

What things affect the quality of the air we breath every day?

By: Ellen Carneheim, May 2020

The air we breathe is one of the most important reasons we can live on this planet. Although the atmosphere is huge, we basically spend all of our lives in a very thin layer of it closest to the surface called the planetary boundary layer. We will call it the PBL from now on. Because this is the air we breathe day out and day in, it is very important to study it and how it affects for example our air quality. Air quality depends a lot on the amount of particles that are in the PBL and how it mixes within it. In this project, it was examined how the wind direction, season and the height of the PBL affect the particle concentration in the countryside in southern Sweden.

One of the things that affect the particle concentration is the height of the PBL which varies throughout the day in summer, spring, and fall. This is because when the sun is up, it heats the ground which in turn heats the air above it. Because warm air rises, this process makes the height of the PBL rise as well so that it is high during the day and low during the night. Mostly this does not happen in winter because the radiation from the sun is not strong enough then. In summer, the height of the PBL is very dependent on the air temperature. Without this daily pattern of the PBL we would probably see much higher levels of pollution during the day in summer, spring and, fall since emissions into the PBL would then not be as much spread out during the day.

In southern Sweden, how polluted the air is depends a lot on where it came from. If the wind is blowing air from the south east, where countries like Poland with a lot of pollution are located, the particle concentrations are much higher than if they come from the north where there is less pollution. If the wind is coming from the south east, the affect that the PBL height has on the particle concentration is also stronger. This affect is that higher PBL gives lower concentrations since the particles spread out in the layer. This effect is also stronger in the fall and winter than in summer and spring.

By knowing which things affect the particle concentration, we can know when an increase is caused by an increase in emissions and when it is caused by for example a lower PBL. If the reason is higher emissions, then something can be done about it in policies and laws.