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Interview with RNDr. Radim Tolasz, Ph.D., climatologist of the Czech Hydrometeorological Institute

Today, one individual cannot quickly mitigate the current impact of climate change that the entire world is facing by changing their behaviour. However, the promotion and spread of education is one of the main keys to making positive changes in a significant part of the population. In an interview for VTEI, the Czech representative in the Intergovernmental Panel on Climate Change (IPCC), climatologist RNDr. Radim Tolasz, Ph.D., from the Czech Hydrometeorological Institute (CHMI), describes further steps to mitigate the effects of climate change or, for example, his own first professional experience after 1980.

Mr. Tolasz, you have been dealing with climatology, meteorology, and hydrology for a long time. Do you remember the moment you said to yourself that this field would be your „lifelong love"?

Probably not, because the beginning of my professional „career" was very wide spread. I studied physical geography and in my diploma thesis I analysed the regime of sedimentation in the Odra basin. After joining the CHMI branch in Ostrava, I concentrated on the so-called water bearing cadastre between 1931 to 1980, and there I finally got to climatology via studying precipitation. I remember very clearly that the runoff conditions on the Čeladenka (which is a small basin in the Moravian-Silesian Beskydy between Smrk and Kněhyně) in the cadastre showed curious results affected by windward precipitation effects. This is probably where I realized how significantly the climate affects other parts of the physical-geographical sphere. And looking back today, I actually experienced paper, pen and calculator climatology in practice, then „wrote" programs in Fortran on punch cards that I took to the computing centre, only to come back two days later to pick up the result of „error on line 154". Those were interesting times compared to today, when modellers prepare megabytes of data for us, on which we start several processes in the R programming language in a few hours. I really don't know when exactly my interest in climatology was born.

Talk of possible climate change began as early as the 1970s. Can you recall your first awareness of this phenomenon?

We discussed it for the first time at grammar school in Havířov in geography lessons, sometime around 1980. However, it was only basic information focused on the greenhouse effect and not very analytical. But it stuck with me, and when we discussed climate change in more detail a few years later as part of a climatology lesson at the Faculty of Science in Brno, I had something to build on. From today's point of view, however, the information was not very accurate and detailed; in almost forty years climatology has taken a huge step forward. Simply put, it was only an estimate of the behaviour of the atmosphere based on the laws of physics. Today, we already know a lot about feedback, about the combination of natural climate variability and anthropogenic influences, and we can model these phenomena, which also gives us probabilistic estimates of the behaviour of the atmosphere in the near future. In its projections and estimates, climatology thus came between meteorology and its weather forecast and geological estimates of the next ice age, both in terms of time and accuracy.

Are the manifestations of climate change that were predicted twenty to thirty years ago occurring at the moment, or did some of them surprise you?

Today we have already confirmed that the climate projections from the 1980s were quite accurate for several decades ahead. The first IPCC report in 1990 estimated a global temperature rise of 1 °C by 2025, and this will certainly be met and exceeded. At the time, little emphasis was placed on the fact that the temperature rise would be higher on land, and even higher, for example, in central Europe, with a continental climate quite distant from the seas and oceans. And we can therefore be surprised that in our country the rise in temperature is almost double compared to global values. Moreover, even today, we are little aware that the problem for humans is not so much in averages as in extremes. Long heat waves with temperatures above 30 °C were unimaginable fifty years ago in the Czech Republic – and now they are an annual reality. At the same time, we have often emphasized that we do not expect a long-term decrease in precipitation, which is still true today; however, we lack water in the landscape more and more often. Why? Because at a higher temperature there is more evaporation. Even this surprises many people, as they do not realize the basic difference between water vapour and clouds in the atmosphere. The water that is missing in our landscape is kept in the form of water vapour at a higher temperature of the atmosphere, and therefore does not increase the precipitation potential. Today's upper estimate of the average temperature in 2050 in the Czech Republic is at the level of 10 °C with an estimated error of ± 0.3 °C, and we have no reason not to believe these model outputs. Let's just put it in context with the average temperature in the Czech Republic for the normal period 1991 to 2020, which is 8.3 °C. In less than thirty years, we could be another 2 °C warmer on average. What will the summer heat be like?

And perhaps I would add that in recent years in Europe, including in our country, the probability of so-called fire weather has increased. It is logical and corresponds to the previous information, and in reality we can observe it directly. The big fire last year in Bohemian Switzerland National Park was not extraordinary in its occurrence, but in its scope and duration, which was influenced by fire weather parameters. Last year's wildfires in Northern Europe are totally extraordinary – they never appeared in these areas before. And this year's summer season in the Mediterranean is also absolutely extraordinary from the point of view of the scope and duration of natural fires, and is most certainly related to the changes taking place in the climate system.

Is it possible that for some reason, for example, due to the weakening of the Gulf Stream, climate change in the Czech Republic or in Europe will stop, or will „reverse" its course and it will start to cool down?

It is possible. Fluctuations in the volume and temperature of the Gulf Stream are normal, but some oceanographers estimate that the Gulf Stream will slow down in the coming centuries. However, the question remains how such a gradual change can alter the entire ocean circulation system. The Gulf Stream is not an isolated element in the ocean; in nature, everything is connected, and that applies to the ocean too. I'd rather not rely on it when dealing with climate change.

Do you think there are places in the world that will be transformed from inhabited to uninhabitable due to climate change?

Some climate models project, for example, for the Arabian Peninsula in the second half of the century, on some summer days, a combination of high temperature above 50 °C and humidity above 70 %, which will be completely unsuitable for humans and the area will be uninhabitable in the outdoor environment. People will have to take refuge in air-conditioned spaces and not go out at all. For some shopping fans, this will probably not be a change, but it is necessary to prepare for such a situation. However, not everyone lives in the developed and rich part of this region.

TGM WRI cooperates with CHMI on your „PERUN" project, which is very ambitious. Can you say which outputs you are most looking forward to?

We are currently analysing the first available climate scenario in the *„PERUN"* project, which we have prepared based on the pessimistic emission scenario SSP5-8.5. We look at dates that we think and hope will not be achieved on average. We are looking at the upper limit of the possible development of the characteristics of our climate until 2100. Few people realize that the year 2100 is not so far away – today's young children will live to see it. That is also why I am glad that these scenario data will be gradually analysed by our future colleagues to find out what could happen in our landscape, in forests, rivers, but also in groundwater. In connection with the second, more probable scenario according to SSP2-4.5, we will give the state administration, politicians, and the public information that I personally consider important – what our climate will be like in ten, twenty, or fifty years. What conditions must our agriculture, power engineering, drinking water supply, construction, tourism, and other areas prepare for. And I am most looking forward to the time when some of the *„PERUN"* project investigators will evaluate in ten or twenty years whether anyone took our forecasts into account at all.

You are a regular participant in foreign conferences, and you have experience of similar foreign projects. How does the Czech Republic compare in this area? And is it possible to interconnect the outputs of these projects?

Not only is it possible, but it is quite common. The *„PERUN"* project is sometimes accused of being a national project, closed within the borders of the Czech Republic. It is not so. Our modellers are part of the global community, climate scenario experts routinely discuss the possibilities of their use and inclusion in other European results, and hydrologists in neighbouring countries are eager to know how much water we send them in our scenarios. Of course, a lot depends on how well we manage to get the results of the *„PERUN"* project into top peer-reviewed journals. It's not about quantity, it's about quality. In this context, it is good to remember that the seventh IPCC assessment cycle is starting, and it is therefore the right time to try to get our results into the new IPCC reports.

Can you name five things each of us can do to mitigate the effects of climate change? Start with the most important, please.

There is not much an individual can do to mitigate the current impact. In hot days they should change their daily routine if possible, in dry seasons they should not waste water, during a gale they should not walk in the forest, and during floods they should not go canoeing. However, each individual has the power to mitigate the effects of climate change in the future. The most important thing is to elect a political representation that will listen to science and promote climate measures. Furthermore, every person in our country could and should reduce their own consumption, which translates into a much-needed lower consumption of raw materials and energy. Thirdly, I consider it important to support and spread education, because only educated people understand the necessity of implementing the measures that climate change puts before us. It's difficult, but fourthly, let's try to ensure that only competent people make decisions– engineers about power engineering, foresters about forests, transport experts about transport, water managers about water, etc., and always with an overall view and, above all, in context. If these four wishes worked, then we don't need the fifth.

Speaking of the influence and capabilities of each of us, on your website three years ago you decided to write the so-called „Climate Ten Commandments of the Individual", where you try to summarize our options for responding to the ongoing climate change. There are two more points to be added to the list. Do you know what they will be?

I don't know, I think the „ten commandments in eight points" mentioned is a good summary of the options that each of us as an individual have to influence future climate change. Little do we realize that the climate system has a lot of inertia, that all our activities accumulate in it for decades and only then begin to manifest themselves. That is why we see a mismatch between the growth of greenhouse gas emissions and the rise in temperature, that is why greenhouse gas concentrations can increase continuously, but the global temperature of the atmosphere fluctuates. We must not forget the influence of the oceans, which are also warming, and of large forest units, for example in tropical rain regions, which, on the other hand, can absorb more or less greenhouse gases depending on their size and quality. These are all reasons why we need to change our behaviour now so that future generations have fewer problems.

Thank you for speaking to us.

Ing. Adam Beran, Ph.D.
Ing. Adam Vizina, Ph.D.

RNDr. Radim Tolasz, Ph.D.

RNDr. Radim Tolasz, Ph.D., born on 19 March 1964 in Frýdek-Místek, has been working at the Czech Hydrometeorological Institute (CHMI) since 1986 as a climatologist, in 2003–2011 he was deputy director. He is a World Meteorological Organization (WMO) expert on climatological databases and climate data exchange. He is also the co-author of the Czech climatological application CLIDATA, which has been used in CHMI since 2000. In cooperation with WMO, this application is used in more than 30 meteorological services around the world (Estonia, Latvia, Lithuania, Montenegro, Serbia, Tanzania, Ethiopia, Georgia, Ghana, Namibia, Nigeria, Dominican Republic, Trinidad, Tobago, and others). Since 2014, he has represented the Czech Republic in the Intergovernmental Panel on Climate Change (IPCC). He is the author and co-author of many scientific articles and publications, and since 2012 he has also been the editor-in-chief of the Czech *Meteorological News (Meteorologické zprávy)* and a member of the editorial board of the Slovak *Meteorological Journal (Meteorologický časopis)*.