



European Environment Agency



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Sustainability Survey

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1. EXECUTIVE SUMMARY

The Copernicus In Situ first [State of Play Report](#) published in December 2017 and the Thematic Report on [“Research Infrastructures and Copernicus”](#) from November 2017 both clearly stressed that there are severe sustainability issues regarding environmental in situ observations. The Copernicus In Situ Component therefore has implemented a thematic project with the aim to conduct a sustainability survey and analysis on environmental in situ observing networks in Europe.

The work was based on a questionnaire that has been circulated to observation system operators to monitor any known funding risks to the platforms they operate. The platforms within the scope of this Thematic Project included ocean, meteorology and atmospheric composition in situ networks. Based on a total of 233 replies – 91 for ocean, 122 for meteorology and 20 for atmospheric composition an analysis of the funding source and sustainability has been carried out.

The analysis shows clear and remarkable differences in the funding in the ocean and meteorological communities – 73% of meteorological observations are funded purely by institutional funds, for atmospheric composition this number is 45%, while for ocean observations this funding source only covers just above 28% of the total expenses. The remaining part of the observation activity involves additional support from external funds such as research funds (national, EU) or other funds (EU, private) in various combinations.

A similar marked difference is also displayed in the analysis of funding sustainability:

- 68% of meteorological observation networks have sustained funding while for the remaining: 27% the funding is subject to some uncertainty in the near future and only 2% of the networks seems to have severe problems
- For ocean the picture is nearly opposite – 28 % of the networks have sustained funding, 53% face problems in the near future and 9% have severe problems.
- For atmospheric composition the situation is very similar to one of the ocean with 30% funding sustainability, 40% having problems in the near future and most worrisome entire 30% have severe problems

Conclusion from the performed funding sustainability survey and subsequent analysis of responses are:

- The relatively high degree of sustained institutional funding for meteorological in situ observations clearly reflects the way the meteorological community is organised via one national meteorological service with national responsibilities but also with clear international commitments to contribute to the global meteorological observation network under WMO..
- Only around 30% of ocean and atmospheric composition in situ observations have sustained institutional funding, while the remaining part is dependent on external funding primarily linked to research funds (national or EU) with the degree of uncertainty and time limitation that this implies.
- The clear difference in the funding sustainability in the meteorological, ocean and atmospheric composition communities reflects the fact that the ocean and atmospheric composition communities – as opposed to the meteorological community- do not have the same national and international commitments to monitor the environment on a regular and operational basis, a majority of their observations are linked to research activities.

- The ocean and atmospheric composition communities therefore need to take a different strategic approach towards a sustained in situ observation network than the meteorological community.
- Important components of future strategies towards sustained in situ observations will be regular mapping of user requirements, cost benefit analysis, national and international commitments as well as free and open exchange of data. Copernicus – services and the in situ coordination component – can play a vital role in this strategic work in Europe.

The results of the sustainability survey have presented to the members of EuroGOOS, Eumetnet and ENVRI Plus, who have endorsed the work and conclusions, see Appendix 1.

2. INTRODUCTION

The Copernicus In Situ first [State of Play Report](#) published in December 2017 clearly stressed that there are severe sustainability issues regarding environmental in situ observations. The gap in in-situ observations due to lack of sustained funding can be subcategorised as follows:

- There is a lack of sustained funding for observations in general, a substantial part of in-situ observations is obtained via time limited research funds
- Observing networks lack sustained funding for coordination or management of the network (staff, travel)
- In-situ observations are based on infrastructures, primarily supported by national agencies and the number of observation sites or platforms are decreasing due to:
 - Ageing of instruments/networks
 - Changes in scientific goals and priorities
 - Funding opportunities decreasing
 - Environmental effects (climate change, harsh environment)

2.1. Purpose of Sustainability Survey

It was in this context that the Copernicus In Situ Component project initiated a Thematic Project with the aim to:

Conduct a sustainability survey and analysis on environmental in situ observing networks in Europe. The work shall be based on a questionnaire that will be circulated to system operators to monitor any known funding risks to the platforms they operate. The platforms within the scope of this Thematic Project shall include ocean, meteorology and atmospheric composition in situ networks.

2.2. Survey

The survey was conducted using the web based **EUSurvey** platform. A very simple questionnaire was formulated, it was deliberately kept simple and easy to answer in a very short time in the hope that many in situ observation network operators would respond to the survey. The questionnaires are shown in Appendix 1.

The survey has been conducted in two laps:

- Survey 1 was conducted in the period 15 January to 15 March 2018. Results were analysed and reported preliminarily by the end of April 2018. It was however recognised that more replies were needed especially within Atmospheric Composition to get a credible picture of the sustainability of environmental in situ observation networks. Therefore, it was decided to reopen the survey
- Survey 2 was conducted during the period 25 June to 15 September 2018

2.3. Analysis

The two surveys received in total 250 replies. General statistics as could be extracted from EUSurvey platform are presented below; while a more detailed analysis within each of the thematic domains is displayed in the following chapters.

Replies to the surveys:

	Answers Survey 1	Answers Survey 2	Answers Total	% of total
Meteorology	110	18	128	51,2%
Atmospheric composition	6	14	20	8,0%
Ocean	90	12	102	40,8%

Ocean sub-categories

	Answers Survey 1	Answers Survey 2	Answers total	% of total
ARGO	9	0	9	8,8%
Gliders	5	0	6	5,9%
Ferry box	4	0	4	3,9%
HF-Radars	25	1	26	25,5%
Animal borne instruments	1	0	1	1,0%
Ship Observation	11	5	16	15,7%
Fixed platforms/moorings	30	5	35	34,3%
Other	5	1	5	4,9%

Meteorology sub-categories

	Answers Survey 1	Answers Survey 2	Answers total	% of total
Synoptic stations	25	1	26	20,3%
Climate stations	13	2	15	11,7%
Rain-gauge stations	9	1	10	7,8%
Weather radar stations	12	1	13	10,2%
Upper-air stations	12	2	14	10,9%
Sea surface temperature stations	5	2	7	5,5%
Solar radiation stations	10	2	12	9,4%
Lightning detection stations	8	2	10	7,8%
Soil temperature	7	3	10	7,8%
Soil moisture	5	1	6	4,7%
Other	4	1	5	3,9%

Atmospheric Composition sub-categories

	Answers Survey 1	Answers Survey 2	Answers total	% of total
Atmospheric composition (concentrations of gases, aerosols)	5	8	13	65,0%
Ecosystem flux and related parameters	0	0	0	0,0%
Vertical profile of atmospheric composition (Lidar, FTIR, Aircore, etc)	1	6	7	35,0%
Other	0	0	0	0,0%

How is your network funded? (all domains/themes?)

	Answers Survey 1	Answers Survey 2	Answers total	% of total
National research fund	71	19	90	23,9%
EU Research Funding	36	4	40	10,6%
Other EU funds	32	3	35	9,3%
Institutional funds (annual budget)	152	36	188	50,0%
Private funds	10	3	13	3,5%
Other	3	7	10	2,7%

Funding sustainability

	Answers Survey 1	Answers Survey 2	Answers total	% of total
Solved today, no problems foreseen in the future	114	5	119	47,4%
Solved today, but problems foreseen in 2-3 years	72	27	99	39,4%
No funding today, but plans for funding in the near future is under way	8	1	9	3,6%
No funding today and no plans for funding in the near future	8	3	11	4,4%
Other	4	9	13	5,2%

3. OCEAN OBSERVATION SYSTEMS

3.1. Survey sampling

3.1.1. Number of responses

Number of original answers: 102 (90+12)

After cleaning duplicates (institutions which replied twice for the same component): 95.

Cleaning USA, Canada and Brazil Replies: **91 Replies**

3.1.2. Countries represented

21 countries plus the Euro-Argo and OceanSITES networks replied to the questionnaire. Answers from USA, Canada and Brazil are excluded in this analysis.

List of countries (18 EU countries plus Norway, Faroe Islands and Israel):

Belgium	Latvia
Croatia	Malta
Denmark	Norway
Faroe Islands	Poland
Finland	Portugal
France	Slovenia
Germany	Spain
Greece	Sweden
Ireland	The Netherlands
Israel	UK
Italy	

3.1.3. Institutes /Organizations

There are answers from **56 institutes/organizations/networks**, which are among the main institutions around Europe (see appendix 2). There are answers from 10 universities, 1 private company and the rest are research, governmental or operational centres.

3.1.4. Systems by observing platform

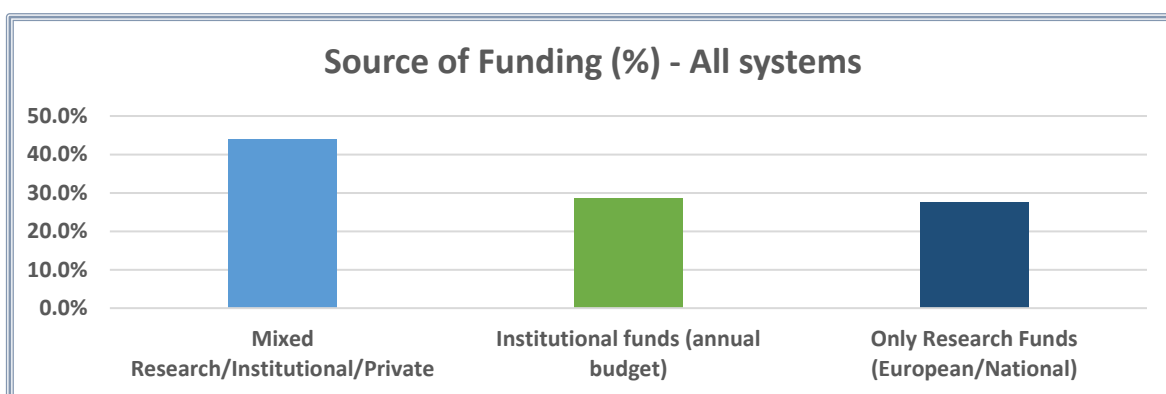
The systems with most information are Fixed platforms/mooring and HF radars.

Fixed platforms/moorings	31
HF-Radars	23
Ship Observation	15
ARGO	8
Other	5
Ferry box	4
Gliders	4
Animal borne instruments	1

3.2. Global results - all systems

3.2.1. Funding

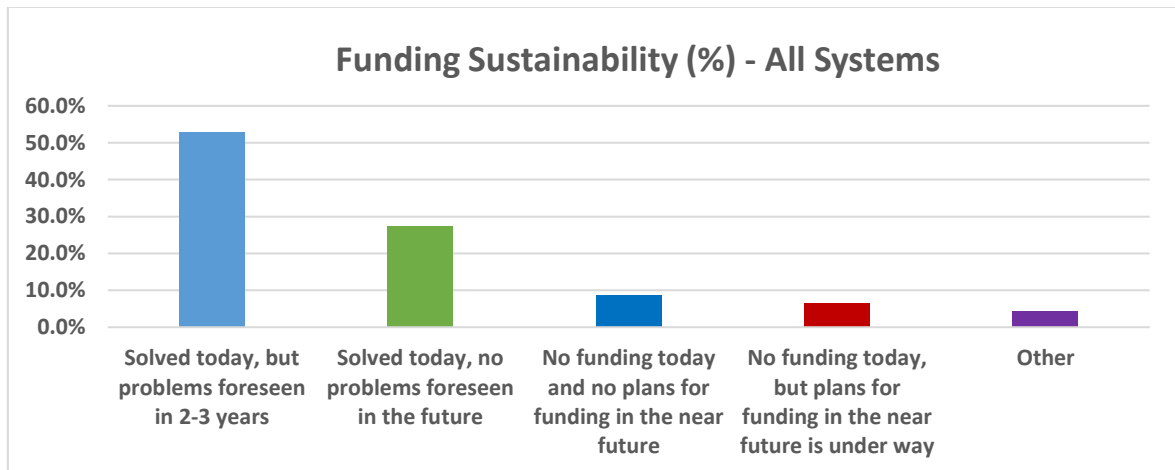
A mixed funding source is the situation in 44 % of the responses, combining research (both national and EU) with institutional funding. A substantial number of systems (28%) are based solely on institutional funds (annual budget) and around 15% are based entirely on national research funds. Around 70% of the systems depends partly or totally on research funds (national and/or EU), One system (CPR- SAHFOS) uses also private funding, together with institutional and research funds.



Source of funding	Percentage over the total (%)
Institutional funds (annual budget)	28.6%
National research fund	15.4%
National research fund;Institutional funds (annual budget)	8.8%
National research fund; EU Research Funding	7.7%
National research fund; EU Research Funding;Institutional funds (annual budget)	7.7%
National research fund; EU Research Funding;Other EU funds	5.5%
National research fund; Other EU funds	4.4%
EU Research Funding	4.4%
Other	3.3%
EU Research Funding; Institutional funds (annual budget)	3.3%
National research fund; EU Research Funding; Other EU funds; Institutional funds (annual budget)	2.2%
Institutional funds (annual budget);Private funds	1.1%
Other EU funds; Institutional funds (annual budget);Private funds; Other	1.1%
National research fund; Other EU funds; Institutional funds (annual budget);Private funds	1.1%
National research fund; EU Research Funding; Other EU funds; Institutional funds (annual budget);Private funds	1.1%
Other EU funds; Institutional funds (annual budget)	1.1%
Institutional funds (annual budget);EU Research Funding	1.1%
EU Research Funding; Other	1.1%
National research fund; EU Research Funding; Institutional funds (annual budget); Other	1.1%

3.2.2. Funding sustainability

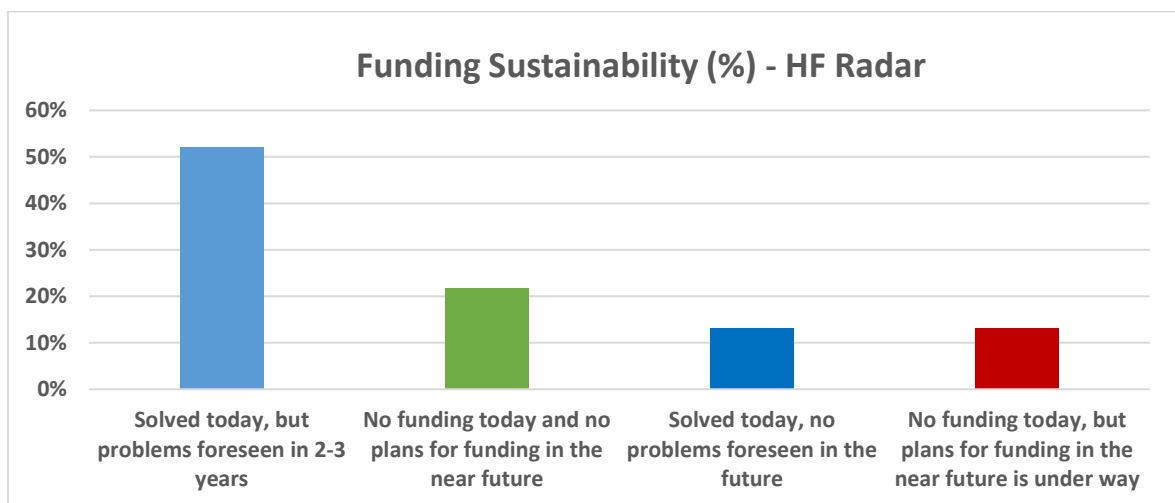
Out of the 91 responses, more than half (53%) responded that the funding of the observing system is solved today, but problems foreseen in 2-3 years, and only 27% responded that the system sustainability is 'Solved today, no problems foreseen in the future'.



3.3. Analysis by Observing Platform

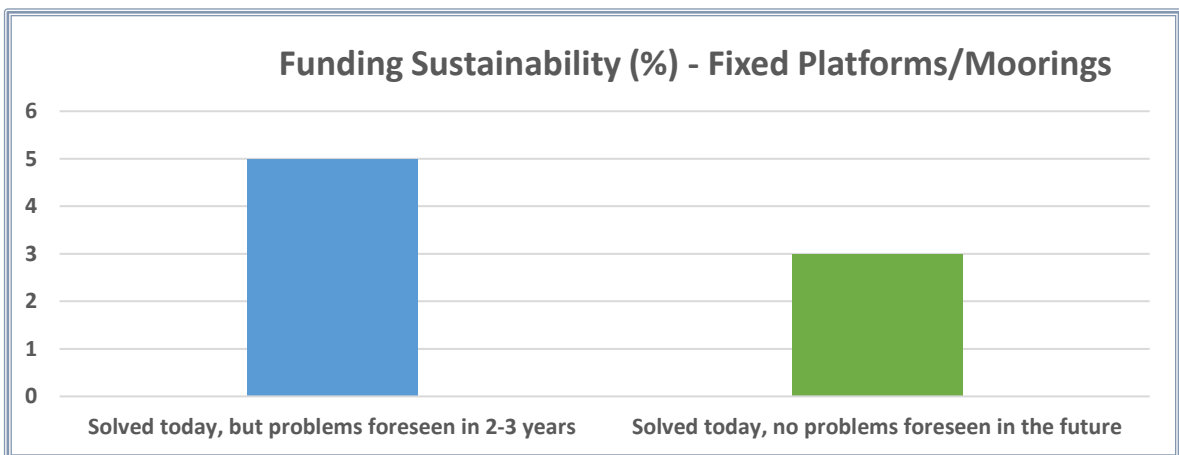
HF Radar

Only 3 systems (13%) have a stable funding, while the majority don't have funding, or some problem is foreseen in next 2-3 years.



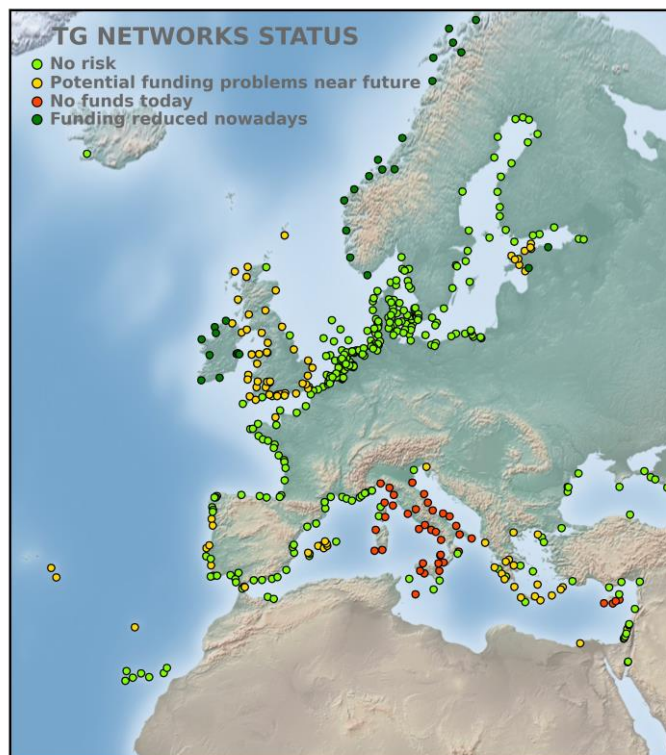
Fixed Platform – Moorings

42% of the Fixed Platforms/Moorings systems that have answered the survey (a total of 31) have a sustained system. Note here we are including also the Tide Gauge system.



Note here that in Fixed Platforms/Moorings categories we are including also the Tide Gauge systems measuring sea level.

In a dedicated study on the Tide Gauge Sustainability in Europe, 41 institutions from 24 different countries answered to a survey launched in 2016 by the EuroGOOS Tide Gauge Task Team.



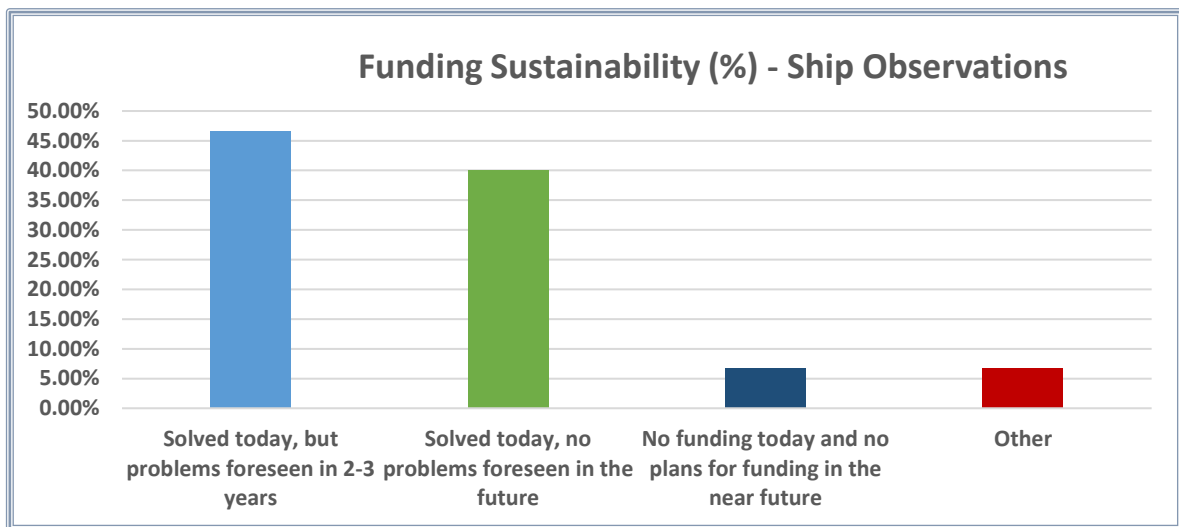
Status of European tide gauge network. Colours indicate whether platforms are at risk of decreased funding in the near future (see map legend). Source: EuroGOOS Tide Gauge Task Team (2017).

According to their responses, from a total number of 674 tide gauges, near 25% of the stations in the region would be facing problems of funding in some way. Focusing on the number of

institutions, only 47% of the respondents claimed having no problems of funding for maintenance while four institutions clearly indicated they had not funds at all for maintenance at that moment. Only 30% of the respondents considered that there was no risk of funding problems in the near future

Ship observations

Around 40%, out of 15 responds, of the ship-based observation systems around Europe are sustained in the future.



ARGO (profiling floats)

Only 2 national systems (Norway and Finland) have a sustained system, the others, including Euro-Argo, may have problems in the next 2-3 years.

Ferry Box

All (4) Ferry Box Systems have replied they foresee problems for the next 2-3 years

Animal Borne

There is one Animal Borne system with still no sustained funding

3.4. Analysis by Country

From the information extracted from each country (table below) we can infer that in some countries such as Ireland, Italy, Malta or Spain, some of the observing systems have no funding today and not plans for funding in the near future. For most of the countries, though, the situation is that most of the systems are sustained today but problems are foreseen in 2-3 years.

Note that the information in the table is not complete: many national institutions have not answered the questionnaire and therefore the colours in the table could change accordingly.

Table 1. Summary of sustainability of observing platform by Country. See that for some countries, the situation of the funding for a particular platform can be different depending on the institution/organization.

	Fixed Plaforms/ Moorings	HF Radar	Ship Observations	ARGO (profiling floats)	Ferry box	Glider
Belgium	Green					
Croatia		Orange				
Denmark	*					
Faroe Islands	Yellow		Yellow			
Finland	Green			Green	Yellow	
France	Yellow, Green	Yellow	Green	Yellow, Green		Yellow
Germany	Yellow, Green		Green			
Greece	Yellow				Yellow	
Ireland	Yellow	Red				
Israel		Yellow				
Italy	Yellow, Orange, Red	Red, Orange, Yellow	**			Red
Latvia	Yellow					
Malta		Red				
Norway	Yellow	Yellow	Yellow	Green		
Poland	Yellow		Green		Yellow	
Portugal	Yellow	Yellow	Yellow			
Slovenia	Yellow		Yellow			
Spain	Yellow, Green	Yellow, Green, Red	Green, Yellow	Yellow		Yellow
Sweden	Green		Green		Yellow	
The Netherlands		Green				
UK	Yellow	Yellow	Yellow	Yellow		Yellow

*Tidal gauges and SST observations have resources. However, 3 current moorings in Danish Straits are out of order and have no resources and expertise to maintain them. No solutions yet.

** The funds for the maintenance of ship observation was strong in 2 The number of vessels was reduced from 3 regional ships to one coastal vessel

Red	No funding today and no plans for funding in the near future
Orange	No funding today, but plans for funding in the near future is under way
Yellow	Solved today, but problems foreseen in 2-3 years
Green	Solved today, no problems foreseen in the future
White	No information

4. METEOROLOGICAL OBSERVATION SYSTEMS

4.1. Survey sampling

4.1.1. Number of responses

Number of original answers: 128 (110+18)

After sending invitations twice for responses to the survey to meteorological services, institutes, offices, departments and agencies of European countries and cleaning duplicates (Institutions which replied twice for the same component), the number of collected answers is **122**.

4.1.2. Countries represented

Number of countries who replied the survey: **27 countries**.

Germany did not complete the survey. However, they provided some links to where information on sustainability of German meteorological networks could be found. These links did not however provide the required information relevant for this analysis. Germany is therefore not included in the analysis displayed below.

List of countries (20 countries members of EU and 7 European countries):

Armenia	Latvia
Bosnia and Herzegovina	Luxembourg
Croatia	Malta
Cyprus	Netherlands
Czech Republic	Poland
Denmark	Serbia
Estonia	Slovakia
Finland	Slovenia
France	Spain
Georgia	Sweden
Germany	Switzerland
Hungary	Turkey
Iceland	UK
Italy	

4.1.3. Institutes/Organizations

There are answers from **30 institutes/organizations/networks**, which are among the main institutions around Europe (See appendix 2). All answers are from research, governmental or operational centers.

4.1.4. Systems by observing platform

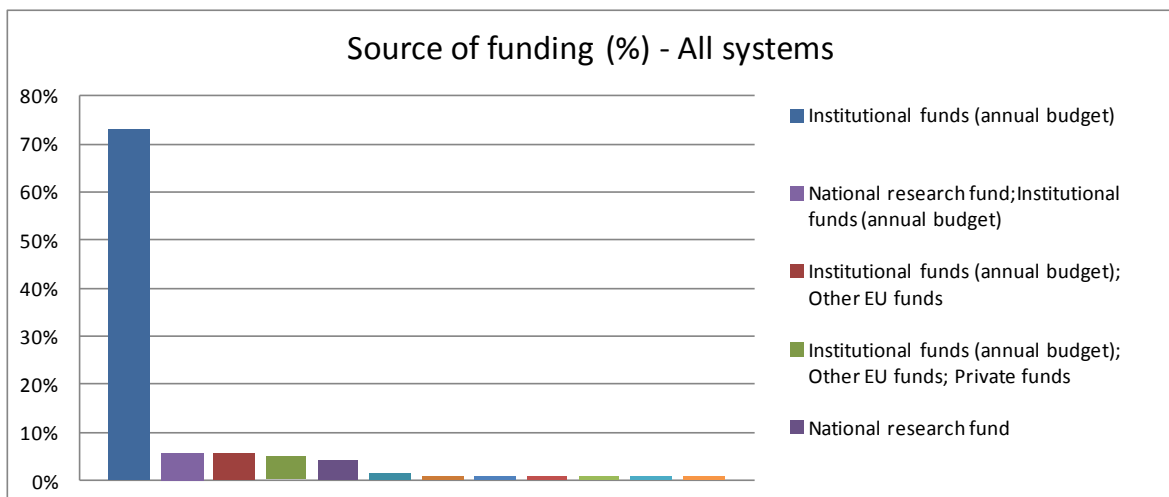
The systems with the most information are the synoptic stations network. The climate, upper- air and weather radar stations networks have a similar number of the responses.

Synoptic stations	23
Climate stations	15
Upper-air stations	15
Weather radar stations	13
Solar radiation stations	12
Rain-gauge stations	10
Lightning detection stations	9
Soil temperature	9
Sea surface temperature stations	6
Soil moisture	6
Other	4

4.2. Global results - all systems

4.2.1. Funding

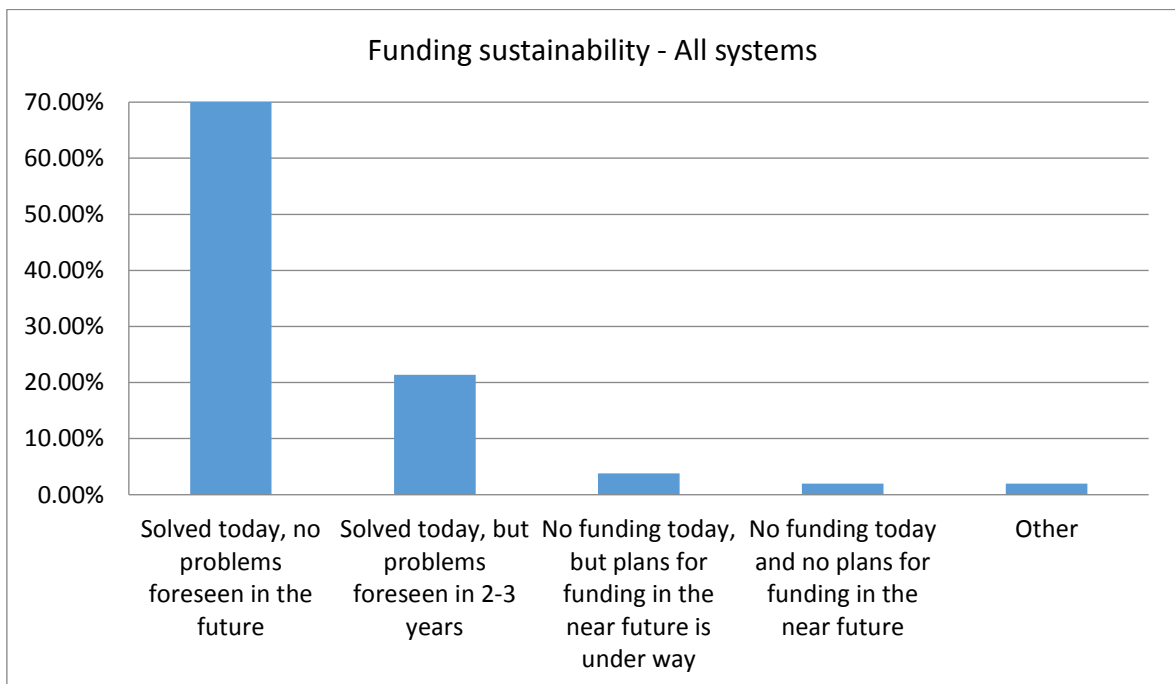
Among the 122 responses, the most common is a funding from Institutional funds (annual budget) (89 responses covering 73% of the answers). Another 5.7% of the answers are combination of Institutional funds (annual budget) and Other EU funds or Other EU funds and Private funds (4.9%). Combination of National research fund and Institutional funds (annual budget) are covering 6.5% of the funding. Only 4.1% of the meteorological networks from the surveys are funded from National research funding and 1.6% through EU funding mechanisms alone. Other funding mechanisms for single systems are not detailed in the legend but are represented in the table below.



Source of funding	Number of answers	Percentage (%)
Institutional funds (annual budget)	89	73.0
Institutional funds (annual budget); Other EU funds	7	5.7
National research fund; Institutional funds (annual budget)	7	5.7
Institutional funds (annual budget); Other EU funds; Private funds	6	4.9
National research fund	5	4.1
Other EU funds	2	1.6
EU Research Funding	1	0.8
Private funds	1	0.8
National research fund; EU Research Funding	1	0.8
National research fund; EU Research Funding; Other EU funds	1	0.8
National research fund; Institutional funds (annual budget); Other EU funds	1	0.8
Other EU funds; Institutional funds (annual budget); Other (Financial funds received for our services)	1	0.8

4.2.2 Funding sustainability

Among the 122 responses, 67% responded that the “system sustainability is solved today, no problems foreseen in the future” and 27% responded the system sustainability is “Solved today, but problems foreseen in 2-3 years”

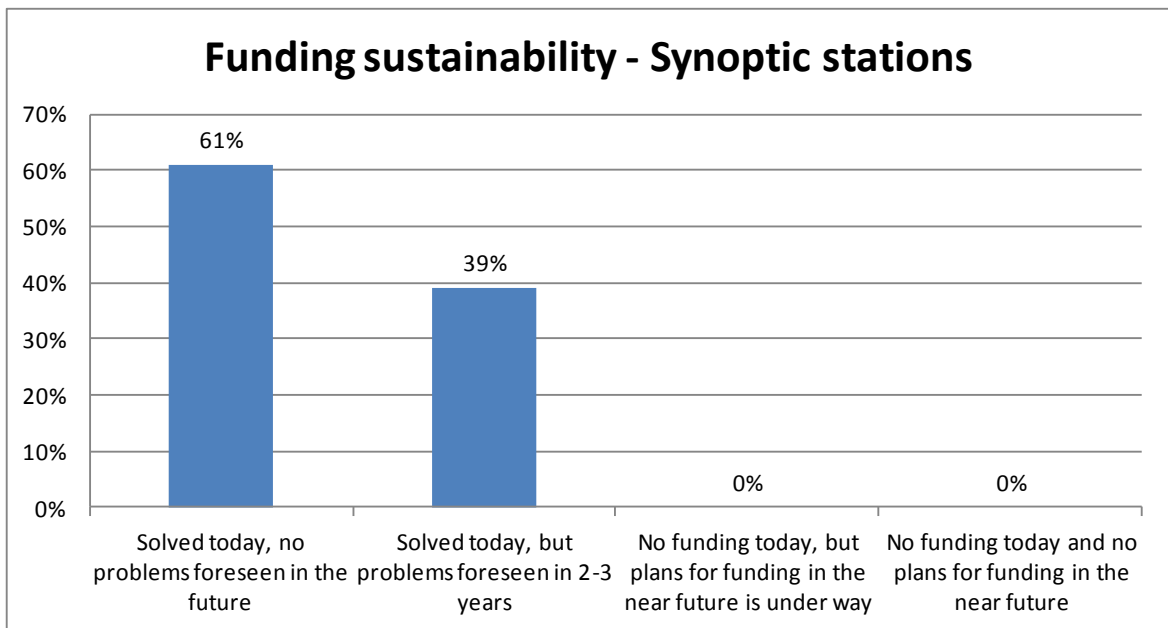


4.3. Analysis by Observing Platform

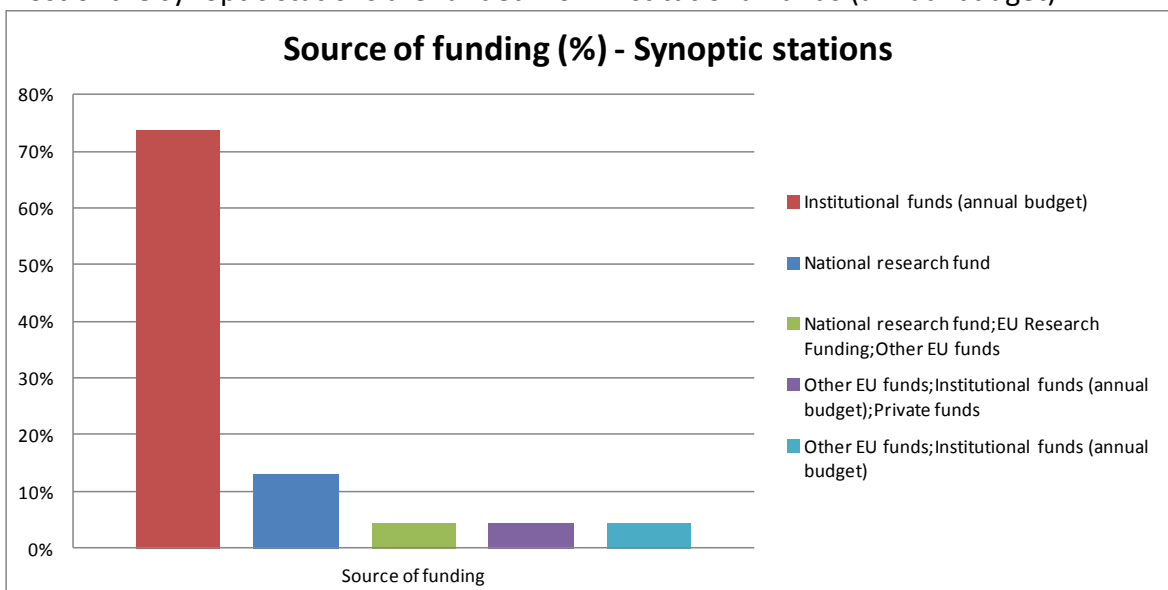
Synoptic stations networks

In the analysis of meteorological observing systems all the synoptic stations have funding solv

ed today with 61% having stable funding, while 39% have funding today but some problems foreseen in the next 2-3 years.

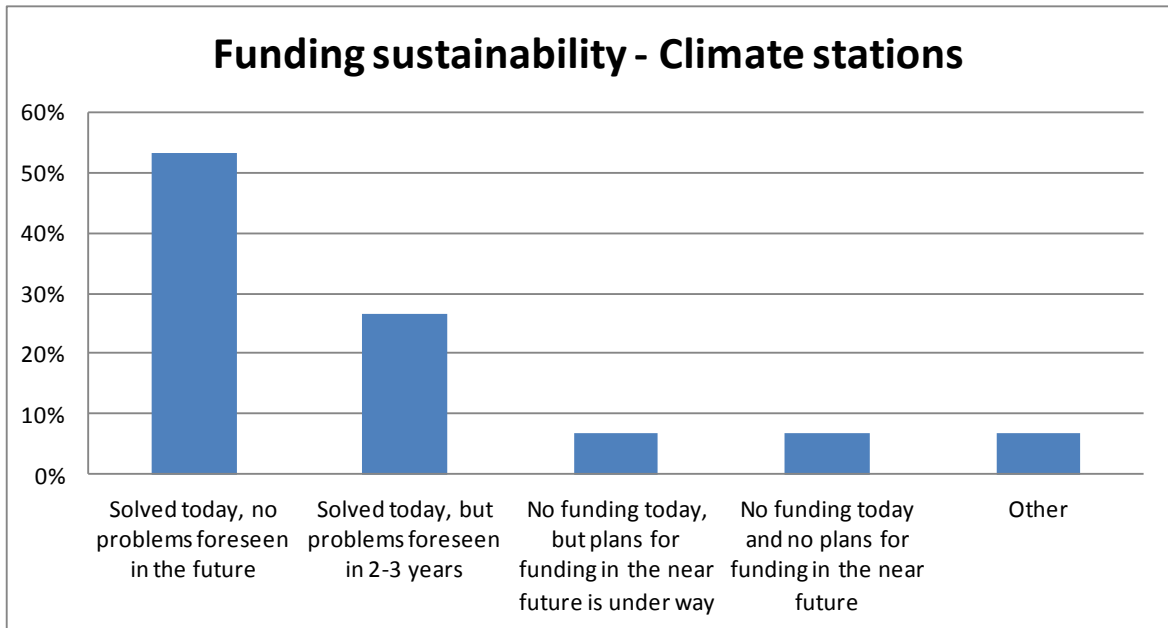


Most of the synoptic stations are funded from institutional funds (annual budget)



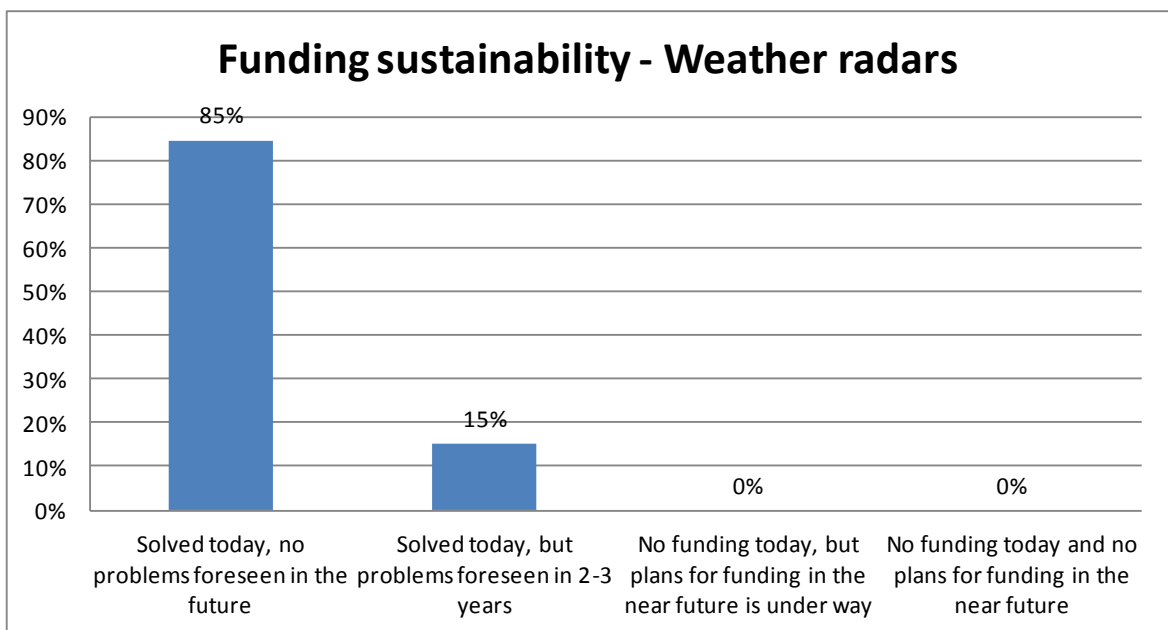
Climate stations networks

57% of the climate station networks have a sustained system.



Weather radar stations

All the weather radar stations have funding solved today and 85% have a stable funding, while the 15% of it have funding today but some problems are foreseen in next 2-3 years.

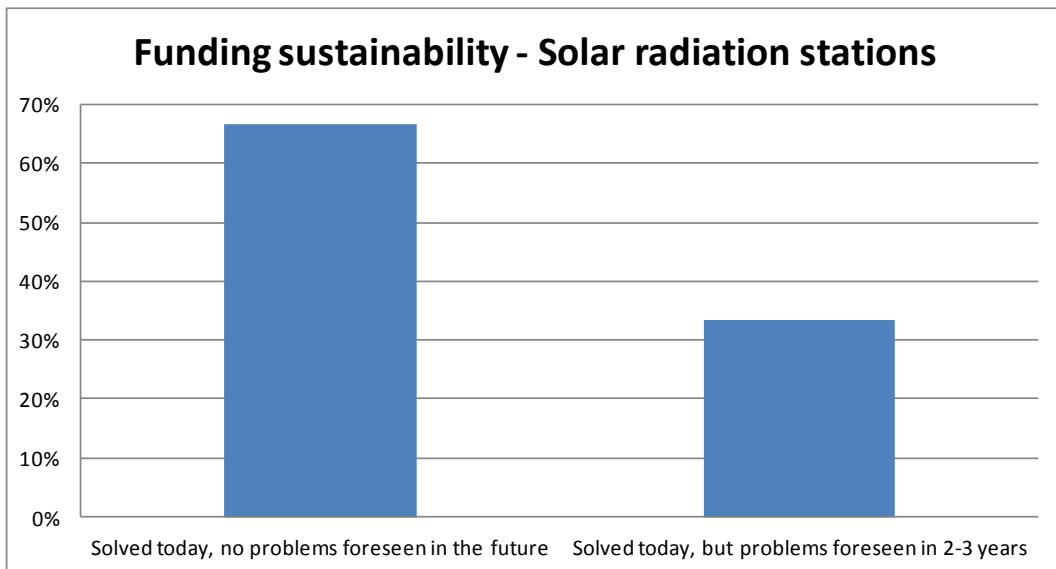


Upper – air stations

All the upper – air stations networks covered in the analysis (15 of them) have a sustained system today but one of them have secured funding that are not sufficient and another one will probably have problems with funding in 2-3 years. Most of them (12 of 15) are funded from institutional funds (annual budget) and the other 2 are funded from institutional funds (annual budget) and some other funds.

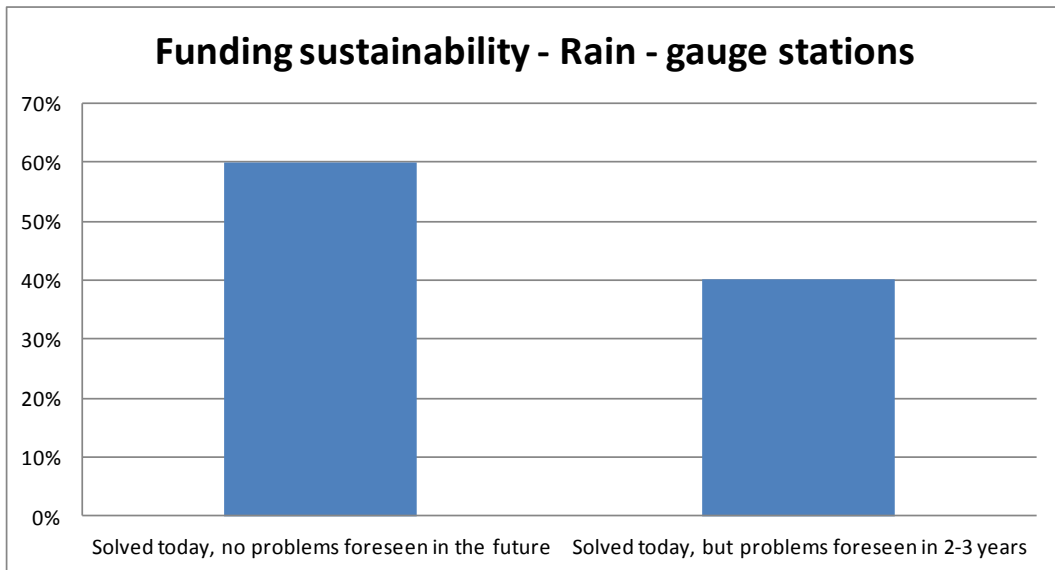
Solar radiation stations

Solar radiation stations networks have funding solved today and 67% have no problems foreseen in the future but 33% will probably have problems with funding in 2-3 years. All of them are funded from institutional funds (annual budget) in combination with some other funds.



Rain – gauge stations

Rain – gauge stations networks have funding solved today and 60% have no problems foreseen in the future but 40% will probably have problems with funding in 2-3 years. Funding resources for 80% are from institutional funds (annual budget) in combination with some other funds and 20% are funded from national research funds.



Lightning detection stations

Lightning detection stations networks have funding solved today for 6 of them and have no problems foreseen in the future with the funding from institutional funds (annual budget). One has funding solved today but problems foreseen in 2-3 years with the funding from institutional funds (annual budget). One has no funding today but has plans under way to gain funding in the near future through the EU and one has no funding today with any plans to gain funding in the near future.

Soil temperature stations

Soil temperature stations networks have funding solved today for 5 of them and have no problems foreseen in the future with the funding from institutional funds (annual budget). Four have funds today but some problems are foreseen in the next 2-3 years.

Sea surface temperature stations

All of the sea surface temperature networks covered in the analysis are funded from institutional funds (annual budget) and five of them have a sustained system but one of them will have problems with the funding in 2-3 years.

Soil moisture stations

Soil moisture station networks have funding solved today for 3 of them and have no problems foreseen in the future with the funding from institutional funds (annual budget) and 2 of them have funds today but some problems are foreseen in the next 2-3 years. One has no funding today but plans for funding in the near future are under way from other EU funds.

4.4. Analysis by Country

From the information extracted from each country (table below) we can conclude that most of the countries responding to the survey have funding today with no problems foreseen in the future. However, some countries (Serbia, Bosnia and Herzegovina, and Estonia) will have problems with funding in 2-3 years.

Note that the information in the table is not complete: many national institutions have not answered the questionnaire and therefore the colours in the table could change accordingly.

Table: Summary of sustainability of observing platform by Country

	Synoptic stations	Climate stations	Weather radar stations	Upper-air stations	Solar radiation stations	Rain-gauge stations	Lightning detection stations	Soil temperature	Sea surface temperature	Soil moisture
Armenia	Yellow									
Bosnia and Herzegovina	Yellow									
Croatia	Green	Green	Green	Green	Green	Green	Orange	Green	Green	Orange
Cyprus										Green
Czech Republic	Green		Green	Green						
Denmark	Yellow									
Estonia	Yellow	Yellow	Yellow	Green	Yellow	Yellow	Green	Yellow		
Finland	Green		Green	Green					Green	
France	Green									
Georgia	Green	Yellow				Yellow	Green	Yellow		Green
Hungary	Green	Green	Green	Green	Green	Yellow	Green	Green		Yellow
Iceland	Yellow									
Italy	Green									
Latvia	Yellow									
Luxembourg	Green	Green			Green	Green		Green		
Malta		Red					Red			
Netherlands		Blue		Blue	Yellow			Yellow		Yellow
Poland									Green	
Serbia	Yellow	Yellow	Yellow	Green	Yellow	Yellow		Green		
Slovakia	Green		Green	Green	Green		Green			
Slovenia	Green	Green	Green	Green	Green	Green	Green	Green		Green
Spain	Green	Green	Green	Green	Green		Green			
Sweden	Green	Green	Green	Green	Green	Green	Green		Green	
Switzerland	Green			Green		Green				
Turkey	Green	Green	Green	Green						
United Kingdom	Yellow	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	

Red	No funding today and no plans for funding in the near future
Orange	No funding today, but plans for funding in the near future is under way
Yellow	Solved today, but problems foreseen in 2-3 years
Green	Solved today, no problems foreseen in the future
Blue	Other
	No information

5. ATMOSPHERIC COMPOSITION OBSERVATION SYSTEMS

5.1. Survey sampling

5.1.1. Number of responses

Only twenty respondents reacted to the survey, a disappointingly low number of responses. The survey request was sent to more than 200 email addresses, namely all country representatives, headquarters and principal investigators of EIONET, ICOS, ACTRIS and IAGOS. No responses have been received from the EIONET network. We expect that in general the response has been low for respondents that currently have and expect for the future sufficient funding. Therefore, the respondents that expect or already experience funding issues will be overrepresented in this study.

5.1.2. Countries represented

We received responses from 11 European countries.

Belgium	Lithuania
Bulgaria	Spain
Finland (4)	Switzerland
Germany (4)	The Netherlands (2)
Italy	UK (2)
Latvia	

5.1.3. Type of networks

Thirteen responses concerned a network of atmospheric composition, the remaining seven responses concerned vertical profiles of atmospheric composition.

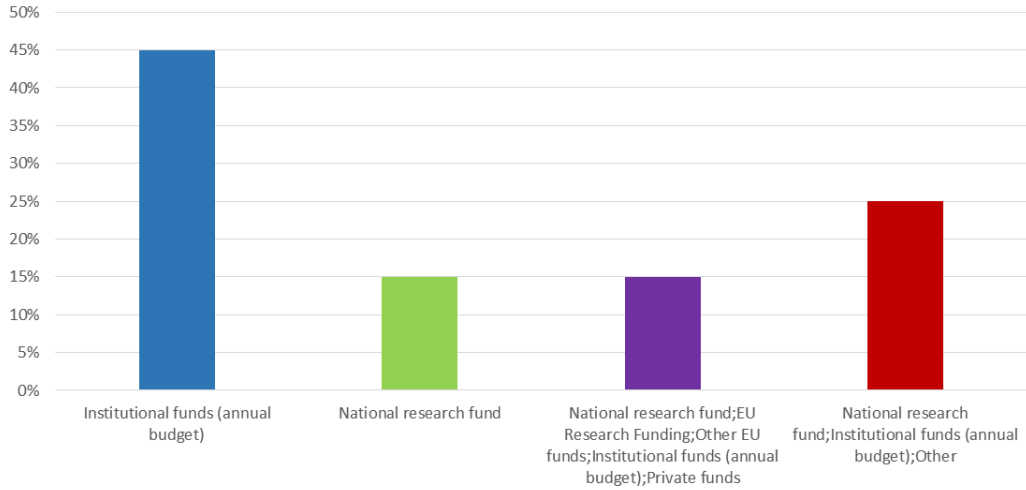
Atmospheric composition	13
Vertical profiles	7
Ecosystem flux	0
Other	0

5.2. Global results

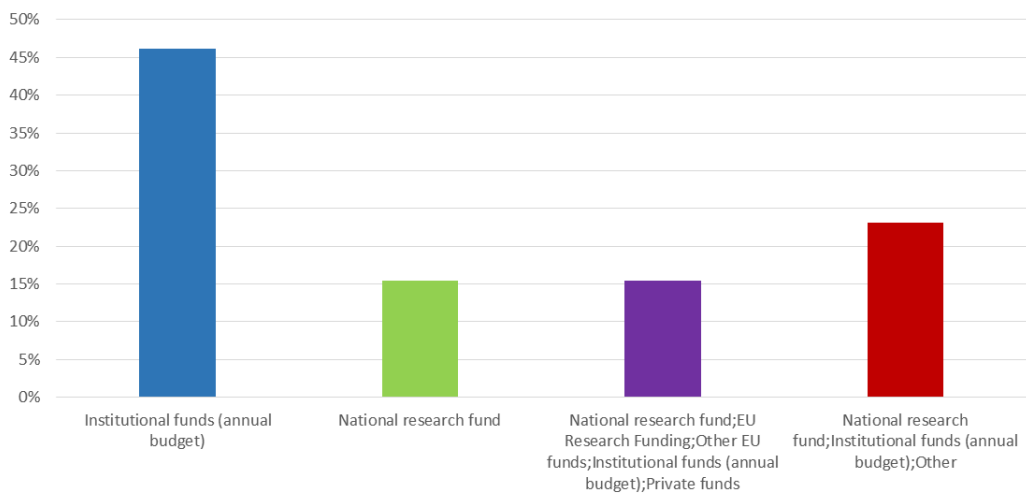
5.2.1. Funding

Most (twelve out of twenty) networks use Institutional budgets for funding, of which three receives also other funding, eight receive (inter)national research and other funding. The situation is very similar for the concentrations network compared to the vertical profile network.

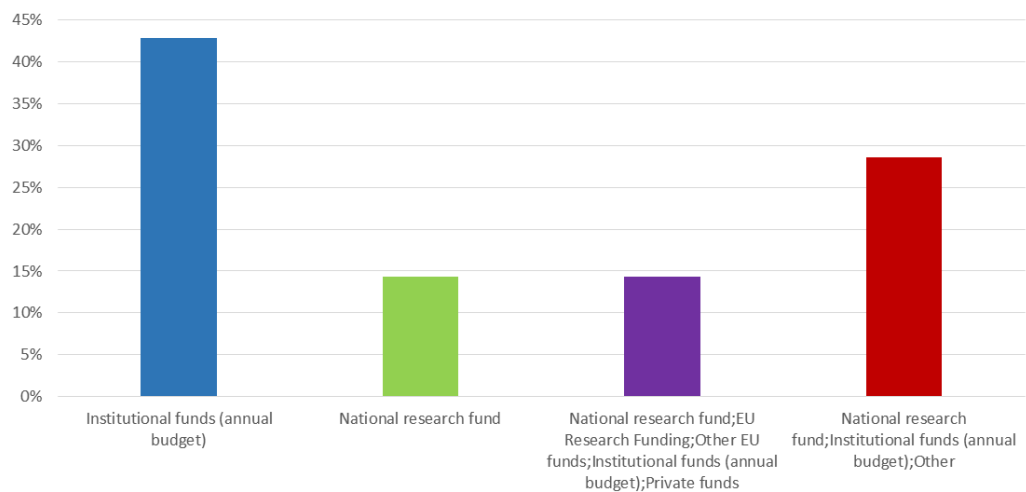
Source of funding
Atmospheric composition - all



Source of funding
Atmospheric composition - concentrations of gases & aerosols



Source of funding
Atmospheric composition - vertical profiles



5.2.2. Funding sustainability

All but six networks indicate that the funding is sustained today and that no problems are foreseen in the future. Eight networks foresee funding problems within the next 2-3 years. The other six networks answer that either no funding is available at this moment already or that problems are expected within the coming one or two years.

5.3. Analysis by country

For the vertical profile measurements only one country does not foresee funding problems in the future. In the below table the situation is summarized per station for the two networks for which we received responses. Only a few networks are safe even after the next 2-3 years, most are under threat either now already or in the near future.

Country	Surface Concentration	Vertical profiles
Belgium		
Bulgaria		
Finland		
Germany		
Italy		
Latvia		
Lithuania		
Spain		
Switzerland		
The Netherlands		
UK		
	Inadequate funding today and no foreseen improvement	
	Solved today, but problems foreseen in 1-3 years	
	Solved today, no problems foreseen in the future	
	No information	

6. SUMMARY AND CONCLUSION

In 2018 the Copernicus In Situ Component conducted a survey to map the funding of – source and sustainability – ocean, meteorological and atmospheric composition in situ observations in Europe. Organisations operating observation platforms within the three mentioned fields were invited to reply to a web-based questionnaire. In total 250 replies were received, when duplications and responses from non- European operators were removed a total of 233 replies forms the basis for the detailed analysis presented in this report – 91 for ocean, 122 for meteorology and 20 for atmospheric composition. The number of replies for ocean and meteorology are satisfactory, while the number of replies for atmospheric composition are below expectations for which reason the analysis results are so differentiated as for ocean and meteorology

The analysis carried out has focussed on funding sources and sustainability of the funding. Regarding the funding source a summary is given in the table below.

Funding source	Ocean	Meteo.	Atm. composition
Institutional funds (annual budget)	28.6%	73.0%	45,0%
National research fund	15.4%	4.1%	
EU Research Funding	4.4%	0.8%	
Institutional funds (annual budget), National research fund	8.8%	5.7%	25.0%
Institutional funds (annual budget); EU Research Funding	3.3%	5.7%	
Institutional funds (annual budget); National research fund; EU Research Funding;	7.7%	0,8%	15.0%
Institutional funds (annual budget) + various combinations of external funding	9,9%	4.9%	15.0%
National research fund; EU Research Funding	7.7%	0.8%	
Various combinations of external funding	14.2%	4.2%	

The analysis shows clear and remarkable differences in the funding in the ocean, meteorological and atmospheric composition communities – 73% of meteorological observations are funded purely by institutional funds, for atmospheric composition the number is 45%, while for ocean observations this funding source only covers just above 28% of the expenses. The remaining part of the observation activity involves additional support from external funds such as research funds (national, EU) and other funds (EU, private) in various combinations.

A similar marked difference is also displayed in the analysis of funding sustainability, see table below:

- 68% of meteorological observation networks have sustained funding while for the remaining: 27% the funding is subject to some uncertainty in the near future and only 2% of the networks seems to have severe problems
- For ocean the picture is nearly opposite – 28 % of the networks have sustained funding, 52% face problems in the near future and 9% have severe problems.

- For atmospheric composition the situation is very similar to one of the ocean with 30% funding sustainability, 40% having problems in the near future and most worrisome entire 30% have severe problems

Funding sustainability	Ocean	Meteo.	Atm. Composition
Solved today, no problems foreseen in the future	28%	68%	30.0%
Solved today, but problems foreseen in 2-3 years	52%	27%	40.0%
No funding today, but plans for funding in the near future is under	7%	3%	
No funding today and no plans for funding in the near future way	9%	2%	30.0%
Other	4%		

Conclusion from the performed funding sustainability survey and subsequent analysis of responses are:

- The relatively high degree of sustained institutional funding for meteorological in situ observations clearly reflects the way the meteorological community is organised via one national meteorological service with national responsibilities but also with clear international commitments to contribute to the global meteorological observation network under WMO.
- Only around 30% of ocean and atmospheric composition in situ observations have sustained institutional funding, while the remaining part is dependent on external funding primarily linked to research funds (national or EU) with the degree of uncertainty and time limitation that this implies.
- The clear difference in the funding sustainability in the meteorological, ocean and atmospheric composition communities reflects the fact that the ocean and atmospheric composition communities – as opposed to the meteorological community- do not have the same national and international commitments to monitor the environment on a regular and operational basis, a majority of their observations are linked to research activities.
- The ocean and atmospheric composition communities therefore need to take a different strategic approach towards a sustained in situ observation network than the meteorological community.
- Important components of future strategies towards sustained in situ observations will be regular mapping of user requirements, cost benefit analysis, national and international commitments as well as free and open exchange of data. Copernicus – services and the in situ coordination component – can play a vital role in this strategic work in Europe

APPENDIX 1 ENDORSEMENT LETTERS



EG18.15
3 October 2018

For attention of:
Copernicus In situ Coordination Group

Re: Sustainability report on ocean and meteorological observations

As the European component of the Global Ocean Observing System of IOC-UNESCO and as advocates of the future EOOS (Europe Ocean Observing System) we welcome the recent publication on sustainability of the meteorological and ocean observing systems. The Sustainability Report was circulated to the EuroGOOS membership and discussed as an agenda item at our General Assembly of members. The membership agree that this is valuable report which clearly reflects key areas for concern and will provide a useful baseline document to underpin establishment of more sustainable networks for the future.

Yours sincerely,



Dr. Glenn Nolan
Secretary General
EuroGOOS AISBL



Thursday, 13 December 2018

For the attention of:
Copernicus In situ Coordination Group

Dear Madam/sirs

Subject: Sustainability report on ocean and meteorological observations

As the European Network of Meteorological Services, EUMETNET welcomes the recent publication on sustainability of the meteorological and ocean observing systems.

The Sustainability Report was circulated to the EUMETNET membership and discussed as an agenda item at our Policy and Finance Advisory Committee and eventually endorsed by the General Assembly of Members which met in Zagreb, Nov 22, 2018.

Although meteorological networks seem to be more secured in the long-term than e.g. ocean observation networks, the EUMETNET members agree with the general conclusions of the report and share the overall concerns. As you may know many countries still apply fees for data access in order to ensure funding levels that maintain their networks. If there was to be a rush to implement free and open data, some networks would be under threat.

Members also agreed that the report should be updated regularly if it is to provide a useful baseline to underpin the establishment of more sustainable networks for the future.

Yours sincerely,
Eric Petermann, Executive Director



Henrik Steen-Andersen
EEA Copernicus in-situ Coordination
European Environment Agency

March 11th 2019

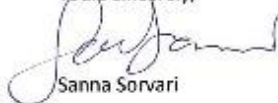
Dear Henrik,

Many thanks for making the Board of European Environmental Research Infrastructures (BEERi) aware of the recently published report on sustained funding of in-situ observations for the Copernicus Services. An interesting perspective of the long-term sustainability of in-situ observations across the meteorological, oceanographic and atmospheric composition domains is provided. We note that the study found that while funding for meteorological observations are generally well established in the responsible institutes with robust funding sources for several years to come, the situation in oceanography and the atmospheric composition community is far from sustainable with ca. 25% of oceanographic observations funded with institutional funds into the medium term. The BEERi concurs with the main conclusions and proposed actions, namely:

- 68% of meteorological observation networks have sustained funding while for the remaining: 27% the funding is subject to some uncertainty in the near future and only 2% of the networks seems to have severe problems
- For ocean the picture is nearly the opposite – 28 % of the networks have sustained funding, 53% face problems in the near future and 9% have severe problems.
- For atmospheric composition the situation is very similar to that of the ocean with 30% funding sustainability, 40% having problems in the near future and worryingly, 30% have severe funding problems.
- The ocean and atmospheric composition communities therefore need to take a different strategic approach towards a sustained in situ observation network than the meteorological community.
- Important components of future strategies towards sustained in situ observations will include regular mapping of user requirements, cost benefit analysis, national and international commitments as well as free and open exchange of data. Copernicus – services and the in situ coordination component – can play a vital role in this strategic work in Europe.

The BEERi members agree that this is valuable report which clearly reflects key areas for concern and will provide a useful baseline document to underpin establishment of more sustainable networks for the future. BEERi members will make its findings known to decision makers in their respective research infrastructures and funding entities.

Yours sincerely,


Sanna Sorvari

Chair, Board of European Environmental Research Infrastructures

ENVRI+ Project

APPENDIX 2 SURVEY QUESTIONNAIRE

Survey on sustainability of in-situ observations in Europe

Click on the observation network you want to report on:

Atmosphere	Atmospheric Composition	Ocean
<ul style="list-style-type: none"> • Synoptic stations • Climate stations • Rain-gauge stations • Weather radar stations • Upper-air stations • sea surface temperature stations • Solar radiation stations • Lightning detection stations • soil temperature • soil moisture • Other 	<ul style="list-style-type: none"> • Atmospheric composition (concentrations of gases, aerosols) • Ecosystem flux and related parameters • Vertical profile of atmospheric composition (Lidar, FTIR, Aircore, etc) • Other 	<ul style="list-style-type: none"> • ARGO • Gliders • Ferry box • HF-Radars • Animal borne instruments • Ship observations • Fixed platforms/moorings • Other

-
1. Rapporteur
 - a. Name:
 - b. Email:
 - c. Institution:
 - d. Country:

 2. Location of stations:
 - a. Please send a list of positions, or a map with indications of location (position or area of operation) to:

Atmosphere: Ines Srzic (srzic@cirus.dhz.hr)

Atmospheric Composition: Alex Vermeulen (alex.vermeulen@icos-ri.eu)

Ocean: Erik Buch (erik.buch@eurogoos.eu)

3. How is your network funded:
- National Research fund
 - EU Research Funding
 - Other EU funds
 - Institutional funds (annual budget)
 - Private funds
 - other (please specify): _____
4. Funding sustainability:
- Solved today, no problems foreseen in the future
 - Solved today, but problems foreseen in 2-3 years
 - No funding today, but plans for funding in the near future is under way
 - No funding today and no plans for funding in the near future
 - Other (please specify): _____

APPENDIX 3 LIST OF INSTITUTES AND ORGANIZATIONS THAT ANSWERED SURVEY FOR OCEAN COMPONENT

Country	Institution
Belgium	Flemish Government Coastal division
Croatia	Institute of oceanography and fisheries (IOF); Split
Denmark	DMI
EU	Euro-Argo ERIC
Faroe Islands	Faroe Marine Research Institute
Finland	Finnish Environment Institute, Marine Research Center
Finland	Finnish Meteorological Institute
France	CNRS
France	IFREMER
France	METEO-FRANCE
France	nke-instrumentation
France	Shom
France	University of Caen Normandy
Germany	Alfred Wegener Institute Helmholtz Center for Polar and Marine Research
Germany	Federal Maritime and Hydrographic Agency (Bundesamt für Seeschifffahrt und Hydrographie - BSH)
Germany	GEOMAR Helmholtz Centre for Ocean Research Kiel
Germany	Institute for Coastal Research, Helmholtz-Zentrum Geesthacht
Germany	IOW
Greece	Hellenic Centre for Marine Research
Ireland	Marine Institute
Ireland	National University of Ireland, Galway
Israel	Tel-Aviv University
Israel	The Hebrew University
Italy	Consiglio Nazionale delle Ricerche
Italy	Distretto Ligure delle Tecnologie Marine
Italy	ISMAR-CNR (Italy)
Italy	Istituto di Scienze Marine - Consiglio Nazionale delle Ricerche (CNR-ISMAR)
Italy	Istituto Nazionale di Oceanografia e di Geofisica Sperimentale, OGS
Italy	Universita Parthenope di Napoli & CoNISMa
Latvia	Latvian Environmental, Geology and Meteorology Centre
Malta	Physical Oceanography Research Group, University of Malta
Netherlands	Rijkswaterstaat
Norway	Nansen Environmental and Remote Sensing Center
Norway	Norwegian Institute for Water Research (NIVA)
Norway	Norwegian Meteorological Institute
Norway	Uni Research Climate, Uni Research, and Geophysical Institute, University of Bergen
Poland	Instytut Meteorologii i Gospodarki Wodnej Państwowy Instytut Badawczy
Portugal	Instituto Hidrografico
Portugal	IPMA Portuguese Institute for the Ocean and Atmosphere
Scotland	Scottish Association For Marine Science
Scotland	University of St Andrews
Slovenia	National Institute of Biology
Spain	EUSKALMET (Directorate of Emergencies and Meteorology, Basque Government). Systems operated by AZTI
Spain	Instituto Español de Oceanografía
Spain	INTECMAR - Consellería do Mar - Xunta de Galicia

Spain	Oceanic Platform of the Canary Islands -PLOCAN-
Spain	PUERTOS DEL ESTADO
Spain	SOCIB - Balearic Islands Coastal Observing and Forecasting System
Spain	University of Vigo
Sweden	Swedish Maritime Administration
Sweden	Swedish Meteorological and Hydrological Institute (SMHI)
UK	Cefas
UK	Met Office
UK	Sir Alister Hardy Foundation for Ocean Science
UK	University of Plymouth
UK	University of East Anglia

List of institutes and organizations that answered survey for meteorological component

	Country	Institution
1	Armenia	Service of the Hydrometeorology and Active Influence on Atmospheric Phenomena
2	Bosnia and Herzegovina	Federal Hydrometeorological Institute FBiH
3	Croatia	Meteorological and Hydrological Service
4	Cyprus	Department of Meteorology, Ministry of Agriculture Rural Development and Environment
5	Czech republic	CHMI
6	Czech Republic	CZECH HYDROMETEOROLOGICAL INSTITUTE
7	Denmark	Danish Meteorological Institute
8	Estonia	Estonian Environmental Agency
9	Finland	Finnish Meteorological Institute
10	France	METEO-FRANCE
11	Georgia	The National Environmental Agency
12	Hungary	Hungarian Meteorological Service
13	Iceland	Icelandic Meteorological Office (IMO)
14	Italy	Italian Air Force - Meteorological Service
15	Latvia	Latvian Environmental, Geology and Meteorology Centre
16	Luxembourg	ASTA / administration des services techniques de l'agriculture
17	Luxembourg	MeteoLux
18	Luxembourg	Administration de la gestion de l'eau - Service hydrométrie
19	Malta	Physical Oceanography Research Group, University of Malta
20	Netherlands	NIOZ - Royal Netherlands Institute for Sea Research
21	Netherlands	KNMI
22	Poland	Instytut Meteorologii i Gospodarki Wodnej Państwowy Instytut Badawczy
23	Serbia	Republic Hydrometeorological Service of Serbia
24	Slovakia	Slovak Hydrometeorological Institute
25	Slovenia	Slovenian Environment Agency
26	Spain	AEMET
27	Spain	SOCIB - Balearic Islands Coastal Observing and Forecasting System
28	Sweden	SMHI
29	Switzerland	Federal Office of Meteorology and Climatology MeteoSwiss
30	Turkey	Turkish State Meteorological Service
31	United Kingdom	Met Office

List of institutes and organizations that answered survey for the atmosphere composition component

Country	Institution
Belgium	Royal Belgian Institute for Space Aeronomy
Bulgaria	Institute for Nuclear Research and Nuclear Energy
Finland	University of Helsinki
Finland	Finnish Meteorological Institute
France	LSCE (CEA/CNRS/UVSQ)
Germany	Karlsruhe Institute of Technology
Germany	Max Planck Institute for Biogeochemistry
Germany	Leibniz Institute for Tropospheric Research (TROPOS), Leipzig
Germany	KIT Karlsruhe
Italy	ENEA
Latvia	Latvian Environmental, Geology and Meteorology Centre
Lithuania	Environmental Protection Agency
Spain	AEMET
Switzerland	Empa - Swiss Federal Laboratories for Materials Science and Technology and FOEN - Swiss Federal Office for the Environment
The Netherlands	KNMI
UK	Plymouth Marine Laboratory
United Kingdom	Met Office