The GGG999 Conference

by Kevin Langdon

I attended the GGG999 Conference over the Labor Day weekend in Denver, organized by Membership Officer Ed Schreiber, along with 50 of my fellow members and about 20 guests. It was a smashing success, in my opinion, with a stimulating program and great opportunities to get to know other members of TNS.

The meeting site was the famous Brown Palace Hotel. A very good rate ($59) had been arranged with the Comfort Inn across the street (conveniently connected to the Brown Palace by a second-floor bridge). The rate at the Comfort Inn included two wine-and-beer receptions and breakfast every morning.

I checked in to my room at the Comfort Inn after I arrived from the airport on Friday afternoon and joined the TNS members assembled downstairs for a glass of wine. Ed greeted me and so did several other members, many of whom I hadn't previously known or had known only by e-mail.

My room was spacious, clean, and comfortable. Everything at the hotel worked well except that one of the two elevators was out of service for much of the weekend. The hotel did post signs directing guests to the service elevators, which were speedy and made this a trivial problem.

The facilities at the Brown Palace were impressive. The building is beautiful and the room in which our activities took place was large and equipped with writing pads and pencils at every seat at a number of rows of tables, and pitchers of ice water. The seats were comfortable, a good thing given the many hours of programming Ed had arranged. Ed brought a microphone and videotaping equipment and all the program sessions were recorded.

There are many eateries and drinkeries within a few blocks of the Brown Palace, including some downstairs at the Brown Palace and a great variety of establishments along the 16th Street Mall, just a block away from the conference hotel, with horse-drawn carts, a free shuttle bus, and lots of partying people on the street on weekend nights, without rowdiness or hostility. I had several enjoyable lunches and dinners with different groups of members and many interesting conversations between sessions and after the formal program on Saturday and Sunday evenings.

The only program activities that I missed were two hikes led by Robert Chase, on Friday afternoon before I arrived and on Tuesday morning after I left, and the final lunch organized by Ed on Monday and paid for with surplus funds from the conference (I had to leave early to catch my flight home). Notes on the program sessions follow. All the videos from the conference are available at http://www.ggg999.org/ .

Program

Friday Evening

Ed Schreiber - Welcome to Denver

Our host, Ed Schreiber, began the conference by welcoming the assembled members and guests and telling us a little bit about the background of the conference, the program, and the facilities available to us at the conference hotel and the Comfort Inn.

Jim and Louise Gunderson and their robot, Wilma

The work Ed and his wife Lea did in arranging all of this was impressive and was greatly appreciated by conference participants. After welcoming us to the conference, Ed introduced Mike Keefe . . .

Mike Keefe - Cartooning from Denver

http://www.intoon.com/

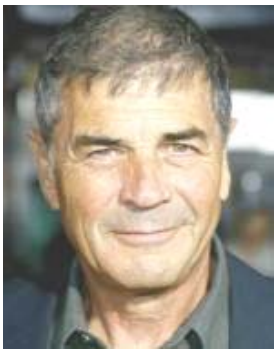
Mike Keefe was heading for a career as a mathematician and had been teaching math for several years and doing amateur cartooning (and playing in a rock band) on the side, when he had a lucky opportunity to become a professional cartoonist. He's been on the staff of the *Denver Post* for 34 years and his work is widely syndicated. His cartoons have appeared in *Time*, *Newsweek*, *Business Week*, and the *Washington Post*, among other publications.

Mike showed us many examples of his work, including cartoons on the wars in Iraq and Afghanistan, Creationism, birth control, global warming, torture and interrogation techniques, the Obama administration, Hillary Clinton, Reverend Wright, big oil, Sarah Palin, Bill Clinton, national parks, guns, the economy, social security, health care, Sonia Sotomayor, sports and doping, computers, technology, and the Internet. Then he showed short animations caricaturing Joe Biden, Dick Cheney, Sarah Palin, Hillary Clinton, John Edwards, Bill Clinton, and George W. Bush. A very impressive body of work. A sample cartoon appears below:

Mike said that he works in real time, doing five cartoons a week, and does not stockpile cartoons. He told us that when he began working at the Denver Post there were 300 full-time editorial cartoonists working for newspapers in the United States but the profession has fallen on hard times and there are only 55 working today—but Mike is a highly-

respected, widely-syndicated, award-winning cartoonist, and there is a strong market for his work..

Robert Forster - Interacting



http://robertforster.com

Robert Forster is an Oscar-nominated actor whose 45-year career has included parts in many films, including "Jackie Brown," "Touching Home," and "Charlie's Angels 2: Full Throttle," and several TV series. He's worked with many well known stars and directors, including Quentin Tarantino, Morgan Freeman, Antonio Banderas, Harrison Ford, Marlon Brando, Elizabeth Taylor, and John Huston.

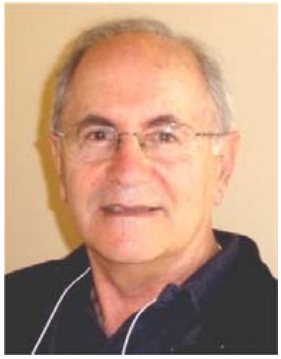
He described the trajectory of his career as a five-year rise followed by a 25-year dry period, with more important parts coming his way again only very recently. Ever since Quentin Tarantino hired him to star in "Jackie Brown" Robert has been very much in demand.

He showed us a menu of short phrases, each a cue for an anecdote illustrating one of the lessons he's learned from his life as an actor, and asked which of them we'd like to hear about. Then he proceeded to spin one interesting story after another. There was a story about a character-actor friend which illustrated the idea that it's not enough just to be an actor; you've got have a special talent.

Robert hadn't intended to be an actor but was led into that field by a beautiful young woman who became his wife. He landed a part in a two-character play with Arlene Francis. Then he had the opportunity to work on a John Huston film, where he learned that what is important is to understand the needs of the director, the camera man, the sound technician, etc., and to give them what they need. His mother's insistence that he do the dishes led him to a way to support himself in school and an appreciation for doing any job well and what it leads to: self-respect and satisfaction.

There was much more. Robert Forster was a riveting presence before the conference audience, with humor, sincerity, and humility, and his presentation was very well received.

Saturday



Bennie Bub - The Neurosciences Explosion

Bennie Bub is a neurosurgeon and anesthesiologist from South Africa, now living in Colorado. He traced the development of understanding about the brain and brain science from trepanation (making holes in the skull to relieve pressure on the brain) going back several thousand years, through the failure of

the ancient Egyptians and Chinese to recognize the importance of the brain and the slow accumulation of knowledge about neuroanatomy, brain chemistry, and electrical activity in the brain, to the huge advances in scientific understanding of brain functioning during the last century. Although we've all heard much about these subjects, Dr. Bub's presentation brought it together in a very interesting way.

Hank Brown - Budget Meltdown

http://polsci.colorado.edu/dept/fac_hankbrown.shtml

Hank Brown served in the Colorado State Senate, the House of Representatives, and the U.S. Senate. He practices law, teaches political science at the University of Colorado, and has been President of that institution. He spoke about the crisis that has been created by deficit spending by the U.S. government. He pointed out that politicians have selectively followed Keynesian economic doctrine in deficit spending to "prime the pump" in difficult economic times but have ignored the complementary principle of spending less than revenue collected in boom times, with disastrous consequences. The current stimulus will increase the national debt by trillions of dollars; this kind of spending is simply not sustainable, with unfunded liabilities totaling $100 trillion, $59 trillion of it in Medicare alone. According to Senator Brown, recovering from the economic condition that's been created will be painful, requiring huge sacrifices from government, business, and the public and a major reduction in U.S. military activity abroad.

Jim & Louise Gunderson - Consciousness in Autonomous Robots and the Impending Robot Conflicts

http://gamma-two.com/

Although it had very little to do with the abstract theorizing of philosophers about the nature of consciousness, this was a fascinating talk by two Ph.D. artificial intelligence and robotics researchers. Their presentation was very well coordinated and they often finished one another's sentences. They've done extensive work on replicating the neural systems of organic brains.

An interesting thought experiment they suggested: If you're driving along and something startles you and you realize you don't remember driving the last three miles were you conscious? They pointed out that episodic memory gets transferred to semantic memory overnight and conjectured that this may be one of the reasons organisms need sleep. They spoke about robots that can perceive, reason about their environments, and perform expedient actions. They pointed out that we don't know how we do many of the things we do, implying that the part of ourselves which calls itself "I" is far from the

whole of the psychic apparatus in action at any given time. Semantic memory is more deeply embedded in the brain than autobiographical memory. If you wake up in the hospital you may not know how you got there but you know that a bed is a bed, a chair is a chair, etc.

And they demonstrated one of the robots manufactured by their company, Gamma Two, Inc. Jim asked "Wilma," "Are you self-aware?" And Wilma gave a long, philosophical answer, which was very amusing. Wilma knew a few tricks but she kept coming back to one question: "What do you want me to do?"

Heather Preston - Blowing Bubbles in Space: The Birth and Death of Practically Everything (Astronomical)

http://www.mensafoundation.org//Sites/foundation/NavigationMenu/Programs/Conversations/RevolutionsinCosmology/RevCosmology.htm

Heather Preston is a mission scientist for several NASA missions, including the Spitzer Space Telescope, Wide-Field Infrared Explorer (WIRE), and the Kepler mission searching for terrestrial-class planets around other stars. She taught physics at the U.S. Air Force Academy and is an instructor in two distance education programs. She was an Operations Astronomer for the Hubble Space Telescope for five years and has published over 50 scientific papers, specializing in asteroseismology, gas dynamics, and computational fluid dynamics.

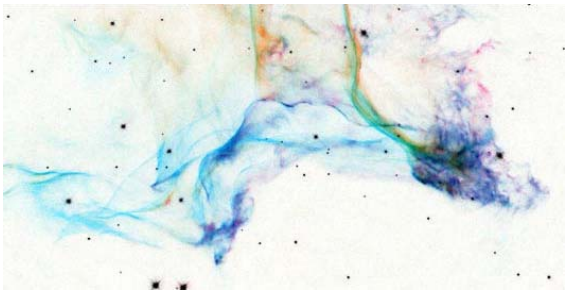
Heather began with some basic astronomical facts. She said that the normal-matter part of the universe is 90% hydrogen, >9% helium, and <1% everything else, and that all heavy elements come from supernovae. That is, since most of the universe is gas, it's no shock that many of the extended structures we see are due to gas-dynamic processes, but it is a bit surprising that a huge number of these extended phenomena are bubbles of one kind or another. And then she added that, in addition to supernovae, stars, planetary nebulae, and galaxies with active nuclei all blow bubbles. She showed some stunning astronomical photographs to illustrate this point.

She spoke about the dynamics of different kinds of objects and the mechanisms through which they blow off the material that creates the characteristic bubble shape. Starting at the low-energy, early-life end, while many protostars are surrounded by gaseous clouds which coalesce into spinning, flattened disks in the process that can lead to planet formation, they're hard to observe in visible light because there's too much obscuring dust. However, they can be imaged in considerable detail in the infrared; and in the infrared there is outflow from the star, frequently constrained at the "waist" by the disk—resulting in an hourglass-shaped "double bubble."

Almost all stars will pass through a "red giant" phase of their lives, and at the end of that phase they will lose some mass to the interstellar medium (the ISM is the ultra-low-density "atmosphere" of the galaxy—random gas drifting around that generally would make a good laboratory vacuum on Earth). Stars less than a couple of times the mass of the Sun will wind up with a fast wind emitting a significant amount of gas (the outer layers of the star) to drop the central star's mass to below 1.4 solar masses (white dwarf limit), and that mass-loss period results in a bubble in space called a "planetary nebula." The becoming-exposed core of the central star is a white-hot and small pre-white-dwarf, giving off ultraviolet radiation that ionizes and excites the puffed-off outer layers of the star, so that they glow. Different scenarios for the star (whether it's a binary, how much mass is lost, at what times) will result in different shapes for the nebula. Heather showed many breathtaking images of these varied "bubbles" from the Hubble, Spitzer, and Subaru missions.

Supernovae are relatively rare events. There is one in a large galaxy like the Milky Way about once every 50 years. Typically only stars which end their red-giant phase with more (sometimes much more!) than twice the mass of the sun explode as supernovae and expel really high-speed shells of gas. Those shells typically glow for thousands of years, heated to excitation by the shocks set up when high-speed extremely hot low-density gas ploughs into the lower-speed and much cooler ISM. The result: big bubbles—splashy young ones or delicate arcs of old ones.

Finally, the truly cosmic-scale gas bubbles we see are the result of outflows from active galactic nuclei. Our own Milky Way has a super-massive black hole at its center (an SMBH has millions of solar masses, and is composed of millions of stars that are close enough together that they become a singularity—the higher the mass of a black hole, the lower the initial matter density that is required to create one). The nuclei of other galaxies typically are inhabited by SMBH's, also, and are much farther away. But it has recently become possible to obtain images that have made it possible to study the "bubbles" blown by gas outflows from these active galactic nuclei. The shapes of the flows are determined by factors such as how much gas is "feeding" the central black hole, whether the disk is fatter or thinner, etc. The field of Computational Fluid Dynamics gives us the tools to work backward from the picturesque and intriguing shapes of these gas bubbles to the physical conditions producing them—because the same set of fluid-dynamic principles underlies all of these phenomena.



Supernova remnant (negative image)

Kevin Langdon - The Higher-IQ Societies and High-Range Testing: Fundamental Concepts and History

http://www.polymath-systems.com

I am one of the five founders of TNS. I've been active in a number of high-IQ societies and currently edit *Noesis*, the journal of the Mega Society. I'm the author of several high-range IQ tests and have published papers on high-range testing in some of the societies' publications.

My talk began with a discussion of IQ testing and the statistical problems with measurement at very high levels of intelligence. It touched on *g*, the general factor in cognitive ability. I cited Dr. Arthur Jensen to the effect that there's a separate "g" for athletic ability. I added that, while I'm convinced that there is also a real and independent emotional intelligence, the tests that purport to measure it are not credible. We spoke of the limits of accuracy of the tests at the high end and the problem of compromising of tests through the publication of answers, in print or online.

I recounted some of my personal history with the high-IQ societies. After some initial experiences with Mensa I joined "The Thousand" (now the "International Society for Philosophical Enquiry") and found that the people I met there were brighter than Mensans, as advertised. I became interested in whether a society could be founded at a still higher level. I chose the four sigma level—four standard deviations above the mean, or one in 30,000—and surveyed existing tests to determine whether they were capable of discriminating at this level. I concluded that none of them were adequate and decided to create my own test, the Langdon Adult Intelligence Test. My test was published in *Omni* magazine and was taken by over 27,000 people before it was compromised by publication of a substantial number of items from the test—with purported "answers" (most of which, unfortunately, were correct)—in the newsletters of Mensa Singapore and Mensa New Zealand. My testing career is on hold pending resolution of legal questions having to do with the practice of psychology in California.

I went on to speak about the history of the Triple Nine Society, from our founding as a split-off from the ISPE through some of the political battles we've had over the years, and culminating in the trouble we've had with expelled member Clint Williams, who sued six officers of TNS in federal court, has tried to get the society in trouble with the law, has represented himself as "The Triple Nine Society" after his expulsion from the society, and has sent bizarre unsolicited mails to TNS members. For more details on the history of the societies, see Darryl Miyaguchi's "Uncommonly Difficult I.Q. Tests" page—http://www.eskimo.com/~miyaguch/hard_iq.html —and for information on the roots of the Clint Williams situation published in *Vidya* #246 and a collection of more current relevant material maintained by Information Officer Jon Miles, see the society's website: http://www.triplenine society.org .

Ed Schreiber - Balkans: The Powder Keg of Europe

http://ed.schreiber.org/

Dr. Andrew Beckwith had originally been scheduled for this time slot but he was unable to arrive in time and so Ed switched to this time from his original Monday-morning slot.

Ed Schreiber was a musician in the U.S. Army for six years. After graduating from the University of Colorado he worked in the computer industry for 35 years, specializing in computer graphics. He ran for Congress in 1980 as a Democrat. As Membership Officer of the Triple Nine Society he's done a great job of recruiting new members. The society is very close to reaching 1,000 members and should do so any day.

Ed was born in the former Yugoslavia and lived there in his youth. He gave a detailed explanation of the historical conflicts, massacres, and suffering on an unimaginable scale there among ethnic groups including Serbs, Croats, Muslims, Bosnians, and others, with particular emphasis on the past several decades and the failure of foreign intervention to put an end to the violence in the region.

It was a very good presentation but one was left, nonetheless, with a pervasive sense of despair for the people of the Balkans and a strong suspicion that conflict in the region will persist for the foreseeable future.

Sunday

Charles Cresswell- Belief: A Word to Retire

http://ggg999.org/BELIEF1.htm (entire talk)

Charles Cresswell is an attorney in Wimberley, Texas. He's a personable and engaging speaker but in presenting his first main point, that blind belief is not a good idea, he was preaching to the unconverted, and his second main point, that the word "belief" should not be used in general discourse, flies in the face of the way languages change and is simply a matter of semantics. The content of this talk could have been presented much more concisely.

Jonathan Ormes

Population, Affluence and the Human Future: An Astronomer's Perspective

http://www.authorstream.com/Presentation/JonOmres-236328-ggg999talkfinal-entertainment-ppt-powerpoint/ (entire talk)

Jonathan Ormes is a Research Professor in the Department of Physics and Astronomy at the University of Denver and former Director of Space Sciences at the Goddard Space Flight Center. He was Project Scientist for the Advanced Composition Explorer prior to its launch in 1997. He is a member of the Large Area Telescope team and has authored or coauthored more than 100 scientific papers.

The questions that Dr. Ormes' talk addressed are: Can we clean up the negative impact that humans are having on this planet? Can we adapt to a new environment? Can we survive a mass extinction? (We're in the midst of such an event now.) Although the population growth rate peaked in the 1970's it is still the case that if growth continues at present rates the earth will be home to a trillion people by the year 3000. Trouble is greatest where there's the greatest population growth. Zero population growth is necessary. If humans don't do it nature will.

Increase in human population is not possible except at the expense of other life forms. We do pretty well at soil conservation in the United States but worldwide there's a very serious problem. Estrogen is getting into the water supply and killing the fish. A much deeper understanding of human impact is needed. Dr. Ormes spoke about some of the possibilities for turning this situation around. He emphasized the need to reduce the impact of human industrial activity and endorsed nuclear power as a way to reduce carbon emissions. Dr. Ormes left many details of the situation and what is needed to deal with it open but indicated that a combination of approaches will be necessary.

David Kopel - The Second Amendment in the Supreme Court

http://www.davekopel.com/

David Kopel is Research Director of the Independence Institute, a Golden, Colorado think tank, Adjunct Professor of Advanced Constitutional Law at Denver University, Sturm College of Law, Associate Policy Analyst with the Cato Institute, and author of ten books and dozens of journal articles.

His talk managed to do a very good trick: it changed my mind, to a certain extent, on the question of gun control. Dr. Kopel showed no sign of the shrillness of many Second Amendment advocates on the

Right. He presented his case in a thoughtful and objective manner and interacted very well with the audience.

While the Supreme Court has ruled that the Second Amendment applies to ordinary citizens, and not just to militias, as some have claimed, it also ruled that it applies only to the federal government and not to the states. After slavery was abolished by ratification of the Thirteenth Amendment in 1865, Southern states enacted special laws for freedmen requiring them to be employed and to sign an unbreakable labor contract. Freedmen were also prohibited from bearing arms. Congress then passed a law to protect freedmen's rights. President Andrew Johnson vetoed it and his veto was overridden. To further protect them the Fourteenth Amendment was ratified in 1868. The Ku Klux Klan was founded by Confederate generals and the first thing they did was to disarm blacks. The Fourteenth Amendment defined anyone born in the U.S. as a citizen and extended all constitutional rights to citizens, including by the states. And the Supreme Court ruled that certain rights are "natural rights," which are not created by governments, while others, such as the right to travel, to petition, etc., were rights created by the Constitution.

All this has come into play recently with regard the right to bear arms. In two cases appeals courts made contradictory rulings on whether the states could prohibit gun possession. The Supreme Court is considering this issue and is expected to make a ruling by the end of its current term. The court could rule that the entire Bill of Rights applies to the states. 44 states have a right to bear arms in their constitutions. If the court rules that the Second Amendment applies to the states they still would be able to *regulate* gun possession.

See Dave Kopel on his new book, *Aiming for Liberty*, at http://www.youtube.com/watch?v=XaJgIjxmFdQ&feature=related

Ben Stoebner- Developmental Vision: The Solution to Children's Learning Problems

www.mylearningprogram.info

Ben Stoebner is a "developmental optometrist" who worked for 30 years with children with learning problems.

Dr. Stoebner's talk was disappointing. It was repetitious, obscure, and self-promotional, with no exchange with the audience. Many of the techniques that he presented were obvious things that any gifted child figures out for him- or herself (making simple tables, studying the shapes and sounds of letters, etc.). Dr. Stoebner's methods may do wonders but there was no evidence for that in his talk.

Derek Buzasi - The Little Satellite That Could

http://www.nytimes.com/1999/08/24/science/an-astronomical-bonanza-from-a-washed-out-satellite.html
(a New York Times article on Dr. Buzasi and the subject of this talk)

Derek Buzasi is Professor of Astronomy at the U.S. Air Force Academy in Colorado Springs, currently on active duty for the US Navy. He is an Affiliate Professor at the Department of Astronomy, University of Washington, and is a member of the science team for the Kepler mission, mentioned above under the talk by his wife, Heather Preston.

How do we know anything about the internal structure of the sun? Starting in the 1960s, Robert Leighton developed a Doppler-based observing technique which detects oscillatory motions on the Sun with amplitudes of hundreds of meters per second. These motions are due to acoustic waves traveling inside the Sun. The study of these waves is called helioseismology, and the study of starquakes in general is called asteroseismology.

The sun, like other stars, resonates in about a million different modes simultaneously. Although convective "noise" generates a wide range of frequencies, since the star can be considered as a resonant cavity only a finite number of these waves interfere constructively and survive. Each mode that survives tells us something about the structure of the star. Since long-wavelength waves penetrate deeper into the sun, while shorter wavelengths sample only the surface, using all of them we can construct a model of the entire stellar interior. From such models, we can learn about details of internal rotation, convection, and structure.

The Wide-Field Infrared Explorer (WIRE), launched in 1999, was a NASA satellite intended to make a four-month infrared survey of the entire sky, specifically focusing on starburst galaxies and luminous protogalaxies. Unfortunately, the main scientific instrument on this satellite failed shortly after launch. It was considered a total loss but Dr. Buzasi realized that the onboard star tracker, a small guide scope on the side of the main scientific instrument, could be repurposed for asteroseismology studies. This approach resulted in interesting results within two weeks and eventually became the primary instrument for the mission over the next 7 years. WIRE data typically achieved precision twenty to a hundred times better than ground-based asteroseismology studies. The best data have a relative precision level of approximately one part per million. Dr. Buzasi showed examples of observational data and its uses in testing stellar models.

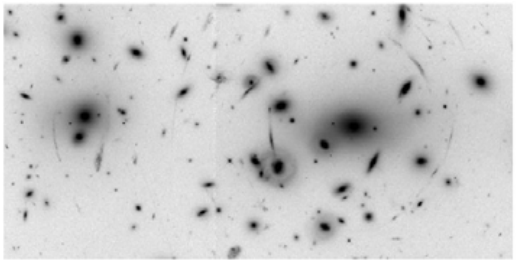
Loren Cobb- The Coming Revolution in Social Dynamics: Asimov's Psychohistory Revisited

http://www.aetheling.com/cobb.pdf

Loren Cobb is a research professor of mathematics at the University of Colorado at Denver and principal of Aetheling International Consultants.

Unknown to all but a few specialists, the U.S. government is pouring large amounts of funding into the development of new mathematical approaches to the simulation and forecasting of major social change—a project remarkably similar in spirit to the mathematical "psychohistory" of Hari Seldon in Isaac Asimov's *Foundation* trilogy (1942). In this series there was a galactic empire that was in decline. Hari Seldon, the hero, worked out a mathematical model which predicted that if nothing were done there'd be 30,000 years of anarchy. Asimov seems to have modeled his system on the Van der Pol oscillator [see http://www.scholarpedia.org/article/Van_der_Pol_oscillator —KL].

All our military actions have run into serious problems with the societies where the action has taken place. The American military has realized that it needs to understand this. Military simulations have worked well; social ones have not. Dr. Cobb has studied social systems in Sweden and Latin America and has written a number of software simulations, including **DEXES**, a social-political-medical-refugee simulation for peacekeeping and disaster relief operations, **NationLab**, a simulation of socio-economic development, used annually in national strategic exercises in Bolivia, Dominican Republic, Ecuador, El Salvador, Honduras, Paraguay, Peru, and Uruguay, **STRATMAS**, simulation and optimization of civil/military peacekeeping operations, humanitarian operations, natural disasters, and health emergencies, and **RegionLab**, a simulation for regional security issues. **COMPOEX** is an umbrella for all models which attempts to unify them in one system. The models have had mixed results because the phenomena they seek to represent are extremely complex and we don't have comprehensive social theories to explain them, but we don't know that something we can't simulate now will not be amenable to modeling in the future. Making the simulations open source will help us create more accurate models.



Abell 2218 – Gravity Lens (negative image)

Monday Morning

Kevin Langdon - [A short talk with no title]

Andrew Beckwith had been rescheduled for this time slot but he couldn't make it at the last minute. I led a short exchange with the members present on loose ends from my presentation and anything that anyone wanted to bring up about TNS or anything else that hadn't been resolved during the conference. After about half an hour, Ed and I agreed that we should ask Dr. Trenberth to begin his presentation early. This turned out to be a very good idea because he had a wealth of fascinating material to show us. . . .

Kevin Trenberth - Global Warming: Coming, Ready or Not

http://www.cgd.ucar.edu/cas/trenbert.html

Kevin Trenberth is head of the Climate Analysis Section at the National Center for Atmospheric Research (NCAR) in Boulder, Colorado. He was a lead author of the 1995, 2001 and 2007 Intergovernmental Panel on Climate Change (IPCC) Scientific Assessment of Climate Change. The panel was awarded the Nobel Peace Prize for the 2007 report. He has published over 400 scientific articles or papers, including 40 books or book chapters and over 175 refereed journal articles.

The atmosphere is a global commons. What's put into the atmosphere in China reaches the U.S. in a few days and Europe a few days later. In hot months CO_2 is released into the atmosphere; in cold months it declines. CO_2 has a long lifetime—about 100 years. Emissions per capita are important in total emissions but so is population—and this is not being addressed. The Bush administration took it off the table. Gasoline in Europe is about two and a half times as expensive as it is in the U.S., and electricity is more expensive too. The Europeans have created policies to control energy consumption but the rest of the world is far behind.

The heat generated by human activity comes to approximately one nine-thousandth of incoming energy from the sun. Indirect effects of human activity are about 100 times greater. The sun has accounted for a little bit of cooling over the last five years due to normal fluctuations, but the IPCC says that global warming is unequivocal and that it's very likely the result of human activity. The El Niño/La Niña cycle is responsible for yearly variations. In July of this year ocean surface temperatures were the highest ever recorded. There are more weather-related problems mainly because the earth is crowded and there's more building in places like flood plains.

There've been two 500-year weather events in the U.S. 15 years apart. The temperature in Europe in 2003 was a five-sigma-plus event (once in 10,000,000 years). There's been a marked increase in ocean surface temperature since 1994, posing a significant threat to the marine ecosystem and global fisheries. Dr. Trenberth said that if he had to choose a single indicator for global warming it would be rising sea levels. The mean increase is ~3.1 mm/year (one foot per century). 60% is from expansion as ocean temperatures rise and 40% is from melting glaciers. The rapid increase in Chinese power plants (one is opened about every three days!) may be responsible for greater melting in the arctic than in the Antarctic.

The last ice age ended approximately 20,000 years ago. Ice ages are based primarily on orbital changes on a scale of about 10,000 years. Projected changes vary but a new ice age is not expected any time soon, contrary to the assertions of global warming skeptics. The deep ocean turns over on a scale of about 1000 years but we've only had deep-ocean temperature measurements since about 2002. The melting of the arctic ice will make things very difficult for polar bears and will result in considerably larger waves in the Arctic Ocean.

What can be done about this situation? There are equity issues among nations and among generations. Many vested interests are involved. The coal and oil industries are mounting massive disinformation campaigns. Precautionary principle: shouldn't we be cautious with regard to the unknown aspects of our models? Dealing with problems like this is what governments are for but we don't have a world government and the U.N. is very weak.

China and India are not only harming the world situation but their own environment and their future. Water is a major problem in China. The bark beetle is proliferating because winters aren't cold enough to kill off the pupae. A carbon tax could help. The Europeans are doing something like that but not the U.S. The cap-and-trade system is loved by industry and politicians because it's very subject to corruption. Tariffs could be placed on goods from countries that aren't controlling CO_2 emissions. There are loopholes in the current bill on this subject.

The half life of atmospheric CO_2 is about a century. Trees take CO_2 out of the atmosphere but put it back when they rot or are burned. The only thing that would work to change this would be to grow trees, cut them down, and never use them. Nuclear fuel is nonrenewable like fossil fuels and there's a limited amount available—and nuclear waste is a major problem. These problems are as yet unsolved.

Postscript: I saw Dr. Trenberth on the CBS evening news in early December responding to the accusations of global warming skeptics that climate data has been falsified. Neither Dr. Trenberth nor I believe this is the case. It will be interesting to see how things go down at the Copenhagen summit on global climate change which had just gotten under way at this writing.

Church from the bridge between the Brown Palace and the Comfort Inn

Norris Swan

Bill and Joyce Mohler

David Kopel

Ed Schreiber, Kerry Williams

Heather Preston, Bob Sadur