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The changing Baltic Sea

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The Baltic Sea has always been changing – from its beginning as the Baltic Ice Lake and Yoldia Sea over 10 thousand years ago to its present brackish water state. Therefore, it is difficult to separate its natural evolution from the changes caused by the human-induced climate change. However, it is likely that the changes in the past took hundreds or thousands of years whereas now we can detect significant changes over a couple of decades. Our ability to detect these changes has also increased tremendously, particularly due to the development of satellite oceanography that started about 40 years ago. Suddenly, we were able to make millions of measurements per day from those “eyes in the sky”.

It is important to differentiate between global climate change and regional environment change. Both are important but we need to separate them as accurately as we can to plan our actions and policies. Politicians and regional administrators love to combine them in order to use the excuse of global climate change as a scapegoat for their own shortcomings in regional management. The devastation caused by forest fires in California is a good example for that. Media, too, tends to bombard us with news clips about climate change that are distorted and seem to be designed to act as click magnets. “The Arctic Ocean is dying” is an example of these inaccurate messages. No, it’s not dying, just transforming. A few years ago I completed an analysis of satellite data that showed that over the last 2 decades, primary production in the Arctic Ocean had increased by about 50%. Note – it has increased by a significant amount, not decreased. More primary production (due to the shrinking ice cover) means that there is more life and not less life in the Arctic Ocean. Of course, with the changing environment the properties of that “life” are also changing.

Science makes most sense when it touches our everyday lives. For example, climate change becomes real to middle-aged and older persons as they can compare conditions “now” with those some decades ago, e.g. “when the grass was greener and the sky was bluer”. For example, I remember that during a research cruise to the Baltic Sea about 40 years ago, we once stopped the ship in the middle of the Baltic and jumped off the ship for a swim. It was a bit scary swimming in the open ocean but the water temperature was a soothing 25 °C. Surprisingly, events of 25 °C water in the middle of the Baltic have not become commonplace in spite of the general warming trend. What has actually happened is that the length of the period with the “barely swimmable” 16-17 °C waters has increased dramatically. The calendar day when the average surface water

temperature of the Baltic Sea reaches at least 16°C has become progressively earlier and the calendar day until which it stays at least 16 °C has become progressively later. As a result, the overall length of this “at least lukewarm” water period has increased by about 33 days during the last 2 decades.

The Baltic Sea waters are not famous for being crystal clear and highly transparent – that is due to the high load of light absorbing and light scattering substances that they contain. While this is primarily a regional problem affected by abundant nutrients, pollution from runoff and eutrophication, it is also exacerbated by climate change. The offshore Baltic Sea waters tended to be decently transparent most of the year and were very turbid only during the relatively short periods of plankton blooms. We can now estimate water clarity from satellite sensors and it appears that the turbid periods that used to last for about 50 days per year about 25 years ago, are now lasting for about 240 days per year. That is an increase in the length of the turbid period by almost 5 times.

Toxic cyanobacteria blooms now start earlier – in the beginning of June instead of July – and end later – in September. It means that most of the year the Baltic Sea is now very turbid and even offshore waters have low transparency most of the year. What this means to fish, zooplankton and other animals who need water transparency for survival is not clear.

In conclusion, the effects of environmental change that the Baltic Sea is experiencing are not primarily in the absolute values of some indicators such as temperature (although trends are certainly present) but rather in the timing of seasonal events. The spring is arriving progressively earlier and the winter is being delayed and the real winter never arrives. Figuratively speaking, it looks as if during the last few decades, the Baltic Sea has moved from Finland to Germany and there is no easy way back.

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