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Analysis of climate skepticism problem

A.O. Kokorin, WWF

The paper reveals and analyzes the specific aspects and origins of climate skepticism, i.e. a negative or highly incredulous attitude seen over the recent decades and the whole of the 21st century towards the idea of anthropogenic nature of climate change, and analyzes the origins thereof. It describes the experience in, and recommendations for, dealing with skeptical audiences, where it is not enough to 'simply' provide information, but it is important to understand and account for human psychology and perception by mass media.

Key words: Climate change, anthropogenic reasons, skeptical view, psychology of perception, presentation of information.

For more than 15 years now, WWF has been raising awareness about climate change under its Climate and Energy Programme. Over this period, there have been more than 3 000 interviews for mass media, nearly 200 lectures, a study guide for higher secondary school teachers 'Climate Change' (Kokorin et al., 2013). In 2015-2017, lectures were delivered at the leading educational centers, including Moscow State University, MGIMO, Higher School of Economics, North Arctic Federal University, Siberian Federal University, and Far East Federal University. WWF holds annual seminars for journalists who write about climate and environment. At annual climate&energy conferences of Russian NGOs WWF delivers special lectures to teach non-government institutions how to convince people about the anthropogenic impact on climate. All the above helped accumulate a substantial experience, reveal and analyze the specific aspects and the origins of climate skepticism, which is a negative or highly incredulous attitude seen over the recent decades and generally in the 21st century towards the idea of anthropogenic nature of climate change. This paper describes such experience and provides recommendations on how to work with skeptical audiences, where it is not enough to 'simply' provide information, but it is important to understand and take account of human psychology and perception by mass media.

New phase of climate skepticism

In 2017, we faced a situation when the understanding of the anthropogenic nature of climate change was developing very slowly, both globally and in Russia, despite increasingly obvious climate changes and progressively strong official action. However, there is certain progress in this area, as shown by the public opinion survey in September 2016 (Bedritsky, 2017). Nearly 60% of people are generally willing to use 'green technologies' to decrease the environmental impact of humanity. 40% of those surveyed are willing to refuse some of their habits and benefits for the sake of climate protection, as they avow strong human impact. Yet just as many are not willing to do so. More than 70% or respondents are aware of potential effects of climate change on the economy and people's lives and believe that governments should give sufficient attention to this problem. Of these, nearly 30% are positive that climate change must be high on the agenda, and the number of such people doubled compared to 2015. At the same time, they often give a negative answer when asked if they truly think that current climate change should be attributed primarily to human beings. A lot of people talk about climate change and believe that it is a bad thing and that it is time to lift a finger, yet they do not avow that climate change is a result of human activities. And this refers even to those who work in the area of environmental protection, waste processing, etc. There are hardly any public calls for fast and drastic

reduction in greenhouse gas emissions, and people, by and large, tend to think of GHG emissions as a minor problem and still a very long way off.

Moreover, the number of skeptical claims and doubts is increasing both in the media and in presentations by public organizations and individuals. To a certain extent, these are provoked by the position of business circles, which can see no profit in the 'green' trend. Business has a commercial interest – they wish to debar stronger action in reducing greenhouse gas emissions and so are looking to plant more seeds of doubt about the very core of the matter – human impact on Earth's climate system through greenhouse gas emissions. Their propaganda aims exactly to deny the impact of GHG emissions on the greenhouse effect.

They obviously understand only too well, that the Paris Agreement will not lead to any supranational measures to reduce global GHG emissions at least until 2030 (the staff of commercial firms are pretty well educated). However, they fear that things will go as usual: under the veil of environmental protection their business will be laid with payments and/or restrictions either by importers of their products, or by Russian agencies. Therefore, for better 'safety' some of the companies opted to join the process of discrediting the climate science, which has been seen in other countries, primarily in the U.S., for a long time. It is important to understand, why the 'soil' is so lavishly 'enriched' with people's skeptical attitudes for these 'seeds of evil'. People have little trust in businesses, particularly in large greenhouse gas emitters, for their commercial interests are just too obvious. Therefore, the development of skeptical attitudes in the society can be attributed to the management and press-offices of coal and metallurgic companies to a small extent only. This is more about human psychology and the general relocation of climate issues in the media space.

Some 10 years ago many people had doubts about the very fact of climate change. Such doubts still persist, but mainly on the part of older people, who do not trust any information sources in modern Russia, even Roshydromet, to say nothing about foreign media. Most people agree though, that climate conditions have changed. Recognition or denial of the anthropogenic impact on climate is now the demarcation line between science and skeptics.

Psychological origins of climate skepticism

Skepticism is rooted in the cognitive psychology, and primarily in the epistemic logic. Everyone can see that the climate is changing, the number of warm days is growing, spring comes earlier, autumn is late, there is less snow, etc. These facts are normally not questioned. Urban 'heat islands' are another vivid example, as they are easy to see. For example in Moscow, when the temperature stays below -20^0C, the temperature difference between the downtown and the suburbs may exceed 5^0C. In the downtown, snow cover is lost very quickly. People easily agree with this type of human impact and often ask climate scientists, why they do not account for direct atmosphere heating from cities and industrial facilities in their calculations. This type of heating is negligible against global energy processes, yet it is visible. What people cannot see, is the human impact on the global scale. CO_2 emissions from pipes (basically, water vapour) are obvious, but how do they relate to the warming? It only remains to believe. The problem is that human impact on global climate is something you have to believe, i.e. take the word of scientists or people you have personal trust in (Mayatsky, 2015; Hornsey et al., 2016). This is the principal difference from 'ordinary' air or water pollution, i.e. garbage in the forest or the ocean. Those who study special literature at work or for fun, and are deep into the physics of atmosphere, do not need 'faith', but such people are very few.

With regard to the above, two things are important:

- Trust in authorities. There are fewer skeptics in countries where people tend

to believe what they hear on TV, from members of national governments, scientists high on the academic hierarchy, or other officials. On the other hand, 'faith' is much weaker, and skeptics are larger in number in countries where for decades people were told lies on TV, where they had to differentiate between official and unofficial science and even used to forbid certain scientific knowledge. People cannot use their personal experience to check human impact on the global climate and they cannot rely on 'authorities'. This is not to say that in such countries (including Russia) climate scientists and hydrometeorological services are not doing as much as in others. They may be much better, than other countries, in emission reductions, informational and educational publishing, but the share of skeptics will remain large.

- Personal 'warming' experience over the recent years. It is easier to believe in the global impact, if in your locality the weather is warmer, than in the previous years. A recent research showed, that distribution of skeptics across the U.S. states is a direct function of whether or not summer and/or winter was cold in these states (Kaufmann et al., 2017). Only summers/winters over the very recent 5-year periods matter, while what happened before is forgotten. Hot periods prevailed in the west and northeast of the U.S., and the skeptics are fewer in number there, whereas in the middle of the continent there were colder periods, and there are more skeptics.

Another reason related to cognitive psychology is about the reluctance to recognize and admit wrongdoing. There is a gap between what an individual has been sure of from his childhood and what he is being told. People are positive that they take care of their children and grandchildren, and of the next generations that will have better lives. And the fact that today we are developing in a way that harms tomorrow's civilization is so uncomfortable, that our consciousness is mobilizing its resources to deny this fact – for the sake of normal functioning (Mayatsky, 2015; Hornsey et al., 2016).

The third aspect of cognition is reluctance to change personal beliefs. Many people feel quite strongly that man is insignificant compared to nature, and so believe that we cannot affect Earth's climate. They developed this view long ago, often in their childhood, and have many times seen for themselves during a storm or hurricane or while watching a volcanic eruption.

According to Hornsey, any time someone's personal beliefs contradict an opinion offered, his brain switches over to the 'lawyer' regime, i.e. starts picking the facts that support his beliefs and putting aside or doubting those that do not. In the end such individual comes up with a 'scientific' view of the world composed of nice and consistent 'facts' (Hornsey et al., 2016). If you keep providing more information to this person, the following will happen: he will ignore the facts as 'irrelevant', and the threat to his personal beliefs will make him even more skeptical to the arguments of science communicators, as he will suspect them of disrupting morality. Psychologists recommend to start by assuring the audience that their morality and personal beliefs shall not be affected; and only then you can make an attempt to convince them that they can trust scientific findings (Mayatsky, 2015; Hornsey et al., 2016).

A 'golden dream' of large-scale cargo flow from Europe to Asia by Russia's Northern Sea Route may illustrate such attempt. Many people have hopes that it would become a driver for the Arctic development and for Russia's new role in the world. And when they hear that this cannot be obtained through anthropogenic climate change, at least not until the 2040-2050's, because human impact on climate is too 'slow' (Khon, Mokhov, 2010), they start denying the very fact that changes in the Arctic ice are of anthropogenic nature. They appeal to some phantom natural cycles that drive climate change, and underline that in the 1930's there was also less ice, than in the 1980's. In the heat of the moment they even forget that,

unlike the anthropogenic trend, the cyclic nature of climate change, even hypothetically, can ensure only temporal large-scale ice-free navigation in the east of the Northern Sea Route.

In the climate context, it is very easy for Russian skeptics to put aside facts as 'irrelevant' for three reasons:

- Geographic remoteness. Climate discussions are often about remote localities, such as Africa, the Arctic, etc., where climate change is very obvious and is already causing substantial damage. However, it is perceived as something very far away.
- Time lag. When people learn that anthropogenic climate change is destined for a few coming decades, and that the action they should take can only alter the situation in the second half of the 21st century and onwards, they often simply ignore such projections claiming that sometimes weather forecasts are no good even a week ahead, so what good can they be 50 or more years ahead?
- Probability nature of climate projections. Today's scientific knowledge is often of probabilistic nature, and raising the probability of a theory being correct from 20% to 40% is a fantastic scientific achievement. However, this is no result for a man in the street, who is not really aware that knowledge always deals with uncertainty. So people can see no difference between scientific uncertainty and doubts that are borne by 'liberal'-style presentation of information by media and that make people not believe anything, stir their critical potential, appeal to their individual perception of any problem (Mayatsky, 2015).

Effects of mainstream, media, and social networking websites

Along with universal problems related to cognitive psychology, there is a fundamentally new, only 5-10 years old, parameter of the climate problem. Climate change has become mainstream! It is being discussed in the UN, by world leaders, RF President and members of the Russian government; they make decisions and adopt action plans. The Paris Agreement, which has been more than once positively referred to by the RF President, was signed to describe the principles of long-term joint action. Climate change has turned from an opposition-leaning and officially denied issue into an area of 'routine' official action. The problem has lost its opposition-leaning media- and social attractiveness.

Mikhail Mayatsky, Professor at the Higher School of Economics, also working for Freibourg University (Switzerland), makes a point that there is resistance to the scientific consensus about human impact on the climate system leading to global warming. It is rooted in the intuitive resistance to anything advocated 'from the above'. This effect is stronger in Russia, than in the rest of the world, because distrust of 'the authorities' in Russia is backed by many generations' experience.

Another mainstream effect is that the climate change problem is now discussed in the media in the ordinary 'antagonistic' format. Reporters and TV crews know that a topic that has acquired a substantial public consensus is no longer interesting. So they develop an artificial conflict of opinions to raise public interest. TV show producers keep looking for those who disagree with the global warming theory to ensure the conflict of opinions. Therefore, if thousands of researchers declare that Earth is spherical, but there are two opponents to the mainstream, one saying that it is flat, the other stating that it is triangle, all three would be invited to a TV show, and two of them would disagree that it is spherical.

A similar thing was described for the tobacco problem. When doctors approached media so they would inform the public about the apparent harm caused by smoking, the

media often refused or agreed only on condition that doctors would bring along an opponent. And they were not at all concerned that opponents do not exist or are negligible in number: this was required by the media format (Mayatsky, 2015).

The problem is not only about media traditions, but also about attracting advertisers. Whenever a TV show looks to maximize its advertising revenues, it is important to both attract advertisers and get the highest viewer ratings. This is achieved by offering a sensation. A show about a spherical Earth will get a much smaller audience and a tiny viewer rating compared to that about a flat or triangle planet. And the media go for it, even though they understand that a triangle Earth is bullshit (Bloom and Weisberg, 2007), while serious scientific programs are shifted to the night time at the best.

The result is that TV shows about climate change are much of a 'wonder-room' full of specially selected 'shamans', very far from the climate science, with just one or two professional physicists, geographers or biologists who are doing climate research. The show format does not give scientists a chance to explain their point of view, and the truth is often 'determined' by the show participants' shouts or votes. The procedure is so uncomfortable for climate scientists, that they would do anything to avoid being part of it and to save their nerves instead of trying to 'outroar' the opponents. They prefer to move in their own scientific circles without taking part in public discussions on TV or in social networks. They are just not interested in such discussions; they want to get a scientific result, or new knowledge, or even a grant, but definitely not waste their time or nerves substantiating their results for those who are doing their best to disagree. Sometimes it gets ridiculous: climate scientists are so much unwilling to join public discussions that they go like: 'You prefer thinking that the Sun goes round the Earth? OK, do as you wish!' (Mayatsky, 2015).

Another effect revealed in the recent years is the impact of social networking and internet, i.e. access to 'lateral branches' of information without understanding the 'trunk' – basic knowledge about the problem. Information is increasingly supplied following the media scheme, rather than cognition logic. Back in the 'pre-Internet era', people had an understanding of what the trunk is, and what branches of a science are. Today's searching systems destroy the 'tree' of knowledge. While their influence on older people is not so obvious, younger generations already have a vague trunk-and-branches idea. They are prepared to take 'branches' without seeing the 'trunk' or just giving a thought to whether or not these branches relate to some systemic baseline trunk (Mayatsky, 2015).

On the other hand, older people are more skeptical about the findings of foreign science and inclined to set the results obtained by Russian/Soviet experts in opposition to the appeals heard from abroad. To a certain degree, this too, is an attempt to resist the global mainstream, because intrinsically, Russian science is just a small part of the global climate community. Older people are also inclined to misconception: for example, Russian climate scientists' finding about the urgency of adaptation measures and about a purely long-term effect of greenhouse gas emissions reduction (Second Assessment, 2014) is interpreted as there is no need for emissions reduction. Therefore, it would be very good to, firstly, provide information primarily from Russian scientists, and secondly, to accurately follow their wording without generalizing the findings beyond a specific research.

How should information be provided to skeptics?

The first thing to be understood about work with skeptical audiences is that people are not driven by the lack of, or inability to obtain, knowledge, but rather by fear that their personal principles or beliefs will be taken away from them (Hornsey et al., 2016). You should never allow a 'straight forward'

polemic, for it will enhance the denial of any results obtained by the climate science.

A preliminary step, sort of introduction to convincing people, is recognition of their principles and beliefs at the moral and ethical level. It is important to show that you, too, are reluctant to accept anything 'in good faith', that there is no 'wrongdoing' on your part, and the action suggested is based on human values. The 'mainstream effect' should also be recognized and illustrated, preferably with humour.

Then it is important to not just state the facts, but describe them to the audience so as to 'tailor' the description to their interests (Hornsey et al., 2016). Understanding of what the skeptical audience would be prepared to agree with is of extreme importance, for it is to be used as the basis to start from while describing the latest scientific data (Hornsey et al., 2016).

The first part of presentation may include a statement of obvious facts supplemented with accurate references to Russian scientific sources. These should deal with a combination of natural and human-induced effects, because the audience should see that natural variations are not denied, but recognized:

- Temperature rise, maps of Russia (Roshydromet, 2017) and data for the Arctic (Richter-Menge et al., 2016).
- Data on the beginning and end of ice ages, data obtained from the Russian station 'Vostok' in the Antarctic (Second Assessment, 2014).
- Ice conditions in the Arctic (Roshydromet, 2017; Richter-Menge et al., 2016) and Antarctic (NSIDC, 2017). Same nature of changes in atmospheric circulation patterns leading to a variety of trends (enhanced Atlantic meridional overturning circulation leads to the Arctic ice melt, yet preserves ice cover in the Antarctic).
- Growing frequency of hazardous weather events that cannot be attributed to mismanagement or low-quality work of meteorologists (Roshydromet, 2017).

In the second part, it is worth while showing scientific results, which are not visible to 'an unaided eye', yet provide evidence of human impact. These should convince the audience that 'homemade research' is no good, and set their minds on the recognition of anthropogenic impact.

- Increasing heat content of the sea is the main indicator of global warming per se, while the atmosphere may heat up or cool down every now and again (IPCC, 2013).
- The greenhouse gas effect, which is not visible to an 'unaided eye'. Isotopic composition of atmospheric CO_2 which shows that growing CO_2 concentrations in the atmosphere are driven exactly by fuel combustion (Second Assessment, 2014; IPCC, 2013).
- Declining temperature in the upper atmosphere (stratosphere) along with rising temperature in the lower atmosphere (troposphere). While this effect cannot be attributed to solar radiation, it correlates well with human-induced enhancement of the greenhouse gas effect (Roshydromet, 2017).

In the conclusion, you may give a few obvious and emotional illustrations of climate change development. It would be good to supplement these with positive examples of response.

- 'Melting-out' of anthrax in Yamal in summer 2016 (picture of dead animals along with the temperature anomaly map, Roshydromet, 2017).
- Outbreak and escalation of, and solution to, tick-borne encephalitis in Arkhangelskaya Oblast (Sokolova et al., 2017).
- Pictures of extreme coastal erosion in the Arctic, Vize and Ushakov Islands (WWF, 2016).
- Problem related to fuel and other cargo summer-only delivery to remote northern settlements as aggravated by climate change (delivery by melting winter roads, thinner ice on rivers) (Berdin et al., 2017). Pictures taken in Yakutia: a track fallen through thin ice and a solar power plant to address the fuel delivery problem (pictures can be

found as 'delivery problems melting winter roads' in www.yandex.ru/images).

The emotional message combined with positive examples is expected to set people's minds on supporting practical action both in adaptation and mitigation, despite the uncertain mutual impacts and contributions of natural and anthropogenic components of climate change.

The general trend is that the climate consensus (i.e. the idea that current civilization development promotes global warming, yet human response to this challenge can be adequate to at least slow down the process), – is making its way, albeit there is so much to be done yet.

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