

Manual for EUMETNET AutoPollen site certification

Revision history

Version	Author/Editor	Description	Date
0.1	Marie-Pierre Meurville	First draft	13.12.2024
0.2	Bernard Clot	Review	23.12.2024
0.3	Marie-Pierre Meurville	Comments integration	27.01.2025
0.4	Fiona Tummon	Review	5.02.2025
0.5	Marie-Pierre Meurville	Last draft before sharing for review	26.02.2025
0.6	Marie-Pierre Meurville, Tummon Fiona	Updates after last round of revisions and vote.	01.05.2025
0.7	Marie-Pierre Meurville	Update on the application form procedure, from online to local document.	15.10.2025

Applicable from 24 April 2025.

Useful links and contact

Application form can be downloaded from: <https://autopollen.net/autopollen-network/>

Link to the example digital logbook: https://docs.google.com/spreadsheets/d/15jYRN-MmVLBCt5Ev-fJJGzN8eLerbENWEb8SLRsu9_c/edit?gid=109514969#gid=109514969

Link to the NASA-Ames explanations for AutoPollen data transfer: <https://autopollen.net/nasa-ames-data-file-guideline/>

Link to the EBAS database: <https://ebas.nilu.no/>

In case you have questions or comments about the procedure developed in the current Manual, please contact us at: autopollen.sites@gmail.com.

Purpose of this Manual

This EUMETNET AutoPollen Manual describes the mandatory information to be evaluated so that a site can become certified and join the official AutoPollen monitoring network (Sections 5.2 & 5.5). It establishes the philosophy of how AutoPollen-certified sites should be operated and provides information on how AutoPollen certification can be maintained. There are mandatory requirements that must be fulfilled (distinguished by “must” or “shall”) as well as various recommendations (denoted by “should”). All sites are assessed by the AutoPollen Site Evaluation Committee based on the documents submitted by each site operator. Sites need to be re-evaluated every three years to remain certified.

This Manual recognizes that the AutoPollen network is heterogeneous, e.g., it includes instruments from different manufacturers based on different technologies. The mandatory practices required of AutoPollen sites detailed in this Manual reflect AutoPollen’s primary goal of providing open, comparable data of a known quality while accommodating the diverse capabilities of sites within the network.

This Manual has been evaluated and accepted by the AutoPollen community on the date mentioned in the header “applicable from”.

Contents

Revision history.....	1
Useful links and contact.....	1
Purpose of this Manual.....	2
1. Introduction	4
1.1. Background and purpose.....	4
1.2. Terminology.....	4
1.3. Organisation and operation of the AutoPollen network.....	5
1.4. Role of the Working Team “Quality Control & Measurement Sites”	6
1.5. The Site Evaluation Committee	7
2. Measurements	7
2.1. Essential measurements.....	7
2.2. Managing change	7
2.3. Measurement uncertainty.....	8
3. Data management	9
3.1. Overview of the AutoPollen network data flow.....	9
3.2. The AutoPollen network data policy	9
3.3. Logbook guidelines.....	9
3.4. Data format and submission guidelines	9
3.5. Quality control at the instrument and site level	10
4. Instrumentation	10
4.1. Instrument selection	10
4.2. Measurement evaluation	10
4.3. Calibration and maintenance	10
4.4. Reanalysis of level-0 data	10
5. The AutoPollen network site assessment and certification process	11
5.1. Introduction.....	11
5.2. Mandatory operating protocols	11
5.3. The assessment and certification process.....	11
5.4. Conditions for exclusion from the network	12
5.5. Material evaluated	12

1. Introduction

The EUMETNET AutoPollen programme is establishing a sustainable real-time automatic bioaerosol monitoring network across Europe. This network is maintained and continually improved by the community of the EUMETNET AutoPollen programme through regular meetings, as well as according to reports from AutoPollen working teams and scientific papers published in international peer-reviewed journals.

1.1. Background and purpose

AutoPollen site certification provides a traceable reference for real-time bioaerosol measurements and data transfer, ensuring that data are collected from well-qualified sites and are of high quality.

The purpose of the AutoPollen network is to:

- i. Provide reliable, real- or near-real time bioaerosol measurements;
- ii. Ensure data accessibility;
- iii. Ensure the continuity and homogenization of past and future bioaerosol measurements;
- iv. Keep the present Manual up-to-date with the latest conclusions and guidelines from the EUMETNET AutoPollen programme and international community in terms of measurement protocols, technological developments, and data management.

All data provided by AutoPollen-certified sites are expected to comply with the mandatory operating protocols detailed in the section 5.2 of this Manual.

1.2. Terminology

Application form: The form filled out by a site manager to apply for AutoPollen site certification.

Evaluation sheet: The form filled out by the AutoPollen Site Evaluation Committee with details about the score assigned to each site.

Level-0 data (raw data): Measurements directly produced by real-time bioaerosol monitors. They are required for any re-analysis with a new identification algorithm to produce a complete time series.

Level-1 data: Airborne concentrations of bioaerosol calculated from the level-0 data.

Logbook: A document to be completed and maintained by the site operator containing metadata and additional information for data traceability (e.g., a change event log). This document is essential for the site certification.

Measurement system: The combination of a bioaerosol monitor and an identification algorithm which includes any pre-/post-processing applied to the level-0 data.

Metadata: Informational data transmitted with level-1 data to the central database, that allow level-1 data traceability. They include complementary information about the measurements and are essential to fully understanding the measurements.

Near-real-time: Data provided within a few hours of production.

Operator: Person(s) responsible for running and maintaining a measurement site, including any instrument(s) and supervision of data transfer.

Real-time: Data provided within a few minutes after production.

Site: The geographic location of a monitoring device. Several monitoring devices may be located at the same site.

See more definitions in [Galán et al., \(2017\)](#) and Tummon et al., (2025, submitted).

1.3. Organisation and operation of the AutoPollen network

- I. The AutoPollen network operates under the auspices of the EUMETNET AutoPollen programme (Figure 1).
- II. Coordination and development of the AutoPollen network is performed by the working team “Quality Control & Measurement Sites”, composed of individuals with scientific and operational expertise relevant to automatic bioaerosol monitoring.
- III. The AutoPollen Site Evaluation Committee is composed of members from the AutoPollen community, elected by the AutoPollen community during the AutoPollen Annual Meeting.
- IV. The Site Evaluation Committee uses the application (this includes the site description, an example NASA-Ames datafile, and a logbook) to assess whether a site fulfills the criteria described in this Manual and makes the decision on site certification. An assessment form is provided to each applicant, including the grade for the site and whether it is certified or not.
- V. The AutoPollen programme ensures that standard operating procedures are followed and, once a CEN specification developed, that these guidelines are followed.
- VI. The AutoPollen programme is responsive to the latest technological and scientific progress through, for example, the regular organisation of intercomparison campaigns.
- VII. Decisions on the AutoPollen network and the present Manual are taken by the AutoPollen community during the AutoPollen Annual Meeting (a majority being required for acceptance). Therefore, the present Manual can be updated yearly.

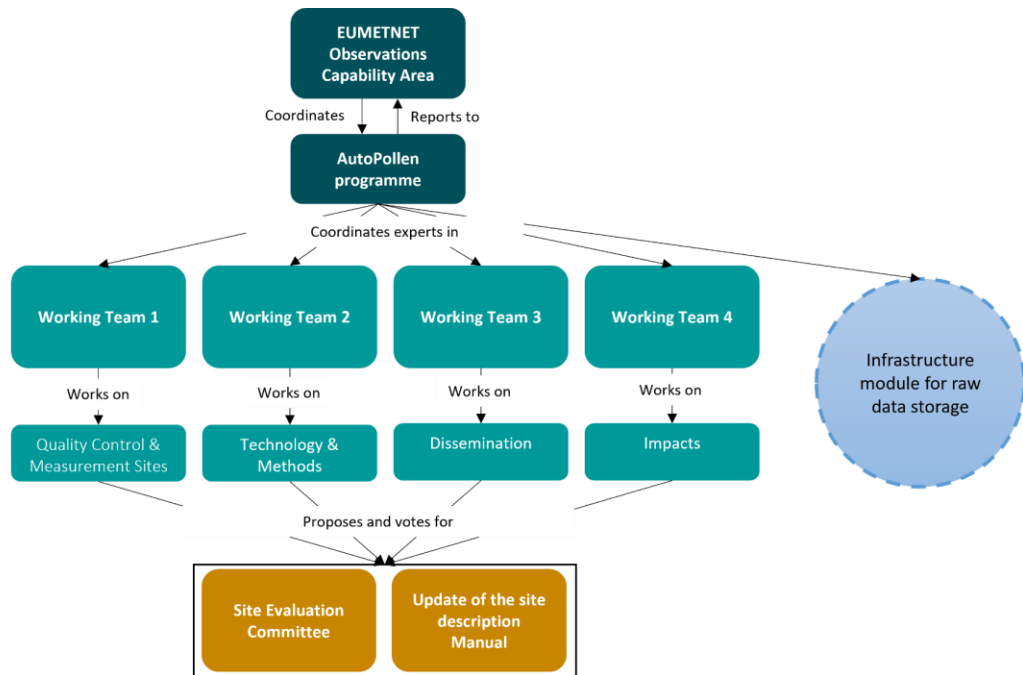


Figure 1. Overview of the organisations that are responsible for the AutoPollen network. The AutoPollen programme is coordinated and reports to EUMETNET. The AutoPollen community is split into four working teams, each of them working to achieve objectives. The working team “Quality Control & Measurement Sites” is, among other tasks, in charge of updating the current Manual. The whole community elects the Site Evaluation Committee annually. The Infrastructure module for raw data storage is being developed.

The current Manual can be updated yearly. During the year, the Site Evaluation Committee as well as the AutoPollen community can make suggestions. They will be collected by the AutoPollen Programme Manager and Scientific Coordinator, who will propose updates. The updated Manual will be voted during the AutoPollen Annual Meeting.

1.4. Role of the Working Team “Quality Control & Measurement Sites”

- I. The coordination of the AutoPollen network shall be guided by the EUMETNET AutoPollen programme, in particular the working team “Quality Control & Measurement Sites” (Figure 1).
- II. The AutoPollen working team “Quality Control & Measurement Sites” will provide support to help site operators complete the site documentation before evaluation.
- III. Specific activities in support of AutoPollen network operations, such as running intercomparison campaigns, will be carried out with other AutoPollen working teams. These tasks will entrain operational and other relevant expertise in support of the AutoPollen network.

1.5. The Site Evaluation Committee

The Site Evaluation Committee is made up of five experts elected on a yearly basis by the AutoPollen community at its Annual Meeting. All Site Evaluation Committee members are to be part of the AutoPollen Working Team “Quality Control & Measurement Sites”. They can be re-elected for as long as they are willing to serve on the committee.

The Site Evaluation Committee meets virtually three times a year to evaluate sites based on the documentation provided by applicants. This includes a complete site description, an example NASA-Ames data file as well as a site logbook complying with AutoPollen requirements. Site Evaluation Committee members will not participate in any evaluations of sites that they operate.

Should an evaluation be contended by a site operator, a discussion between the Site Evaluation Committee, the operator and the programme manager will be arranged. This discussion should allow the operator to explain any disagreements with the conclusions of the Site Evaluation Committee, and the members of the Site Evaluation Committee to justify or modify any decisions as needed.

2. Measurements

2.1. Essential measurements

The AutoPollen network aims to provide homogenous automatic bioaerosol measurements of a known quality across Europe. In this Manual, we consider the term bioaerosol to cover both pollen and fungal spores, but not bacteria or viruses since these are beyond the scope of the AutoPollen programme. The AutoPollen programme acknowledges that, in the future, it may be possible to identify other particle types with the same instrument, such as airborne microplastics, and these measurements will be integrated into the network when sufficient accuracy has been proven operationally.

2.2. Managing change

The purpose of this section is to describe the protocols for managing change within the AutoPollen network. AutoPollen will inevitably have to account for changes at sites across the network. This includes, but is not limited to, changes in:

- i. Instrumentation
- ii. Identification and data processing algorithms
- iii. Operating procedures
- iv. Instrument location
- v. The site operating environment

These changes will hereafter collectively be referred to as “change events”. Change events (i) to (iv) are punctual, while change event (v) is typically a gradual process and can induce trend-like drifts in the measurements. Change events are thus likely to introduce sources of uncertainty into data

products so it is important to keep track of them in the site logbook and to re-evaluate site certification every three years.

When changing from one measurement device to another, e.g., from manual to automatic, it is recommended to ensure a period of parallel measurements of at least 2-3 years to facilitate the homogenisation of measurements.

The AutoPollen community will provide recommendations regarding particle identification algorithms for the measurement systems used across the network. This is to ensure that a community-accepted algorithm is applied across the network. As most measurement systems can run several identification algorithms in parallel, the use of more locally-adapted algorithms is not excluded.

Changes in the site surroundings, e.g., construction of new buildings or plantation of trees, may alter the quality of a measurement by modifying atmospheric turbulence and/or the quantity and type of bioaerosols present in the local atmosphere. It is important that such events are recorded when they occur so that they can be identified as potential breakpoints in a time series. In general, sites where urban development is very likely should be avoided so that measurements are not strongly influenced by local environmental changes. It is recommended to consult with the local government when planning a new site. Should a site be relocated for any reason, the site will need to be re-certified by the AutoPollen Site Evaluation Committee.

All change events must be documented in the logbook and change events of type (i), (ii), (iv) and (v) will also engender changes in the metadata submitted with the level-1 data. Therefore, the site operator does not need to announce these changes to the AutoPollen Network, unless any of the mandatory operating protocols are not met anymore.

2.3. Measurement uncertainty

The AutoPollen programme acknowledges that bioaerosol measurements will always be subject to a certain level of uncertainty. To achieve the best quality measurements possible, the AutoPollen network will include only instruments that have been CEN-certified. Until such a certification process has been finalised, the measurement systems used in the AutoPollen network will need to have been evaluated in an AutoPollen intercomparison campaign.

Instrument calibration procedures are currently being developed for real-time bioaerosol measurement systems. Calibration curves for particle number counts can be determined for airflow cytometers using optical particle counters in certified laboratories (this is routinely carried out for air quality monitors). For systems based on impaction, alternative methods are being developed. For both instrument types, there is presently no quantifiable way to validate particle identification in a traceable manner. At present, the only available method is to evaluate measurements with manual observations from Hirst-type traps, which ideally should be co-located with the automatic instrument. Such evaluation needs to take into account the uncertainty of both measurement techniques (i.e., manual and automatic).

Once instrument calibration procedures have been more fully developed, they will need to be applied at all AutoPollen network sites. The calibration procedure is the responsibility of the site operator and must be reported in the logbook.

A procedure for calculating measurement uncertainty will be included in the CEN standard for real-time bioaerosol measurements. Until this is available the uncertainty of the identification algorithm should be included in the level-1 data reported.

3. Data management

3.1. Overview of the AutoPollen network data flow

Real-time measurement systems record a wide range of level-0 data from which bioaerosol concentrations are calculated. As algorithms and technologies will continue to develop, it is essential that all level-0 data are archived for future re-analyses with new identification algorithms to ensure coherent long time series. At present the archiving of level-0 data remains the responsibility of the site operator, however, as of 2027 the AutoPollen programme will integrate the SYLVA IT infrastructure, and thus provide the possibility to archive level-0 data for network participants.

Level-1 data must be uploaded to the NILU EBAS database in NASA-Ames format^{1,2} (see section 3.4).

3.2. The AutoPollen network data policy

- i. The aim of the AutoPollen network is to provide users with real- or near-real time level-1 data. These must be made available under a fully open data policy.
- ii. Level-0 data produced by an AutoPollen-certified site should be made accessible to the AutoPollen community at least under a Restricted Open Data policy (i.e. data can be used by the community for research, model training or reanalyses for example, but can not be shared or reproduced).
- iii. All level-0 and level-1 data belong to those who produced them.

3.3. Logbook guidelines

A logbook must be completed for each site. The logbook contains general information about the site, such as the site code (AutoPollen / EBAS and national identifiers), location, and operator contact information. Furthermore it includes information about each automatic bioaerosol monitor at the site, such as the instrument model and manufacturer, where raw data are stored, and the identification algorithm used. Further details about the content of the logbook can be found in section 5.5.6.

¹ <https://ebas.nilu.no/>

² <https://ebas-submit.nilu.no/templates/Bioaerosols/lev2>

3.4. Data format and submission guidelines

Level-1 data from AutoPollen-certified sites must be submitted to the EBAS database following the AutoPollen guidelines and in NASA-Ames format. A guide to producing the NASA-Ames data files can be found on the AutoPollen website³. The “Quality Control and Measurement Sites” working team can provide support for setting up the data-transmission process.

In case an instrument already submits data to EBAS, an example NASA-Ames file must be provided. If the site does not already submit data, AutoPollen will provide, after the site has been certified, the material and contacts necessary for the data transfer to EBAS.

3.5. Quality control at the instrument and site level

The AutoPollen Programme has established a set of Key Performance Indicators (KPI) that are used to assess network performance. They are reported on a quarterly basis to EUMETNET. Information regarding data availability and timeliness of data submission are provided for each instrument and used to compile the overall KPIs. Such reports are sent to the AutoPollen Programme Manager and Scientific Coordinator, who will communicate summaries to the AutoPollen programme community.

If measurements provided by a site do not meet the AutoPollen KPIs, the AutoPollen Site Evaluation Committee will contact the site operator and discuss how the data submission can be improved to reach these goals.

4. Instrumentation

4.1. Instrument selection

Periodic instrument and algorithm intercomparisons are carried out by the AutoPollen Programme, with the aim of regularly evaluating real-time bioaerosol measurement systems. Until the CEN certification process has been established, the conclusions of these intercomparison campaigns will define which instruments and algorithms can be used at AutoPollen-certified sites.

4.2. Measurement evaluation

It is not necessary for a site to have multiple instruments to be AutoPollen-certified. However, at present, it can be useful to have manual measurements in parallel for the evaluation of the automatic measurement system.

4.3. Calibration and maintenance

³ <https://autopollen.net/nasa-ames-data-file-guideline/>

When available, each instrument must be calibrated following CEN recommendations. Each calibration must be noted in the logbook.

It is the responsibility of the site operator to ensure that each instrument is properly maintained following manufacturer recommendations or CEN specifications. This is to avoid degradation of the measurement quality.

4.4. Reanalysis of level-0 data

The level-1 data submitted to the EBAS database are produced with a particular identification algorithm. As algorithms are improved and new particle types can be identified, level-0 data will need to be reanalysed to produce new, complete time series. These new level-1 data will need to be re-submitted to the EBAS database, which will store the newest version of the data in addition to previous versions. It is therefore highly recommended to archive level-0 data.

5. The AutoPollen network site assessment and certification process

5.1. Introduction

This section outlines the process by which a site becomes and remains certified as part of the AutoPollen network. Site certification is crucial to ensure the delivery of the known quality data to end users. The AutoPollen network provides scientific and technical support to site operators, as well as regularly updated recommendations regarding a variety of aspects such as measurement techniques, data submission protocols, and uncertainty calculations. This section lists the concrete information that must be provided by a site operator for the AutoPollen Site Evaluation Committee to assess the site for certification. The evaluation process is designed to be as transparent as possible, with templates for the evaluation and site description provided. The Site Evaluation Committee will provide an assessment form with detailed information about the grading of the site.

5.2. Mandatory operating protocols

The AutoPollen community has decided on a set of mandatory criteria that must be fulfilled for a site to be certified. Not meeting one of these criteria will exclude it from becoming an AutoPollen certified site. The minimum mandatory requirements are as follows:

- I. Measurements must be made with an automatic bioaerosol measurement system that has been evaluated in an AutoPollen intercomparison campaign. When CEN certification has been established, instruments will need to be CEN-certified.
- II. The measurement system and site must be planned for use in long term monitoring (at least five years).
- III. The measurement system must at least be able to differentiate between pollen taxa.

- IV. The measurement system must be regularly calibrated following the CEN standard when this becomes available. In the interim, standard operating procedures are being developed by AutoPollen and will need to be followed, and manufacturer recommendations must be followed.
- V. The site logbook needs to be kept up to date.
- VI. Level-1 data must be submitted to the EBAS database under a fully open data policy.
- VII. The level-1 data must be automatically submitted to EBAS, in real- or near-real-time.

5.3. The assessment and certification process

Each site is required to submit a complete description through a digital form⁴ and certify that a logbook⁵ following AutoPollen recommendations is regularly updated. The form and annex documents (maps and pictures) must be combined into a zip file and sent to autopollen.sites@gmail.com. Should the zip file be too large to be shared by email, a download link can be sent to the same email address, at the applicant's convenience.

This material will be evaluated remotely by the AutoPollen Site Evaluation Committee within four months, using the criteria described in section 5.5. If instruments send data to EBAS, an example NASA-Ames file is requested. If data are not yet submitted to EBAS, an example NASA-Ames file must still be provided (even not complete). Once a site is certified, AutoPollen will provide the necessary metadata and help with establishing the automatic submission of data to EBAS⁶.

Each criterion is graded with a maximum of 5 points obtainable. These points provide an indication of how well each site meets the criteria specified in this Manual. A maximum of 20 points can be obtained for sites that fully meet all criteria. Should a site obtain less than 20% of the maximum number of points, the site will need to be improved before it can be evaluated again and achieve certification. The result of the evaluation must be made available to the AutoPollen community and can be made available to external data users on demand, with consent of the site operator.

AutoPollen certification remains valid for three years, unless decided otherwise. Six months before the end of the certification period, the AutoPollen Site Evaluation Committee will request an updated site description. This is to ensure that any changes to the site are taken into account in the new certificate and that logbooks are correctly kept up-to-date. Should evaluation criteria change, the site operator will be notified at the next certification.

If inconsistencies are observed either in the data or the metadata transmitted to the EBAS database, the AutoPollen Site Evaluation Committee can request updated photos of the site or instrument and/or, exceptionally, to evaluate the site in person at any time. This visit would be paired with

⁴ <https://autopollen.net/autopollen-network/>

⁵ https://docs.google.com/spreadsheets/d/15jYRN-MmVLBCt5Ev-fJJGzN8eLerbENWEb8SLRsu9_c/edit?gid=109514969#gid=109514969

⁶ <https://autopollen.net/nasa-ames-data-file-guideline/>

discussions with the operator and scientists responsible for the measurements at the site, and actions could exceptionally be requested to keep the certification.

5.4. Conditions for exclusion from the network

Should a site description intentionally contain false information, the AutoPollen Site Evaluation Committee can decide to not deliver certification. Similarly, should a change event result in any of the mandatory operating protocols (see section 5.2) no longer being met, the AutoPollen Site Evaluation Committee can suspend or cancel site certification.

The operator of a certified site can request that a site temporarily be removed from the AutoPollen network. Such a request must be made directly to the AutoPollen Site Evaluation Committee by email (autopollen.sites@gmail.com) and will be discussed with the site operators. The Site Evaluation Committee should again be informed if and when the site can be integrated back to the AutoPollen network. Depending on the lapse of time, the site description may need to be updated and evaluated again.

Should the site operator participate in the EUMETNET AutoPollen Programme, their participation is not impacted by a site being removed from the network. If the site operator does not participate in the EUMETNET AutoPollen Programme, then the terms of the letter of agreement signed when entering the AutoPollen network must be followed.

5.5. Material evaluated

The site description, logbook, and an example NASA-Ames data file provide all the information needed for the AutoPollen Site Evaluation Committee to assess a site. Should the description, logbook, or data file lack any information, the AutoPollen evaluation team will request the site operator to complete it. Should the operator lack expertise to complete all documentation required, the AutoPollen “Quality Control and Measurement Sites” Working Team will provide help. All documents, including photos, must be provided through the online evaluation form⁷. The following sections detail the information required in the evaluation form.

5.5.1 Basic site identification

For a site to be part of the AutoPollen network, the site description must contain the following basic information:

- Site name and address;
- Institute/Organisation operating the site;
- Contact person’s name and email address;
- Name and email of the person responsible for data submission (if different from the contact person);
- Latitude and longitude, and altitude in metres above sea level;

⁷ <https://forms.gle/j3rnWi98YfYFLGZm8>

5.5.2 Maps of surrounding land-use and vegetation

The site description must contain three maps of the surrounding area. The maps must display three aspects:

- vegetation,
- altitude-elevation curves,
- land-use.

Maps must take a similar form to that described in [Saar and Meltsov \(2011\)](#), with three levels of complexity including:

- the immediate surroundings (within 100 m of the site, Figure 2 A),
- the adjacent surroundings (within 1 km, Figure 2 B),
- the distant surroundings (within 30 km, Figure 2 C).

Maps of the surrounding plant communities as well as the estimated land coverage of wind-pollinated plants must be provided for both the immediate and adjacent areas. For the map of distant surroundings, a more generic land-use cover map, such as the CORINE land cover map, can be used to describe the diversity of land coverage up to 30 km from the site.

All major non-biological particle sources, e.g., major roads, chimneys, etc. must be included on the maps of the immediate and adjacent surroundings.

At least level-2 EUNIS resolution⁸ must be used for all maps. The map of the adjacent site surroundings should use at least level-3 EUNIS resolution.

These maps must be updated when the AutoPollen site certification is to be renewed.

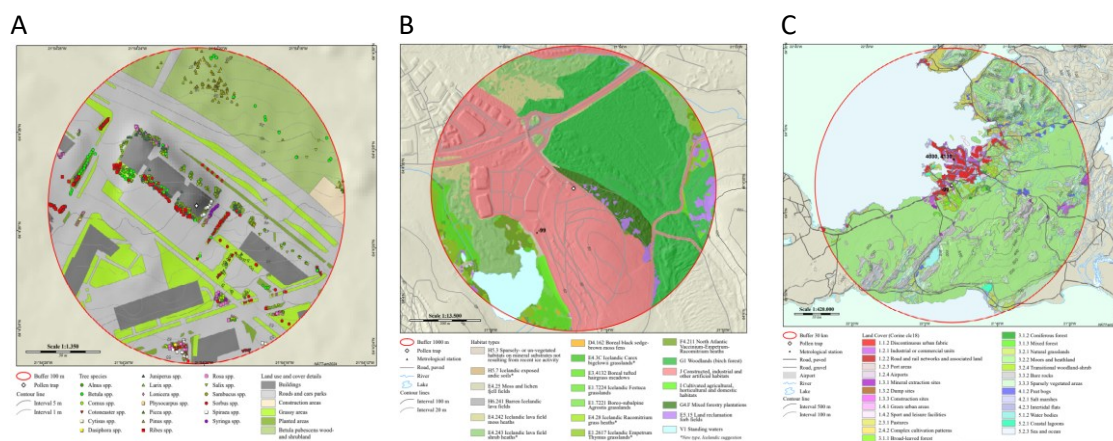


Figure 2: Example maps of A) immediate surroundings (100 m surrounding site), including different land-use types surrounding the sampling site (ideally also includes a list of all major wind pollinated plant species (grasses, herbs, and trees)); B) adjacent surroundings (1 km surrounding site), including different land-use types surrounding the sampling site; and C) distant surroundings (30 km

⁸ <https://eunis.eea.europa.eu/habitats-code-browser-revised.jsp>

surrounding site)), including different land-use types based on the CORINE land-use types. Maps from Garðabær Station, Iceland.

We also require the operator to qualify:

- The site setting, following EBAS guidelines (https://ebas-submit.nilu.no/templates/comments/ss_station_setting)
- The site land-use, following EBAS guidelines (https://ebas-submit.nilu.no/templates/comments/sl_station_landuse)
- The site biogeographical zone, following EBAS guidelines (www.eea.europa.eu/data-and-maps/figures/biogeographical-regions-in-europe-2)

5.5.3 Proximity of local particle sources

The vegetation and land-use maps will be used by the AutoPollen Site Evaluation Committee to assess the proximity of all major particle sources. Higher scores will be attributed to sites located away from major anthropogenic particle sources (stationary or mobile) such as heating chimneys, major roads, waste burning plants, commercial shopping centres, etc, as well as any other major sources of pollen or fungal spores that would strongly influence measurements. Note that the committee will consider the height of these sources and their potential influence on the measurement system(s).

The AutoPollen Site Evaluation Committee will attribute

- *5 points to a site located more than 100 m away from all major particle sources,*
- *3 points for sites located between 50 and 100 m from major particle sources,*
- *0 points for sites located less than 50 m from major particle sources.*

5.5.4 Microscale location:

Each measurement system should be placed on an easily accessible, flat, horizontal surface – ideally on the roof of a building. Each measurement system should be located at least 2 m away from the edge of the surface it stands on to avoid the effects of turbulence. The inlet of the measurement system should be at least 1.5 m above the surface it stands on to avoid micro-scale turbulence generated near the roof surface. The required height of the roof depends on the surrounding topography and obstacles (buildings, trees, etc.), but should ideally be higher than 10m above the surrounding ground^{9,10}.

The measurement system should be placed at a distance of at least four times the height of any objects (e.g., trees, other buildings, Figure 3). Where possible, surrounding trees and other vegetation should be well maintained to have minimal impact on the site (e.g., seasonal pruning). While not currently practical, given the size of most automatic instruments, another option is (when device properties allow it) to install the device on a mast, away from all obstacles, as is done, for example, for wind measurements.

⁹ [Galán et al., 2014](#)

¹⁰ [Rojo et al., 2019](#)

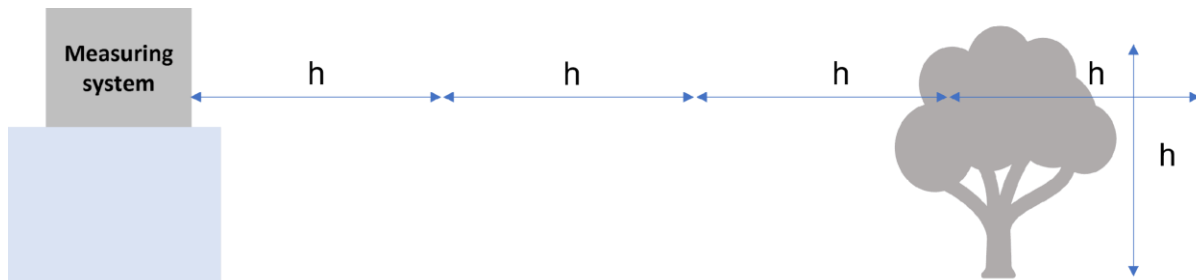


Figure 3. Illustration of the situation where an automatic measuring system is located at a distance of at least four times the height of any objects.

The site description must include the following information, for each measurement system:

- Name or code of the device;
- Model of the measurement system;
- Height of the measurement system's location, in metres above the surrounding ground,
- Height of the device inlet above the surface on which the instrument is located in metres,
- Location of the measurement system - whether on a flat roof or other type of roof, with details if the latter;
- Whether the measurement system is located at least 2 m from the edge of the roof;
- At least one photo of the measurement system as well as of the site surroundings.

The AutoPollen Site Evaluation Committee will attribute

- *5 points if the measurement system is located on a surface higher than 10 m above the surrounding ground, at least 2 m away from the edge of the surface on which it stands, the inlet is at least 1.5 m above the roof surface, and away from all major obstacles that may cause turbulence.*
- *3 points if the measurement system does not comply with one of these requirements.*
- *1 point if the measurement system does not comply with at least 2 of these requirements.*

It is also important for the site operator to provide information regarding the:

- Number and type of obstacles at a distance of < 4 times the height of the obstacle from the device.
- Number and type of obstacles at a distance of < 2 times the height of the obstacle from the device.

The AutoPollen Site Evaluation Committee will attribute:

- *5 points if no obstacles are at a distance of < 4 times the height of that obstacle from the measurement system;*
- *3 points if there are obstacles at a distance between four and two times the height of the obstacles from the measurement system;*
- *0 points otherwise.*

5.5.5 Site accessibility and available infrastructure:

Each site should be easily accessible for any personnel who may have to carry out maintenance or other inspections at any time of the year. Furthermore, the site must provide adequate facilities such as electricity, internet (for data transfer), and security measures against interference (e.g., cigarette smoke produced by people in the vicinity) or theft, as well as to ensure operator safety. Depending on the location, it may be useful to secure the device, e.g., with fencing. Changes in these infrastructures must be included in the logbook.

The site description must indicate if the following infrastructures are available:

- electricity
- data transfer capabilities
- how operator safety is ensured
- security against theft

The AutoPollen Site Evaluation Committee will attribute:

- *5 points if all aforementioned necessary technical and security infrastructures are provided,*
- *3 points if at least one of them is not.*

Note that automatic data transfer capabilities in real- or near real-time is mandatory.

5.5.6 Site logbook:

Each site must maintain a logbook to record and document site operations, particularly any change event that may affect the measurements, safety procedures, or data transfer. This information may be important at a later stage for data validation or homogenisation analyses. The maintenance of an updated logbook does not account for any points since this is a mandatory requirement for certification.

The AutoPollen community recommends using the template for logbooks¹¹. It contains a general logbook for the site as well as individual tabs for each instrument located at the same site. The logbook must be kept up-to-date and be accessible upon request. Even if the AutoPollen logbook template is not used, the following mandatory information about the site and measurement system must be available for consultation at any time:

- Site code (provided by EBAS during the data transfer setup, and national code)
- Location, country, latitude and longitude, altitude above sea level
- Contact person (email, phone number, address)
- The instrument model, manufacturer, device code (if available) and sampling flow
- The instrument altitude (above sea level, above ground, and above the surface where the device stands)
- The current algorithm version

The evaluation form requests the list of elements recorded (action, date, personnel involved, etc.) and the frequency of logbook updates.

¹¹ https://docs.google.com/spreadsheets/d/15jYRN-MmVLBCt5Ev-fJJGzN8eLerbENWEb8SLRsu9_c/edit?gid=569469151#gid=569469151

5.5.7 Data availability:

If data are already submitted to the EBAS database this must be indicated. If level-1 data are available elsewhere, this can also be indicated.

5.5.8 Historical pollen monitoring site:

If the site to be certified has archives of previous data obtained from automatic measurement systems installed at the site, they must be mentioned. If, in parallel to automatic bioaerosol monitoring instruments, data are available from a Hirst-type trap, this must also be indicated and, ideally, also be made available together with a description of the operational protocol. AutoPollen recommends submitting these data to EBAS, following the procedure developed by the European Aerobiology Society (EAS). In the case of automatic and manual instruments being present, the distance between the automatic and manual devices must be indicated.

5.5.9 Meteorological and air quality measurements

If the site also records meteorological variables, they should be detailed. If not, the site description should indicate the location of the closest meteorological station (ideally from a national meteorological agency) and how these data may be obtained (if possible).