

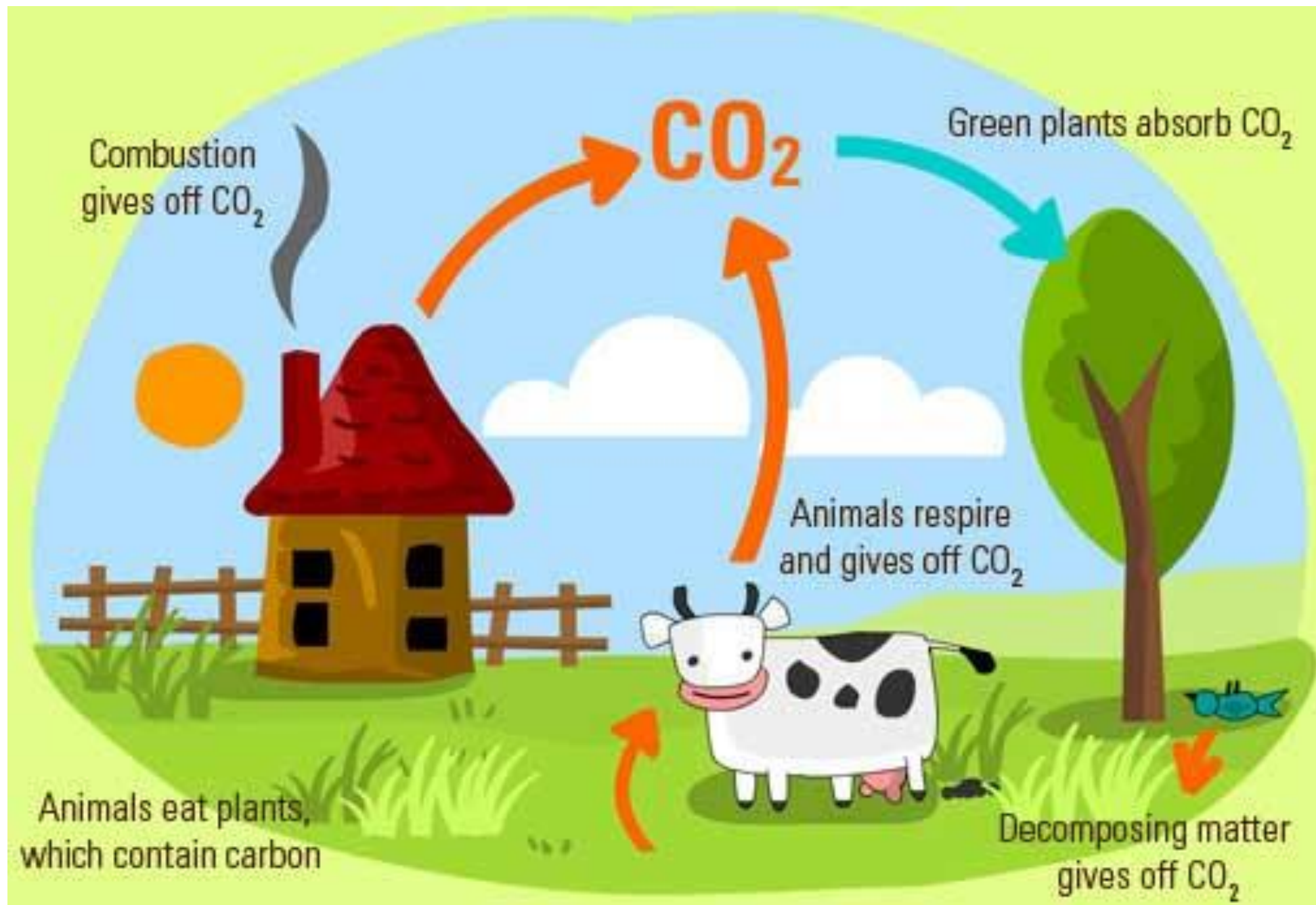


Phenology & Carbon Cycle



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Europe and Eurasia
Region Coordination Office



Learning Activities

Four learning activities on carbon cycle you can download:

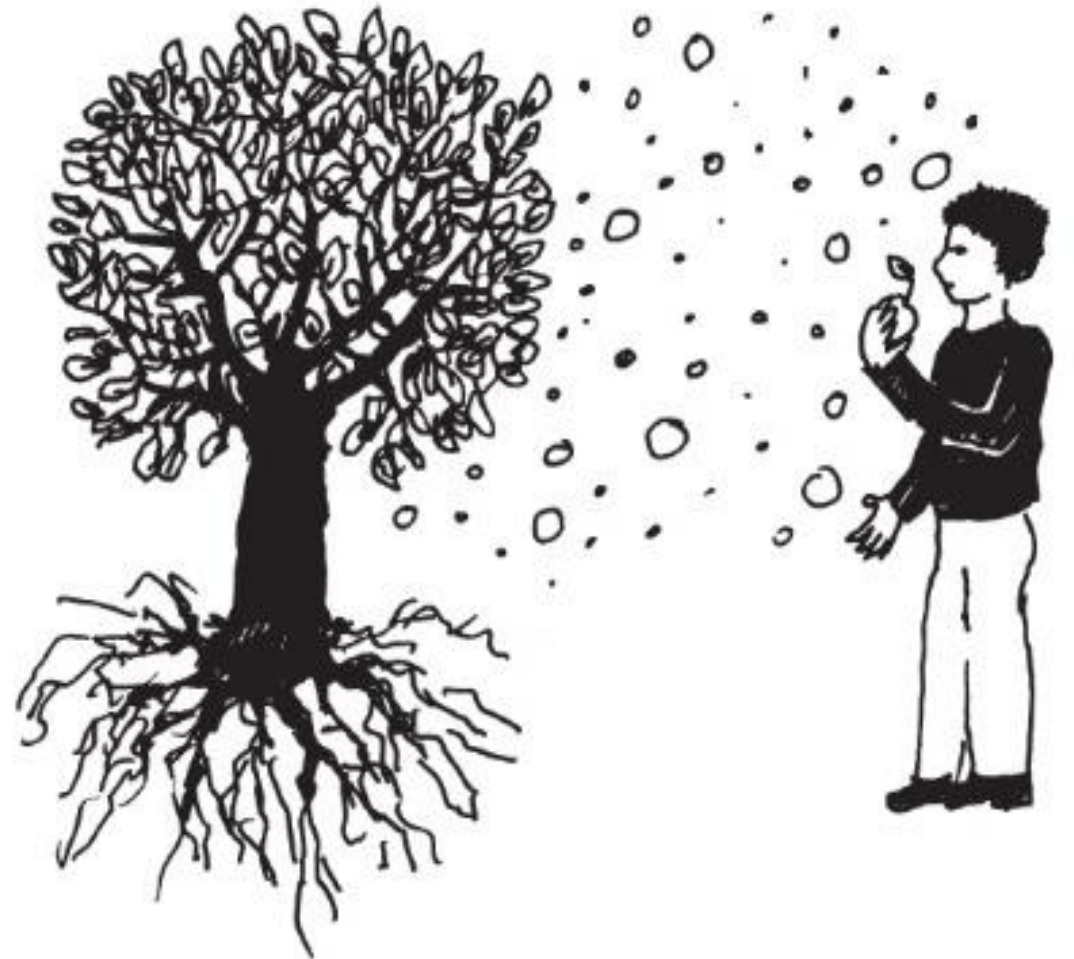
1. Tree Growth Game
2. Carbon Around Me
3. Carbon in My Tree
4. The Case of Missing Carbon



<https://www.globe.gov/web/european-phenology-campaign/overview/download-materials>

Why do we talk about Carbon Cycle in connection to trees?

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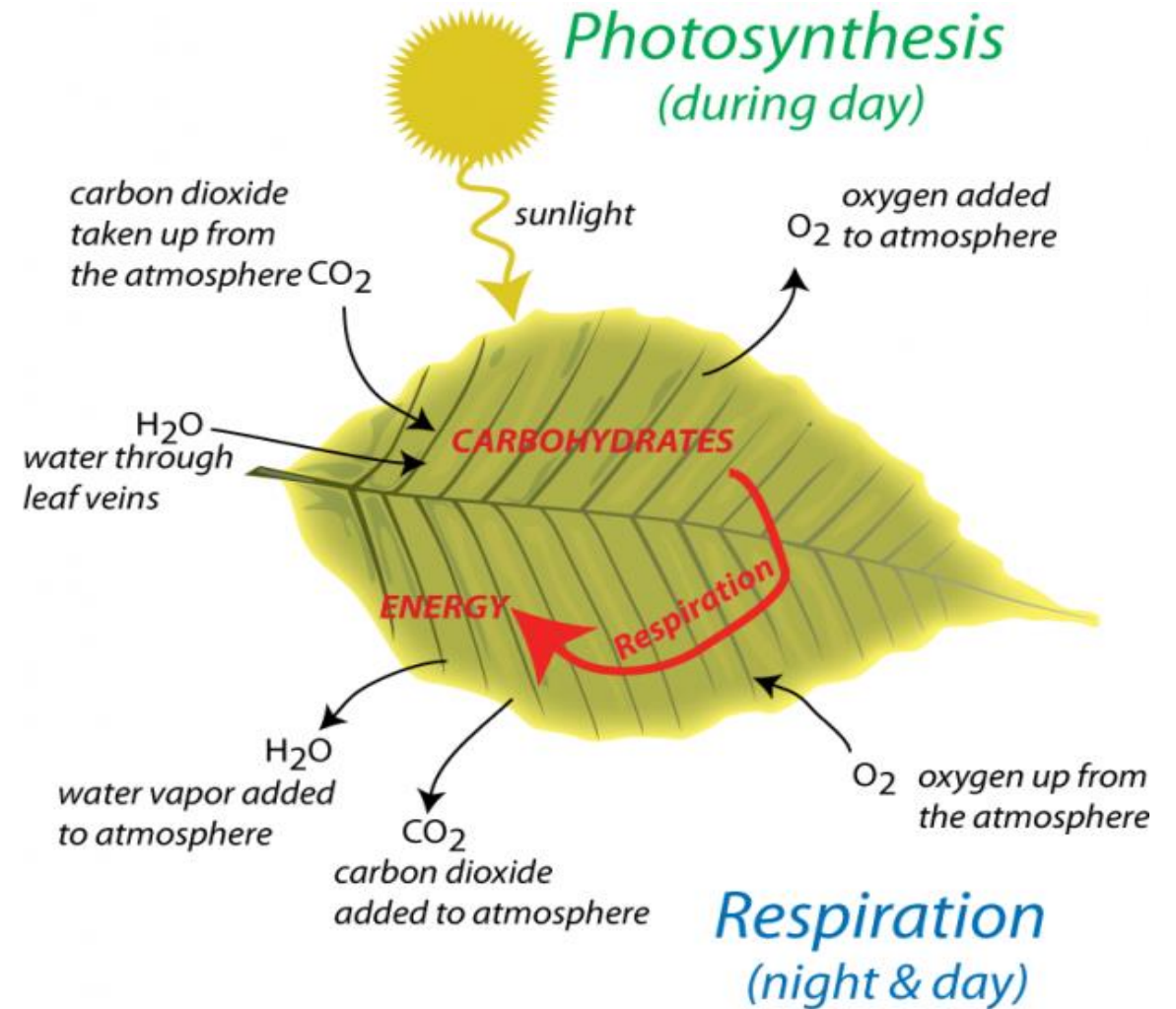
The Magic of Plants

The most effective solar panel: Transforms the energy from sun to a chemical energy.

- Trees bind a large amount of carbon dioxide and water.
- Carbon is built into leaves and wood.

→ Activity 1:

Tree Growth Game



Source: course Earth in the Future, PennState,
<https://www.e-education.psu.edu/earth103/node/1020>



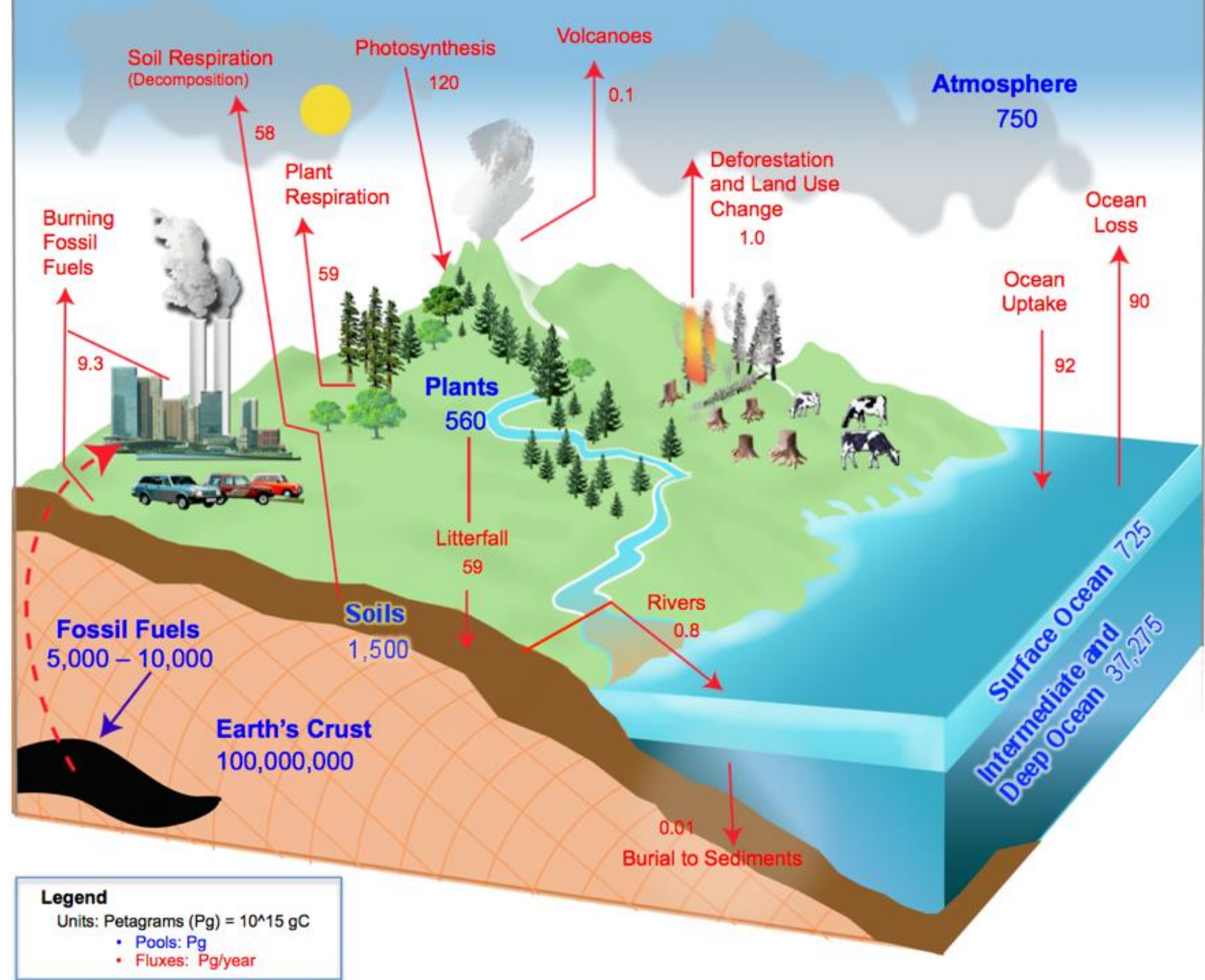
Where else can you find carbon?

Carbon is everywhere!

- the flow of carbon between Earth's spheres
- fluxes / pools

Think about carbon sources, fluxes, pools in your area

→ activity 2:
Carbon Around Us



GLOBE@2017

Global Carbon Cycle Diagram

Biosphere

Data Sources: Adapted from Houghton, R.A. Balancing the Global Carbon Budget. Annu. Rev. Earth Planet. Sci. 007.35:313-347, updated emissions values are from the Global Carbon Project: Carbon Budget 2017. Diagram created by a collaboration between UNH, Charles University and the GLOBE Program.

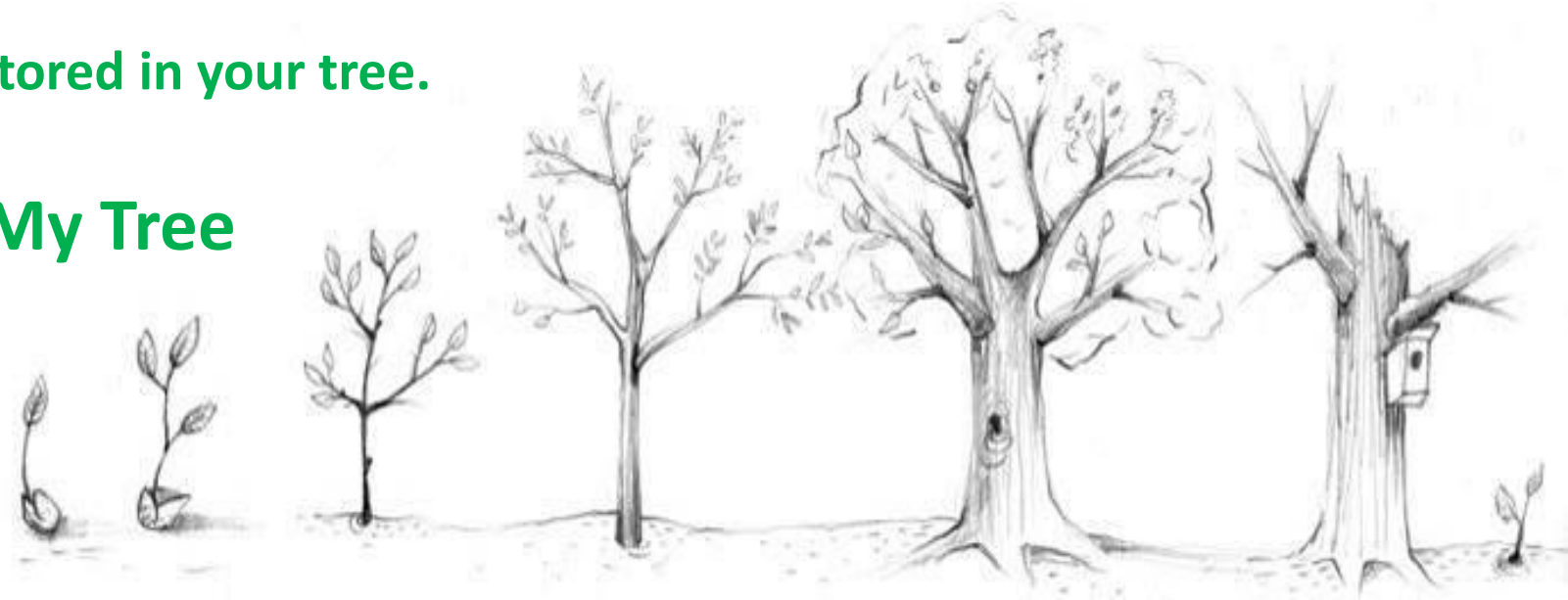


Carbon in a Life of a Tree

- The CO₂ balance (carbon intake vs. release) changes over tree life cycle.
 - Young tree - a natural carbon storage because of the massive carbon intake
 - Adult mature tree - the carbon stored in the wood increases very slowly
 - Aging tree - the CO₂ balance comes close to zero
 - Dead tree - carbon gradually released to the soil and into the air.

Calculate how much carbon is stored in your tree.

→ activity 3: Carbon in My Tree



Carbon in a Life of a Tree

NASA visualisation: <https://svs.gsfc.nasa.gov/vis/a010000/a010000/a010006/index.html>.



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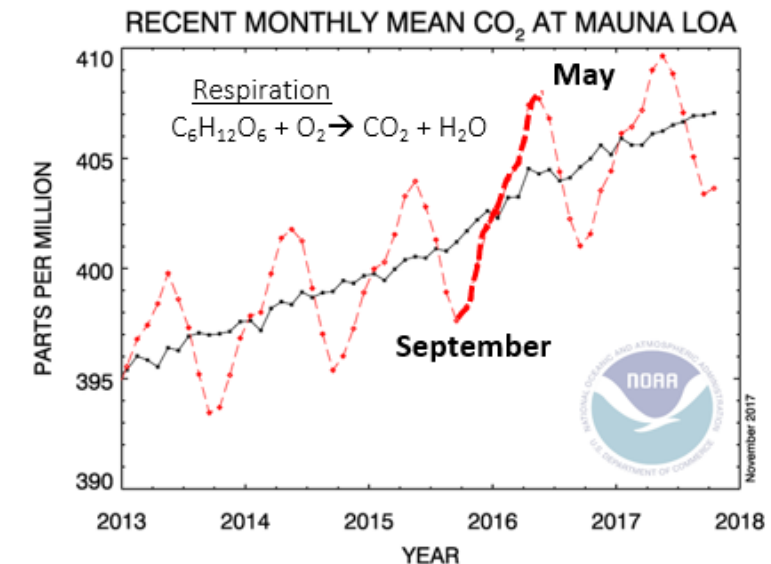
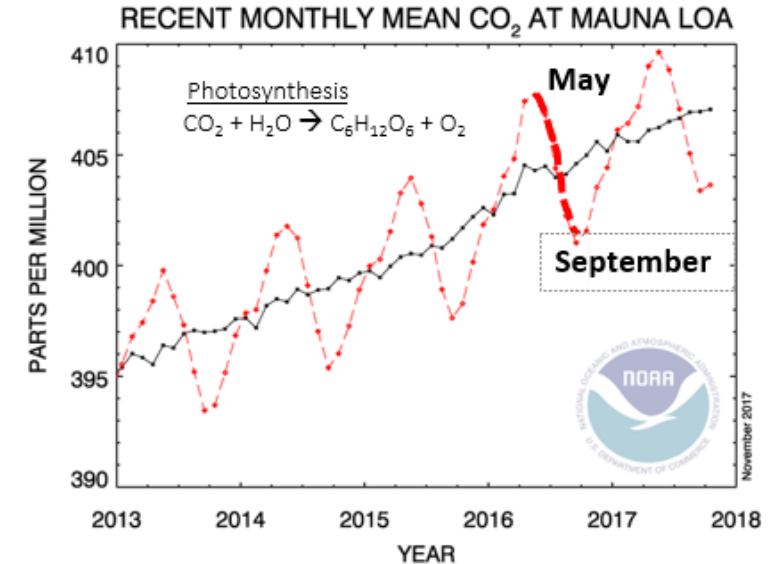
What time of the year a tree builds in the biggest amount of carbon into its biomass?

Role of Trees in Global Carbon Cycle

- CO₂ level oscillation corresponds with the “green wave” in vegetation of the northern hemisphere
 - **spring-summer: biosphere takes up more CO₂ than it releases**
 - **autumn-winter: biosphere releases more CO₂ to the atmosphere than it absorbs**
- **Forests keep amount of carbon in balance** - exchange carbon between air, plants, animals and soil
- **Trees of the northern hemisphere** influence carbon cycle of the whole planet

→ activity 4:

The Case of Missing Carbon



Download Materials

[activities](#) | [field guides](#) | [e-training](#) | [protocols](#) | [GLOBE data tutorials](#) | [lesson plans](#)

European Phenology Campaign

[2022 Spring](#)

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[Our Measurements](#)

[My Tree grows under Covid-19](#)

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[2021 Autumn](#)

- **2022 Spring Campaign Flyer** - basic information about the campaign
- **Presentation**
- **GLOBE 365 Poster** - there is a place to stick photos of your tree as well! If you want to receive a hard copy of the poster, contact your GLOBE country coordinator.
- **Winter twigs** - a key to recognising buds
- **Why do the leaves change color?** - learn why and how the autumn change of trees happens.



2022 Spring Campaign Newsletters

No 1: Spring trees are beautiful. Let's observe them together

Activities for students

Spring

Activity 1: My Tree + carbon activity: Tree Growth Game

Activity 2: Look at the Buds + Data Sheet + Carbon Around Me

Activity 3: First Leaves + carbon activity: Carbon in my tree

Activity 4: My Green Up Data + Data Upload Guide + carbon activity: The Case of Missing Carbon + Data Sheet

Activity 5: Green Color Scale



Resources

- Phenology Campaign: www.globe.gov/web/european-phenology-campaign
- E-trainings: www.globe.gov/get-trained/protocol-ettraining/etraining-modules/16867717/3099387
- Protocols: www.globe.gov/do-globe/globe-teachers-guide/biosphere?p_p_id=globegovteacherguideportlet_WAR_globegovcmsportlet_INSTANCE_4CcA&globegovteacherguideportlet_WAR_globegovcmsportlet_INSTANCE_4CcA_protocolCat=2513263#13326840
- GLOBE Elementary: www.globe.gov/web/elementary-globe/overview/seasons
- GrowApp: www.growapp.today
- NASA videos and animations (see the links on each slide) and NASA Earth Observatory: <https://earthobservatory.nasa.gov/>



Thank you!

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www.globe.gov/web/european-phenology-campaign



How Much Carbon do Plants Take from the Atmosphere?

1. Watch the video: https://earthobservatory.nasa.gov/global-maps/MOD17A2_M_PSN

2. What we see on the video

The greener the color, the bigger amount of CO₂ is built in by plants in that time of the year.

net primary productivity = how much CO₂ vegetation takes in during photosynthesis minus how much CO₂ the plants release during respiration

The data come from [\(MODIS\)](#) on NASA's [Terra](#) satellite. Values range from near 0 grams of carbon per square meter per day to 6.5 grams per square meter per day (dark green).

A negative value means that more carbon was released to the atmosphere than the plants took in (due to decomposition or respiration)

3. Compare to what you see on this video: <https://www.youtube.com/watch?v=x1SgmFa0r04>