

The green lungs of our planet are changing

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Are leaves and buds developing earlier in the spring? And do leaves stay on the trees longer in autumn? Do steppe ecosystems remaining green longer and are the savannas becoming drier and drier? In fact, over recent decades, the growing seasons have changed everywhere around the world. This was determined by a doctoral candidate at the Goethe University as part of an international collaboration based on satellite data. The results are expected to have consequences for agriculture, interactions between species, the functioning of ecosystems, and the exchange of carbon dioxide and energy between the land surface and the atmosphere.

"There is almost no part of the Earth that is not affected by these changes", explains Robert Buitenwerf, [doctoral candidate](#) at the Institute for Physical Geography at the Goethe University. He has evaluated [satellite data](#) from 1981 to 2012 with regard to 21 parameters on vegetation activity, in order to determine the point in time, the duration, and the intensity of growth from the northernmost conifer forests to tropical rain forests. His conclusion: On 54 percent of the [land surface](#), at least one parameter of vegetation activity has moved away from the mean value by more than two standard deviations.

As reported by researchers from Frankfurt, Freiburg and New Zealand in the current edition of the professional journal *Nature Climate Change*, leaves are now sprouting earlier in most of the climate zones of the far north. Although they are also dropped somewhat earlier in autumn, the overall vegetation period has grown longer. On the other hand, in our latitudes, trees and shrubs are losing their leaves later than they have up

to now.

To date, not much research has been conducted on the regions of the [southern hemisphere](#). In those areas, the researchers found that in several savannas of South America, southern Africa and Australia, the vegetation activity has decreased during dry seasons. "Although these savannas have similar vegetation and comparable climates, the changes in vegetation activity differ. That may be attributable to the differences in the functioning of the respective ecosystems", says Buitenwerf.

In this respect, the seasonal distribution of leaf growth constitutes a sensitive indicator: it indicates how various [ecosystems](#) react to changes in the environment. "Although vegetation changes in the [northern hemisphere](#) have conclusively been attributed to climate change by other studies, attributing all the changes found in our study would require a more complex analysis," Buitenwerf emphasizes. In the northern hemisphere it has already been shown that species whose life cycles depend on the vegetation period are endangered by these severe changes. Consequences for species in the southern hemisphere are as yet unclear.

Provided by Goethe University Frankfurt

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