# Requirements on data sets for climate research and climate services - survey results

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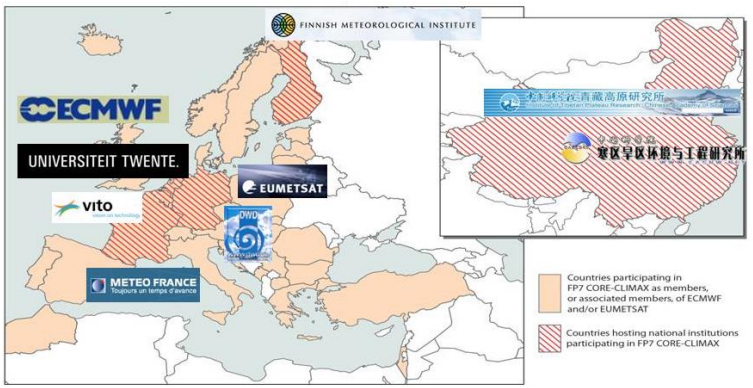
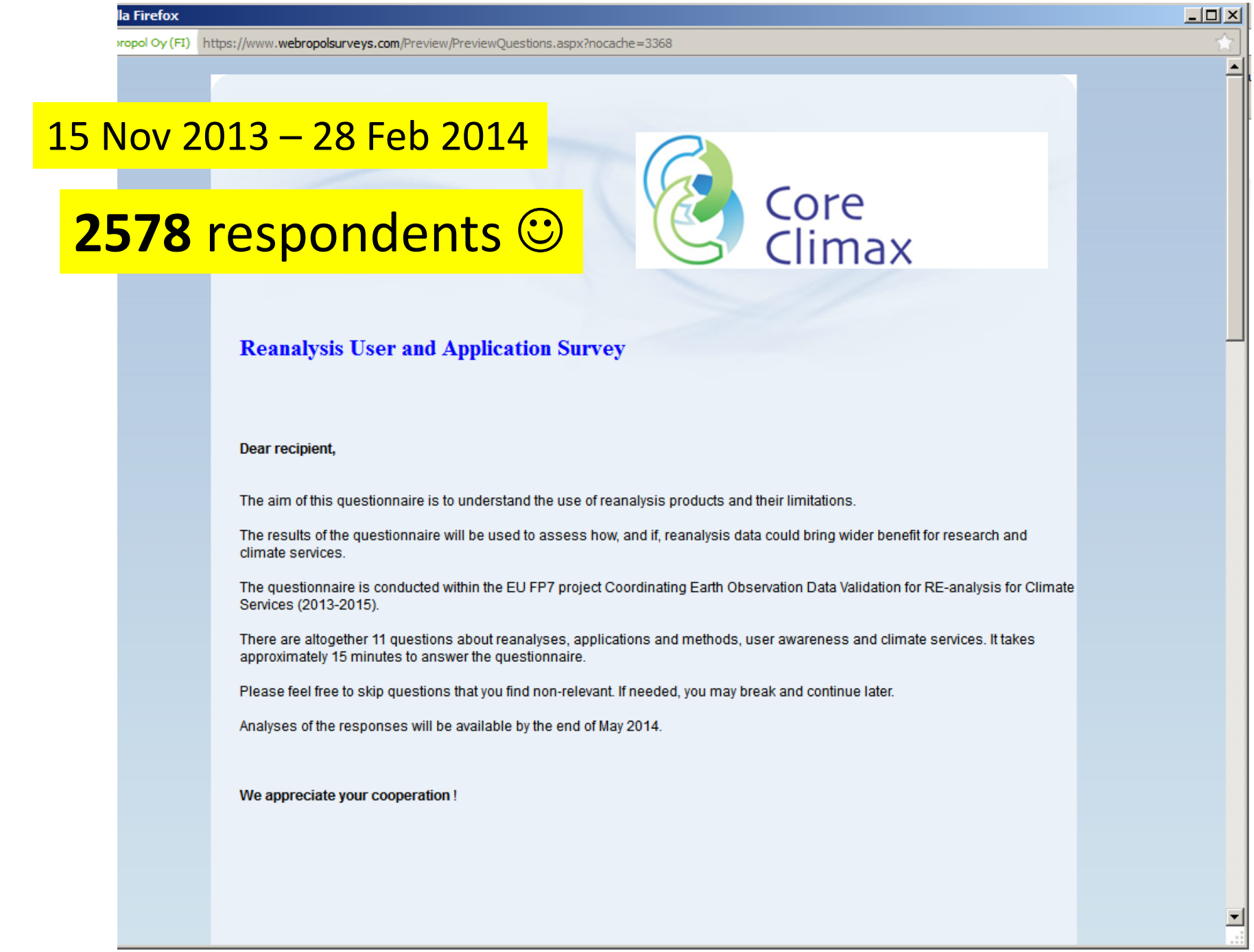


15 Nov 2013 – 28 Feb 2014

**2578** respondents ☺

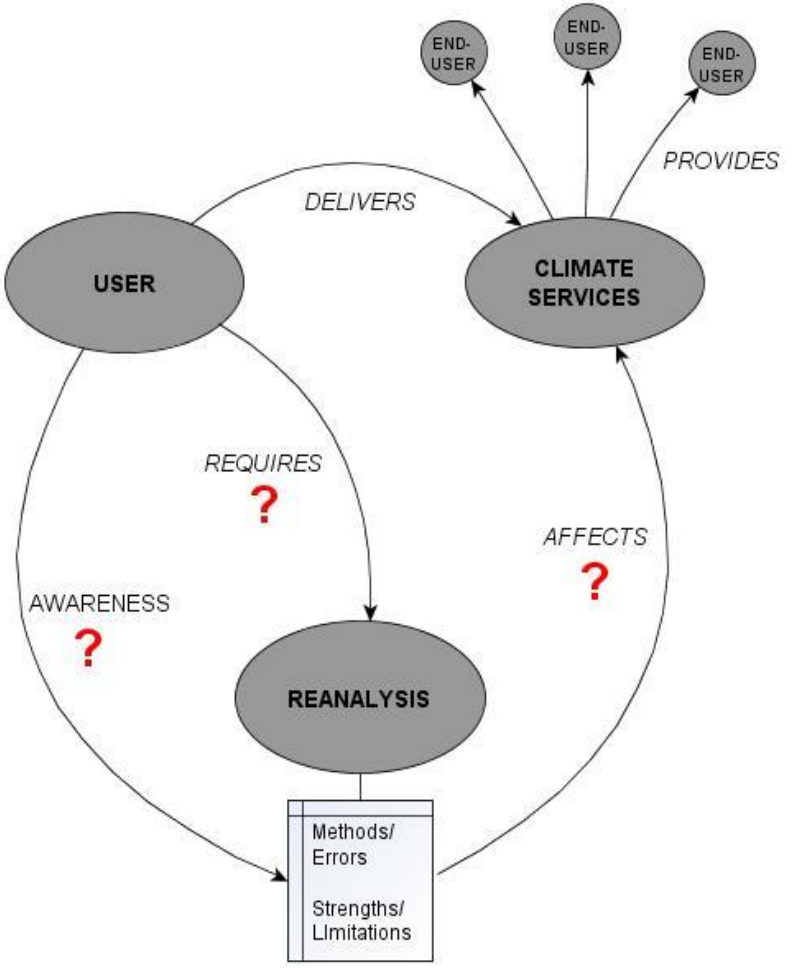


# Reanalysis User and Application Survey
# OBJECTIVES

- ✓ To understand the use of reanalysis products and their limitations
- ✓ To survey the awareness of the scientific community on uncertainties in the reanalyses, and the effects of these to deliver climate services
- ✓ To collect information on requirements from the scientific community regarding the improvement of reanalyses for better climate services
- ✓ Results of the survey will be used to assess how reanalysis data could bring wider benefit for research and climate services

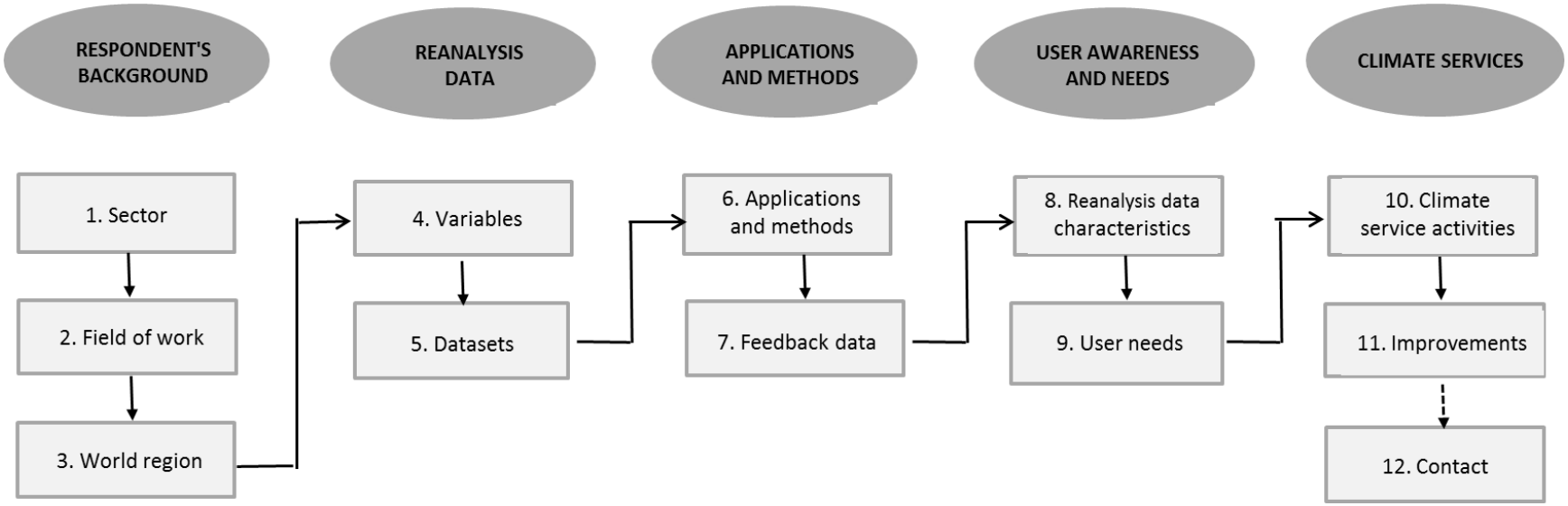
# Purpose of the Reanalysis User and Application Survey – the key questions to be addressed

- ✓ How aware are the reanalysis data users of uncertainties and limitations in reanalyses? What is their knowledge on strengths and weaknesses? → *User awareness*
- ✓ What kind of improvement in reanalysis do the users need to better deliver climate services? → *User needs and requirements*
- ✓ How are climate services/climate research affected by uncertainties/gaps in reanalyses? → *Implications for climate services*



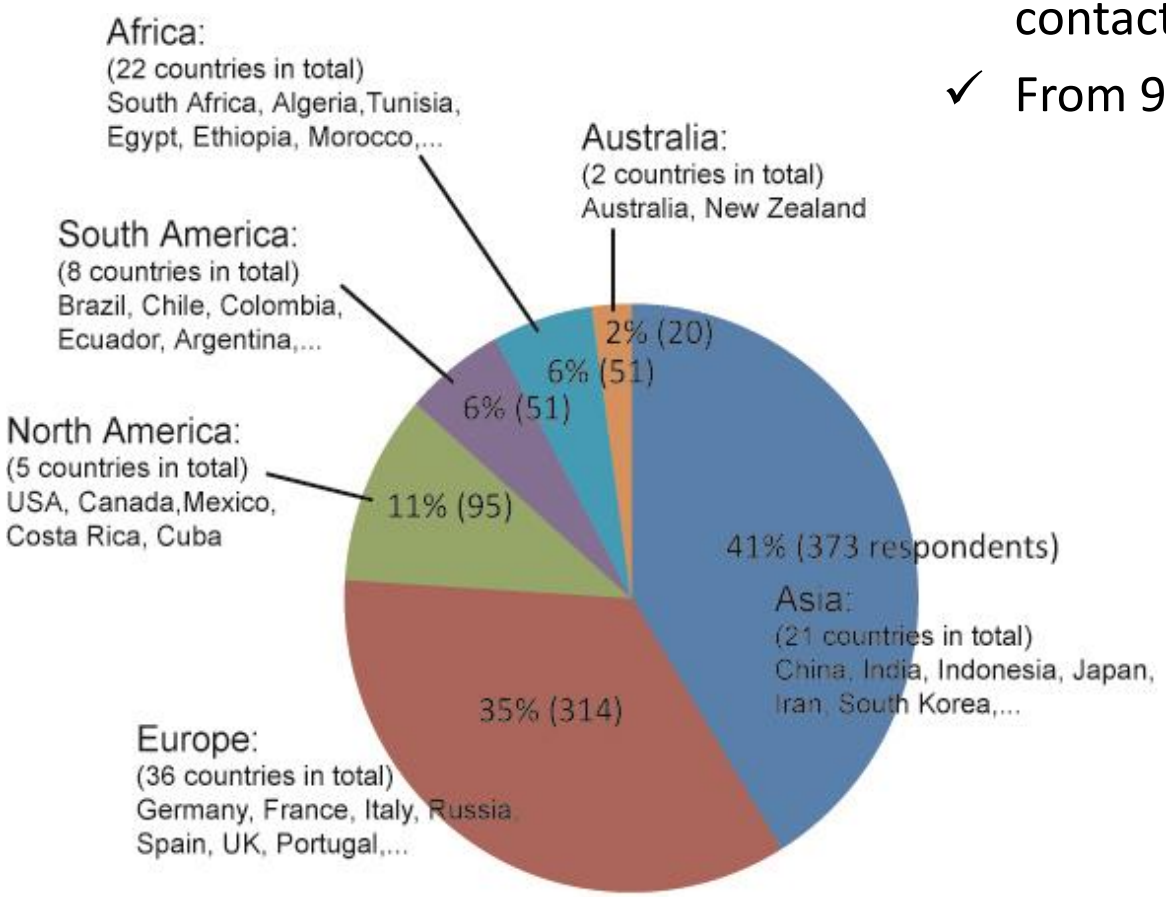
- ✓ The main target groups of the questionnaire
  - existing users of reanalysis datasets
  - users with a possible contribution to future climate services (e.g. governmental institutes, research institutes)
- ✓ Distribution of the online questionnaire
  - CORE-CLIMAX webpage, web portal http://reanalysis.org, DWD web site, FMI internal site
  - Distributed to regional meteorological offices around the world with the help of the WMO
  - Distributed to universities, research institutes and COPERNICUS-Userforum members in Finland.
  - Two very large emailing operations were conducted by ECMWF

- ✓ Questionnaire consisted of 11 questions in the following categories:



# Results – Summary of all respondents

# Background of the respondents (ALL)



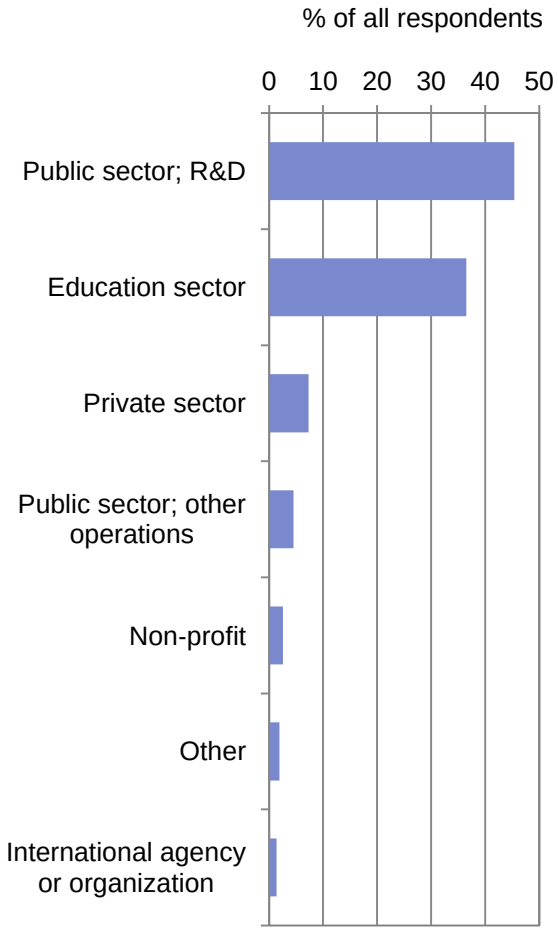

- ✓ 904 respondents (35%) left their contact info
- ✓ From 94 different countries

**TOP10 countries**

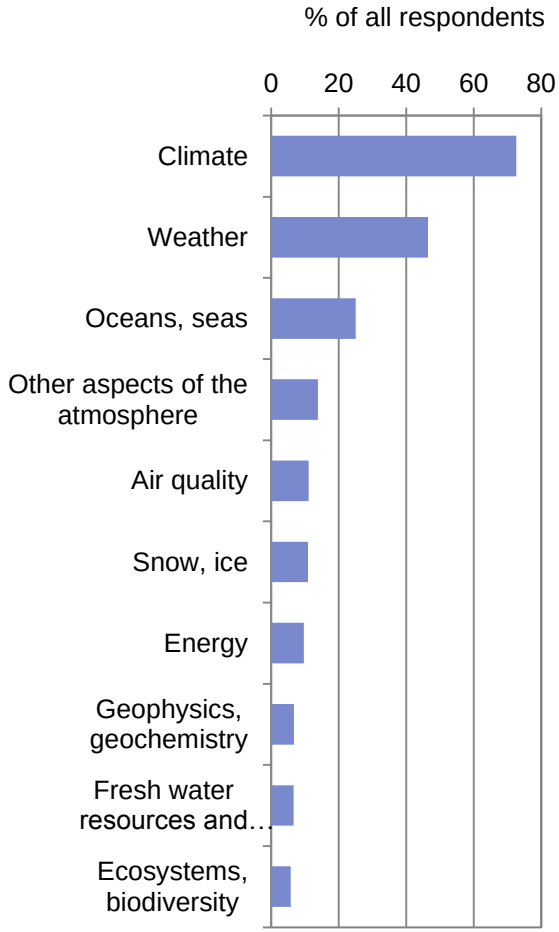
| | |
|---|---|
| P.R. China | 152 |
| India | 81 |
| USA | 71 |
| Germany | 34 |
| France, Italy | 32 |
| Indonesia | 30 |
| Japan | 29 |
| Spain | 27 |
| Brazil | 26 |
| UK | 21 |

# Background of the respondents (ALL)

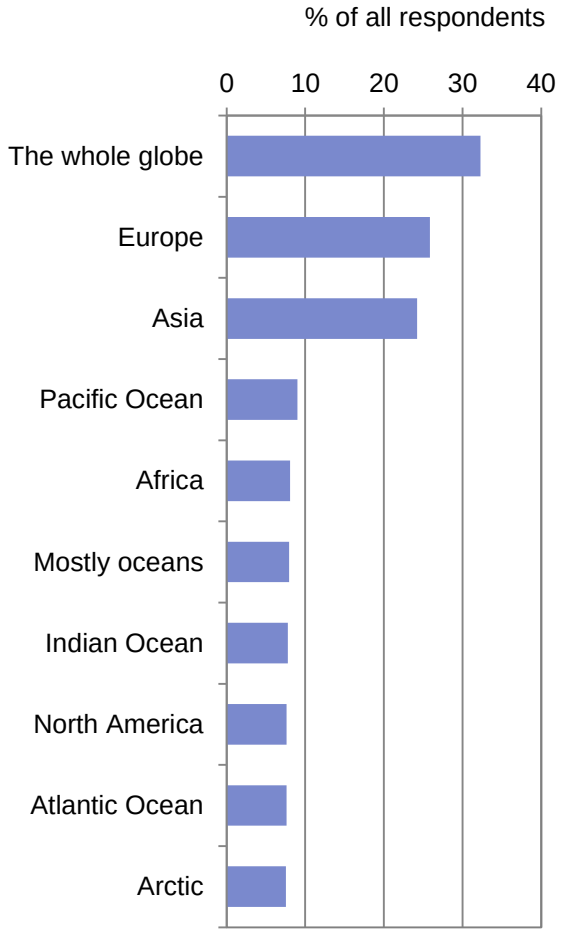
## Sector of work



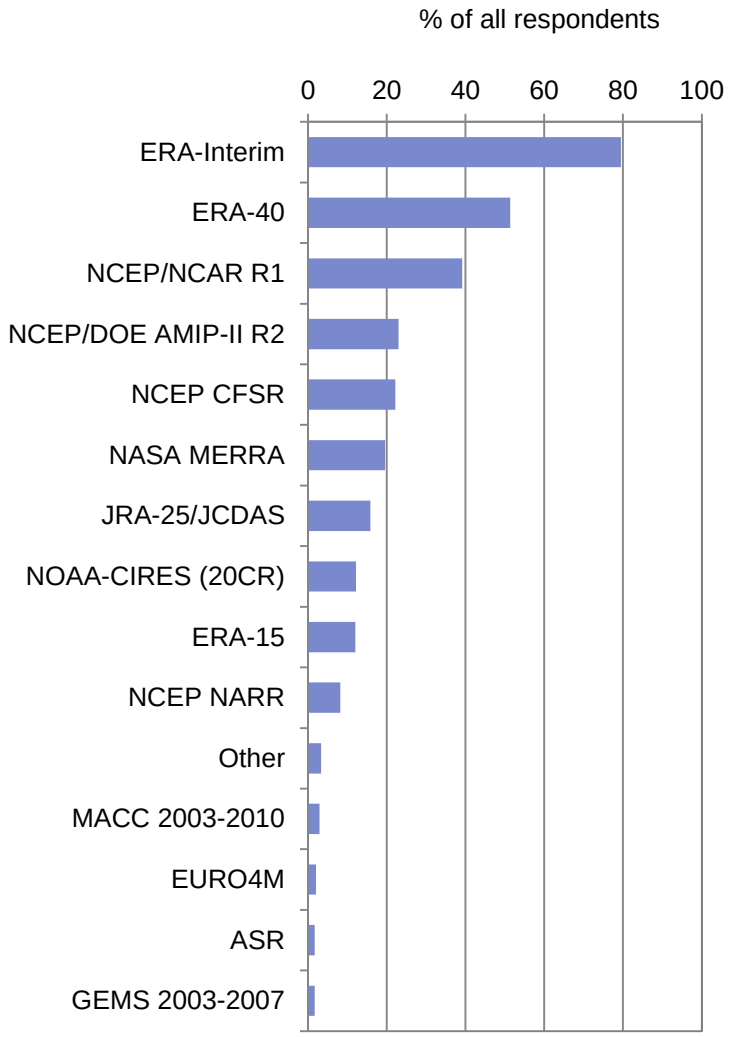

## Field or subject of work TOP10



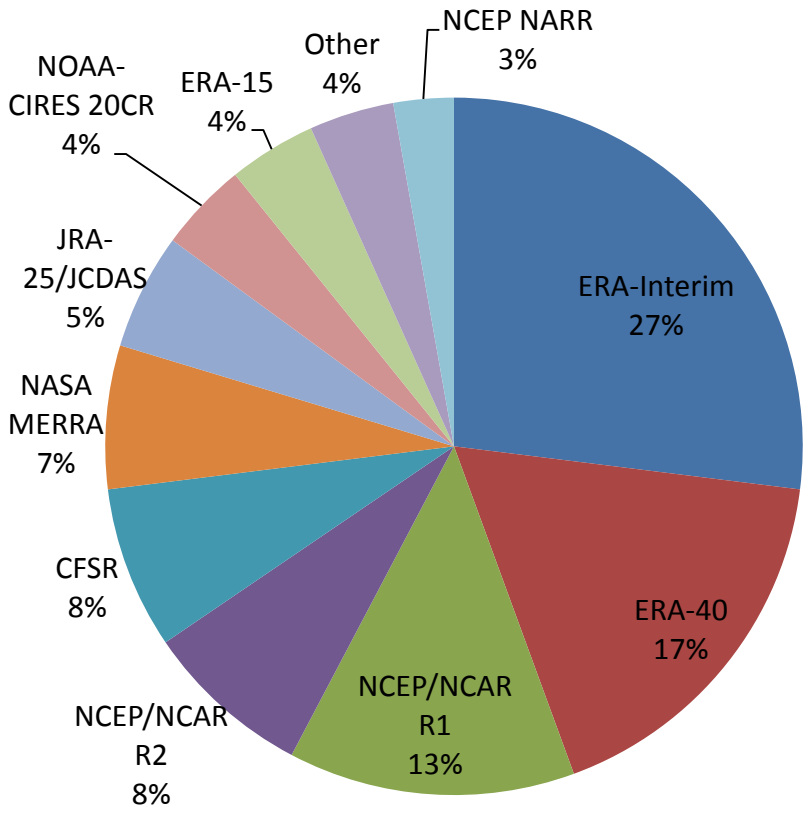

## Regional focus of work TOP10



# Use of atmospheric reanalysis (ALL)




- ✓ On average, respondents use 3 different reanalysis datasets
- ✓ Proportion of each dataset from all given votes:



# Use of Essential Climate Variables (ALL)

The variables for which the number of respondents USING reanalyses IS LARGER than those NOT USING reanalyses

| TOP10 | I work with this variable and USE reanalysis data for this | I work with this variable but DO NOT USE reanalysis data for this | Proportion (%) of those using reanalysis from all users |
|---|---|---|---|
| AU: Temperature | 1494 | 116 | 93 |
| AS: Pressure | 1792 | 150 | 92 |
| AU: Wind speed and direction | 1483 | 135 | 92 |
| AS: Wind speed and direction | 1894 | 177 | 91 |
| AS: Air temperature | 1910 | 202 | 90 |
| AU: Water vapour | 1094 | 161 | 87 |
| AS: Water vapour | 1265 | 208 | 86 |
| AS: Precipitation | 1453 | 415 | 78 |
| OS: Sea-surface temperature | 1153 | 343 | 77 |
| AS: Surface radiation budget | 914 | 299 | 75 |

AU: atmospheric upper air, AS: atmospheric surface, OS: oceanic surface

# Use of Essential Climate Variables (ALL)

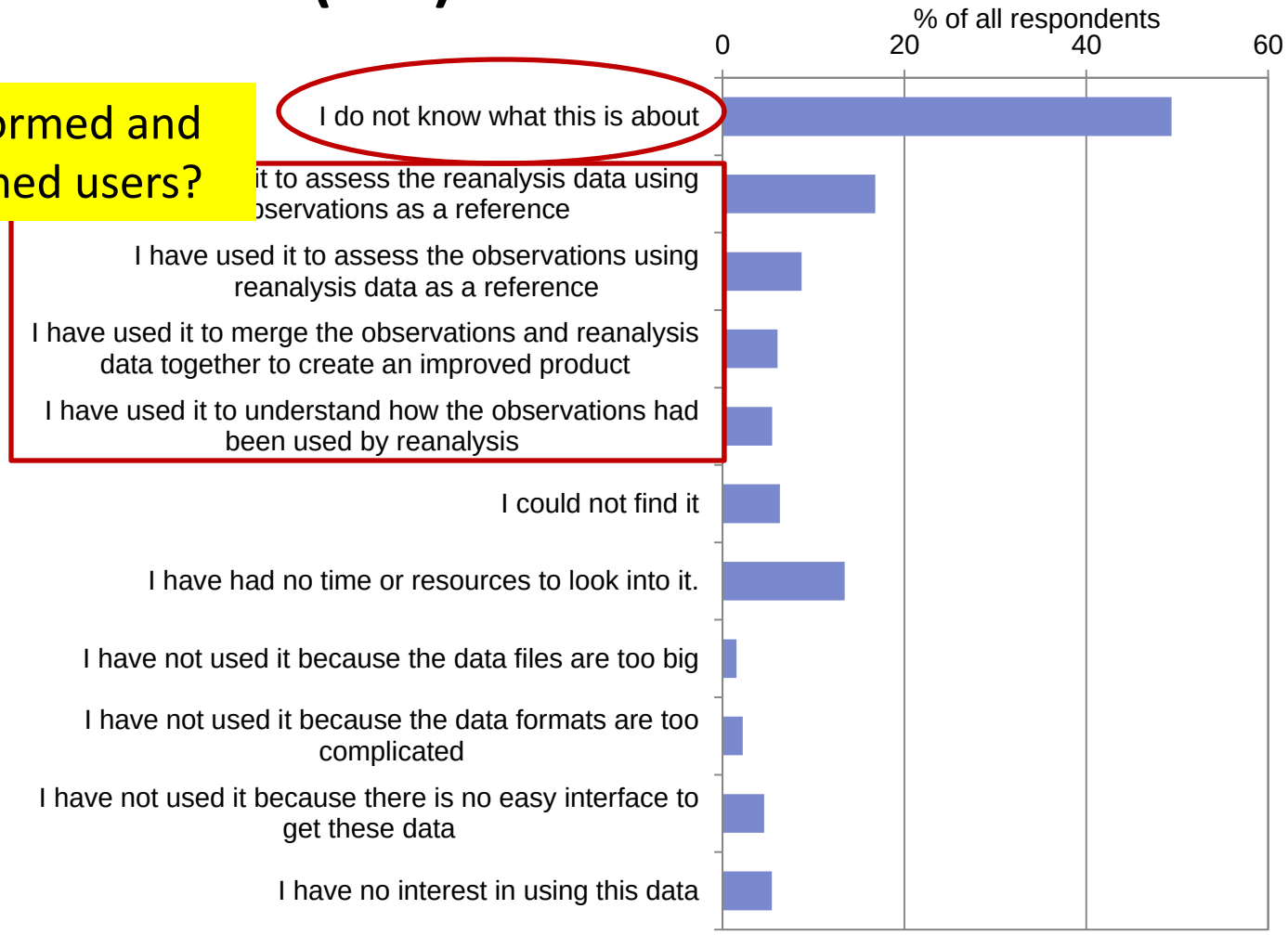
The variables for which the number of respondents NOT USING reanalyses IS LARGER than those USING reanalyses

| TOP10 | I work with this variable and USE reanalysis data for this | I work with this variable but DO NOT USE reanalysis data for this | Proportion (%) of those using reanalysis from all users |
|---|---|---|---|
| OSS: Ocean acidity | 60 | 183 | 25 |
| OSS: CO2 partial pressure | 66 | 193 | 25 |
| OS: CO2 partial pressure | 70 | 201 | 26 |
| OSS: Tracers | 72 | 204 | 26 |
| OS: Ocean acidity | 67 | 189 | 26 |
| T: Fire disturbance | 76 | 209 | 27 |
| OSS: Oxygen | 78 | 210 | 27 |
| T: Soil carbon | 82 | 209 | 28 |
| OSS: Nutrients | 86 | 213 | 29 |
| OS: Ocean colour | 106 | 234 | 31 |

OS: oceanic surface, OSS: oceanic sub-surface, T: terrestrial

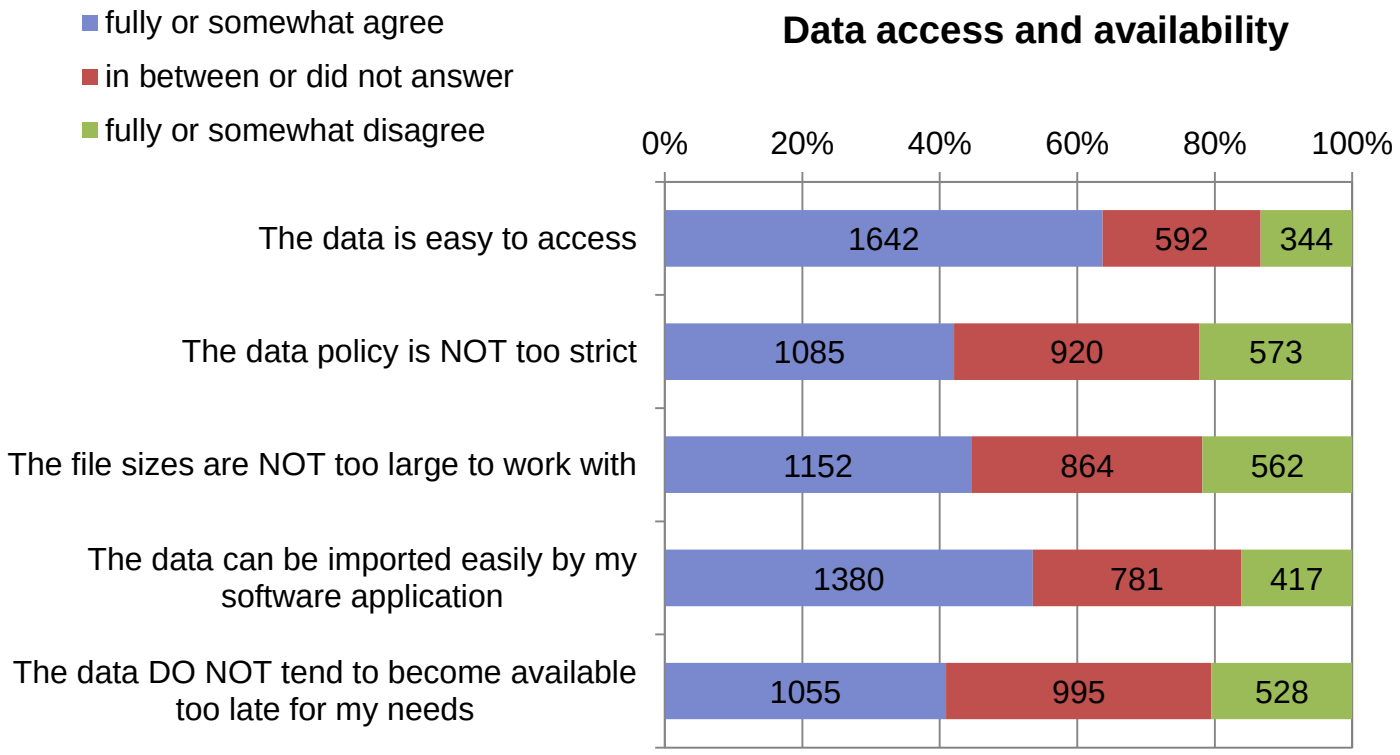
# Have you used reanalysis input observations and feedback data? (ALL)

→ Best-informed and least-informed users?



# User awareness and needs (ALL)

- ✓ Regarding the characteristics of reanalysis data, would you say that…
- ✓ 1 = agree, 5 = disagree, or skip to the next statement



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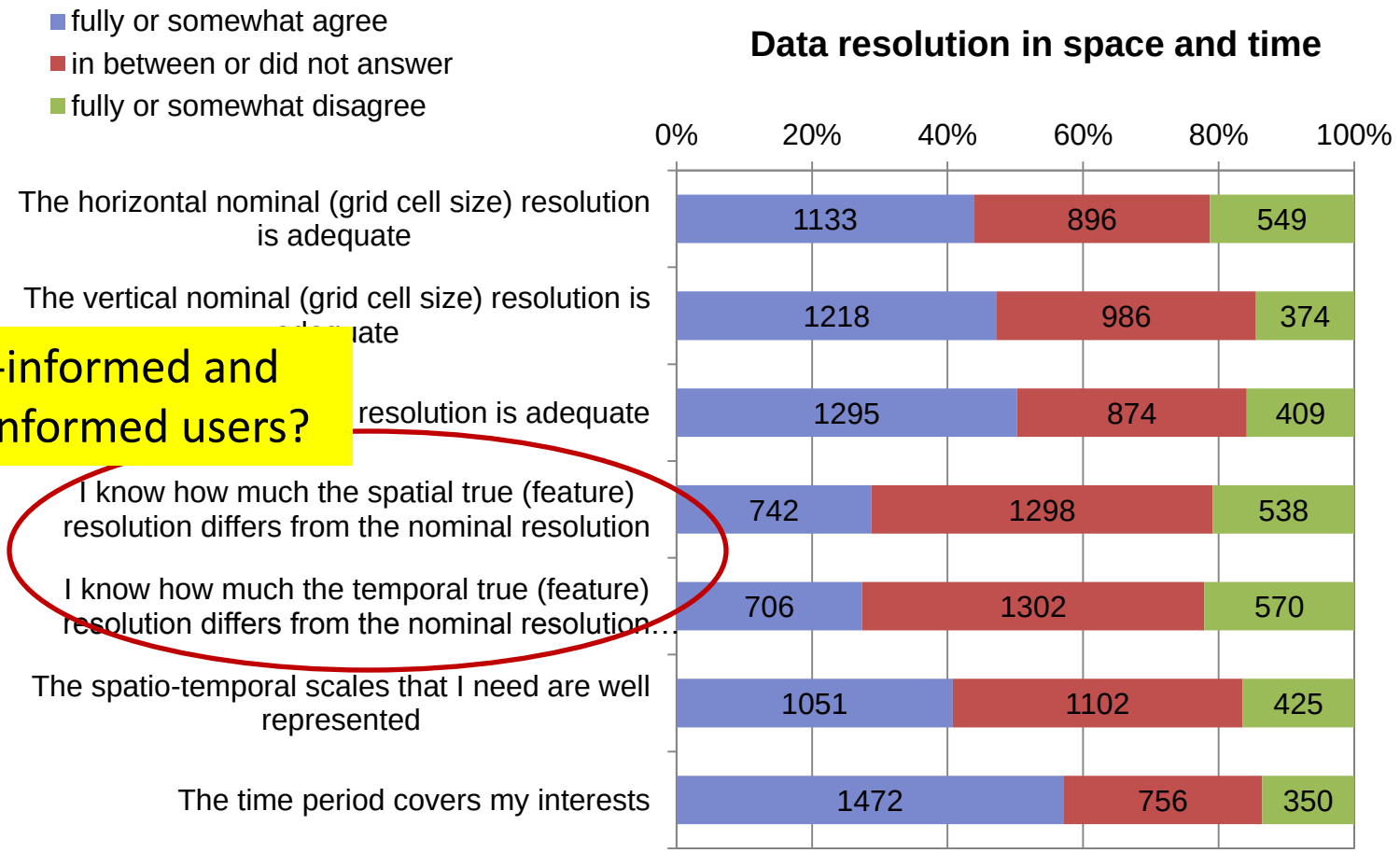
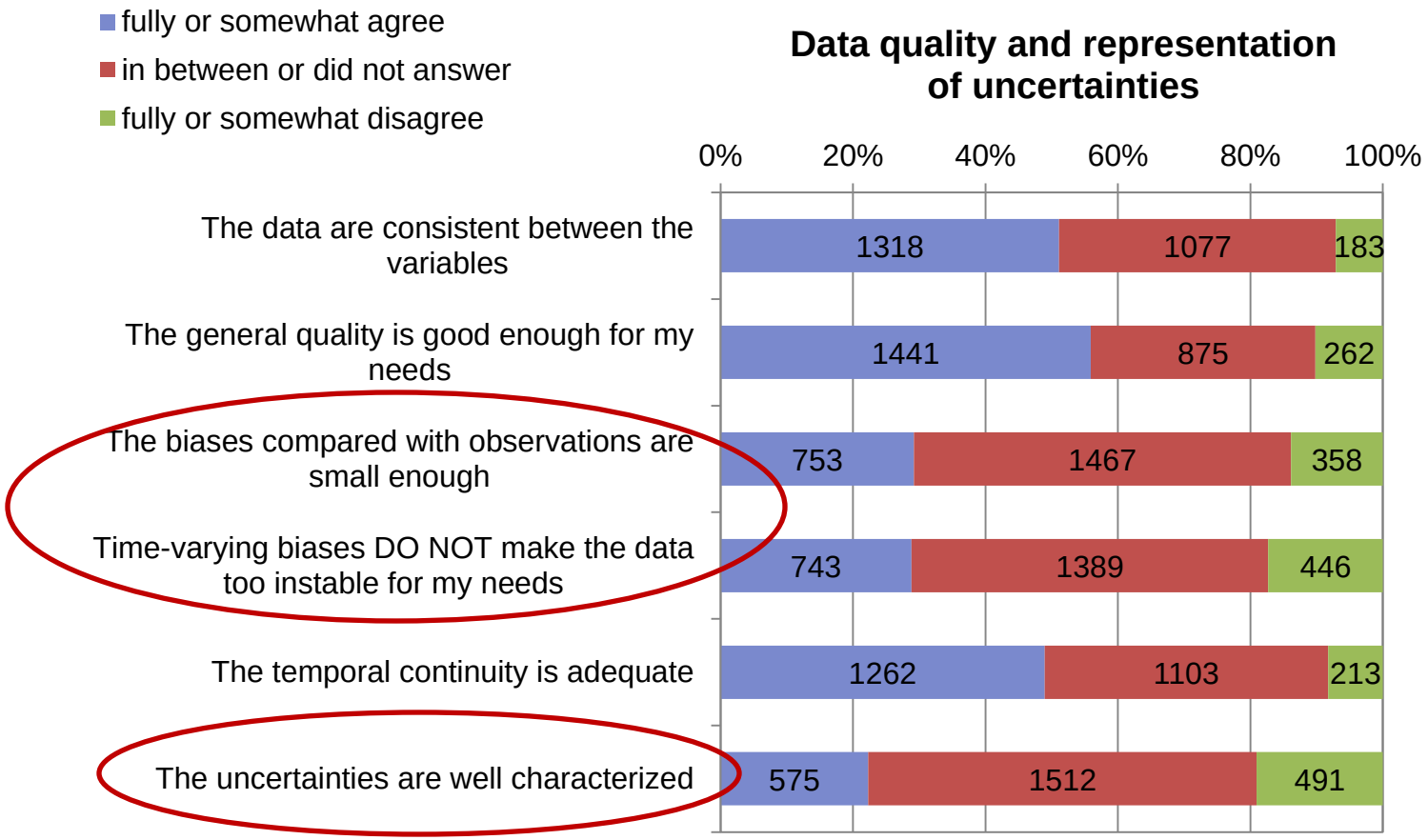
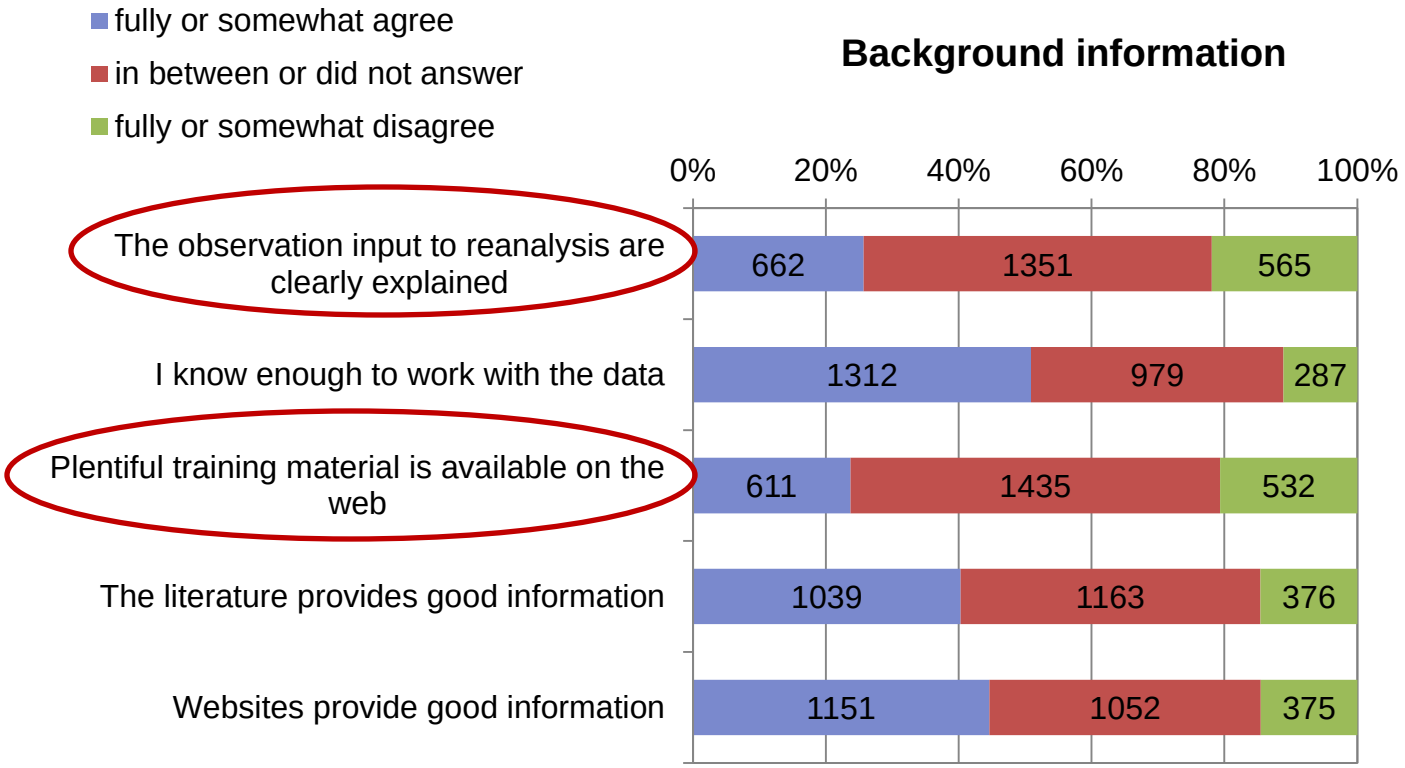



Best-informed and least-informed users?

# User awareness and needs (ALL)



# User awareness and needs (ALL)



# Regarding future climate services, do you think they should include the following tasks or activities? (ALL)

| | |
|---|---|
| 1: Fully agree | |
| | The most wanted tasks |
| 1.8 | Interpolation and production of gridded data sets based on observations |
| 1.9 | Provision of statistics based on observations |
| 1.9 | Homogenization of weather station data |
| | |
| 2 | Research and communication of climate change uncertainties |
| 2.1 | Monthly forecasting and verification |
| 2.1 | Detection of climate change |
| 2.2 | Seasonal forecasting and verification |
| 2.2 | Production of long-term climate projections |
| 2.2 | Applied weather and climate research for impact assessment |
| 2.2 | Provision of statements describing past weather events |
| | |
| 2.3 | Attribution of climate change |
| 2.3 | Statistical impact analyses for improving weather warnings and their criteria |
| 2.4 | Climate watch bulletins |
| 2.4 | 24/7 updates, in the internet, of statistics of weather and climate |
| 2.4 | Climate change impact consultancy for decision makers |
| | |
| 5: Fully disagree | |

# A few examples of different subgroups

1. **“best-informed users”** versus **“least-informed users”**
2. **“ERA-Interim users”** versus **“not ECMWF-users”**

# ”Best-informed users” versus ”least-informed users”

- ✓ **”Best-informed users” are those who**
  - DO KNOW what ”reanalysis input observations and feedback data” is and have use it
  - AND fully or somewhat AGREED on ”For the climate variables I need, I know how much their spatial true (feature) resolution differs from the nominal resolution”
  - AND fully or somewhat AGREED on ”I know how much the temporal true (feature) resolution differs from the nominal resolution”

→ There were 170 respondents (7% of all respondents) fulfilling the definition.

# ”Best-informed users” versus ”least-informed users”

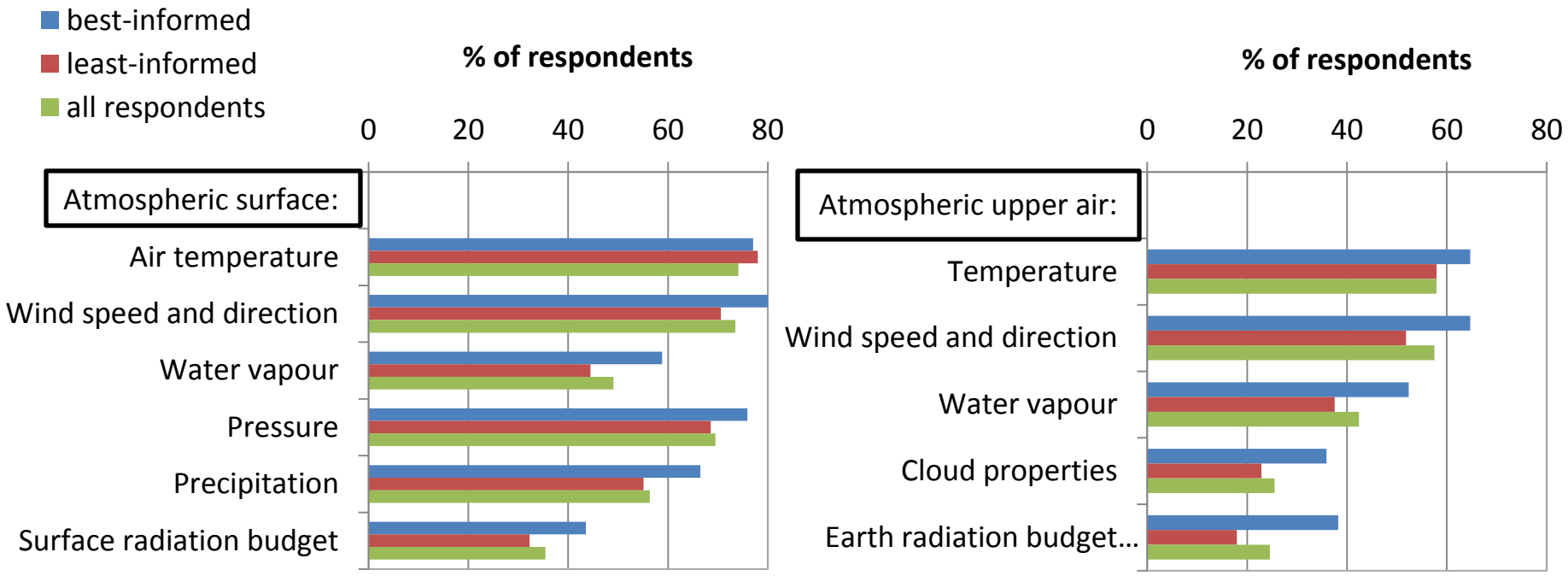
- ✓ **”Least-informed users” are those who**
  - DO NOT KNOW what ”reanalysis input observations and feedback data” is
  - AND fully or somewhat DISAGREED or were IN BETWEEN on “For the climate variables I need, I know how much their spatial true (feature) resolution differs from the nominal resolution”
  - AND fully or somewhat DISAGREED or were IN BETWEEN on “I know how much the temporal true (feature) resolution differs from the nominal resolution”
  - AND fully or somewhat DISAGREED or were IN BETWEEN on “I know enough to work with the data”

→ There were 245 respondents (10% of all respondents) fulfilling the definition.

# Example: Use of Essential Climate Variables

## best-informed and least-informed users

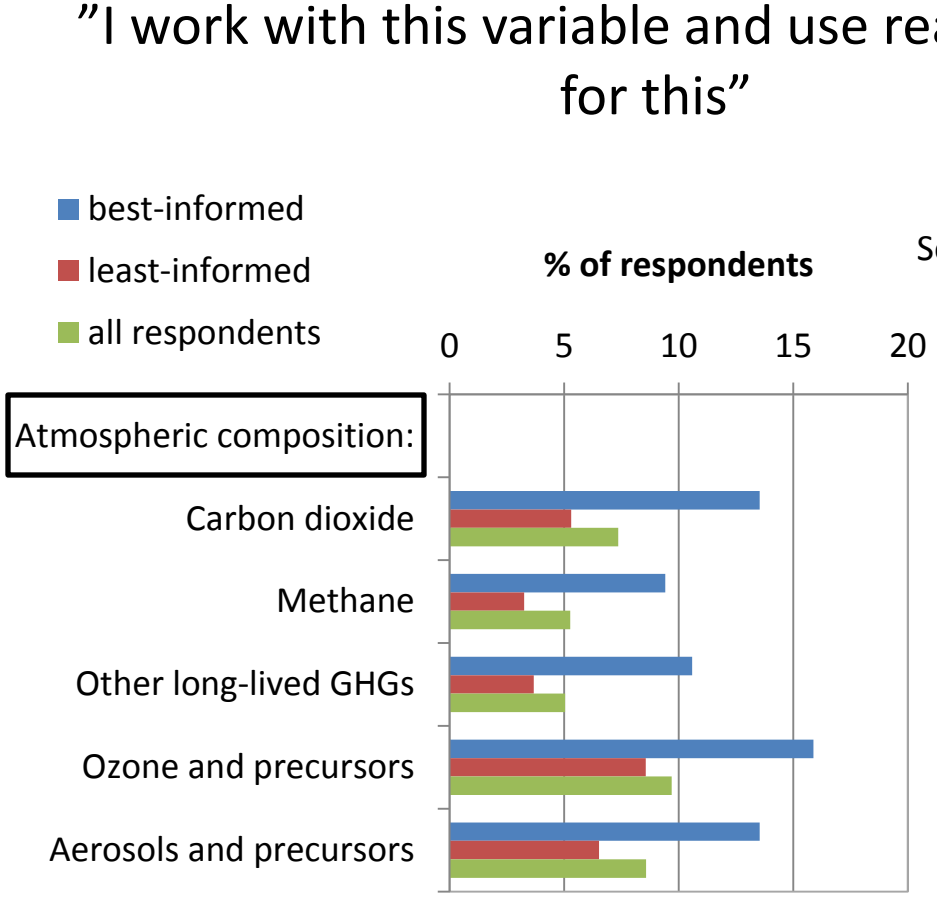
”I work with this variable and use reanalysis data for this”

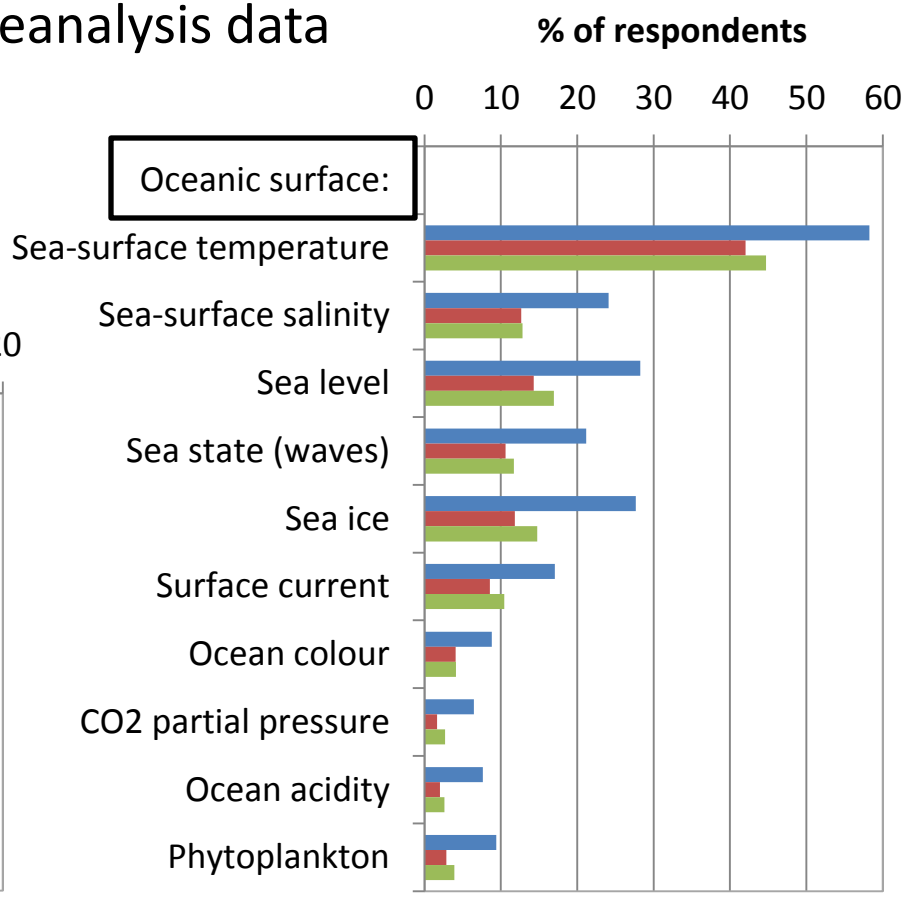


# Example: Use of Essential Climate Variables

## best-informed and least-informed users

”I work with this variable and use reanalysis data for this”



# ”ERA-Interim users” versus ”not ECMWF-users”

- ✓ Almost 80% of the respondents indicated that they have used ECMWF’s ERA-Interim reanalysis

- ✓ **“ERA-Interim users”:** uses only ERA-Interim reanalysis

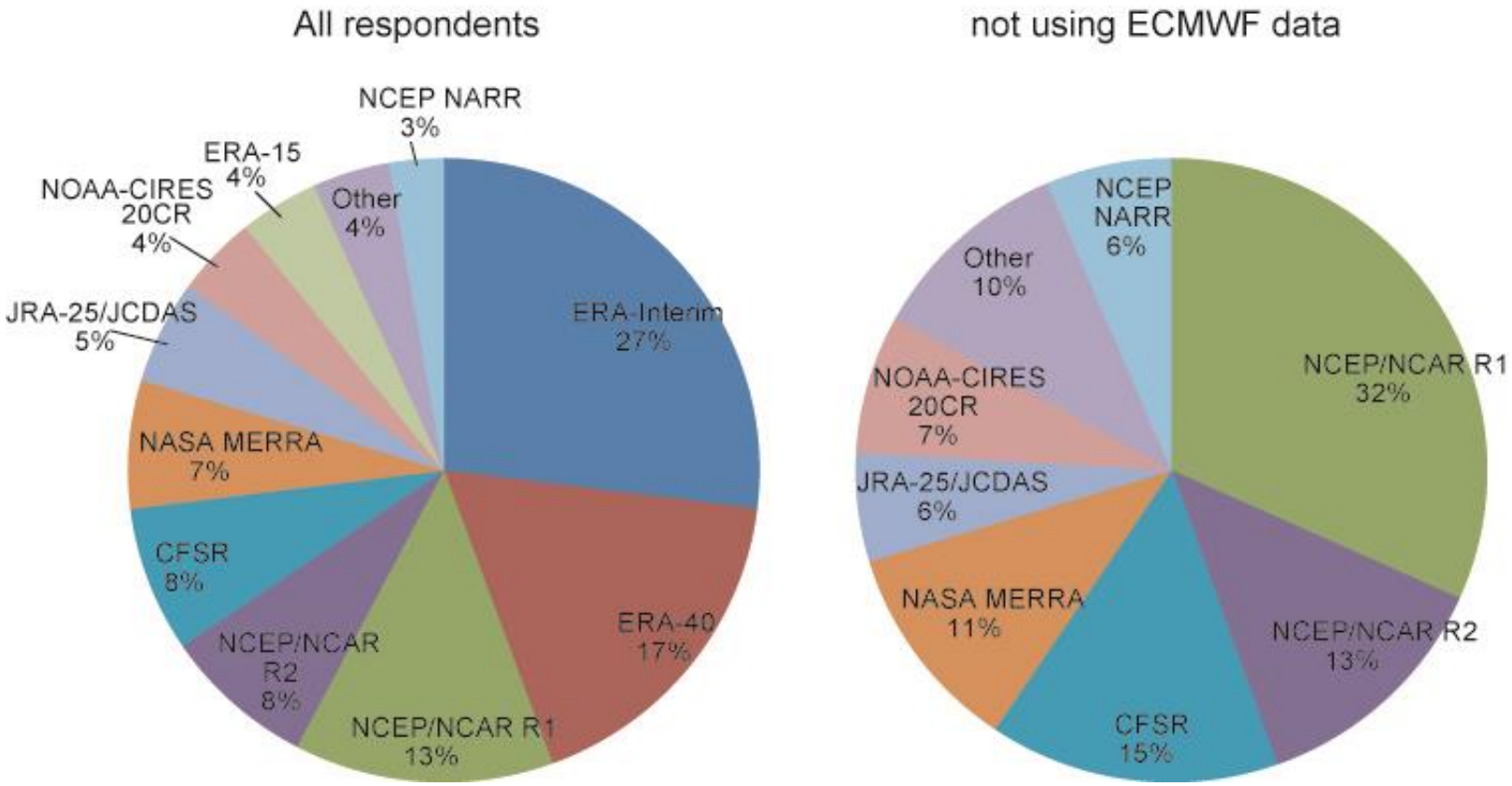
  → 391 respondents, 15% of all respondents

- ✓ **“not ECMWF users”:** doesn’t use any ECMWF reanalysis

  → 241 respondents, 9% of all respondents

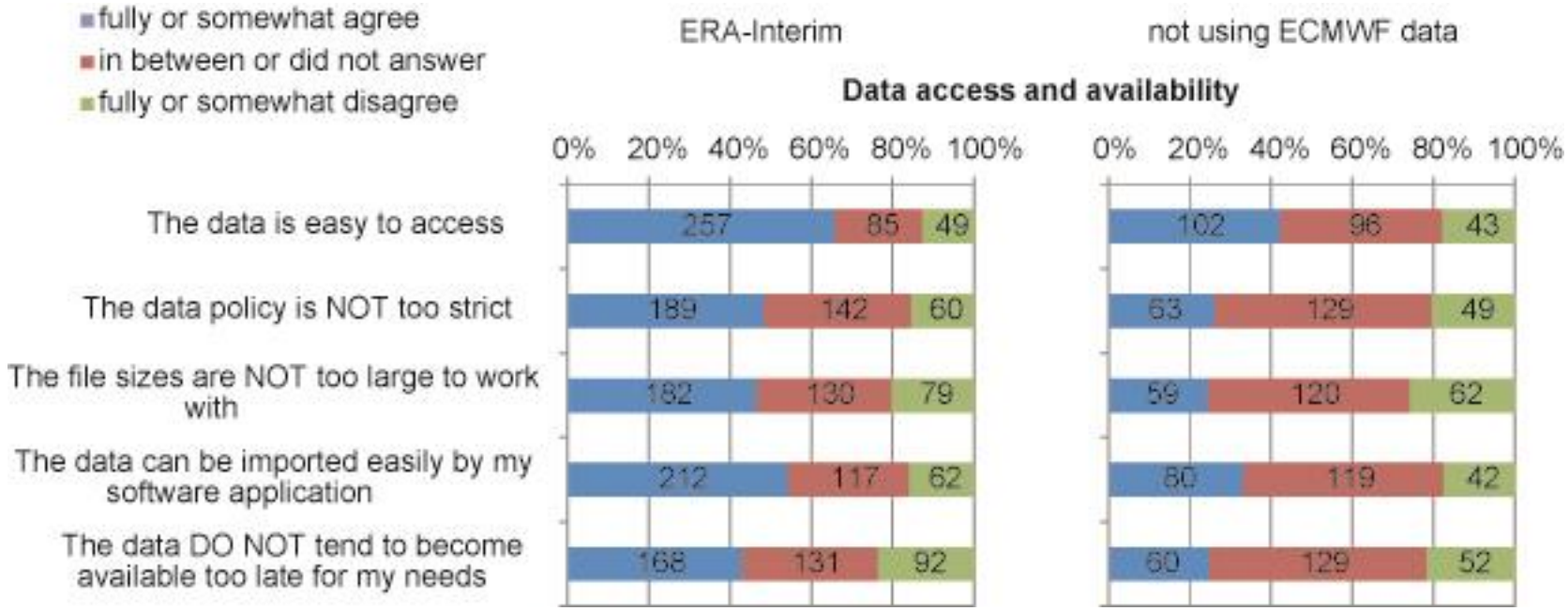
# Example: Use of atmospheric reanalysis

”ERA-Interim users” versus ”not ECMWF-users”



# Example: User awareness and needs

## ”ERA-Interim users” versus ”not ECMWF-users”



# Get-together and discuss in groups

- ✓ Discuss the following topics in groups of 5-7 people:

1. Where do you come from, what kind of work you do, which data you use and what do you expect from this workshop?
2. What are the main strengths and weaknesses in reanalysis products from the view point of your work? How aware are you of their uncertainties and limitations? What kind of improvement in reanalysis would you need?
3. Are you (your organization) providing climate services/climate change services and involved or planning to be involved in Copernicus Climate Services?
4. What are the areas that will need attention to make a more effective climate service? In what aspects is there a lack of capacity currently, and how could this lack be addressed?

- ✓ Someone(s) in your group, please write on the flip charts 1-4 a few key notes related to each question. Thanks!
- ✓ During the afternoon session, we will have a time slot for each group to briefly tell all about their findings.