

Monitoring manual



Introduction - how to be a scientist

General rules

How does it work

Parameters to be observed and reported

Conclusions

Introduction – how to be a scientist?

Would you like your students to learn first-hand about the weather, climate, water, biology and effects of global climate change on the natural world?

Consider lending a hand to scientists by observing the world around you and reporting what you spot. Information that you and your students will collect as **observers** in **monitoring programme** can be used in numerous investigative studies and are a foundation of the comprehensive climatological study. This data are increasing in importance as the world faces more challenges posed by climate change. Those challenges include: higher temperatures, prolongation of warm seasons, more frequent storms, floods, droughts, and other forms of natural disasters. Even slight change in air temperature and precipitation can upset the delicate balance of ecosystems, and affect plants and animals that inhabit them. Rising temperatures and changing patterns of precipitation are influencing for example time and place of particular plant species occurrence.

Observations taken at fixed locations and fixed time, together with standardized recording format will give accurate data for comparison. Different regions of Europe have different phenological patterns depending on their latitudes, longitudes and heights. Even at the same location, the phenological pattern observed in the past may be quite different from the present.

Although, scientists nowadays have access to data from radars, satellite images, and surface weather stations, technology cannot detect every instance of hazardous weather and phenological change. Observers can help fill in the gaps by reporting hail, strong wind, flooding, heavy snow and storms. Scientists need observers to report when and how storms and other hydrometeorological and phenological phenomena are impacting their area.

As an observer you and your students can act as scientific eyes and ears in the field. Your reports can help meteorologists and climatologists by providing direct, timely, accurate, and detailed observations. Reports also provide critical verification, by confirming the information detected by other instruments or meteorological models. Archived meteorological data can help improving our knowledge and influence the future warning services and climatological modelling.

Remember that personal safety is the primary objective of every observer.

General rules

- ✓ Even though you as registered teachers are supposed to report observations on portal, your students should play a crucial role, make observations and provide you with data required.
- We invite you to report observations conducted by your students in schools' surroundings each Monday. If you are unable to report it on Monday, no worries: you may still do that on Tuesday, but remember to provide information on values accurate for the previous day.
- ✓ Actual values should be reported for 12:00 (Monday) local time.
- ✓ Please note that the system accepts only one report from one location (SCHOOL) per week, therefore if more than one teacher is willing to register data from the same school, there should be e.g. an internal schedule of reporting (who reports when e.g. every 2 weeks).
- ✓ For biotic elements: it may occur that particular species are not observed in your surroundings, in such case you may just **leave the box empty**, but still provide other information.
- ✓ Remember, you get extra points in EDU-GAME: 50 points for registration and 10 points weekly for regular, active participation.

How does it work?

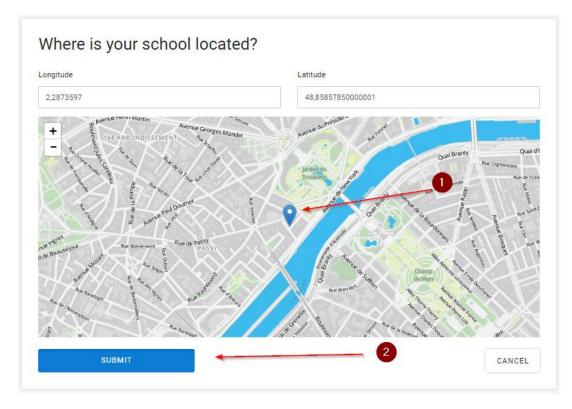
How to register data in the EDU-ARCTIC monitoring system

In order to register data in the EDU-ARCTIC monitoring system please visit the website: http://edu-arctic.eu/program/#measurements and press the "New Measurement" button.

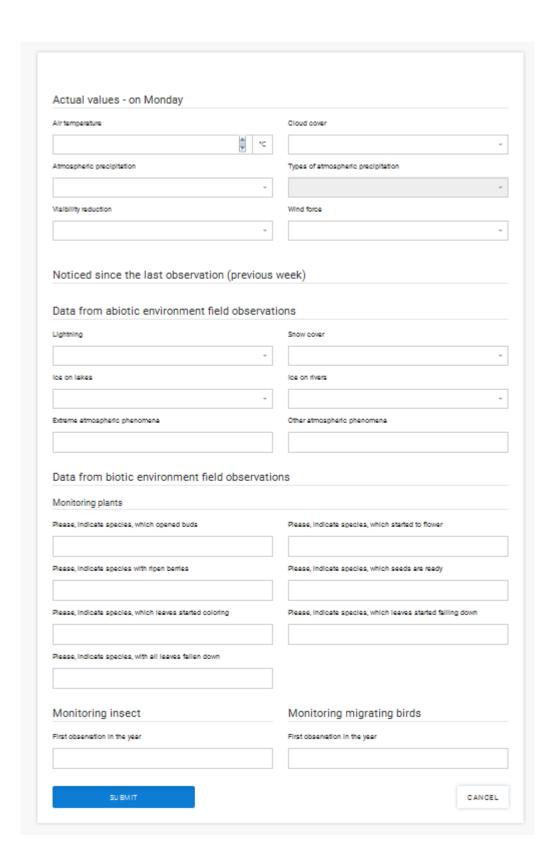
NEW MEASUREMENT

Once you have pressed, the system will ask you to perform the following actions:

- sign in (if you are not logged in) or sing up (if you don't have account)
- confirm your school location please mark the correct location on the map and press "submit" (please see example below).



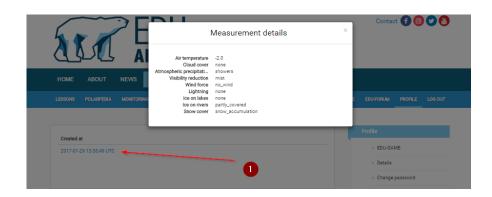
Once done, you will see the form ready for your regular observations. Please fill in that regularly (every Monday) and compare the results provided by other schools.



Once you have filled in, please press the "submit" button.

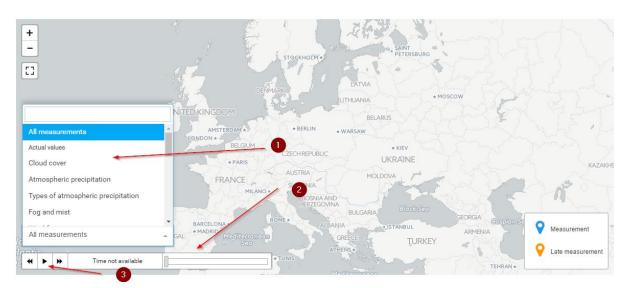
You may check your observation on the map by clicking on your school location. You will also find every of your registered observation in the PROFILE \rightarrow My Measurements section.





Every registered observation is being displayed on the map. You may check various of provided data by selecting each school location (by clicking on the displayed icons on the map).

You may also choose any parameter of your interest, select the date range and press the "play" button on the menu.

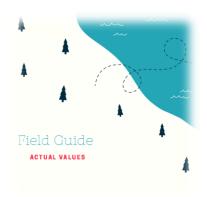


If you would like to compare data, observe variability etc., you can generate reports (.xls format):

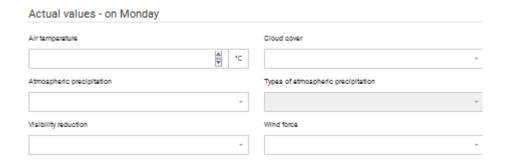




- ✓ Actual values✓ Abiotic environment
- √ Biotic environment plants, insects, birds



Actual values on Monday

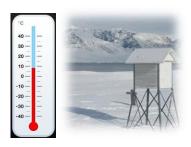


Air temperature (data presented in degrees Celsius).

The air temperature is measured by an ordinary thermometer in degrees Celsius °C. At the meteorological stations thermometers are placed 2 m above the ground in a special white shelter (a Stevenson screen) to shield them against precipitation and direct sunlight, allowing air to circulate freely around them, to provide a standardized environment in which to measure air temperature.

By measuring the temperature of the air we need to remember these tips:

- The correct measurement of the air has to be done outdoor, in the shade, ${\sim}2\text{m}$ above the ground,
- At school or in the house put a thermometer outside the window on the north side.



Phot. 1. Ordinary thermometer is placed inside a Stevenson screen.

Cloud cover (none, partly, completely)



Cloud cover

Cloud is an aggregate of very small water droplets, ice particles or a mixture of both. Cloud cover (or cloudiness) refers to the fraction of the sky obscured by clouds when observed from a particular location. Total cloud amount is the fraction of the sky covered by cloud of any type or height above the ground. Okta is the usual unit of measurement of the cloud cover – from 0 to 8, although for monitoring purpose choose one of the following:

None - represents the complete absence of clouds, when the sky is completely clear	- None	Phot. 2. Stonehengesteinane during beautiful, clear weather (southern Spitsbergen)
Partly cloudy - represents a cloud amount higher than zero but not full cloud cover, so type it if you can see blue sky between clouds	Partly cloudy	Phot. 3. Sørkapp Land (southern Spitsbergen) and cumuliform clouds above
Complete cloud cover - full cloud cover with no breaks or sky obscured by fog or other meteorological phenomena, no sky visible	Complete cloud cover	Phot. 4. Full cloud cover above Hohenlohefjellet (Svalbard)

Atmospheric precipitation (none, showers, continuous)



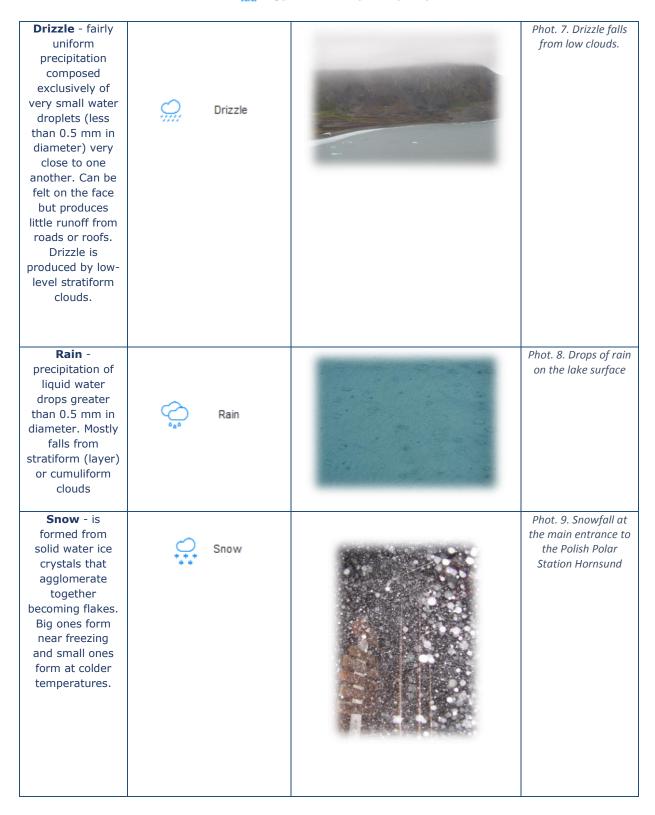
Atmospheric precipitation

Precipitation is water in a solid or liquid form that falls from clouds to the Earth's surface under the influence of gravity. Depending on duration of this phenomena choose one of the following:

None - no precipitation observed	None	Phot. 4. High clouds above meteorological site next to Polish Polar Station Hornsund on Spitsbergen
Showers – precipitation begins and ends suddenly. Relatively short- lived, but may last half an hour. Often, but not always, separated by blue sky. Showers come from puffy clouds or cumuliform clouds, like cumulus or cumulonimbus	Showers	Phot. 5. Showers above Billefjorden
Continuous – precipitation which does not cease after half an hour, or ceases only briefly. May last up to few hours	Continuous	Phot. 6. A view from Fugleberget during rain (southern Spitsbergen)

Types of atmospheric precipitation (drizzle, rain, snow, hoar-frost, hail)

Types of atmospheric precipitation



Hoar-frost - is the coating or deposit of ice that may form in humid air in cold conditions, usually overnight. It is deposited on the ground or loosely attached to exposed objects such as wires or tree branches	**** Hoar frost	Phot. 10. Hoar-frost deposited on rock
Hail - is a form of solid precipitation that consists of balls or irregular lumps of ice, each of which is called a hailstone. Hail is possible within most thunderstorms as it is produced by cumulonimbus	Hail	Phot. 11. Hail (source: CC BY-SA 3.0 by 59Ballons)

Visibility reduction

10000

Visibility reduction

Meteorological visibility is a measure of the distance at which an object or light can be clearly seen.

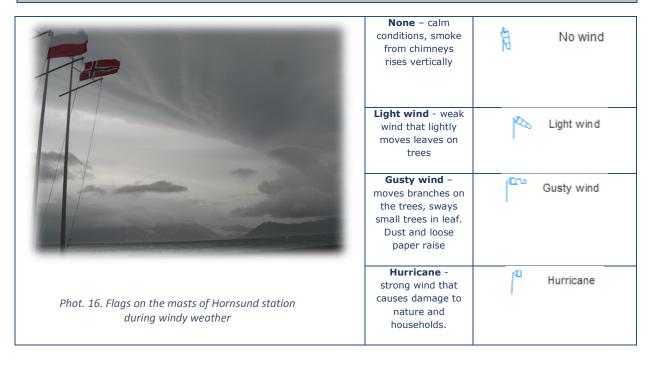
None – good visibility, more than 10 km	None None	Sept 1	Phot. 12. Mountains and glaciers of western Spitsbergen seen from the distance
Mist - restricts visibility to between 1 to 10 km.	== Mist		Phot. 13. Mist above Hornsundfjord

Fog - restricts visibility to 1 km or less	=	Fog	Phot. 14. Fog in Revdalen (southern Spitsbergen)
Smog – a fog in which smoke and other forms of atmospheric pollutants have an important part in causing the fog to thicken, and can have dangerous physiological effects.		Smog	Phot. 15. Smog above Warsaw

Wind force (none, light wind, gusty wind, hurricane)

Wind force

Wind is the horizontal movement of the air mass caused by differences in the atmospheric pressure in the neighboring areas. When a difference in atmospheric pressure exists, air moves from the higher to the lower pressure area. The greater the pressure difference, the higher the wind speed. Wind speed usually is given in meters per second (m/s), in kilometers per hour (km/hr) or on the Beaufort scale (in °B). Choose one of the following:





Noticed since the last observation (previous week) - data from abiotic environment field observations. Collect information on meteorological and hydrological phenomena:



Lightning (none, lightning inside clouds, lightning strikes the ground)



Lightning is a sudden electrostatic discharge between electrically charged regions of a cloud, between two clouds, or between a cloud and the ground, that occurs during thunderstorm. The best shelter from lightning is inside a large enclosed structure, such as your home or school. Avoid contact with the windows. No place outside is safe during a thunderstorm.

Cumulonimbus clouds often form thunderstorms



 $Phot.\ 17.\ Towering\ vertical\ cloud.\ Cumulon imbus\ seen\ above\ Bieszczady\ Mountains\ in\ Poland.$

None – lightning did not appear	○ None	_	_
Lightning inside clouds - happens completely inside the cloud, jumping between different charge regions in the cloud or between separate clouds	Lightning inside clouds		Phot. 18. Lightning inside the clouds (source: CC BY-SA 3.0 by 350z33)
Lightning strikes the ground - lightning that occurs between the cloud and the ground	Lightning strikes the ground		Phot. 19. Lightning strikes the ground (source: CC BY 3.0 by Unfortunately Named)

Extreme atmospheric phenomena (none, flood, whirlwind, avalanche)



Extreme atmospheric phenomena

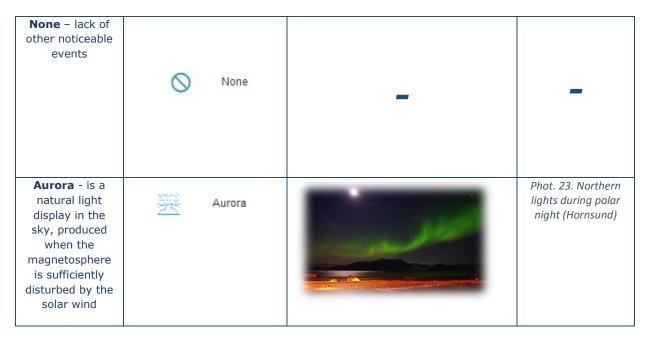
Report any extreme events that happened in previous week in your area (city, town, district) and caused damage on property and nature.

None – lack of extreme events	0	None	_	,	-

Flood - overflow of water that submerges land which is usually dry	Floor		Phot. 20. Flood in Alaska (source: Diocese of Alaska)
Whirlwind - a weather phenomenon in which a vertically oriented rotating column of air forms	Whirlwin	nd	Phot. 21. Whirlwind (source: CC BY-SA 3.0 by NJR ZA)
Avalanche - a rapid flow of snow down a sloping surface	Avalanch	e	Phot. 22. Avalanche on the slope (source: CC BY-SA 3.0 by Scientif38)

Other atmospheric phenomena (none, aurora, rainbow, glazed frost)

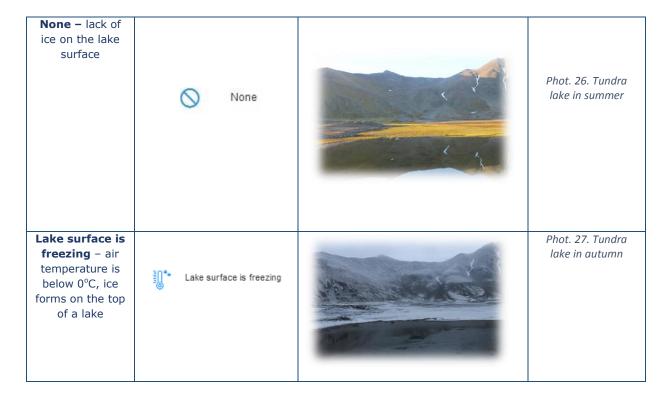




Rainbow - a Phot. 24. Rainbow meteorological above Polish Polar Station Hornsund phenomenon in Rainbow the form of a multicoloured arc, caused by reflection, refraction and dispersion of light in water droplets resulting in a spectrum of light appearing in the sky Glazed frost -Phot. 25. Glazed ice coating frost covering frozen occurring when tundra Glazed frost freezing rain or drizzle hits a surface

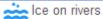
Ice on lakes (none, lake surface is freezing, lake surface is melting, complete ice cover)





Lake surface is Phot. 28. Tundra melting - air lake in spring temperature is above 0°C, ice on Lake surface is melting the top of a lake melts Complete ice Phot. 29. Tundra Complete ice cover **cover** – surface lake in winter of lake completely covered by ice

Ice on rivers (none, partly covered, complete ice cover)





Complete ice cover - river surface is covered with ice





Phot. 32. Complete ice cover over Revelva in Revdalen (Spitsbergen)

Snow cover (none, first snow, snow accumulation, stable snow cover, snow melting)



Snow cover

None – no trace of snow on the ground	None	Phot. 33. Reindeer on tundra during summer
First snow – first observation of snow in autumn (beginning of winter)	First snow	Phot. 34. First snow in Denali National Park (Alaska)
Snow accumulation – snowfall observed in previous 7 days, increase of snow cover thickness compared to that of previous week	Snow accumulation	Phot. 35. Snow accumulation
Stable snow cover - remained almost unchanged to that from previous observation with no (settled and consolidated but did not melt)	Stable snow cover	Phot. 36. Tracks of female polar bear with the cub and arctic fox

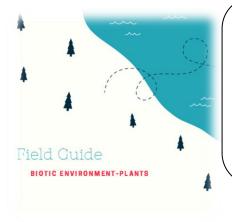
Snow melting decline of snow, surface runoff produced from melting snow



Snow melting



Phot. 37. Measurements of runoff from melting snow



Noticed since the last observation (previous week) data from biotic environment field observations. Collect information on selected common spieces of plants (birch, lilac, rowan, bilberry, rosebay willowherb). Observe note and the most important phenological phases - lifecycle events, influenced by seasonal and interannual variations in climate, as well as habitat factors (such as elevation). This will give approximate dates of first occurrence of biological events in their annual cycle.

Monitoring plants	
Please, indicate species, which opened buds	Please, Indicate species, which started to flower
Please, indicate species with ripen berries	Please, indicate species, which seeds are ready
Please, Indicate species, which leaves started coloring	Please, indicate species, which leaves started falling down
Please, indicate species, with all leaves fallen down	

Birch (Betula pendula)



🚔 Birch

Medium sized tree with white peeling bark (like tissue paper) on the trunk. It's a pioneer tree with low demands. Native to and common in Northern Europe. Its range extends into Siberia, China and southwest Asia in the mountains of northern Turkey, the Caucasus and northern Iran. In southern Europe it appears at higher altitudes. The twigs are slender, reddish brown and noticeably drooping and the leaves are roughly triangular with doubly serrate margins and turn yellow in autumn before they fall. Its drooping branches give it a "weeping willow" appearance. Buds are slender, pointed, green and brown.

In early Celtic mythology, the birch symbolised renewal and purification. Bundles of birch twigs were used to drive out the spirits of the old year.



Phot.39: Birches avenue; http://pixabay.com

Started to Phot. 40 male catkins Started to flower Wikipedia flower - male flowers (catkins) are long and yellow-brown in colour, and hang in groups of two to four at the tips of shoots, like lambs' tails, producing yellow pollen. Female catkins are smaller, short, bright green and erect. Opened buds -Phot. 41. Paula Gordon, Opened buds 2013, buds are small, https://dbaplanbpix.wo pointed, sticky rdpress.com/tag/spring resin that covers -buds/ and permeates the entire bud, open into bright green, sticky, nice-smelling leaves

Leaves started Phot. 42: By Famartin -Leaves started coloring Own work, CC BY-SA coloring -4.0. The foliage is a https://commons.wiki pale to medium media.org/w/index.php green and ?curid=36954291 turns yellow earl y in the autumn befo re the leaves fall (approx.5 - 10% of foliage) **Leaves started** Phot .43: Stephen Leaves started falling down Rowlings, falling down - it http://lossofthenight.bl starts shedding ogspot.de/2014/12/arti leaves to survive ficial-light-andharsh weather trees.html conditions (up to 10% of foliage) All leaves Phot. 44: All leaves fallen down http://unsplash.com fallen down goes dormant for the winter months

Lilac (Syringa vulgaris)



Lilac is a shrub or a small tree, with greyish bark on multiple stems and simple oval leaves. Purple or white flowers grow in large panicles, and are extremely fragrant. Lilac is native to woodland in southeastern Europe to eastern Asia, and widely and commonly cultivated in temperate areas elsewhere.

The wood of lilac is close-grained, diffuse-porous, extremely hard and one of the densest in Europe. The sapwood is typically cream-coloured and the heartwood has various shades of brown and purple. Lilac wood has traditionally been used for engraving, musical instruments, knife handles.

Opened buds when the first leaves push out of the bud and unfold completely	Opened buds	Phot. 45 http://pixabay.com
Started to flower- the flower buds for the following year are set in the fall before the lilac shrub goes dormant. The flowers grow in clusters 10 cm - 20 cm (4 - 8 in.) long.	Started to flower	Phot.46 http://pixabay.com
All leaves fallen down lilac needs a cold-dormant time of year to rejuvenate for spring flowers and greenery	All leaves fallen down	Phot. 47 Lilac in winter

Rowan (Sorbus aucuparia)



Rowan

Rowan is a typically small and slender tree with a greyish-brown bark. As the leaves emerge they are a mid green colour. In early to mid autumn the leaves turn yellow to orange and fall off. The flowers appear in mid-May as sprays of cream to white. They have a slightly sweet scent. The fruits appear in late summer, and are initially green, they quickly ripen to a bright red in very early

September. Birds love them and often trees are stripped of their ripening fruit within a few days, especially if the weather turns cold. Rowan is native to most of Europe and parts of Asia, as well as northern Africa. The range extends from Madeira and Iceland to Russia and northern China, but mostly inhabits cool to cold areas.

Rowan trees can live up to an impressive 100 years or more.

Opened buds -Phot. 48 Opened buds https://commons.wi Buds are small kimedia.org/wiki/Sor (up to 1,7cm), bus aucuparia#/me egg-shaped, dia/File:Sorbus aucu grey, covered by paria lateral bud.jp bright short hairs. Started to Phot. 49 Started to flower flower https://commons.wi kimedia.org/wiki/Sor Small white bus aucuparia#/me flowers, borne in dia/File:Sorbus aucu dense corymbs, paria_no.JPG each flower contains 5 petals Ripen berries Phot. 50 Ripen berries https://commons.wi Its fruits are kimedia.org/wiki/Sor small, orange, bus aucuparia#/me bright red or red dia/File:Jodlowka Tu chowska_Brzanka_ja rzebina_1.jpg Phot.51 Leaves started Leaves started coloring https://commons.wi coloring kimedia.org/wiki/Sor The foliage is bus_aucuparia#/me medium green dia/File:Arbre_avc_fr and turns golduits.JPG yellow and goldred in the autumn before the leaves fall

Leaves started Phot. 52 Leaves started falling do falling down-it https://commons.wi starts shedding kimedia.org/wiki/Sor leaves to survive bus aucuparia#/me dia/File:Arbre avc fr harsh weather uits.JPG conditions (up to 10% of foliage) All leaves Phot. 53 All leaves fallen down fallen down https://upload.wikim goes dormant for edia.org/wikipedia/c the winter ommons/8/8a/Ancie months nt_rowan_tree_at_si te_of_old_croft_on_ ridge_above_Divach _geograph.org.uk -1220522.jpg

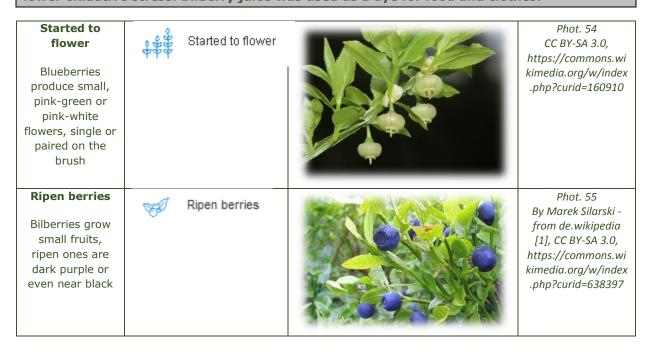
Bilberry (Vacciunium myrtillus)



Bilberry

Bilberry (also known as Blueberry, Whortleberry, Huckleberry, Hurtleberry) is a small shrub (up to 40 cm) growing mainly at the northern parts of the Northern Hemisphere (known as the taiga zone and the subarctic zone) *Vaccinium myrtillus* is found natively in Europe, northern Asia, Greenland, Western Canada, and the Western United States. It occurs in the wild on heathlands and acidic soils. Small, elliptic, green leaves are finely toothed and prominently veined on the lower surface. Flowers are pink and urn-shaped. Fruits are dark blue, with dark red, strongly fragrant flesh and red juice that turns blue in basic environments.

Bilberries are very healthy and are recommended to lower blood glucose, reportedly they have anti-inflammatory and lipid-lowering effects, and promote antioxidant defense and lower oxidative stress. Bilberry juice was used as a dye for food and clothes.



Rosebay willowherb (Chamerion angustifolium)



Rosebay willowherb

Rosebay willowherb is also known as willow herb. It has reddish stems, which are simple, erect, smooth and tall (up to 2 m). The leaves of this plant are unique in that the leaf veins are circular and do not terminate on the edges of the leaf, but form circular loops and join together inside the outer leaf margins. This feature makes the plants very easy to identify in all stages of growth. The flowers are 2 to 3 cm in diameter, with four pink petals and four narrower pink sepals behind. It inhabits light-filled forest heaths, broad-leaved forests, rich mixed swamps, burned areas, disused fields, railway embankments, banks, wasteland, often used to reestablish vegetation. It is native throughout the temperate Northern Hemisphere, including large parts of the boreal forests, in a variety of arctic ecosystems.

Rosebay willowherb has been believed in Finland to increase the milk production in cattle, and was thus often added to feed. In Russia flowers/leaves were traditionally used to make tea. The plant is also called "fireweed" or "bomb weed", as it was said that it only bloomed in London after the Great Fire of 1666 and after the bombings during WW2.



Phot. 56: Lateral leaf veins have a unique quality - they do not extend to the outer edge of the leaf, but loop together near the margin. This makes it easy to identify before it flowers. Source: http://wildfoodsandmedicines.com



Started to flower



Started to flower



Phot.57 http://pixabay.com Seeds ready Seeds have a plume of hairs and are wind dispersed



Seeds ready



Photo. 58 Dcrjsr (Own work) [CC BY 3.0 (http://creativecom mons.org/licenses/b y/3.0)], via Wikimedia Commons

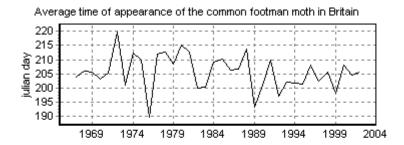


Noticed since the last observation (previous week) - data from biotic environment field observations. Collect information on selected insects (Bumble bee, Mosquito, Ant, Common brimstone, European peacock). Observe and note the very first appearance in your neighborhood.

Monitoring insect

First observation in the year

Why is it so important and what does it actually say? See the dates of insect appearance and activity in Britain shown in relation to temperature variables:



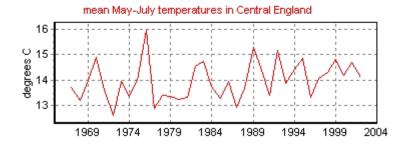


Fig.1 source: http://www.ecn.ac.uk/iccuk/indicators/27.html

The activity of insects is related to many important environmental factors. In winter, they hibernate, and wake up in early spring/late winter to lay eggs. The interannual variability of their appearance, number etc. is subject to scientific observations and research.

Bumble bee (Bombus)

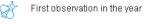


Bumble bee

Bumble bee is a large insect with round body covered in soft hair often consisting of contrasting bands of colour (many are **black and yellow**) making it appear and feel fuzzy. They feed on nectar, using their long hairy tongues to lap up the liquid. Bumblebees are typically found in temperate climates, and are often found at higher latitudes and altitudes than other bees, some range into very cold climates, e.g. *B. polaris* occurs in the high Arctic. This is the most northernmost occurrence of any **eusocial insect**. One reason for their presence in cold places is that bumblebees can regulate their body temperature, via solar radiation, internal mechanisms of "shivering" and radiative cooling from the abdomen.

Many bumble bees are social insects that form colonies with a single queen. Bumble bees are important pollinators of wild flowering plants and agricultural crops like tomatoes, peppers, and cranberries.

First observation in the year





Phot. 59 http://unsplash.com

Mosquito (Culex)



Mos quito

Mosquitoes have two pairs of wings, but their second pair of wings is reduced to short, peg-like structures. Mosquitoes have thin, long bodies and three pairs of extremely long legs. They have scales along the veins of their wings and long beak-like, sharp sucking mouth parts. Mosquitoes feed on sweet nectar, fruit, and other sugary substances. Mosquito eggs require water in order to develop. Females of some mosquito species also feed on blood, which they need in order for their ovaries to mature and for their eggs to develop. Female mosquitoes detect their blood hosts (not only humans, but also other mammals, birds, lizards etc.) partly through the sense of smell and partly by sight from up to 30 meters. They live on almost every continent and habitat and serve important functions in numerous ecosystems (as pollinators or parts of a food chain), although some researchers claim that if extinct, they could be easily replaced by other spieces.

The oldest known mosquito with an anatomy similar to modern species was found in 79-million-year-old Canadian amber.

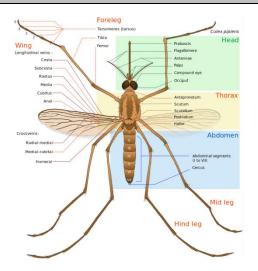


Fig. 2 Source: Wikipedia

First observation in the year





Phot. 60 https://commons.wi kimedia.org/wiki/Fil e:Diptera-komarmoscow.jpg

Ant (Formica)



Ant

Ants are very capable, busy insects 2 to 25 mm long (larger ants occur in tropical regions). Ants have a narrow "waist" between the abdomen and thorax, large head, elbowed antennae, and powerful jaws. Ants can lift and carry more than three times their own weight. Enthusiastically social insects, ants typically live in structured nest communities (typically with one queen-with wings, female workers care for the queen's offspring, work on the nest, protect the community, and perform many other duties and males destined only to mate with the queen), that may be located underground, in ground-level mounds, or in trees. Ants communicate and cooperate by using chemicals that can alert others to danger or lead them to a promising food source. They typically eat nectar, seeds, fungus, or insects. Ants can be found everywhere on the planet except for permanently icebound northern and southern areas of the globe.

Ants play a key role in global ecosystem and have a big impact on their local environment as a result of their activity as 'ecosystem engineers' and predators.

First observation in the year





Phot. 61 http://unsplash.com

Common brimstone (Gonepteryx rhamni)



Common brimstone

Common brimstone is a butterfly living in Europe, North Africa and Asia. Despite its opened-wing brilliant colour they are masters of disguise when closed as their under-wing colour and shape provide camouflage for resting and hibernating adults. Brimstones are common bright yellow butterflies and are often cited as the first butterflies of the year because adults hibernate over winter in woodlands and emerge on warm spring days. Males have sulphur-yellow fore and hindwings with an orange central spot, the females' wings are a more delicate yellow or pale green. The eggs are laid singly on the leaves of either common buckthorn (Rhamnus cathartica) or alder buckthorn (Rhamnus frangula) - the only two food plants - and females will wander far and wide in

search for these particular shrubs. Brimstone butterflies spend the summer feeding on nectar to build up energy reserves for the winter and by the end of August they are already beginning their long sleep.

The name "butterfly" is believed to have originated from the brimstone — which was called the butter-coloured fly by early British naturalists.

First observation in the year



First observation in the year



Phot. 62 http://pixabay.com

European peacock (Inachis io)



European peacook

This remarkably beautiful butterfly is rather common in temperate Eurasia, inhabiting woodlands and gardens. The base colour of the wings is a rusty red and there is a distinctive blue eye on each wingtip. The underside of the wings is a dark greyish brown, giving the butterfly perfect camouflage against a branch or tree trunk. The male and female have identical markings. Host plants for the caterpillars are first of all the stinging nettle, Urtica dioica, and sometimes Common hop, Humulus lupulus.

It is no coincidence that the European Peacock's markings resemble staring eyes. When the butterfly opens it swings, it is these staring eyes that scare off predators.

First observation in the year



First observation in the year



Phot. 63 http://pixabay.com



Noticed since the last observation (previous week) - data from biotic environment field observations. Collect information on selected spieces of birds (arctic tern, common cuckoo, white wagtail, crane). All of them are migratory birds, and fly hundreds and thousands of kilometers to find the best ecological conditions and habitats for feeding and breeding. Observe and note the very first appearance in your neighborhood. This will give approximate schedule and routes of their return.

Monitoring migrating birds	
First observation in the year	

Arctic tern (Sterna paradisaea)



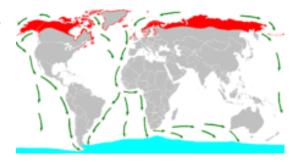
Arctic tern

Arctic tern is a medium-sized, slender white bird with black cap, deeply forked, long tail and white wings with some dark at tips, well known for its long yearly migration. Its travel from its Arctic breeding grounds to its wintering grounds of Antarctica may cover perhaps 40,000 km (25,000 mi), and is the farthest yearly journey of any Bird. The birds survive the vast journey by dipping down to the sea surface to catch fish and other food (invertebrates) as they ravel. It nests once every one to three years (depending on its mating cycle); once it has finished nesting it takes to the sky for another long southern migration. The Arctic tern has a continuous worldwide circumpolar breeding distribution.

Arctic terns can live for 15 to 30 years, meaning the record-breaking tern could fly as far as 3 000 000 kilometres over its lifetime, the rough equivalent of four round trips to the moon.

Distribution of Arctic tern.

Fig. 3. Source: Wikipedia



Red -breeding area

Blue - feeding area

First observation in the year

First observation in the year



Phot. 64 http://pixabay.com

Common cuckoo (Cuculus canorus)



Common cuckoo

Common cuckoo can be actually difficult to spot, as it's more often heard than seen. The familiar and unforgettable 'cuck-oo cuck-oo' call heralds the beginning of spring when they return to European forests from wintering in sub-Saharan Africa and south east Asia. As one of the most infamous brood parasites, cuckoos lay their eggs in the nests of other birds with precision timing. Once hatched, the chick ejects the legitimate occupants and then gets fed by its new and unsuspecting foster parents. Although its eggs are larger than those of its hosts, the eggs in each type of host nest resemble the host's eggs! The adult too is a mimic, in its case of the sparrowhawk; since that species is a predator, the mimicry gives the female time to lay her eggs without being seen to do so. Cuckoos are quite large (up to 34 cm long, 60 cm of wingspan), the plumage is greyish with a slender body and long tail and can be mistaken for a falcon in flight, where the wingbeats are regular. During the breeding season, common cuckoos often settle on an open perch with drooped wings and raised tail.

Cuckoos are insectivorous, and in particular are specialised in eating larger insects and caterpillars, including noxious hairy types avoided by other birds, they are able to shake the toxins out of hairy caterpillars before eating them.

First observation in the year

First observation in the year



Phot. 65 Chris Romeiks Vogelart.info http://commons.wiki media.org/wiki/File: Cuculus_canorus_vo gelartinfo.jpg

White wagtail (Motacilla alba)



White wagtail

White wagtail is a rather tiny bird (length up to 19 cm, wingspan up to 25 cm). White wagtail is instantly recognisable thanks to its distinctive black and white plumage, loud *tsli-vitt* call, and characteristic habit of constantly bobbing the tail, hence the common name 'wagtail'. It is mostly an aquatic bird, but this species can be common in various types of habitats, as well near water to hunt as in urban parks and cities for roosting in trees, so they are often seen running across lawns, car parks and other flat areas in pursuit of insects. These birds flock together to roost at warm sites such as reed beds and sewage farms.

This species breeds in much of Europe and Asia and parts of north Africa. It is resident in the mildest parts of its range, but otherwise migrates to Africa.

First observation in the year





Phot. 66 <u>http://pixabay.com</u>

Crane (Grus grus)



Crane

Crane is large and impressive waterbird with a long neck, beak and legs. The plumage is mainly slate grey, with black flight feathers, the innermost of which are greatly elongated, forming a drooping, bushy 'cloak' over the tail. In contrast, the neck, chin and throat are dark grey to black, with a black forehead and a distinctive white stripe that runs from behind the eye, down the neck and to the upper back. The top of the head bears a red patch of bare skin, and the eye is also bright red or reddish-brown. Cranes eat mostly plants (roots, seeds, berries-like cranberry), insects, snails, amphibians etc. Common crane is breeding from Western Europe to Siberia. Monogamous pairs reinforce their bond with a series of calls and elaborate head jerks. Together the pair builds a ground nest within their wetland habitat from a mound of swampy vegetation. The job of incubating their two eggs is also shared. They breed near water (marshy wetlands, swampy openings etc.). Cranes are quite social - flocks of up to 400 birds may be seen flying together during migration to/from southern Europe, Africa or northern India. Before spotting it, you can hear its piercing call from considerable distance.

During incubating eggs, adults sometimes embark on the fascinating behaviour of 'painting' their upper bodies and wings with reddish mud, which is thought to provide camouflage.





First observation in the year





Phot. 67 Flock of cranes during flight http://pixabay.com

Phot. 68 Common crane http://pixabay.com

Conclusions

We hope you and your students will enjoy conducting measurements, making observations and reporting. We encourage you to observe our maps, to compare your results with schools from all over Europe and to draw conclusions.

We strongly advise to discuss your results and experience regarding MONITORING on our EDU-FORUM (dedicated 'Monitoring' section).

Please don't hesitate to contact us in case of any problems or questions. For technical issues, please contact our support. For scientific issues, please contact Institute of Geophysics Polish Academy of Sciences (IGF PAS).

And remember: "To acquire knowledge, one must study, but to acquire wisdom – one must observe". **So keep calm and ...**

