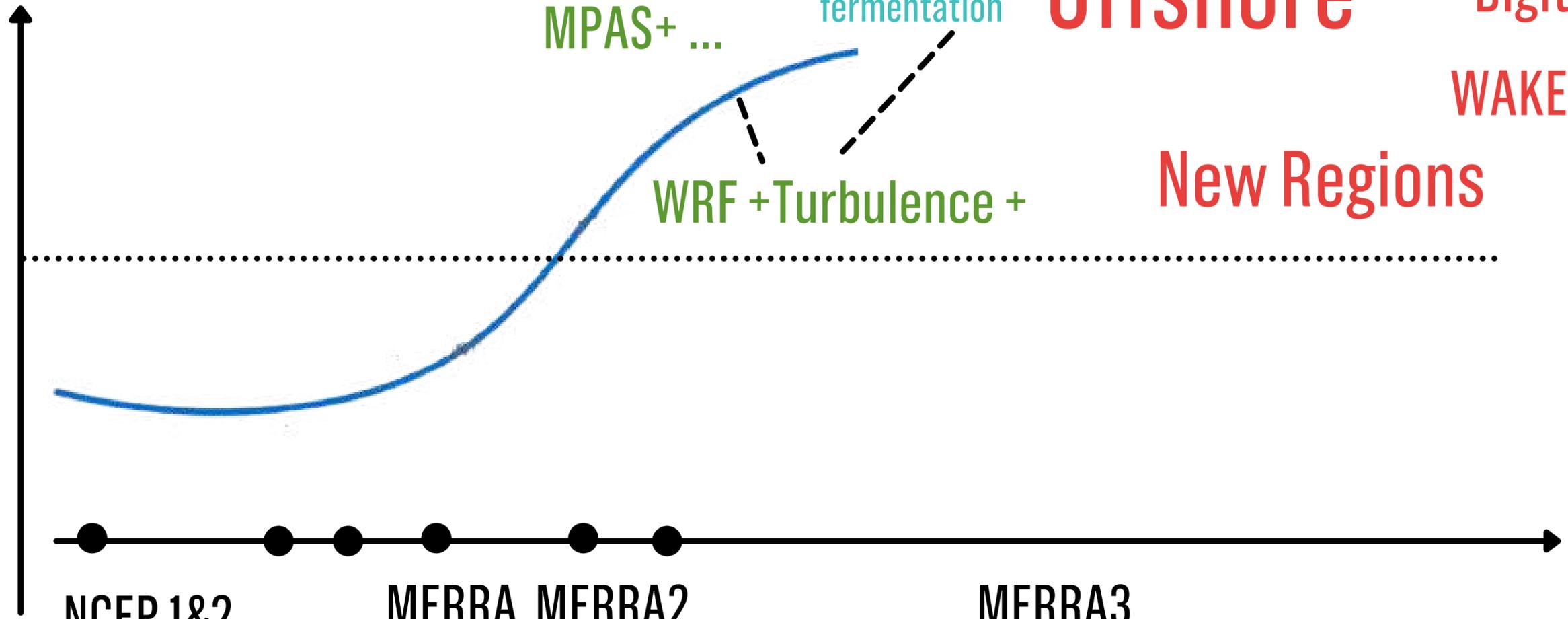




Evolution of the use of the Renalysis



adoption



NCEP 1&2

ERA-Interim

CFS-CFSR

MERRA

MERRA2

ERA5

NOAA-XX

MERRA3

ERA6

Complex Machines

Met-Ocean

Extreme Conditions

Time Domain

Offshore

Digitalisation

MPAS+ ...

fermentation

WRF + Turbulence +

New Regions

WAKES

Regional Reanalysis

time

Questionnaire

1. What do you see are the most significant advances for the field of reanalysis in 5-10 years?
2. What do you see are the most significant barriers to progress in the field of reanalysis?
3. Which collaborations are currently working and which collaborations need to be fostered?
4. What are the critical requirements for consistent Earth system reanalysis?
5. What observational datasets are required to support these requirements?
6. What modeling components are mature enough to enable reanalysis for your specific science question or application?
7. How is uncertainty quantified for your application? Are there significant barriers for quantifying uncertainty in your field?

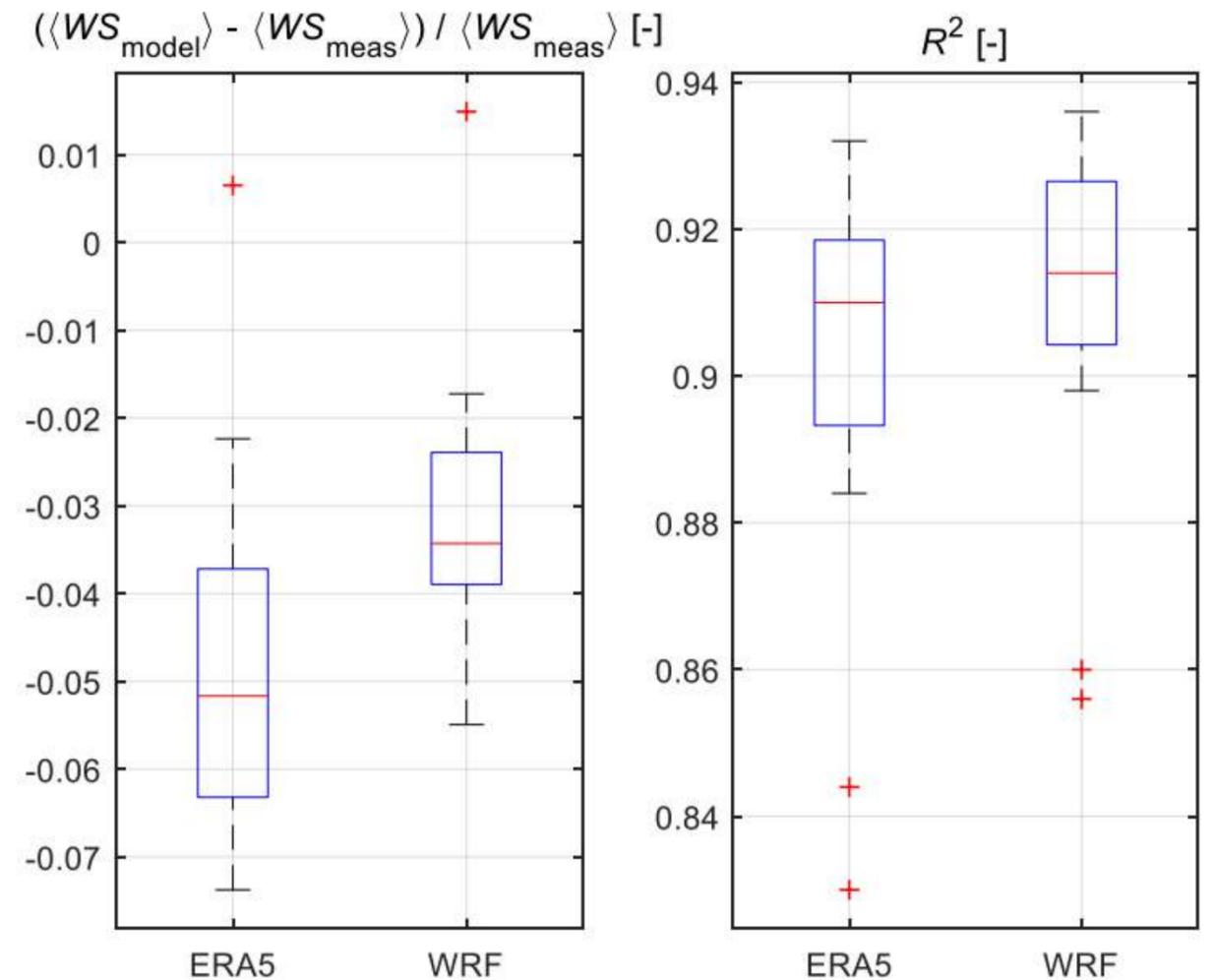
***I took the liberty to ask these questions to the Wind Resource Assessment Group (<https://groups.io/g/wrag>) with more than 400 members**

Most significant advances for the field of reanalysis in **LAST** 5-10 years?

- a. Adoption of Reanalysis and derived products as key resource (summary of all the answers)
- b. Reduction of bias and increase of correlation with industry site measurements
- c. Increase of spatial/time resolution
- d. Access to the data
- e. short latency !



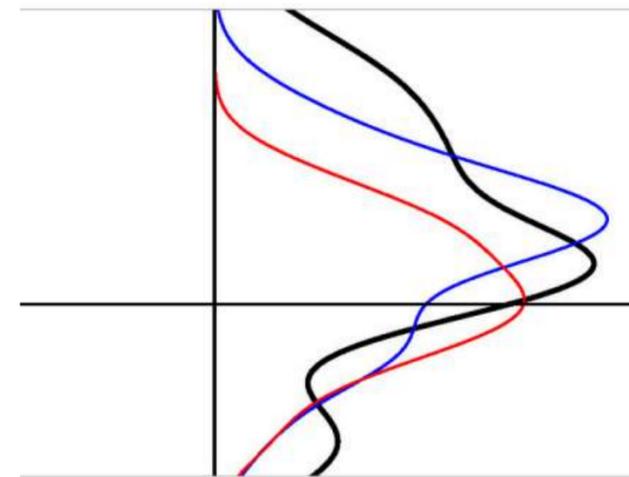
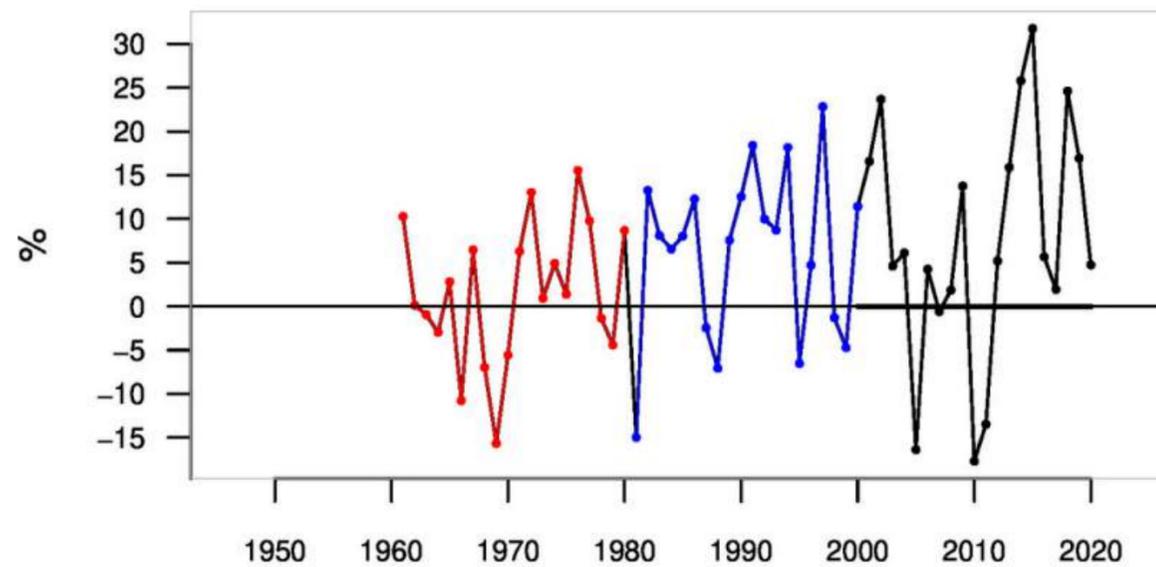
http://c2wind.com/f/content/win europe_wra_workshop_20190627_c2w_rev4.pdf



Questionnaire - towards 5h generation

Most significant barriers/improvements to progress in the field of reanalysis?

- a. time consistency (and time consistency myths)
- b. improve quality for specific regions/context/events
- c. melting pot: events (extremes), inter-annual variability, metoceans, ...
- d. transition between Reanalysis versions
- e. uncertainty assessment (a little elephant in the room?)
- f. multiple Reanalysis projects
- g. Missing a data quality dimension ←



Which collaborations are currently working and which collaborations need to be fostered?

- a. ... dialogues
- b. it is actually more about "the forest and the trees"
- c. translators play a key rol (honestly, yes)



"Well, I basically had no idea that this 50m wind field of mine was of interest to anyone - It was a pretty random decision to include it"

Reanalysis Dev team member



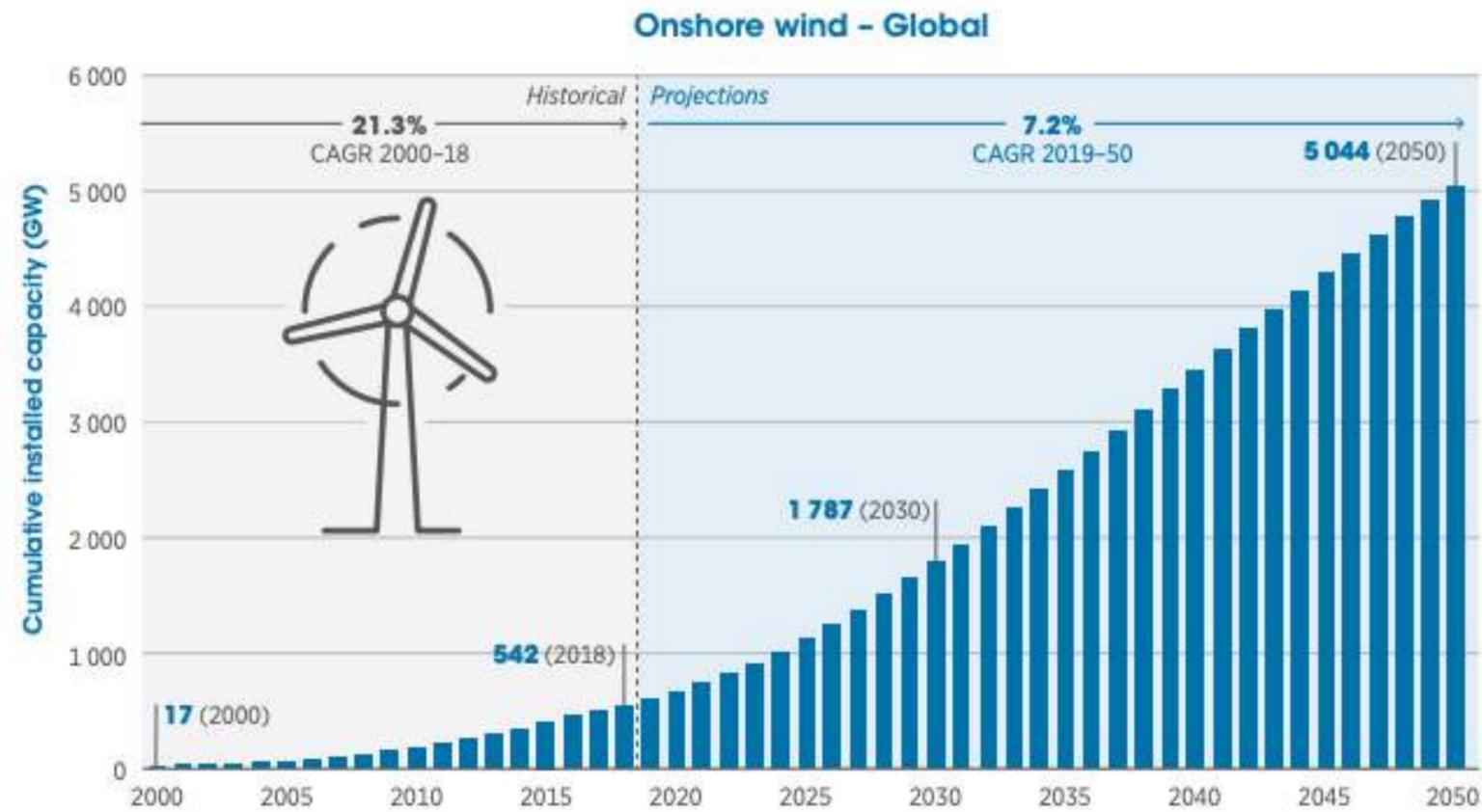
"look, reanalysis data are so vital to the wind industry, if you shut down MERRA2 their world crumbles".

Me at last Reanalysis Conference

How is uncertainty quantified for your application?

- a. What's uncertainty?
- b. Engineering/round robin approaches
- c. Yes, I know that ERA5 has an ensemble version but
- d. Binary approach (accept it with "no uncertainty" or reject it)





source: IRENA, Future of wind (2019).



Impact on levelised cost of electricity for newly commissioned renewable power...

Impact on levelised cost of electricity for newly commissioned renewable power capacity in Europe by...

iea IEA



What does a 1% error in wind speed mean?

- Energy price € 65 / MWh (IEA, 2020)
- Wind farm: 100 MW with 35% capacity factor
- 1% error AEP -> € 20,0000 / year
- Installation 50 GW / year -> € XX,000,000 / year

Dear



Yes, there are many reasons to continue supporting Reanalysis development.

Signed,

VORTEX 

In Barcelona 11/1/2022

(* on behalf of +10000 users and stakeholders of the wind industry)

Emerging commercial applications based on public data

Get in touch:

gil.lizcano@vortexfdc.com
and also [@climatescale.com](https://twitter.com/climatescale)

US CLIVAR Reanalysis Workshop webinar series



vortexfdc.com

