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The 5th Annual
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Session Sketches

Plenary I

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[SESSION NAME]: Trajectories of Earth Climate System: Where Are We Heading and What Needs to Be Done?”

Date / Time: 2018.11.30 / 10:35-11:35

Moderator: **Jeon, Eui-Chan** (Professor, Sejong University, The 3rd President, The Korean Society of Climate Change Research)

Speaker: **Katherine Richardson Christensen** (Professor and Leader, Sustainability Science Centre, University of Copenhagen, Former Chair of Danish Commission on Climate Change Policy)

Axel Timmermann (Director, IBS Center for Climate Physics, Distinguished Professor, Pusan National University)

Han, Sam Hee (Senior Editorial Writer, The Chosun Ilbo)

Kim, Joojin (Managing Director, Solutions for Our Climate)

Keywords: Climate Change, Ocean Rise, Nuclear Power, Food, Human Migration

The moderator, Jeon, Eui-Chan, began the session by introducing the panelists and giving brief backgrounds on their research areas and prior accomplishments. The panel possessed a wide range of impressive experiences relevant to the topic of climate change. Each panelist took about 10 minutes to speak to a unique topic related to climate change.

Axel Timmermann: Axel Timmermann kicked off the panel discussion by giving a brief presentation about climate change, sea level rise, human migration and food insecurity. During this presentation, Timmermann brought to light many important scientific facts regarding climate change. First, warming has increased by 1 degree Celsius over the past 120 years. However, this global mean increase does not represent what is happening regionally. Different parts of the world will face unique challenges and the impact of climate change will not be spread equally. Another alarming issue that Timmermann identified is that ocean acidification has reached unprecedented low levels that haven't been seen in 55 million years. These rates are projected to continue to decrease rapidly in the coming years, which will result in certain consequences if immediate action is not taken.

Timmermann built upon his case for monitoring impacts to the oceans by stating there is clear evidence demonstrating the acceleration of sea level rise over time. Furthermore, some of the Pacific islands have been threatened by this sea level rise. Sea levels have risen as much as 12mm per year in certain locations, and only 30% of this rise is the result of climate change. The other 70% can be allocated to wind trends. According to Timmermann, we will have patterns of sea level rise that are attributed to environmental and natural climate factors, as well as from human caused climate change moving forward.

Upon the conclusion of his discussion on ocean levels, Timmermann seamlessly transitioned to the topic of temperature warming. He claimed we could experience between 3 and 6 degrees of warming over the next 80 years, but this number could be reduced with better efforts to mitigate climate change. Additionally, he believes reaching the 1.5 or 2 degree warming targets set in the Paris Agreement are very ambitious and will require extensive efforts. Timmermann brought the topic full circle by correlating that one resulting impact of these rising temperatures is the rapid melting of the Arctic and Antarctic ice sheets. The ice melting in Antarctica will raise sea levels significantly based on its current trajectory, but we do have an opportunity to slow this process with better global efforts. Timmermann feels we still have a lot to learn as a scientific community about ice sheet melting.

Another important aspect of this presentation was the issue of food insecurity. According to Timmermann, all corporate efforts to make crops more temperature resistant have failed up until now. This is important, because every degree warming will cause roughly a 10% reduction in total crop yields. This will result in large-scale food shortages in the future unless immediate action is taken to begin addressing the problem.

The final topic Timmermann spoke to was the challenge of human migration that will come with climate change. Humans are likely to have to migrate from more affected areas of the planet to others because of climate change. The sheer number of people could be staggering, as current models project between 100 million and 1billion people could be forced to relocate.

Timmermann concluded his discussion by saying that not all science on climate change is very well understood. Current models give varying predictions, and much of this results from a lack of understanding of clouds. He feels that we as a scientific community need to conduct more research leveraging resources and emerging technologies.

Han, Sam Hee: Han, Sam Hee was the second panelist to speak and he started his discussion by responding to and re-emphasizing comments made by Katherine Richardson Christensen in her opening keynote presentation. Specifically, he stated that the topics of tipping points and positive feedbacks are not used enough in scientific papers. Han, Sam Hee then utilized an analogy of an egg rolling to the edge of the table to describe our current relationship with climate change. Once the egg falls off the table and breaks, we cannot put it back together and revert it to its previous state. We are moving towards this irreversible tipping point with climate change. Han, Same Hee also conceded that it is almost impossible to predict when the tipping point will happen. The changes we are currently experiencing are nonlinear. Because of this, it is very difficult to make accurate simulations to anticipate the impacts of climate change.

The next concept Han, Sam Hee explained was positive feedback. He says there are many climate change factors that are co-related and impact each other directly. This works in a

connection similar to that of a spider web. He then transitioned his discussion to the concepts of tragedy of the commons and the short-sited perspective human beings have of their own impact on climate change. Han, Sam Hee believes we need to share the responsibility among the 7 billion people on the planet, but some people might try to avoid the responsibility. Furthermore, many countries might prioritize national issues over efforts to combat climate change. Part of the reason for this perspective is that carbon emissions will have longer term consequences which we might not feel the need to address immediately.

Han, Sam Hee concluded by offering that the climate change issue was raised 30 years ago, but we didn't make large enough strides to tackle the issue initially. Our current efforts are still not enough to tackle this challenge. A small catastrophe might help us to become alert and tackle this issue. However, up until this point, science communication has failed us.

Kim, Joojin: The third panelist to speak was Kim, Joojin. His organization is working to reduce coal both domestically and overseas. He spoke on the topic of the importance of reducing coal power, because of its financial burdens. According to him, coal is the low hanging fruit for reducing GHGs. The continually lowering price of renewables is having a big impact on reducing the need to retain coal as a primary power source. Existing coal and nuclear power is about to become more expensive than new renewable power. Kim, Joojin raised that by around 2020, new coal will be more expensive than new solar in Korea, according to a study conducted by Bloomberg. Furthermore, by 2024, active solar energy will be cheaper than active coal energy. To add to this study, the Ministry of Trade, Industry, and Energy believes renewables will be cheaper than traditional power sources in Korea by 2030. Because of this, money for new technology in the energy sector is increasingly being allocated to solar and wind.

Kim stated that new coal power plants will become a financial burden, and Korea currently has 3 new coal plants under construction. Eventually, these assets will have to be bailed out, and the electricity consumers will end up bearing the burden of the cost. China and Japan are experiencing similar problems as well. In fact, Japan is installing 20 new coal plants currently. This issue will need to be addressed throughout Northeast Asia in the near future.

Katherine Richardson Christensen: The final panelist built upon her keynote presentation by highlighting how important the issue of risk is to climate change. No scientists have said that the 2-degree mark set at the Paris Conference will make us safe. She stated this number was negotiated by politicians, and we must consider what the risks are at 1.5 degrees, 2 degrees, and every other temperature. All increases in temperature increase the associated risk, and we have to consider this as we work towards solutions.

Another important point Christensen raised is governments are not the same as governance. We must manage climate change and our resources allocated to it at a global level, because this is a global issue. Individuals and companies matter, and we must change the way we think about resources so that we don't overuse them to retain our current lifestyles.

The conversation was then transitioned to the topic of food. Energy has been a big focus, but our food system will also be greatly impacted. This system is made up of a billion one-man businesses, and the transformation that needs to happen to address this problem will require us to rethink our current structures.

Christensen followed this by addressing a couple of points raised previously by Han, Sam Hee. The first: Is this truly a failure of scientific communication? Christensen believes that the scientific community does not bare the blunt of the blame. People must be open to hearing the messages delivered by these scientists. She used the comparison that 40% of Americans still don't believe in the theory of evolution despite the wide-scale messaging by the scientific community. The second point she addressed is that small catastrophes from climate change are already going on, such as the fires in California. However, most of the world doesn't care about regional catastrophes. There are several happening right now, and this has not raised awareness to the problem.

Christensen concluded by saying there is no one source of energy that will replace fossil fuels. Nuclear will be part of the solution, but others will be needed because of several limitations, including the time it takes to implement nuclear power. Nuclear is a better option than coal, but it will not be able to power the world on its own.

Audience comment: The session concluded with a few comments made by members of the audience. One highlight came when an audience member commented on the positive possibilities of nuclear energy. Timmermann responded to this comment by countering that there are insurance costs of nuclear power plants and the communities end up taking the funding risk, which is borrowed from future generations. He believes we should follow the lead of insurance companies, who are not willing to insure nuclear plants for meltdowns.

Han, Sam Hee added the point that there is uncertainty of technology development to improve energy solutions that must be considered.

List

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