Institute For Theological Encounter With Science and Technology
Volume 46 - # 3 Summer 2015 Bulletin

## Religious Liberty

The recent supreme court decision legalizing same-sex marriage is yet another victory for the forces of secular humanism, which curtails the religious liberty that Americans have long taken for granted. That court decision is certain to lead to a barrage of more court cases where individuals holding "politically incorrect" views will be fined, driven out of business and otherwise punished.

Already a variety of publications have guessed at what's next. *The Weekly Standard* of 20 July 2015 carried an article "Free to Shut Up" which recounted the treatment of a baker who declined to provide a wedding cake for a gay wedding. At the conclusion it said "… rooting out and punishing small-business owners and public employees with retrograde ideas about sex and morality seems to be an increasingly common and acceptable tactic."

Nearly every totalitarian regime always claimed that their citizens have religious freedom, but the catch is that it's confined to what you do *inside your church building*. In America, the tradition has been that a person's religious beliefs influence his/her entire life, which certainly involves "the public square" as well. This gay-marriage decision, and the fallout that is sure to follow, tells us not to allow religious beliefs to play a role in our daily lives.

Francis Cardinal George, ITEST's late Ecclesial Adviser, foresaw this problem coming years ago and warned about the encroaching secularization of our society. Here is a quote from his column just before the 2012 election:

"I expect to die in bed, my successor will die in prison and his successor will die a martyr in the public square…His successor will pick up the shards of a ruined society and slowly help rebuild civilization, as the church has done so often in human history."

On another occasion, Cardinal George wrote

"In our own country, the challenge to the church's freedom is basically cultural; anti-Catholic bigotry is an acceptable prejudice and the church is often regarded with contempt, which sometimes reduces her freedom of action.

"For many years, the church could rely upon the law in this country to protect her against enemies; now, however, the law itself is often adversarial, used to destroy rather than protect. The Catholic Church in this country is perhaps less free to govern herself now than at any time since the founding of the American Republic."

Cardinal George's foresight is widely termed *prophetic*. Already several bishops have spoken up against this supreme court decision. The compelling question that faces all of us today is "What are we going to do about this incursion against religious freedom?" The website/blog *Catholic Stand* posted on July 20 an essay entitled "Taking a Stand at the Crossroads" which presents the sharply contrasting choices.

Is there a connection to science in all this? Only that the purveyors of "progress" always claim the mantle of science, asserting that "science shows…" whatever they want to do justifies brushing aside religious beliefs. But in this case, they also want to brush aside Natural Law and a cornerstone of human society. We who are trained in science are able to articulate the scientific case against trying to overthrow Natural Law. Unless we provide leadership by speaking up promptly, the majority of inattentive citizens will let their religious liberty go down the drain without even noticing.

Thomas P. Sheahen
Director, ITEST

## In This Issue…

# Announcements

**Economic Justice in the 21st Century: Myth or Reality?**

Save the date for this important ITEST seminar, October 23 & 24 at the Cardinal Rigali Center, St. Louis, Missouri. We are busy preparing the brochures all ITEST will receive digitally; with hard copy for those who prefer "paper in hand."
**Registration before October 1:**

ITEST Members $45.00
Non-Members $75.00
*(Includes ITEST Membership)*
Students $30.00

***After October 1, add $10.00.***

*(The actual cost of this conference is about $75.00 per attendee, but in the interests of economic justice to our participants, we've found a way to subsidize your attendance with support from outside granting agencies. However, we surely appreciate you donations you could make above costs.)*

Costs include lunch and coffee breaks. Teachers who attend may earn professional development hours/credits for attending the Conference.

Our essayists include Dr. Edward J. O'Boyle, economist and senior research associate at the Mayo Research Institute, West Monroe, Louisiana; Dr. Hermann Frieboes, assistant professor in Bioengineering at the University of Louisville, Kentucky, and adjunct professor in Moral Theology at Holy Apostles College & Seminary, Cromwell, Connecticut and Dr. Martin Rafanan, Community Organizer, Fast Food Worker Movement and Co-Chair of the Workers Rights Board of Missouri Jobs with Justice.

For more information contact Sister Marianne Postiglione, RSM at 314-792-7221 or at mariannepost@archstl.org

> "Consequently, an evangelist must never look like someone who has just come back from a funeral!"
>
> – *Evangelii Gaudium*
> *Pope Francis, II.*
> *November 10, 2013.*


**Alert** Recently the ITEST Facebook page has been updated thanks to our capable, creative administrator and ITEST Board member, Dr. Stacy Trasancos. We urge you to visit this site and engage with others about significant faith/science issues. However, remember first of all to access the ITEST web site at www.ITEST-faithscience.org and then refresh the page. Right click and choose "refresh" from the drop-down menu. That will update all changes on the site since your last visit. Click on the "About" page and you will see the Facebook and Linked-in icons on the left hand corner; click on the Facebook icon and you will be on the ITEST Facebook site. See you on our Facebook page!!

**Professor Faggioli to deliver**
**Interfaith Lecture at Aquinas Institute**

The annual Interfaith Lecture jointly sponsored by Aquinas Institute of Theology, Eden Theological Seminary and the Jewish Community Relations Council, will be delivered this year by Massimo Faggioli on Sunday evening at 7:00, August 30, at the Aquinas Institute on the campus of St Louis University. The title is "Not only Nostra Aetate: Christianity and Judaism Fifty Years after Vatican II." Dr. Faggioli, currently associate professor of theology and director of the Institute for Catholicism and Citizenship at the University of St. Thomas in St. Paul, Minnesota, will evaluate the legacy of Nostra Aetate and develop it for the future by considering the whole of conciliar and post-conciliar teachings against the temptations to "reform the reforms" of Vatican II. (submitted by Rev. Sean C. Martin, President, Aquinas Institute.)

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**Errata:** Please note in the Spring issue of the Bulletin Volume 46 Number 2 page 5 we reprinted a translation error found in a quote of Pope Francis: "…God is not a divine being or a magician, but the Creator who brought everything to life." The sentence should be: "God is not a demiurge…" Thanks to our director, Tom Sheahen, who pointed out the error.

Institute For Theological Encounter with Science and Technology
Cardinal Rigali Center • 20 Archbishop May Drive • Suite 3400-A • St. Louis, Missouri 63119 • USA
314.792.7220 • www.ITEST-faithscience.org • E-mail: mariannepost@archstl.org
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# Science, Data and Reality
# The Investigation of Climate Change

Dr. Thomas P. Sheahen

The *Nicene Creed* begins with the sentence "We believe in God, the Father almighty, Creator of heaven and earth, and of all things visible and invisible." One of the very best *invisible* things that God created was *science*. God created logic; God created mathematics; God created the coordinate system; God created the laws of physics. All of *science* is entirely a creation of God.

God had a very intentional purpose in doing so. As a physicist, I look with total astonishment at the equations of the laws of physics and contemplate that within that very elegant structure, God devised a means by which the system He created could bring forth a creature who was capable of loving God in return. When the *Baltimore catechism* that we studied as children taught us that our purpose is to "know, love and serve God," it didn't mention that there was a careful plan spanning 13.7 billion years to reach the state where we could intelligently grasp that purpose. It brings to mind the hymn "How Great Thou Art!"

### Historical Development of Science

The ancient Greeks got off to a very good start by developing mathematics: Pythagoras and others were fascinated with numbers; Euclid gave us the laws of Geometry, and Aristotle tried to use philosophy to develop an understanding of physics. These were great achievements on the theoretical side, but the profound thinkers left the applications of technology, like sailing ships, to the more practical-minded tradesmen. There was a collection of phenomena to be learned, but not a coherent understanding of the entirety of science.

From the Judeo-Christian tradition came the notion that science might become an organized body of knowledge. A very old Christian say is "The book of nature and the book of Scripture were both written by the same Author, and they will not be in conflict when properly read and understood." Of course, the clause "properly read and understood" is a very tall order.

As the Christian era progressed, some brilliant insights occurred. St. Augustine (circa year 400) stated that the beginning came when God created space and time together. [Among other things, the word "before" has no meaning in the absence of time.] Augustine reasoned that the very coordinate system was something God created. In seeing the unity of space and time, he was 1500 years ahead of Einstein. That kind of thinking continued. The Christian faith has always insisted that God made the universe intelligible, and accessible via human reason.

Across the Middle Ages came scholars like the Muslims Avicenna and Averroes, the brilliant Jewish scholar Maimonides, and a tremendous string of Christians, many of them churchmen, spanning a millennium. Leonardo da Vinci's many mechanical inventions and his knowledge of human anatomy stand out as examples. As science advanced, a preference for experimental and observational *data* emerged. By the time of Kepler and Galileo, measurement equipment became much better, and as a result their precise data forced the inclusion of more and more *epicycles* onto planetary orbits. The philosophical commitment to perfect circles slowly crumbled. Instead of profound Aristotelian theories, *data* became the final arbiter of what is scientifically *true*.

There was still a place for theory, which is mankind's attempt to use reason to make sense of the data. Isaac Newton did that particularly well. But not completely: Newton went to considerable extra theological effort to try to explain a relationship between Jupiter and Saturn, which was evident in the data. By that time, the community of scientists were in agreement: in the final analysis, *data* was supreme.

Today, that principle is captured in the short phrase "**Data Trumps Theory**."

Another way to state this same cornerstone principle of science was enunciated by Nobel-prize winning physicist Richard Feynman in the 1960s: "it doesn't matter how beautiful your theory is, it doesn't matter how smart you are. If it doesn't agree with experiment, it's wrong."

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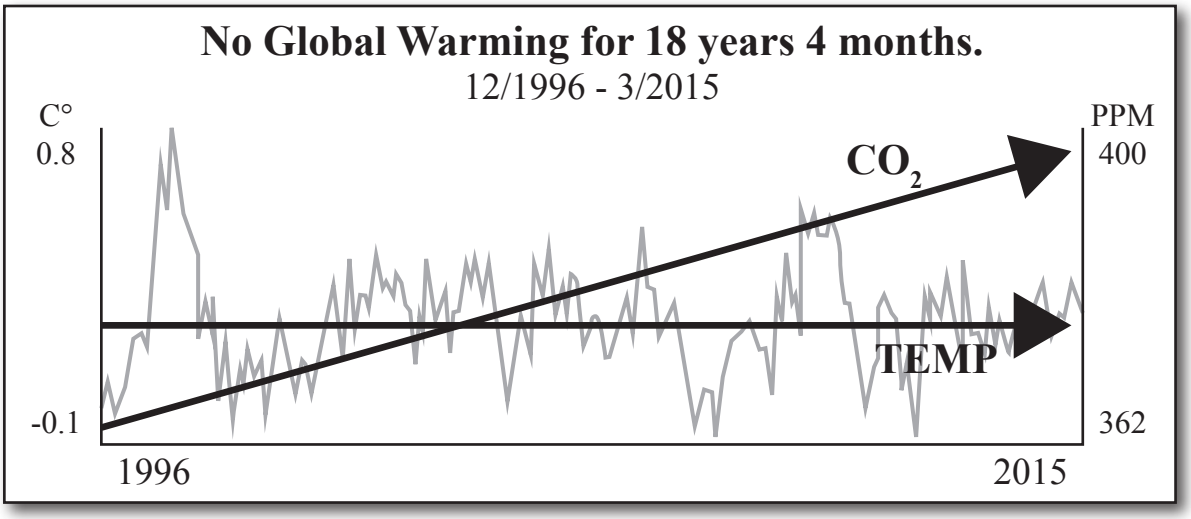
Take a moment to think back thousands of years, to when Aristotle wrote that a body in motion naturally tends to come to rest. Nobody thought to question or doubt that for nearly 2000 years, because Aristotle was a very smart man and his explanations were very beautiful theories, rooted in the best philosophical principles. When Newton came along and examined data, he grasped the notion of friction. Aristotle's philosophical approach was swept aside and replaced by Newton's first law, saying that a body in motion tends to stay in that motion until another force acts upon it.

We look back from the 21st century and ask "why didn't anybody do an experiment?" That conveys exactly the difference between ancient and modern science.

### What Real Data Tells Us

Today we are able to base our knowledge firmly upon real data, collected over many years and checked very carefully. Two such sets of data are shown in the adjacent graph.

The time span here covers nearly two decades. The thick line rising linearly from lower left to upper right is the steady progression of CO2. The CO2 content of the atmosphere has risen from 362 parts per million (ppm) to about 400 ppm today. In fact, CO2 has been rising steadily since the start of the industrial revolution, when it was only 280 ppm. There is sufficient reason to argue that most of the increasing CO2 is due to people burning fossil fuels.




The very jagged line is the temperature record over the same period. It is only jagged because the span of the vertical axis is only 1°C, so even small changes in temperature are greatly exaggerated. The flat line passing through all the temperature data is the average of all the data over 18 years. Clearly, the "trend" is a flat line.

These two sets of data were obtained completely independently, and stand by themselves as reliable indicators of what CO2 and temperature are each doing. There are many other such graphs that might have been chosen; some going back to the mid-19th century, some going back thousands of years. Before the invention of the thermometer, it was necessary to use *proxy data* to determine the temperature (tree rings, etc.) Trustworthy CO2 measurements are of even shorter vintage. Since 1978, there have been *weather satellites* in orbit which give very reliable temperature measurements of the entire planet, not just on populated land. The best data seems to indicate that the Earth's average temperature is increasing at a rate of about 1/3°C per century. The satellites have also proven that there are substantial *regional* variations in temperature.

Under the auspices of the IPCC and various governmental agencies (NOAA, NASA, etc.), very large computer models known as *General Circulation Models* (GCMs) have been run to forecast what the temperature will do because of the increase in CO2. Those models have programmed within them the theory that more CO2 emissions will warm the planet, and furthermore will cause feedback that causes yet further warming. The numerous models belong to various research groups, but each model contains the characteristic that CO2 causes warming.

In the next graph, a comparison is made between the predictions of computer models and the actual obser-

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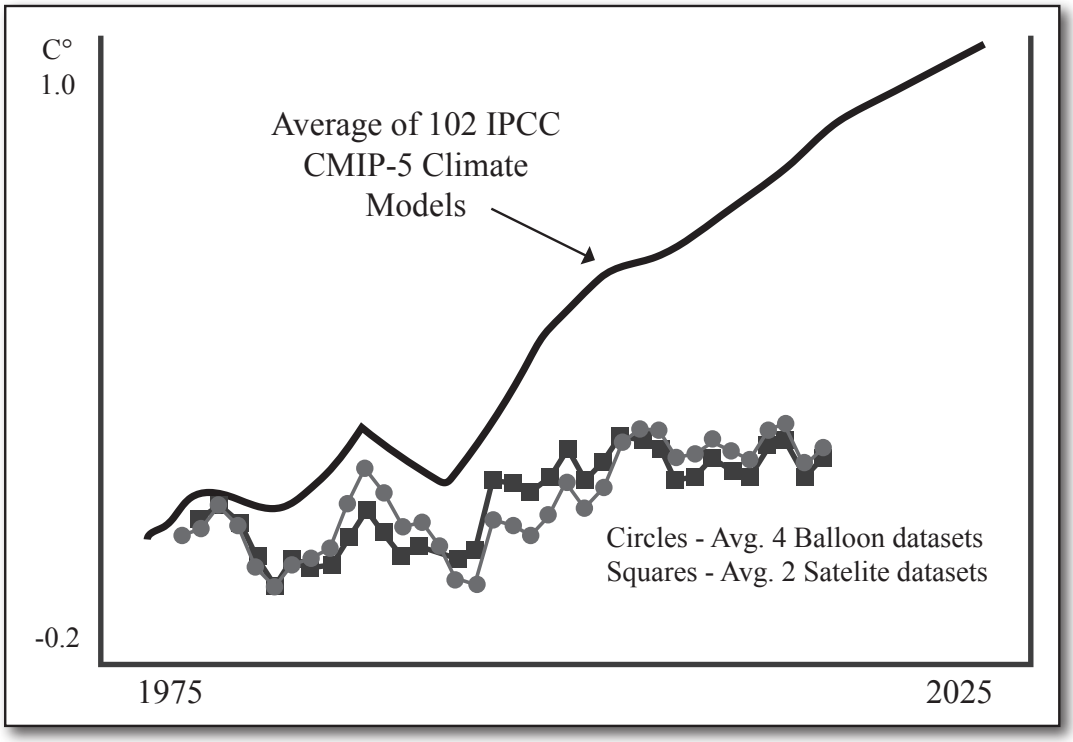


vations of recent temperatures. Therefore, this graph is a comparison of *theory* with *data*. The origin of all the curves were adjusted to 1979, the start of the satellite era. The solid black line is the average of 102 models, projecting into the future. Meanwhile, the black and gray dots are actual data from balloons or satellites.

The key point to be recognized is that *all* models overestimates the actual observed temperature. The GCMs *all* predict that the global temperature would already have risen by several degrees. That is clearly not the case. The *theory* that CO2 causes dangerous global warming is *wrong*.

Given this outcome, what a reasonable and responsible scientist would do is go back and repair the models. Regrettably, altogether too much discussion has been devoted to explaining "the pause" in predicted rising temperatures. The reality is much simpler: It is the theory, not the data, that must be revised.

**Carbon Dioxide**

We now return to the very beginning, and again direct attention to what God has created. The Old Testament Book of Wisdom describes God's intention in His creation, and that wisdom is far beyond anything we humans can imagine. There are *two* major life forms on earth, which depend upon each other inextricably for their survival. The waste product of one is food for the other. We humans are utterly dependent upon the oxygen that is discarded by plant life. And our waste product, CO2, is food for plant life.

An important effect of additional CO2 is to cause the openings on plant leaves (called *stomata*) to open wider, and that in turn enables more efficient conversion of water into sugars, providing food for the plants. More CO2 causes plant life to thrive -- more growth of trees, grain, vegetables, etc. It has been recognized for decades that North America is a net *sink* of CO2, with forest growth taking up more CO2 than all the cars and trucks and machinery produce. All that plant life generates more food for animals and humans. Life becomes more *abundant.*

It is also worth mentioning that CO2 is a very low-energy molecular state, and every pathway to convert it to anything else is energetically *uphill*. This means that there are no free or cheap ways to lock it up as some other chemical. With the input of energy via sunlight, CO2 is readily taken up (sequestered) by plant life. But any process engineered by mankind requires inputting some energy, which always has an associated economic cost.

Finally, we are able to draw certain conclusions, based on the scientific preference for *data* over *theory*: We do not need to be afraid of CO2. The slow steady increase of CO2 does not cause a serious excursion of global temperature, and the extra CO2 is good for plant life. There is no scientific reason to get rid of CO2. And therefore (the most important conclusion of all), there is no reason to suppress mankind's use of fossil fuels.

# Response to Dr. Tom Sheahen's "Science, Data and Reality"

By Deacon Donald Sparling, PhD, Associate Professor Emeritus,
Cooperative Wildlife Research Lab, Southern Illinois University

Tom Sheahen and I are colleagues and we agree on a great many things. For instance, I am sure that we both agree with this statement from Pope Francis' new encyclical *Laudato Si*,

"Saint Francis, faithful to Scripture, invites us to see nature as a magnificent book in which God speaks to us and grants us a glimpse of his infinite beauty and goodness.

'Through the greatness and the beauty of creatures one comes to know by analogy their maker (Wis 13:5); indeed, "his eternal power and divinity have been made known through his works since the creation of the world"'

We would also most likely agree with our Holy Father when he wrote,

"The destruction of the human environment is extremely serious, not only because God has entrusted the world to us men and women, but because human life is itself a gift which must be defended from various forms of debasement."

But it is less likely that we would agree with this statement from the encyclical,

"A very solid scientific consensus indicates that we are presently witnessing a disturbing warming of the climatic system. In recent decades this warming has been accompanied by a constant rise in the sea level and, it would appear, by an increase of extreme weather events, even if a scientifically determinable cause cannot be assigned to each particular phenomenon."

And we probably would not agree with

"…yet a number of scientific studies indicate that most global warming in recent decades is due to the great concentration of greenhouse gases (carbon dioxide, methane, nitrogen oxides and others) released mainly as a result of human activity"

In fact, I'm not sure that I entirely agree with the last seven words of the statement just above because, frankly, I don't know how much of the Global Climate Change (GCC) is due to natural perturbations and how much is due to anthropogenic activities. There is a lot of noise in the data. However, I am pretty well convinced (~95 to 98%) that a potentially adverse change in global climate is occurring. I just cannot ascribe a percentage to human culpability. It makes sense, however, that years of atmospheric pollution has to be having an effect. According the NOAA website,

"In its Fourth Assessment Report, the Intergovernmental Panel on Climate Change, a group of 1,300 independent scientific experts from countries all over the world under the auspices of the United Nations, concluded there's a more than 90 percent probability that human activities over the past 250 years have warmed our planet."

But again, scientists do not seem to able to agree whether human activities account for 20% or 80% of the GCC.

However, let us examine some of the data that Dr. Sheahen references. I agree with Tom that in the case of GCC, as in any science, it is very important to take a hard look at the data and separate it from **opinion**. Contrary to what Tom states, however, **theory** is based on data and tested hypotheses. Global climate change is a theory, not an opinion. With the political associations that both supporters and critics of GCC have allied themselves, it is important to view the data very carefully and to identify the sources of that data. Data for my arguments below come from NOAA (www.esrl.noaa.gov/gmd/ccgg/trends/), and NASA (www.climate.nasa.gov/evidence/) but similar evidence is present in other federal agency sites including the Environmental Protection Agency (www.epa.gov/climatechange/) and the U.S. Geological Survey (www.usgs.gov/climate_landuse/).

On the matter of carbon dioxide emissions, a primary source of anthropogenic CO2 comes from the combustion of fossil fuels. Other sources include animal respiration and volcanoes. Carbon dioxide is one of several greenhouse gases including methane and water vapor. Water vapor accounts for the greatest amount of greenhouse gases but has a relatively mild effect in reflecting heat back to the surface. Carbon dioxide, although less abundant than water vapor is substantially more effective in reflecting that heat.

A major source of the CO2 comes from the combustion of fossil fuels such as coal and oil. The carbon in these sourc-

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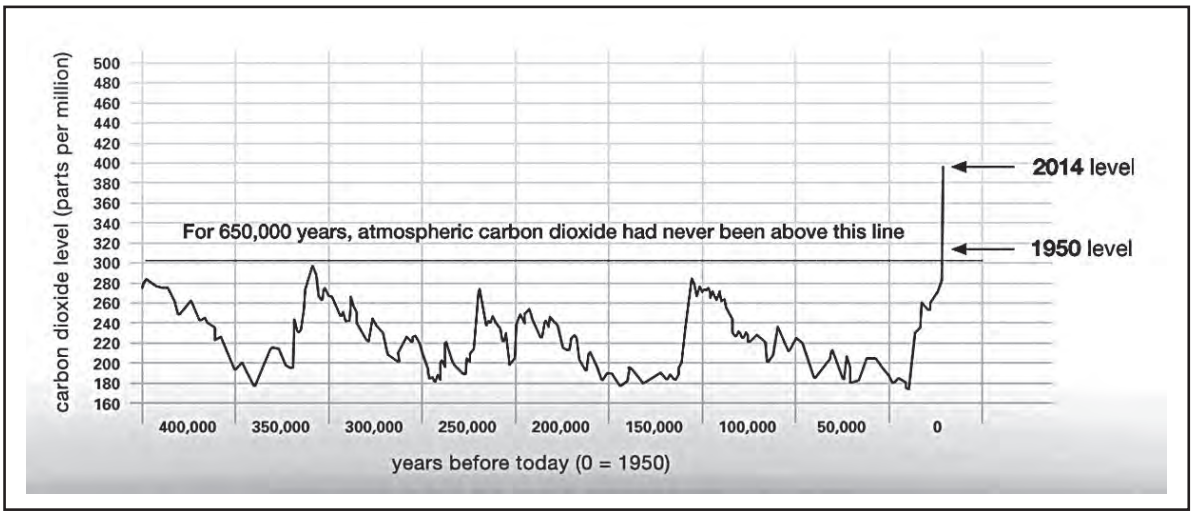


Figure 1. Atmospheric CO2 concentrations over millennia.

es has lain dormant under the Earth's surface for millions of years but since the start of the Industrial Age humans have been burning coal and oil at a startling and increasing rate. For example, Figure 1 above from NASA shows that the carbon dioxide present in the atmosphere is higher than it has been in 650,000 years. Of course, we do not have direct data from anything earlier than the late 19th century that can provide some information. Note that they do identify a more or less cyclic pattern in CO2 concentrations but they do not come near to the present levels.

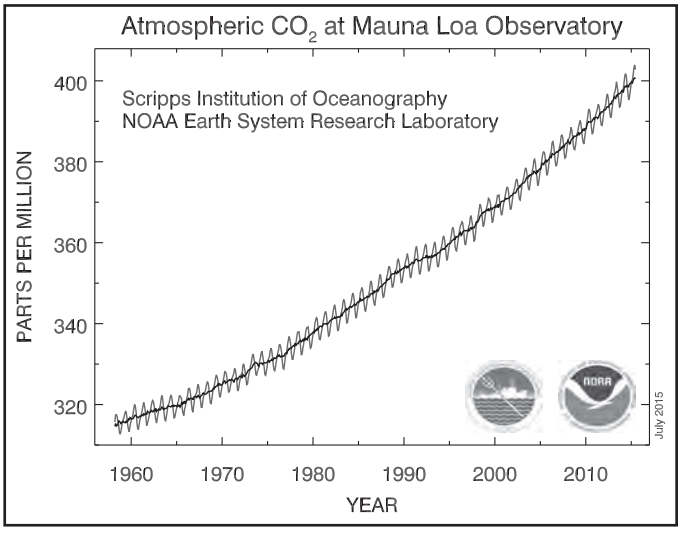


Figure 2. Annual mean atmospheric CO2 concentrations with a running five year average.

Figure 2 above presents the same data that Tom did on atmospheric CO2 levels on a yearly basis and on a running five year average. Statisticians note that a five year running average smooths out the perturbations seen among years and makes it easier to see trends. Note again that there is a steady increase in CO2 concentrations. In fact, mean CO2 levels have increased approximately 26% since 1960.

Along with increasing CO2 levels global temperature has also been rising. Not surprisingly, there are many different ways of presenting global or even regional temperatures. Depending on the method of presentation one chooses, anything from minimal to drastic temperature changes can be supported and that discrepancy provides the primary source of controversy.

Figure 3 below from NOAA uses a baseline average from 1951 to 1980 as its standard. Note that the global temperature has been increasing steadily using this method. As with CO2 concentrations there is significant variation

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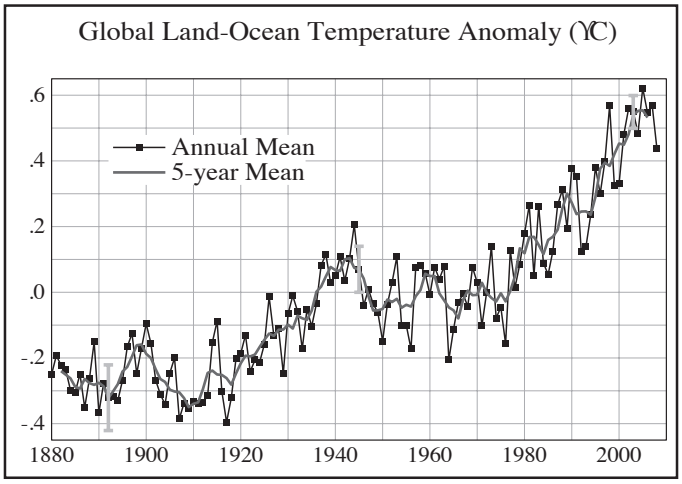



Figure 3. This graph illustrates the change in global surface temperature relative to 1951-1980 average temperatures. The 10 warmest years in the 134-year record all have occurred since 2000, with the exception of 1998. The year 2014 ranks as the warmest on record.

from year to year which can be smoothed with a running average.

To be fair and to illustrate how the same set or subset of

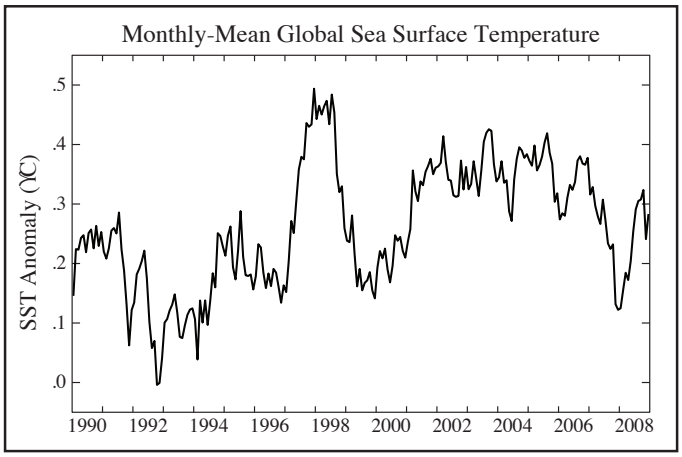
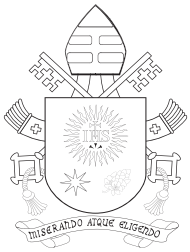



Figure 4. Global temperatures based on anomalies of monthly highs and low, 1990 to 2008

data can provide different conclusions however, I have also included Figure 4. In this case mean annual temperatures are calculated by averaging highs and lows for each month and then averaging the averages across months for a year. The data extend only from 1990 to 2008. Note that even if you drew a regression line through the data you may not obtain a significant ($p < 0.05$) trend.

Perhaps even more significant than mean annual global temperature, is the increased variability that is predicted to occur and is already occurring. Some regions may actually experience decreased temperatures while others are expected to warm considerably. Overall, climate extremes such as 100 year floods, temperature extremes, droughts, hurricane or typhoons, etc. are expected to increase in frequency. Are we already seeing these increases in extremes?

In conclusion, I would like to address Tom's assessment of risk from CO2. He said, "The slow steady increase of CO2 does not cause a serious excursion of global temperature, and the extra CO2 is good for plant life. There is no scientific reason to get rid of CO2." After 30 plus years conducting research in environmental contaminants I am very aware as Paracelsus (1493-1541), the 'father of toxicology' said, "The poison is in the dose". Many compounds and elements that are natural and have no measurable negative effect or may actually be beneficial at low concentrations can be lethal or cause serious non-lethal effects at higher concentrations. Heavy metals are among the simplest of these compounds but acid rain, pesticides, the other greenhouse gases, and a host of organic compounds are included. Sometimes there is no reaction until a critical level (the so-called 'tipping point' touted by supporters of GCC) is reached while other toxins exert their effect very subtlety starting at low concentrations and increasing in effect as the concentrations increase. I think it may be too early to fully understand what may happen with greenhouse gases including CO2 but it is not too early to take measures to reduce any real and potential risk.




**#14 from Laudato Si**

"Obstructionist attitudes even on the part of believers, can range from denial of the problem to indifference, nonchalant resignation or blind confidence in technical solutions. We require a new and universal solidarity. As the bishops of Southern Africa have stated: `Everyone's talents and involvement are needed to redress the damage caused by human abuse of God's creation.' All of us can cooperate as instruments of God for the care of creation, each according to his or her own culture, experience, involvements and talents."


**#12 from Laudato Si**

"What is more, Saint Francis, faithful to Scripture, invites us to see nature as a magnificent book in which God speaks to us and grants us a glimpse of his infinite beauty and goodness."

# "And God Got Lonesome:" Our Response To God In Faith

By Father Robert Brungs, SJ

*(ITEST Bulletin Volume 36 Number 4)*

*As we prepared this issue of the ITEST bulletin around the time of the release of* ***Laudato Si,*** *we were struck by the similarities (and some differences) between the Pope's encyclical and the reflections on creation in Father Brungs' essay published ten years ago in the fall issue of the ITEST bulletin. We are excerpting here a large section of the essay, "And God Got Lonesome: Our Response in Faith." The article foreshadowed many of the same thoughts found in Chapters One and Two of Pope Francis' encyclical. Whether or not Father Brungs would be in complete accord with a number of the Pope's conclusions on climate change is a question we choose not to pursue here. Rather, we invite you to meditatively read Father Brungs' praise to the Creator and Redeemer God, his depiction of the place of human beings within the cosmos and the interrelatedness of all creation. Then, draw your own conclusions. (Eds.)*

*Abstract*

*In this article the author "fleshes out" what Christians believe "in faith." No dull, discursive catechism of dry questions and answers; rather this reflection is a song of praise to the God who created all things! Even scientists and theologians proclaim that all creation is interrelated and all things are therefore to some extent dependent upon one another. And so the God who loves into being this community of creatures desires the good of each individual made in the image and likeness of God.*

*"We know God only in his relationship to his creation and that knowledge must be revealed." We are encouraged to look on the beauty of the world as a reflection of Christ and to love this world. We see the "consummate humility" of a God who became one of us – who loved us so much that he took on our flesh – who delights in the children of men. "And God Got Lonesome…" is a well chosen title. Although God does not need us, in a sense God longed for our company… And God Got Lonesome." "Lucky me, lucky mud." (Cat's Cradle by Kurt Vonnegut, Jr.)*

**Introduction**

There are few certitudes in the faith/science apostolate. One thing is clear, however: we are living in an age that demands as much of us as the then-present culture demanded of the Church Fathers. In the early centuries of the Church they were the "theologians" – as we must be in ours. The Church Fathers were mainly bishops who had to educate their flocks both to the learning of their day – the first five centuries of our era – and to the developing sense of belonging to what was considered an international, globalized Church. Augustine, Irenaeus, Gregory of Nyssa, Gregory Nazianzen, Basil the Great and many others dealt with both an emerging culture and an emerging Church. Our task is to treat the growing awareness of creation along with the expanding knowledge of our union with God. Our education in these realms must occur in our minds and in our hearts.

Scientific knowledge is growing at an accelerating rate. We hear: "There are probably more scientists alive in the world now than there were in all history." I don't know any way to estimate how many scientists there were in the past or who was considered a scientist. But I assume that the statement is fairly accurate. It is certainly true that our appreciation of the complexity of the cosmos is growing. From the immensity of space to the intimacy of the DNA molecule we see the vast complexity and the extreme delicacy of nature. We proclaim the interrelatedness of all creation. It would be good if we could grow as rapidly in understanding the interrelatedness of faith and science. But in the minds of many they are separate – even incompatible – though they are intimately connected. Both sides of this intellectual debate seem closed to the reality of the situation.

I don't believe that things in the cosmos "just happened." They are too complex to have occurred merely by chance. I find it difficult to imagine that anyone could maintain that, while all things are intimately interrelated, they occurred completely at random. Perhaps something may have occurred in a way that is still beyond our knowledge. We can't say why or how everything

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is the way it is. But explaining why the eye is the way it is and works the way it works is orders of magnitude less than explaining the fact that everything is part of a whole. "Chance" may be nothing more than our inability to explain what truly happens.

There is one reality in the world. The universe as we know it was created once and only once. Humankind is related to animals, plants, stars and even black holes. It does not exist apart from them. The earth has an effect, however small, on each star and planet in the universe and they have an effect on it. Our weather on earth is related to heat from the sun and other heavenly bodies as well as on each living thing and the earth's terrain – or should we say terrains? Do we consider this interrelatedness in our science? Hardly! It is too complex to write the requisite equations. Yet this interrelatedness exists whether we can cope with it or not.

According to the most accepted physical theory, the cosmos is interrelated in its particulars simply because it is interrelated in its beginnings. According to the Big Bang theory everything began at the same time from the same "singularity." That is the first and last time in the history of the universe that this "singularity" occurred. We simply do not know what was "before", nor will we ever know. In the sense of that one singularity, everything in the universe is "in common." What happens to one piece, no matter how tiny, happens to all pieces. Our science should begin to think at least somewhat in these terms. Otherwise, science will be inadequate to explain any part of creation, much less the whole.

In some respects, this is the direction science is now taking – at least implicitly. Today we hear directly from science that the human race and animals are more alike than we ever thought. We are finding connections with the animal world in our advances in neuroscience and in genetics. We are told that we share about 98% of our genes with chimpanzees – but look what two percent of the genes has accomplished. We are beginning to realize that the sun may be affecting temperatures on earth. We are working scientifically toward a more interrelated universe. We are much better off doing so.

This process has happened in theology over the centuries. It happened slowly, of course. Part of the problem in theology can be called the "vicissitudes of the times." Basil the Great corrected some of Aristotle's cosmic "guesses" and made statements about the biota in the Black Sea that could be interpreted as anticipating "evolution." Then came the invasions of the "barbarian" tribes and the Dark Ages. Unfortunately, the works of the Greek Fathers were lost in western Europe until the Middle Ages and the beginning of the Renaissance. By then the first stirrings of the Reformation were being felt and there was little time to glean the "Wisdom of the Fathers." During the Enlightenment a new set of questions arose and there was little enthusiasm for the thoughts of the patristic era. Only in the nineteenth and twentieth centuries did scholars became more consciously aware of the importance of the Fathers for our times.

But the interesting thing, both for science and theology, is the *recognition* of the interrelatedness of all things. Both science and theology admit the truth of interrelatedness but it seems that neither has thought out its implications, even though the notion pervades the writings of St. Paul. Saying that all things are related doesn't seem to mean in science more than a cursory study of the influence on a particle of "nearest neighbors, next nearest neighbors, etc." In theology we have not yet approached a systematic idea of why everything is related to everything else. But we know two things: God has made the universe this way and God doesn't do things "off the top of his head." This is what God wanted creation to be – interrelated in absolutely every way.

In science we must begin to factor other related items into our equations and perhaps revise in appropriate ways our assumptions on the origins and developments of things, ourselves included. In theology we should rethink our theology of creation – reshape it, not do it over. There are many things in theology that are essential to the faith. God's purpose in creation reveals such a splendor that it will more consciously occupy our thoughts and our prayers. What was God's purpose "in the beginning?" Did he create the universe with us and our happiness especially in mind? Why are there so many "creatures" in space? What do they have to do with our blessedness in his Kingdom? Why did he create so many creatures on earth? Was it to provide food for other creatures? What will our advances in genetics do to the variety of plants and animals? This is a quick listing of some of the apparent questions we can ask of

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our theology. No doubt they will form the basis of questions to be considered theologically in the near future.

If we come to a theological conclusion about one or the other of these questions, what will this do to our knowledge of God and his purposes? We shall still be thinking, acting, loving and praying in faith. In this life we can approach God only in faith. We can live only in faith. We can only say in faith what we consider to be true. Science too is unable to say anything except in terms of human faith. Even in its most "scientistic" terms, science can say nothing about the world without faith in its assumptions. No set of assumptions about anything can be proved. They can be accepted; they can be said to be most probably true. Absolute truth is beyond us in this present stage of our lives.

**Theological Concerns**

There is either a God or there is not. There is no other option. I believe that God exists and I hope to believe that until I die. But it is not enough to say that I believe in God. There is a lifetime more to be said. Let's take the first sentence of the Apostle's Creed: "I believe in God, the Father Almighty, Creator of heaven and earth." In one sense the concept of Creator in the Creed is as important as the word God. Why? Because we cannot believe in God except through his activity in creation. We do not know an idle God; we know only God active in creation.

The notion that God created us and then "walked away" is not possible. We can speak as if it were true, but it is always contrary to fact. There is no way – at least no way I know – that God can contact us except through his creative action. Why? Because we are his *created* children. We might think "ward" or "orphan" a better word, but he calls us "children." Without creation, we would not exist. God does not *need* us. Rather, we are here because of God's *love*. We are called children because that is what we are – we exist because he is "in love" with us. In that love God may actually "need" us.

God seems to have been lonely, longing for the return in love of all that he has created. Let's look at what he has created. He created atoms which had the ability to join with other atoms to make molecules. The molecules in turn could unite with other molecules to build upon still more complex molecules and finally to come then to things like stars, planets, comets and the rest. All this seems to have happened too quickly to be explained by random activity. For this unity to have come about by random activity would have taken a long, long time – if it could have occurred at all. Then came probably one of the most unlikely things of all – the event we call life. How can something that was not alive come alive? A thing that was not alive lived. How? Either the inert came to life or a new thing, one that could not be imagined by one looking on, came into being. It pulsed with life, but would in time die.

Could any of us have conceived of something living when all we had experienced was something inanimate? There may have been rocks and dirt and stars and planets but everything was lifeless. Kurt Vonnegut, an author whose acid dissection of our society is incomparable, wrote ironically about some primitives on an unnamed island. Fr. Bert Akers quoted Vonnegut at the ITEST workshop on *Some Christian and Jewish Perspectives on the Creation*:

"*Gott mare mutt*," crooned Dr. von Koenigswald.
"*Dyot meet mat*," echoed "Papa" Monzano.
"God made mud" was what they said, each in his own dialect.
I will abandon the dialects of the litany.
"God got lonesome," said von Koenigswald.
"God got lonesome."
"So God said to some of the mud, 'Sit up.'"
"So God said to some of the mud, 'Sit up.'"
"'See all that I have made,' said God, 'the hills, the sea, the sky, …and the stars.'"
"'See all that I have made,' said God, 'the hills, the sea, the sky, …and the stars.'"
"And I was some of the mud that got to sit up and look around."
"And I was some of the mud that got to sit up and look around."
"Lucky me, lucky mud."
"Lucky me, lucky mud." Tears were streaming down "Papa's" cheeks."
"I, mud, sat up and saw what a nice job God had done."
"I, mud, sat up and saw what a nice job God had done."
"Nice going, God!"

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How did the transition from non-life to life occur? Did it just happen by random mutation as Darwin might claim? It is difficult for me to believe that at one moment nothing was alive and the next moment a living being was there. How did such a momentous change take place? The whole history of the cosmos changes and we're content to call it a random mutation and think we've solved the problem? I can't buy an explanation of that kind. This transition is surely at least as important as the rise of sexuality and the rise of human consciousness and of fully human beings. I don't recall that Darwin dealt adequately with these either. Along with creation itself, the Incarnation and Pentecost miracles are the "high-lights" of life on earth so far. None, however, matches the mystery of divinization of the Last Day. They do not surpass in importance our being taken, fully human, into the life and love of God. More on these mysteries later on.

**The Interdependent Creation**

Let's for a moment ponder the indispensable, growing interdependency of *all* things. Paul writes in Romans 12:

> Just as each of our bodies has several parts and each part has a separate function, so all of us, in union with Christ, form one body, and as parts of it *we belong to each other* (italics mine).

Clearly, the notion of interdependence, interrelatedness, was not foreign to St. Paul and to the other disciples. Everything is dependent on everything else. The stars and planets are related to the earth and everything in it and on it. The proteins in the body are related to the enzymes as well as to the stars and planets; the heart has dependence on the kidneys and vice versa. Nothing in the universe is unrelated to everything else. In our present state of knowledge this interdependence may seem very tenuous; it may even be so tenuous that we tend to forget about it completely. Can we afford to do so? "No man is an island," it has been said. No person is alone in the cosmos. Everyone is related to everyone else. Everyone is related to everything. This is merely a statement of fact, not an over-delicate concern for plants and animals. They, and we, have to live.

Still, that interdependence gives us no real understanding of how inanimate creation brought forth life. For all our sophistication we don't know what life is. We talk about a life-force. At least a "life-force" has the advantage of suggesting a kind of dynamism, but what kind of dynamism? That force has been called an "*elan vital*" or other such appellations but we don't know what that is beyond giving it a name. Could it be that the answer eludes us precisely because we are alive amidst a world of other living things? We can compare inanimate things to animate things; we can say what each can or cannot do. But that doesn't display to us the nature of the inanimate or of living things. Yet we and they are made of the same basic atoms and molecules. The briefest answer is that we simply don't know, although we say we do. We try to control things by naming them, but we "control" very little, if anything.

The questions of life/non-life, of asexuality/sexuality do not seem amenable to Darwin's notion of *random mutation*. Usually we don't dig deeply into these questions. We assume that Darwin's theory takes care of such questions and we don't have to probe into the deep problems that exist if we deny the action of God in creating and sustaining creation. We can even go back a few steps in time to the "creation" and ask how nothing became something. We can't do better with such questions than Kurt Vonnegut in the quotation above. Unless philosophers admit to insoluble mystery, there is no reason to believe them. Reason, unaided by faith, has not given us answers. We can't give only rational answers to these mysteries any more than we can give only rational answers to God's actions in the universe.

Let's leave these questions behind and probe as best we can into the mysteries of God's loving care for us and for *all* things. Why should God even give us a nod, much less life, beauty, honor and love? The words of Psalm 8 tumble through my mind: "What is man that you should spare a thought for him, the son of man that you should care for him?" Even after 3,000 years this sends a clear message to those who would believe. God loves us and desires that in freedom we lose our lives to love him in return. Our life is all we have; it is a *gift* from God but we must surrender it.

Everything in the heavens and everything on earth is a gift from God. The planets, the stars, the nebula, quasars, pulsars and the other elements in the heavenly "bestiary" are gifts from God. We have the mysterious words from Romans 8 hanging over us about their free-

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dom being like ours. The operative word is *gift*. There is not a single thing in the universe that isn't a gift of God – even mosquitoes and creepy, crawly things.

The act of creating the universe and all that it holds is a gift. God did not have to create anything to be perfectly "content" in himself. Creation did not "add" one iota to God. He didn't create for self-aggrandizement. He did it for us. He endowed each creature with an ability to serve him and be blessed doing it. We read in Romans 8: "The whole creation is eagerly waiting for God to reveal his sons …but creation still retains the hope of being freed, like us, from its slavery to decadence, to enjoy the same freedom and glory as the children of God." One can spend a lifetime trying to appreciate this scriptural passage. The vistas it opens before our eyes are simply astounding. We can't comprehend them. But we can get a hint of the world to come. This future we see in faith and hope that leads to the love of God. We understand immediately that this destiny is pure gift to us and to the entire creation.

In an age of "Scientism," we have almost totally lost our awe of creation. If creation is not seen as the gift of a creator; creation has no meaning and no destiny. It is just there – part of the furniture – and that is the end of the story. It rarely affects us with awe at its immensity and its ultimate intimacy. We do not understand its role in our future. By wanting it to be orderly enough to have a place in our scientific view we contradict the notion that creation is just there. But we don't seem to ask if creation has a destiny. Is it moving toward some future? Do we ever ask if things fit any pattern?

I know of nothing that God has done that does not redound to human good. I firmly believe, though I do not know what or how, that even the far reaches of the universe will play a role in human happiness. That is part of heaven I eagerly anticipate. Do I fully understand what I just said? No! But it is part of my belief in the goodness of God. Do I understand St. Paul's statement about creation retaining the hope of being set free from decadence? No! Do I have an understanding of what he meant when he said that all creation will enjoy the same freedom and glory as the children of God? No! I can't understand a conscious creation – as Paul implies. But I accept that notion and it colors my perspective.

**God's purposes**

Isaac Asimov once wrote ("The Threat of Creationism," *New York Times Magazine*, 14 June 1981, p. 98) that "The vistas it [mathematical language of science] presents are scary – an enormous universe ruled by chance and impersonal rules, empty and uncaring, ungraspable and vertiginous." I suppose that the universe may well look that way to a non-believer like Asimov. He didn't admit to an "intelligent designer" of whom I am aware, so that the cosmos had to be "ruled by chance and impersonal rules." There was no other avenue open to him except the "ungraspable and vertiginous."

It strikes me, however, that in the final analysis Asimov unwittingly described God. God's purposes, to one like Asimov, would seem to be capricious, "ungraspable and vertiginous." God is not to be grasped by humans (or angels). Yet he has made himself totally vulnerable to those who want to love him: "I tell you most solemnly, anything you ask for from my Father he will grant in my name… Ask and you will receive and so your joy will be complete" (John 16: 23-24). One who loves God has only to ask and it will be granted to him. These are not my words. They are the words of the Son of God.

God is personal, the very meaning of what we call "person." To the best of our knowledge God does not act capriciously nor has God turned over the rule of the universe to a god or goddess named Chance. There are things in reality which (or who) act in accordance with some truth beyond our capacity to discern. Some realities are simply beyond our power to conceive, much less dissect, with our limited intellectual resources. We think we are powerful intellectually, so we deny the notion that some creature or creatures may be more powerful.

With our limited intellects we do not *know* of any higher creatures. But we can know of other much greater creatures, like angels, through faith. We can imagine such creatures as angels though we try to domesticate them to our will. The notion that it is the task of angels to keep us from falling from cliffs demeans their power. Moving the course of stars and planets is more in consonance with their authority than keeping me from stumbling and falling, though they may do that too out of kindness. I would not be surprised to discover that

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we exist in some intimate relationship with such creatures; our only problem may be that we do not (cannot) know about it now.

I cannot *prove* anything I have said. I cannot *prove* any statement about God. I can say it only in faith. Having faith, I have the hope that it will come true. Atheists, famous philosophers and thinkers cannot prove the opposite either. To them God does not exist and they can have faith in nothing and hope in nothing beyond the grave. All I can do for them is pray that eventually they will see at least a glimmer of the Light. That may be enough for God to welcome them into heaven where, with the saved, they will find everything that can delight the person. In other words, perhaps they will find the love of God. They will never find in science delight beyond the grave. Moreover, they'll never get closer to the "secrets of the universe."

God who created the universe and everything in it will not be served with the kind of love de-scribed by the cur-rent term "LUV." Our love for God must be unconditional. God knows no conditions and the only conditions on our love for him are those he may have imposed on us. Placing limitations on God is beyond our power. Nor can we place constraints on him to create only things we want. God does what he wants with whatever means suit him. If he wants to create mosquitoes or tsetse flies, he does. If St. Paul is correct – I am willing to bet that he is – creation, even flies, fleas and subtler animals like viruses, will enjoy the freedom we will enjoy in heaven.

**The Daunting Task**

These statements get us at least this far: we cannot describe God fully no matter who we are or how hard we try. We seem to want to cast God in our own image and likeness. We are guilty of trying to domesticate God, of getting him to the point where we can live comfortably with him in a human way. Are we meant to live comfortably with God?

Our relationship with God is an ever-teasing, ever-growing, never-complete love affair. Is one ever comfortable and complacent in such a relationship? Is there always an edge in a love affair with God? Does courtship ever find itself with that old-shoe, comfortable feeling? Our relationship to God is like a beguiling courtship. There is tension in the divine/human give and take. God is always and in every way making overtures to us. Our love for God can never be complacent. It can be exciting, even ecstatic and delirious; it can never be comfortable. There is (and always will be) more.

That is our future in this beautiful, tumultuous, wild universe. That is the one reason why I do not fret about living in this universe as turbulent as this seems to be. One thing is true: I shall always be at home in a universe my Love has made. I am not and never will be an alien with no hope. Our hope is the Lord Creator of the cosmos and we will grow in the love of God who made it. It is his and we are his, born in conformity with his will. We will never be alien in the universe. No matter how "vertiginous," it will always and in every way be home.

None of the above does justice to God and to his love for us. Why he should love us so much is hidden. We know in faith that he does love us even though we can give no reason for it. It is part of the mystery of God-with-us. That he loves us is clear to those who believe in him; it is not clear to those who would rather not commit themselves to his love. As I said before, that love may be too wild, too "vertiginous" for them to cope with. Some of us may have driven away the more naturally adventurous of the "non-believers" by seeming to believe in a placid, down-home, stodgy God. God is not stodgy nor is he comfort-able. He is comforting but not comfortable. The revelation to those who truly love him is not usually easy or pleasant. Elijah found God in the comforting breeze, not in the wild and spectacular storms which beat upon the mountains, yet God's commands to him were not comforting. God's love is everlasting; it is meant to keep us enthralled forever. There will always be infinitely more to cope with – forever.

Gregory of Nyssa, in his work *From Glory to Glory*, compares our way to heaven to a spiral ascent. When we die and rise we will get to know God better and thereby love him more. Loving him more we will know him better, and knowing him better we will love him still more. Loving him still more, we will come to know him even more – for all eternity that progression will continue because we can never know God as he exists in him-self. God is "infinite"; we will always be finite. Even in heaven we shall know limits to our knowledge.

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**The Compatibility Aspect**

It seems we are in conformity with the universe and the universe with us. It is not accidental that we can formulate laws of behavior for the earth, moon, sun and stars; otherwise the heavenly bodies would be-have in a fashion unlike the one we imagine. We can't have it both ways: either the cosmos is orderly or it is completely incomprehensible. The fact – it seems like a fact – that we can formulate laws which cover celestial activity speaks to an orderly universe. Isaac Newton formulated "laws" that showed the unity between terrestrial and celestial activity. Newton's laws showed that, at least on one level, earthly and heavenly motion followed the same equations. That may not be true, however, at all levels. Maybe angels keep the planets in their orbital movement. (Wouldn't that be ironic?) But that would be something completely beyond the scientific method and scientific "fact." We can never know in this life the truth of such an assertion.

The heart of any good science is a systematic and coherent order to things. Our conception of such a system provides the only reason for doing science. It seems wondrous to me that our minds are conformed to things as they are. That need not be the case. We merely assume that it is so. Schizophrenia might be a situation in which a person does not find any order in things. It could be that things are not conformable to our minds or that we only imagine they are. Could that conformity be a foreshadowing of things to come? When we inherit the Kingdom planned for us from all eternity, it may be a good thing that our mind is conformed to what actually is "out there." The coincidence of our mind to the activities of the cosmos is one of the greatest gifts we've been given. Its exercise is a glorious mandate from God our Creator. How we exercise this gift in this stage of our lives is by developing what we learn partially through science and apply through technology. It is not the only source of information that we have but it is a significant part of our knowledge.

Far from being foreign to God's will (and therefore to theology), science and technology have always been seen as an appropriate part of human endeavor. "Scientist" is a word that dates back only to the mid-nineteenth century. William Whewell (1794 – 1866) was the first (1833) to use the word "scientist." Before that time the only terms used were "natural philosopher" and "man of science." The use of the word has come to mean those explicitly employing the scientific method. It is not my purpose to explain the scientific method. Before the word "scientist" was invented, scientific work was still being done by "gentlemen of philosophy," craftsmen and observers of the natural world. Even the ancients who thought that the world was flat were the "scientists" of their day, using their powers of thought to explain the cosmos. Their methods of observing the world used the best means they had at their disposal – their eyes. They could see the horizon and it looked as if the world ended at some certain place or other, but that observation changed as time went on.

In olden times "astrologers" looked at the heavens, but their perception was limited to what they saw, and what they saw reminded them of the mighty heroes of myth and the ordinary items of their terrestrial experience. We did not truly "see" the wonders of heaven until the invention of the telescope. Only the brighter objects of heaven could be glimpsed by the human eye. The microscope, long before there were "scientists," began to alert us to the universe of other life forms, which we came to under-stand as the basis of our lives. Each new technological achievement has led to further knowledge of how the universe is put together and "how it works," even knowledge that was later modified by more powerful technologies. What will people say of our "advanced science and technology" in a generation or two?

Scientific and technological research is a proper use of our powers of reasoning, a tribute to our minds and our imaginations. It forms part of our praise of the creator who made our minds to con-form to the real world. We serve God and praise his majesty by our science and our technology – as long as we avoid thinking of "scientific fact" and "scientific method" as the *only* way to truth, so long as our pursuit and application of data is moral and just. That science and "reasoning" embrace all knowledge is a relic of the Enlightenment that we can live without. The divorce of reason and faith has been deleterious and fraudulent. We cannot live without faith in some-thing, as I said before. We cannot prove our assumptions. That is why they are assumptions.

We cannot live without science nor can we live without

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faith, no matter how hard we try. We assume so many things. We must assume that "gravity" works, whatever gravity is. We assume that "temperature" is a relatively accurate gauge of molecular energy; the more energy a body has, the more heat it has. What if we could not measure heat and were always putting our hands into something extremely cold or extremely hot? We may assume that all will be well if we put our hand in liquid nitrogen, but that is an expression of hope more than experience. If we can't assume that "the trains will run on time," we can't be sure of being somewhere at some reasonably exact time. One late flight may involve a trip of several extra days to get to where we are going. Our lives are a tissue of assumptions, some true, some not.

*(Because of space constraints we have omitted the pages where Father Brungs treats the topics of: "Image and Likeness," "Christ as only Divine?," "Jesus as Merely Man?,"; "The Christian View," and "Our Destiny as 'Divinized' Humans." You may access that material in Written in our Flesh: Eyes toward Jerusalem, Ed. Marianne Postiglione, RSM, ITEST Faith/Science Press, 2008, pp. 269-287).*

*In the final paragraphs, "Living in Hope" Father Brungs explores our destiny as creatures, humbly living in true relationship with all creatures in the shadow of the wings of a loving God, forever giving thanks for all God's gifts.*

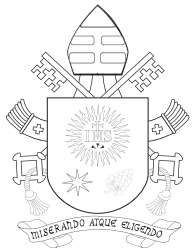
**Living in Hope**

We are to give everything that we have. That includes intellect and will as well as emotions, appetites and desires. They are all part of us; they must all be given to Christ. While it is true that we must use our intellect and will, we must use them in and through Christ. So, too, we must share our desires and emotions with each other in Christ. We are empty beings if we refuse the latter while giving the former. We are called to be passionate in our service of the Lord.

We are wondrous creatures, called to an even more remarkable final destiny. We are called more and more to consider the cosmos as the place in which God can exhibit his glory for the good of all his creatures. The whole universe has been groaning "from the beginning till now in one great act of giving birth." To what is creation giving birth? It might be well for us to meditate on that passage from Romans 8.

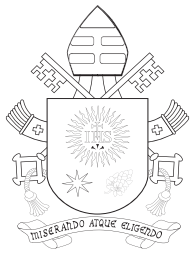
In faith, hope and love we are attempting to grow to be more like God. we are at best novices when it comes to following Christ, but I suspect that we have power we never use because we don't know of its presence. To some extent we may be able to heal. Can we give ourselves totally? Not yet, but maybe someday! We could help each other more than we do if we recognized the goodness that resides in each of us.

We should gauge our worth by the creation and the redemption. We were created to be great! Now that we are redeemed, think of our destiny? We are chosen to work for God in unity with others. That is our call; that is our destiny.




**#79 from Laudato Si**

"In this universe shaped by open and intercommunicating systems, we can discern countless forms of relationship and participation. This leads us to think of the whole as open to God's transcendence, within which it develops. Faith allows us to interpret the meaning and the mysterious beauty of what is unfolding."




**#77 from Laudato Si**

"...Dante Alighieri spoke of 'the love which moves the sun and the stars.' Consequently, we can ascend from created things 'to the greatness of God and to his loving mercy."