

And so, I think that one of the big issues here is that there are certain social structures that can accelerate good ideas and social structures that make it very difficult for ideas to be adopted. It tells you something about either the political structure, the social structure, or something, but I can tell you, my ideas, either because of my low standing in society, or whatever else is going on, have taken an awful long time. OK, that's the negative side, all right?

On the positive side, I have believed in my ideas, I have studied them, and I can tell you that I understand what I am talking about far better because I've worked out all kinds of various problems by myself, with nobody even giving me a thread of encouragement! They mostly shun you, they reject you, they do all these things. But eventually, what will happen, as in this case, is that, I know—in fact, I'm being proven correct over time on these other ideas. The same thing is true on this LNT thing.

In the beginning, when I brought out that [Herman Joseph] Muller probably lied in his Nobel Prize speech, and that Muller probably didn't actually induce gene mutations, and I got bopped on the head, I got flushed down the toilet, and I got treated with, "You're a marginalized scientist, you're kind of a nothing." They really specialize in name calling and other ways to marginalize one. I've always taken great solace in the fact that the criticisms that I got were that I'm not as

smart as Muller, and I didn't go to an Ivy League school, and I'm a marginalized scientist because I work on this hormesis thing. But eventually, when the name calling was all done, I said, "Well, all these things are true, but would you do me a favor, and tell me where my mistake is?" they just went back to recycling the personal attacks, rather than addressing the issues of science that I would raise.

So, you have to listen to what the criticisms are. If the criticisms are just how stupid you are, or the fact that you don't have a Nobel Prize, or the fact that you didn't go to Harvard University—well, all those may be true, but that's not the relevant question! You have to look at the relevant question.

There are different ways in which people try to prevent you from going forward, and to marginalize you. And you just have to try to understand what the basis of the arguments should be which are valid, and those arguments which aren't valid. And then hopefully people will get around to—but you have to be strong, and you have to be courageous, and you have to be self-critical. You know, you have a lot of critics out there, but the most important critic in your life is, guess who? It has to be you! You have to be your own worst, toughest, raunchiest, most difficult person to satisfy. And if you can be all those rough, tough things, to yourself, the rest of the world's going to seem kind of easy when you face it.

## Prof. Sergey Pulinets We Should Unite To Survive

*This is the edited transcript of the presentation of Sergey Pulinets to Panel 3, "Principles of Science for Durable Economic Progress," of the Schiller Institute's June 18–19 Conference, "There Can Be No Peace Without the Bankruptcy Reorganization of the Dying Trans-Atlantic Financial System." Prof. Pulinets is Principal Scientific Researcher at the Space Research Institute, Russian Academy of Sciences in Moscow. He has more than 40 years of experience in space physics and radio physics, the physics of the ionosphere, and also geophysics.*



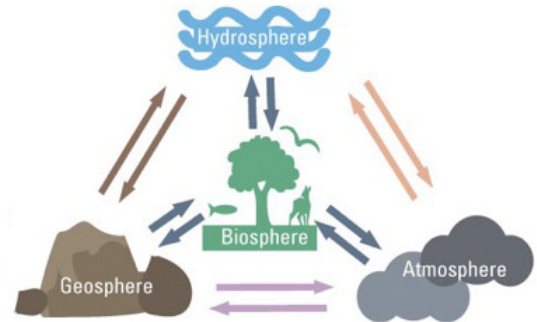
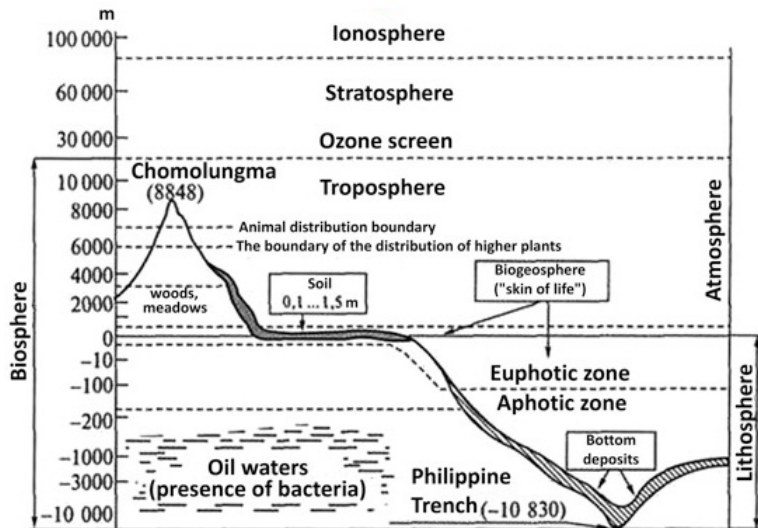
Schiller Institute  
Prof. Sergey Pulinets

*Some graphics used are not shown here, and references to them have been removed.*

Good afternoon, or, to those of you who are to the west it is good morning.

I would like to share with you my ideas about the relationship between the development of science and the present state of our society. I will start with similar things that were described in the first [Jason Ross'] presentation about Academician Vernadsky, whose ideas, I consider, paved the way for what I am doing now, especially two things: He was

## Completeness vs. Simplicity



To properly understand the interactions in the geosphere, it is necessary to go beyond the atmosphere and include the space effects on the environment, notably the phenomena of the stratosphere and the ionosphere, as indicated on the left. At right, the excessively simplified, textbook version.

one of the first scientists who developed the science of nuclear physics, the field of radium studies. He was the director of the Radium Institute in St. Petersburg. I am now working with radon, which is a daughter product of radium, and plays a very important role in the modification of the lower layer of the atmosphere, and contributes to the lithosphere-atmosphere-ionosphere coupling, which I will describe a little bit later.

And the last thing, it is Vernadsky's ideas of the geosphere's interaction on which our model is based. And one of his very interesting and important ideas was the idea of the noosphere. This term was proposed a little bit earlier, by the Jesuit priest, Pierre Teilhard de Chardin, in 1922 in his *Cosmogogenesis*; and the French scientist Édouard Leroy in his 1927 lectures at the College of France, and in his article, "La noosphere et l'hominisation," in his book, *Les origines humaines et l'évolution de l'intelligence*," Part III.

Professor Vernadsky's merit is that he filled this term with new, materialistic content, understandable to the layman: Today, by the noosphere, we understand the highest state of the biosphere, associated with the emergence and development of mankind, which, knowing the laws of nature and improving technology, begins to exert a decisive influence on the course of processes on Earth and near-Earth space, changing them with its activity.

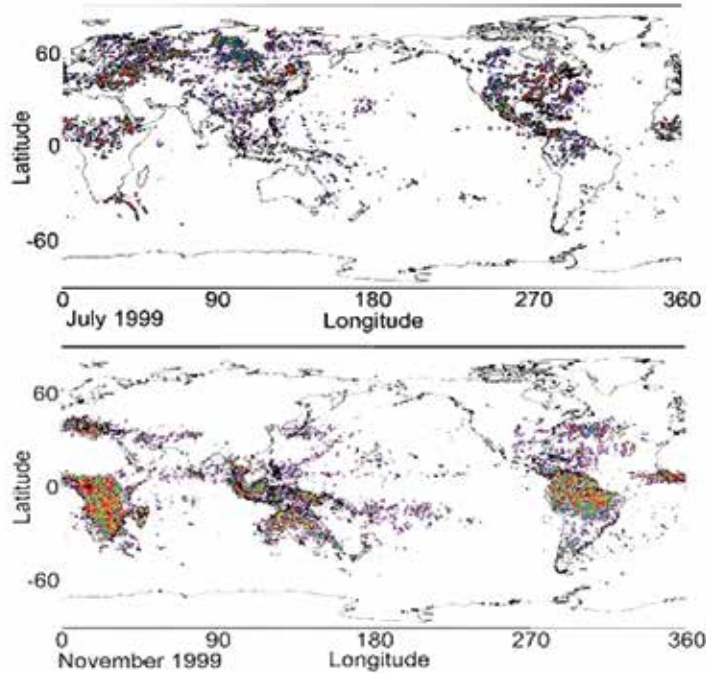
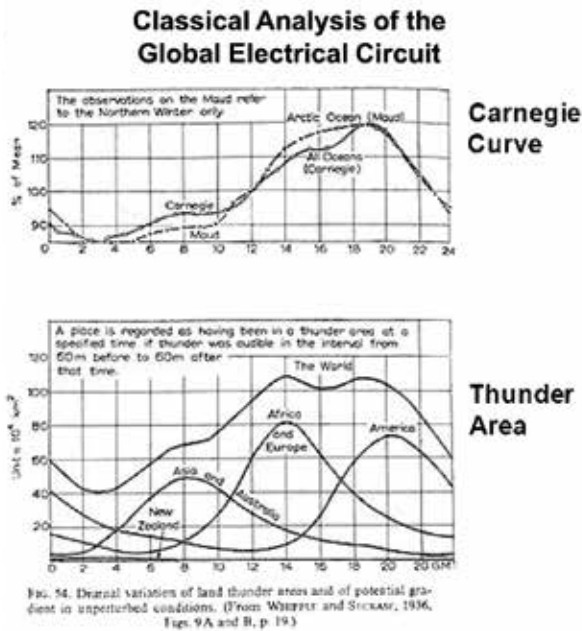
But in many countries, and especially in the Western

world, they're a little bit primitive in their understanding of the geosphere's interaction. If you look at the right part of the picture [Completeness vs. Simplicity], they only show the biosphere, atmosphere, geosphere and hydrosphere, forgetting completely about space effects on our environment, which play a decisive role in the development of our nature and society.

And the second, very important thing: The biosphere, and especially mankind's being, is very fragile, because if you look at the left part of the figure, you will see that the position of the biosphere is the very thin "skin of life." Because this 20 km-thick band where living beings exist is even thinner than the skin of our body, looking from the perspective of the total environment. And we should be very careful to maintain the conditions of our life, so as not to lose the possibility for the future.

... The interaction of the geospheres is much more complex because we have the impact from above, from the Sun, from the galactic cosmic rays. And then the energy of the Sun's activity is transformed into the energy of our magnetosphere, which creates a large number of different currents and fields in our environment, in the ionosphere and in the atmosphere. And many physical events are influenced by the solar activity. For example, interesting objects like hydropower stations can be influenced by solar activity. You may remember this disaster in Canada in 1989, when the

## Carnegie Curve and Thunderstorm Activity



Upper left: The Carnegie Curve shows variations in the electrical potential gradient above Earth's surface throughout the 24-hour day. Here the curve represents the variation in percentage of the mean. Lower left: Thunder results from electrical discharge (lightning), and it, too, varies by time of day. The upper-most curve, representing the Earth as a whole, is similar to the Carnegie Curve: when the electrical potential is great, lightning discharges are more frequent. At right: the geographical distribution of thunderstorm discharges for two dates several months apart. Note the shift between the Northern and Southern hemispheres.

whole province of Ontario was without electricity during a whole day.

From another side, we have influence from seismic activity on our environment and this activity is projected not only into the atmosphere, but into the ionosphere, and even magnetosphere, and modifies our environment.

We will see this if we look carefully at the global electric circuit where we live. We are continuously inside the global electric circuit. On the ground surface, the vertical electric field (or gradient of the vertical electric field) is 100 volts per meter. So, between your feet and head, you have nearly 200 volts difference. This global electric circuit is modified by many factors—by galactic cosmic rays, by air pollution, by natural radioactivity. For example, the galactic cosmic rays contribute to the formation of clouds.

### Earthquakes and Thunderstorms

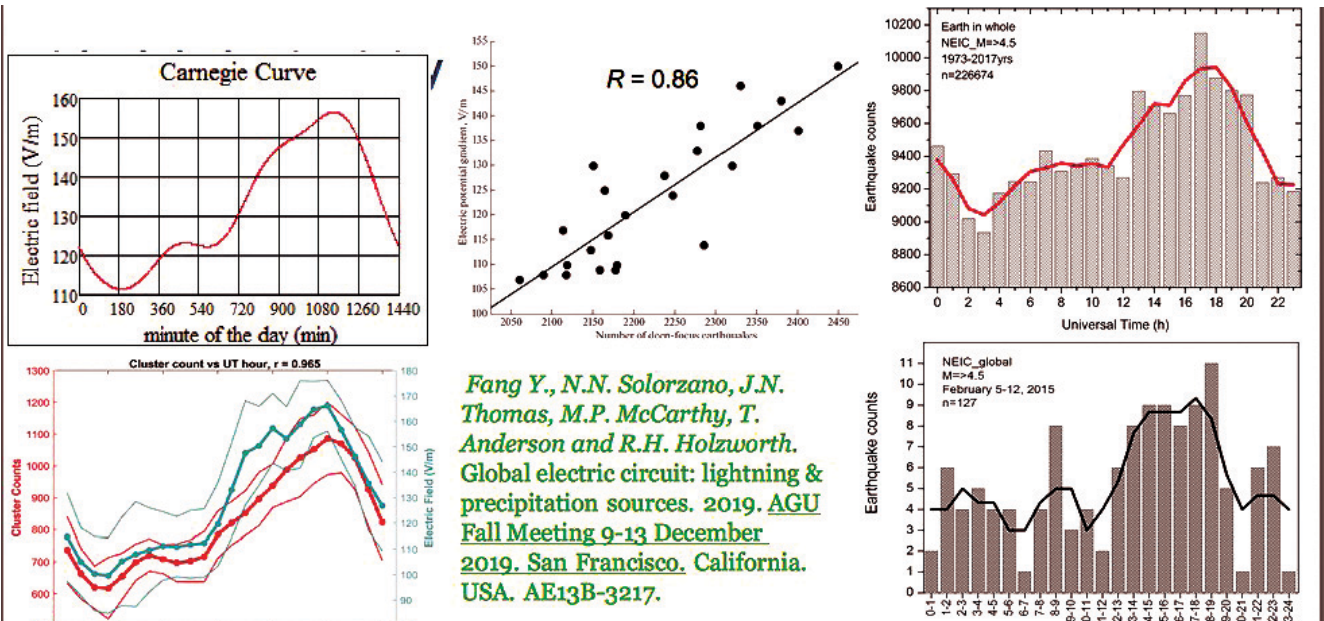
And so we have a relationship between the action of the galactic cosmic rays and our thunderstorm ac-

tivity. Here you can see the so-called Carnegie Curve. It is a UT variation [time-of-day variation based on Universal Time—ed.] in this electric field of the ground surface. On the right side of the figure, you can see the distribution of the thunderstorm discharges, which are mainly concentrated over the continents. In the Summer, this thunderstorm activity is higher in the Northern Hemisphere than in the Southern hemisphere.

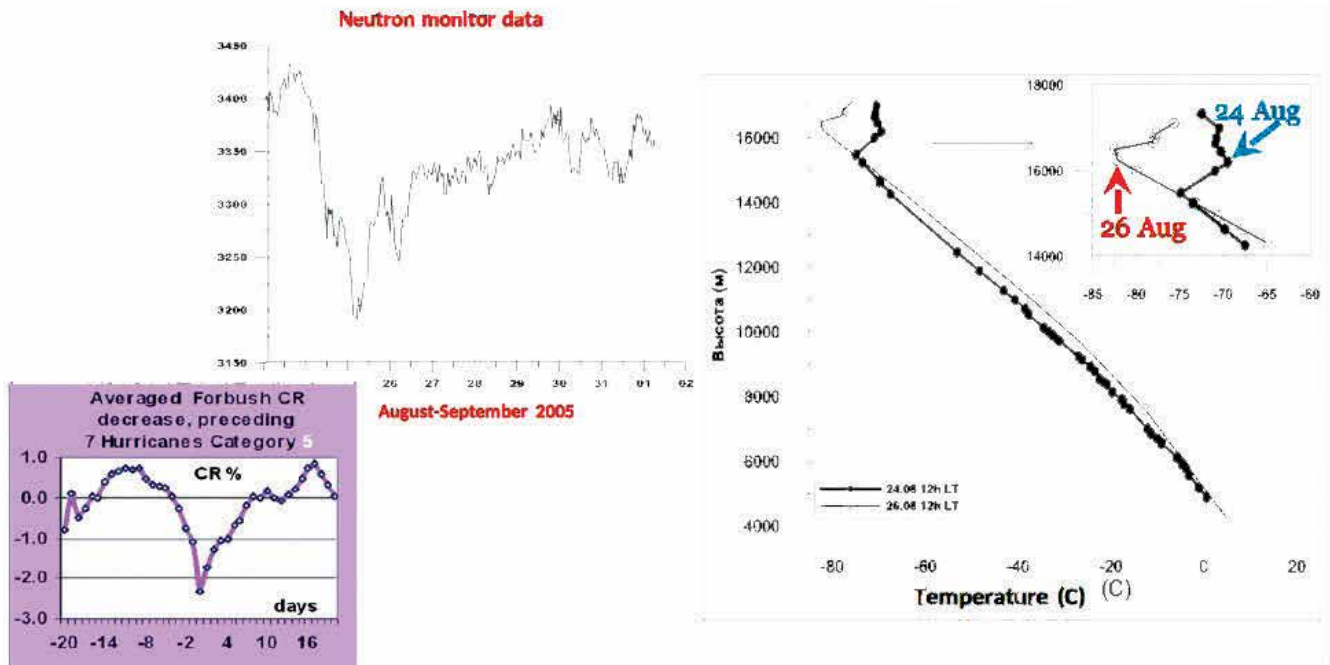
But what is interesting, and very mysterious, is that this daily electric field activity has a very large correlation with global seismic activity. Looking into the cause/effect relationships, we can state that probably seismic activity controls thunderstorm activity on our planet. And we can [say] that mainly the seismic activity happens in such longitudes where the magnet field lines from the tail of the magnetosphere are projected on that longitude during the nighttime. You can see the lines of the main tectonic activity for the case when we have daytime in the Western Hemisphere and nighttime in the Eastern Hemisphere. All the Asian Pacific part is



# Cosmic Rays and Hurricane Katrina



Pulinets: "The daily electric field activity has a very large correlation with global seismic activity.... probably seismic activity controls thunderstorm activity on our planet." Upper right: Earthquake counts around the clock for 1973–2017 with a smoothing curve (red). Lower right: Earthquake counts for one week in February 2015, with a smoothing curve. Note the similarity of these curves to the Carnegie Curve on the left.

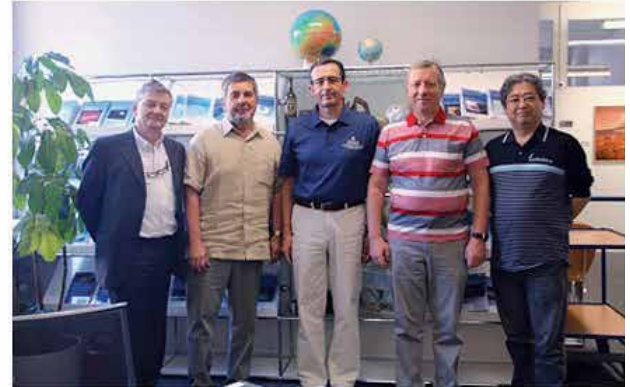


A sudden drop in galactic cosmic rays reaching the Earth led to Hurricane Katrina. (Such sudden decreases result from a CME—solar coronal mass ejection—and the consequent magnetic storm, because some of the cosmic rays are swept away from Earth.) The decrease in galactic cosmic ray flux led to a reduction of the air temperature at the altitude of 16 km in the tropopause by nearly 9°C. That meant a drastic increase in the temperature difference between the tropopause and the ground/ocean surface, which led to an increase in vertical turbulence and vertical convection, which led to Hurricane Katrina.

Lower left: Averaged data for seven Category 5 hurricanes, the most powerful hurricanes, in the Atlantic Ocean. Two days before the development of the Category 5 hurricane, there was a sharp decrease of galactic cosmic ray flux.



**Tammy Jernigan**  
5 Space Shuttle  
Missions  
Deputy Principal  
Associate Director  
in the Weapons and  
Complex Integration  
(WCI) organization  
at [Lawrence  
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Laboratory](#)



*International cooperation is fundamental to scientific progress. At left: Two photos of American astronaut Tammy Jernigan, now at Lawrence Livermore National Laboratory. Above, she talks with Pulinets in the Reagan era. Top right: U.S. Prof. Bodo Reinisch (white beard), founder of Lowell Digisonde International, with other scientists from Kharkiv, Ukraine. Center: Cooperation among scientists from Ukraine, Poland, Taiwan, and Russia in the European Union's Earth Observation Program, Copernicus. Lower right: Scientists from Italy, France, the U.S., Russia, and Japan collaborate on an earthquake forecasting project.*

seismically active; and in the opposite situation, we see the projection of the South Pole and seismic activity in the Western Hemisphere.

About the action of the galactic cosmic rays, probably nobody has heard that galactic cosmic rays have influence on the formation and amplification of hurricanes.

I would like to show you the example of the Katrina Hurricane. Nobody heard that before Hurricane Katrina, we had the effects of the geomagnetic storm during which we had a so-called Forbush [rapid—ed.] decrease of the galactic cosmic rays flux, which led to the diminution of the air temperature at the altitude of 16 km in the tropopause, by nearly 9°C. Due to this decrease of the temperature of the tropopause, the difference between the temperature on the ground surface (or ocean surface) and tropopause, increased drastically, which led to an increase in vertical turbulence and vertical convection, which led to the development of Hurricane Katrina.

And that is not the only case. This violet picture [inset, lower left], made by Mexicans, shows the statistical data for Category 5 hurricanes, the most powerful

hurricanes, in the Atlantic Ocean. You can see that two days before the development of the Category 5 hurricanes, we see the decrease of the flux of the galactic cosmic rays.

### Scientific Cooperation Leads to Progress

But to make progress in science, we should take into account *all* the things which happen in our environment. I mean the interactions between the geospheres. We should end the separation between scientific disciplines—like, this one is a seismologist, this one is a meteorologist, and so on—because all the effects in our environment are concerned with the interaction between different fields of science, different geospheres. Only an holistic approach, and extended international cooperation, will lead to the progress of science. During the recent years, we have observed some slowing down of scientific development. Probably it could be attributed to the lower level of scientific cooperation.

I would like to show that all the progress of our science was made due to contacts of scientists of different countries.



Here, I would like to show you this young lady, with whom I had discussions during the Reagan time, and she asked me then, “Is Russia an evil empire?” I tried to convince her that it is not so. And this small girl, you can see, finally became a famous American astronaut, Tammy Jernigan, who has now a very important position in the Livermore National Laboratory.

Here, our radiophysical studies progressed in cooperation. This [top right picture] is Prof. Bodo W. Reinisch, founder of Lowell Digisonde International, who was the principal designer of the ground-based ionosonde monitoring network [of high-frequency radars—ed.], called digisondes. The scientists in this photo, taken in Ukraine, are from Kharkiv, Ukraine. Here [center picture] is cooperation between scientists from Ukraine, Poland, Taiwan, and Russia. It is called Copernicus.

And pictured here [lower right] are collaborating scientists on an international project just about earthquake forecasting. They are from Italy, France, the United States, Russia, and Japan.

So only in close cooperation can we reach real progress in science. Nothing in science or in human relations can be neglected or eliminated.

This is a portrait of Dostoevsky that appeared in March of this year as a mural on the wall of one of the universities in Italy which is against the elimination of Russian culture in the world now.

I would like to finish with some statements which show that we are now in a very dangerous situation. We see that in the world [are] growing effects such as intolerance when one side does not accept the arguments of the other side. Even if the arguments of the other side are correct, they are not accepted, because that side does not belong to the first side. And better to have an erroneous argument from people in your own company, than accept an argument from people from the other side, which probably have a right opinion.

So [also] increases in primitivism, ignorance. When the people do not have enough knowledge in physics, chemistry, geography, they only want to have enough to eat and to reach prosperity, but do not think about the future which could only be reached by development of science and during cooperation.

And the last thing is a moral decline, which leads to depopulation, degradation of our society, involution, and may lead to war and humanity’s extinction.



*A protest against the current attempt to eliminate Russian culture in much of the world for the sake of NATO’s war drive: This portrait of Dostoevsky appeared in March as a mural at an Italian university.*

So, my appeal is that we should cooperate, work together to prevent humanity’s extinction. Thank you very much.

**Stephan Ossenkopp (moderator):** Thank you very much, Professor Pulinets.

I want to pick up on one of the points Professor Pulinets made at the end, which I think is very relevant, and to which the Schiller Institute has been very dedicated to bringing this forward: The dialogue of civilizations.

If we compartmentalize science, if we have national interests over the interests of humanity, and other such aspects, then we will not get to what Helga Zepp-LaRouche, the founder of the Schiller Institute, called the new paradigm. We need exchange. I think a very promising vehicle and platform, is not only what the Schiller Institute is doing in pioneering this movement, but also what nations such as, for example, China, which I mentioned in the beginning, are also doing. China’s Belt and Road Initiative, or New Silk Road as it’s sometimes known in the West, it’s not just an economic program. It does have a very strong aspect of a cultural dialogue, cultural exchanges, because in the experience of any deep civilization like the Chinese they know that isolation is the wrong way, and the exchange with other cultures, on a fair level, and of course, on an equal level and a level of respect, is the solution for most of our problems that we do have today.