Vatican Observatory
Newsletter
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Pluto, Planets and a Primary Mirror - All Part of Summer 2006

This summer Vatican Observatory scientists traveled all over the world to share their research and discuss our universe. In Arizona, engineers worked on upgrading the VATT! Enjoy reading about these experiences!

Around The World In How Many Days?

By Guy Consolmagno, S.J.

Jules Verne's characters took 80 days to go around the world. An astronaut does it in 90 minutes. My own trip was somewhere in between.

I left Rome on July 7 to travel to Singapore for the Asia-Oceania Geophysical Society; to Beijing for the Committee on Space Research; a week's retreat in Tokyo; a week in Denver on a NASA panel; on to Zurich for the annual Meteoritical Society meeting; then Prague and the triennial General Assembly of the International Astronomical Union; and finally, back to New York to start my sabbatical year teaching astronomy at Fordham University... arriving August 25. I make that out to be 49 days.

I was invited to the Asia meetings to review my work on asteroid structure. By comparing the meteorite densities measured at Castel Gandolfo, with those made for asteroids by recent spacecraft missions, we've found that virtually all asteroids are 20% to 50% less dense than the meteorites that come from their surfaces. How is this possible? Asteroids must be piles of rubble, too weak to be compacted into solid rock.

My annual retreat at the Jesuit novitiate just west of Tokyo occurred simply because I saw that this week was the only time I'd have free for the eight days of silence and prayer that every Jesuit is expected to take. Eight days in a week? I needed to be in Denver on Sunday night, but my retreat wouldn't be finished until Sunday afternoon. Fortunately, like Verne's characters, I was saved by crossing the International Date Line!

In Denver I spent an intense week going over a dozen proposals from scientists hoping to fund research into the ways that planets and asteroids work. It's both an honor, and humbling, to be asked to review the powerful new ideas from young scientists that promise to advance our understanding of these bodies' geology and geophysics. Together with other panels at the meeting, more than 100 such proposals were ranked. There's not enough money to fund even half of them; choosing which half was a hard task.

Guy explores the Hidden City

Walking on the Great Wall of China

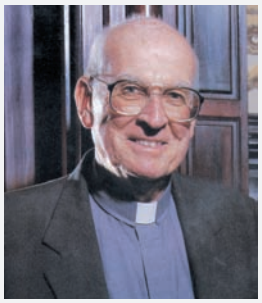
I arrived in Zurich just in time for the Meteoritical Society Council meeting, which I've served on the past four years. It began a week of learning the latest news about space rocks like the ones I curate in Castel Gandolfo. Again I presented my ideas about meteorites and asteroid structure.

Then, on to Prague and the IAU. The big news there was defining a "planet." The final definition talks about Pluto and its size-siblings as "dwarf planets" and I completely agree. Remember the asteroid work I talked about in Singapore and Beijing and Zurich? Asteroids can't pull themselves into compact spheres; but Pluto can. And its cousins, the larger bodies recently found out beyond Neptune, are also big enough to become compact. They deserve their own status. Getting to a final definition was no easy matter, however, and different definitions were hotly debated. I'd been part of those debates for two years now, serving on various IAU working groups. By the end, I was exhausted.

In the midst of it all, I recalled visiting the Forbidden City in Beijing. There, the palaces have names like the "House of Peace" or the "House of Tranquility." But they have no palaces for justice, love, or truth. Yet sometimes seeking the truth means giving up tranquility.

And sometimes, in its pursuit, you wind up arriving right back where you started from. ■

From the Director



Note: Fall 2006 is a time of transition for the Vatican Observatory (VO) and the Vatican Observatory Foundation (VOF). José Funes was named the Director of the Vatican Observatory in August. George Coyne is taking a sabbatical year, working with a parish in North Carolina He plans to return to his work at the VO and the VOF in September 2007.

Dear Friends,

These are obviously very trying times for all of us. World peace appears to be less and less obtainable as the days go by. The inability of various cultures to accept one another seems to be ever on the rise. What can we do about it? It appears to me that we can make a small contribution, as strange as it may seem, by continuing to collaborate on the international stage in astronomical research and by sharing the results of that research with young scholars around the world. It is with that in mind that I share with you the following news item about the Vatican Observatory.

From 9 to 15 July we held a conference at Castel Gandolfo with the participation of 16 scholars from the areas of science, philosophy and theology. They came from Canada, Iran, Ireland, Turkey, the United Kingdom and the United States to discuss the classical, but still little understood, concept of the creation of the universe out of nothing. In my naiveté I thought we knew nothing about nothing, but apparently for this crowd that is not the case.

We are beginning to prepare for the Vatican Observatory Summer School of 2007, the eleventh in the series of month-long biennial schools held at Castel Gandolfo. The theme for this next school will be planets around stars other than the sun, a very hot topic among astronomers, and we are very proud that for the first time the School will be led by an alumnus of our very first School in 1986, Dante Minniti from Argentina, now a full professor at the Pontifical Catholic University of Chile in Santiago. We are also proud that we will continue to bring together young scholars from around the world as we have done in the ten Schools held so far where a total of 250 students from 56 different nations, 62 % of them developing countries, have studied.

Our staff astronomers continue to collaborate with colleagues throughout the world in researching the universe. Here are a few examples. Guy Consolmagno and associates from the Republic of the Congo, France and Italy continue to study the composition of meteorites and asteroids so that someday we will understand more about how planets were formed. Chris Corbally and Richard Boyle continue to study stellar spectra and their work will provide a database of detailed information about stars that will be used in future space missions. In this research they collaborate with astronomers from Argentina, Canada, Colombia, Italy, Lithuania, Netherlands and Poland. José Funes with colleagues from Argentina, Brazil, Honduras, Spain and the United Kingdom is researching black hole masses in early disk galaxies and studying the creation and formation of galaxies that will contribute to our understanding of the evolution of the universe. I am working with Vilppu Piirola of Finland on the structure of cataclysmic variable stars. It is estimated that about 30 percent of the trillions of stars in the universe are binaries and so the study of the interactions between the stars in a binary system is very important. There is a class of these binaries that are very peculiar. The gravity field of one of the stars is so large that he literally sucks material from its companion giving rise to cataclysmic events.

I hope that you will join me in praying that in some small way our efforts to work with colleagues from around the world in the quest to understand the universe will bring us closer to peace in the world.

With fond best regards,

George V. Coyne, S.J.

George V. Coyne, S.J.

Mission Impossible

By José Funes, S.J.

I was asked by Nancy Knoche to write a short article on my experience of teaching astronomy at the University of Arizona. A few days before the article was due, I learned that I was appointed as the new director of the Vatican Observatory.

All the staff are most grateful to Father George Coyne, S.J. for his years of inspired directorship. Personally, I am very happy that George will continue as President of the Vatican Observatory Foundation and that after the sabbatical year he will be back with the Vatican Observatory. I am also quite pleased and happy with the full support that I have from my Jesuit brothers, friends and colleagues.

The Vatican Observatory I "receive" is in very good shape; we just need to keep doing good work. The challenge I am facing is an "impossible mission" that with the help of my Jesuit brothers and friends will be made "possible".

At the time of the appointment, 19 August, I was participating in the IAU (International Astronomical Union) General Assembly in Prague. We were seven Jesuits and Dan McKenna (VATT manager), participating in the most important astronomical meeting that is held every three years. The Assembly covers all astronomical topics, from the near Earth objects through the very distant galaxies. 'Plutos' was not the only theme discussed during the Assembly, despite the impression you may have gained from the media that covered the event. I also would like to point out that during the meeting, we enjoyed, at the Jesuit community in Prague, a very lovely evening with VOSS faculty and alumni participating in the General Assembly.

Finally, I would like to say that, at the Vatican Observatory, we try hard to keep up with the pace of the most recent astronomical developments. Since the IAU General Assembly in Prague, we now have two categories of directors; the giant, classic directors and the "dwarf" ones. George Coyne belongs to the first category and the current director... literally belongs to the second one. ■

Let's Get Acquainted with José!

José was born in Cordoba Argentina. He completed his masters' degree in astronomy at the National University of Cordoba in 1985. In 2000 he obtained his doctorate in astronomy at the University of Padua with the study of ionized gas in the inner regions of 25 disk galaxies.

He entered the Society of Jesus in 1985, obtaining a bachelor's degree in philosophy in 1990 at the Unversidad del Salvador in San Miguel, Argentina. At the same university he attained the master in philosophy in 1996. In his master thesis, he explored cosmology as a science from the point of view of scientific realism. In 1995 he was ordained in the priesthood after completing a bachelor's degree in theology at the Pontifical Gregorian University. He joined the staff of the Vatican Observatory in 2000.

Research interests: He specializes in extragalatic astronomy. This includes the dynamics of disk galaxies and the star formation in the local universe. He studies super massive black holes and their relationship with hosting galaxies. This relation offers strong clues to galaxy formation and evolution.

VATT Science: Jose uses the VATT in his studies of star formation properties of galaxies in the local universe. His research requires the imaging of spiral galaxies, satellite galaxies, and elliptical galaxies with dust lanes. For more information, please visit our website at vaticanobservatory.org or José's own website at http://kino.as.arizona.edu/~jfunes

The Vatican Observatory is a world famous research institution and has its headquarters at Castel Gandolfo outside Rome. It is supported by an annual budget from the Vatican. There are nine scientists on the staff of the Observatory. The VOF is the tax-exempt corporation that raises funds to support the operations and programs of the VATT on Mount Graham near Safford Arizona. The Vatican does not give monetary support to the VOF. It receives financial assistance from many generous friends and benefactors. ■

Vatican Observatory Scientists Participate in the International Astronomical Union Symposium

This summer, seven scientists from the Vatican Observatory attended the International Astronomical Union meeting in Prague Czechoslovakia. Those participating in the week long conference were: Richard Boyle, Guy Consolmagno, Chris Corbally, José Funes, Paul Gabor, Robert Janusz and Jean-Baptiste Kikwaya. This event received world-wide publicity because of the decision made to downsize Pluto to a "dwarf" planet. For a complete review of the conference's highlights, visit their website at IAU.org.

One highlight for the Vatican Observatory staff was a reunion of Vatican Observatory Summer School Alumni and staff organized by Paul Gabor.

Here are some thoughts about the conference and the Pluto decision by Guy Consolmagno:

Defining "what is a planet" is both arbitrary and necessary. How do we name the newly discovered objects out beyond Pluto, that rival Pluto in size? (The rules, and the committees, for planets are different than those for comets and asteroids.) Which committee keeps track of their orbits, and assigns names to their surface features? What definition works for planets around other stars?

Paul Gabor, S.J. hosted a supper reunion for about 30 VOSS faculty and graduates present at the IAU XXVIth General Assembly in Prague.
In the picture are: Chris Corbally, Mercedes Richards, Andrea Ahumada, Emre Isik, Kosmas Gazeas, Richard Gray, Jean-Baptiste Kikwaya, S.J., Robert Janusz, S.J., and Richard Boyle, S.J.

To be a planet, an object would have to be smaller than a star, in orbit around a star, but large enough to pull itself into a rounded shape. (The actual definition speaks of an approach to hydrostatic equilibrium, and other such technicalities.) One then divides the planets in our solar system into the classical eight largest planets, whose gravity dominates their regions of space, and a new class of less dominant, Pluto-like planets.

The name for the latter is still to be settled on. Pluto was suggested, but that word describes a lava mass in geology, and is already the word for Pluto itself in many languages. Other fanciful possibilities include planetoid or plutenoid or plunet, but I suspect in practice we'll just call them dwarf planets, to go along with dwarf stars and dwarf galaxies in the astronomical bestiary.

To me, the definition makes scientific sense: my own research shows a distinct difference between small but compact objects like Pluto and the loose rubble piles of asteroids. And one advantage of this definition is its creative ambiguity. In reply to the question, "Is Pluto a planet?", it will be equally true to say, yes, it's a dwarf planet, and no, it's a dwarf planet. That reflects the ambiguity of nature itself.

Still, it all does have an aura of counting angels on a pin. Indeed, the entrenched positions of many astronomers (and the public) resisting change, and the feeling that somehow the rest of us were left out of the decision, reminds me a lot of what the Church went through during Vatican II. Like the post-Vatican II church, astronomy will survive until these changes become such second nature to us and that we begin to think of them as tradition. ■

Scholars Discuss Cosmology and Creation at Castel Gandolfo

By Bill Stoeger, S.J.

From July 9-15 a group of 17 scholars gathered in Castel Gandolfo to explore the core idea of divine creation (creation from nothing) and to clarify its compatibility with cosmology and the other natural sciences. Unfortunately, in both recent scientific and popular writing and discussion, serious misunderstandings and distortions of this concept have arisen.

In particular, many people, including many scientists and believers consider creation of the universe by God and its origin in the Big Bang are alternatives which exclude one another. If God created the universe and everything in it, then the Big Bang couldn't have happened; and, if the Big Bang occurred, God did not create the universe. Nothing could be farther from the truth! In fact, if each is properly understood, they are completely compatible. Furthermore, from a philosophical perspective, they are complementary explanations: Cosmology and the other sciences cannot in principle answer the questions, ``Why is there something rather than nothing?'' and ``Why is there this kind of order – or any order at all – rather than some other kind of order?'' I cannot say anything about the processes and interrelationships which characterize nature, including those which triggered the Big Bang and those which governed the unfolding of nature from its very simple early stages to amazing richness and complexity that we see now. But it does provide an answer to the fundamental philosophical questions we just mentioned.

The discussions at the meeting focused on reviewing and deepening our understanding of creation as the fundamental relationship of all that is with God, and in discussing how to retrieve it for our broader culture, complementing formational and evolutionary processes and relationships described by the natural sciences. The meeting itself was sponsored by the Vatican Observatory and held at the Vatican Observatory itself in Castel Gandolfo. Dr. Janet Soskice (School of Divinity, Cambridge University), Prof. David Burrell, C. S. C (Department of Philosophy, U. of Notre Dame) and Dr. Bill Stoeger, S. J. (Vatican Observatory) organized it

To the outsider the make-up of the meeting might appear surprising. There were several scientists present, including Bill Stoeger, S. J., a Vatican Observatory cosmologist, and Simon Conway Morris, a very well-known paleontologist from Cambridge University. There was also a philosopher of science – Ernan McMullin (Notre Dame University). The rest of the participants were philosophers or theologians from Christian, Jewish or Islamic traditions. The countries represented were England, Scotland, Iran, Ireland, Italy, Turkey and the United States. The basic philosophical insights about creation are common to all three monotheistic religions. The development of the idea has enjoyed important contributions from outstanding thinkers and believers of all three. Thomas Aquinas, for instance, was influenced by the Arab Islamic philosophers of his time, and of the centuries before.

Now the conference is over, the organizers and participants are revising their contributions, and preparing to publish them in a book, which they plan will be accessible to wide readership. ■

GOOD NEWS FOR IRAS

By Mike Cronin, Attorney, VOF Board member

The Internal Revenue Code (the "Tax Code") is generally filled with bad news for taxpayers. However, the Tax Code now has good news for an owner of a traditional IRA or a Roth IRA who wants to benefit the VOF. A donor who wants to make a gift to the VOF can now do so directly from his or her IRA without incurring any federal income tax.

The Pension Protection Act of 2006 (the "Act") added new Section 408(d)(8) to the Tax Code.

Generally, before the Act, all amounts withdrawn from a traditional IRA would be included in the owner's income, and any amount withdrawn from a Roth IRA which was not a qualified withdrawal would be included in the owner's income. Also, before the Act, all gifts to charities such as the VOF would be subject to certain percentage limitations which could limit the deductibility of some or all of a donor's charitable gifts in one year for federal income tax purposes.

Under the Act, however, a donor who is at least 70? years old can now direct that up to $100,000 be distributed directly to the VOF in each of 2006 and 2007 from his or her traditional IRA or Roth IRA. Under the Act, the amount so distributed to the VOF (a "qualified charitable distribution") is excluded from the donor's income for federal income tax purposes. Under the Act, a qualified charitable distribution is also excluded when determining the donor's federal income tax deduction for his or her other charitable contributions during that calendar year. As a result, a qualified charitable distribution from the donor's IRA does not affect the amount of the federal income tax deduction for his or her other charitable contributions. Only those other charitable contributions are subject to the normal percentage limitations which apply to charitable contributions for federal income tax purposes. According to the Joint Committee on Taxation's August 3, 2006 explanation of the Tax Act, however, a qualified charitable distribution is taken into account for purposes of satisfying the required distribution rules.

For example, assume that George has only one IRA, and that it is a traditional IRA worth $100,000, consisting solely of deductible contributions and earnings. Assume that George instructs his IRA custodian to distribute the entire IRA directly to the VOF in 2006. Finally, assume that George also contributes $10,000 in 2006 to his alma mater. Under the Act, no amount is included in George's income as result of the $100,000 qualified charitable distribution to the VOF, and the distribution itself is ignored when determining the amount of George's charitable income tax deduction in 2006 for his $10,000 contribution to his alma mater.

That is the good news for donors. The less than good news for donors is in the details:

1. This favorable treatment is only allowed to donors who are at least 70? years old.
2. The Act allows this favorable treatment only in 2006 and 2007.
3. The exclusion is only allowed for such distributions from traditional IRAs and Roth IRAs. A similar distribution from any other tax qualified plan will not qualify.
4. To be excludable from gross income, the distribution must be made to a public charity, such as the VOF, which is described in Tax Code §170(b)(1)(A). A distribution to a donor advised fund, certain private foundations, a supporting organization, a charitable remainder trust, a pooled income fund or a charitable gift annuity would not seem to qualify for this favorable treatment.

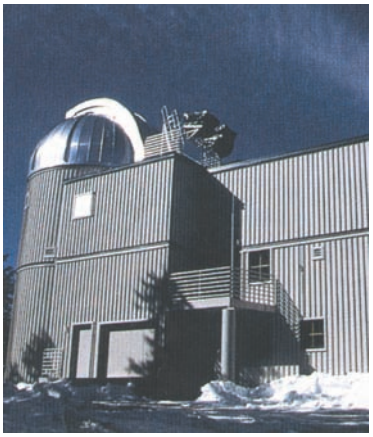
This favorable tax treatment might appeal to you or someone you know:

- The friend who generally only uses his or her standard deduction. Such a donor may find this to be an attractive opportunity to make a charitable contribution. Normally, such a donor would reap no tax benefit from his or her charitable contribution.
- The VOF friend who wants to remain in the lower Social Security taxable category. Such a donor might do so by transferring his or her required minimum distribution from his or her IRA as a qualified charitable distribution to the VOF.
- The individual who wants to make a large gift to the VOF. A qualified charitable distribution keeps the amount of his gift from increasing his or her adjusted gross income.
- A donor who wants to make a gift in excess of the normal 50% limitation.

For more information contact Nancy Knoche, Development Director, at 602-482-9147 or Nknoche@earthlink.net ■

Summer Means Work on the VATT'S Primary Mirror

The VATT continues to provide crystal clear images of celestial bodies to students and astronomers. It is in almost constant use because it has an international reputation as a first class astronomical research facility. However, since July and August typically bring the rainy season to Arizona, those months are used for maintenance and upgrading of the VATT and the other observing facilities in Arizona. Observations are discontinued and the engineers descend upon the telescope. This summer they discovered a particularly difficult and urgent situation. The mounting of the primary mirror of the VATT is not stable and it will require interventions of the engineers which will last until at least mid September.



Vatican Advanced Technology Telescope (VATT) on Mount Graham in Arizona

This is simply one of the signs that the VATT is no longer a young instrument. It has been in operation for more than ten years. If it is to continue as an Advanced Technology Telescope (ATT) we must find the financial resources to carry out the advanced engineering required. The Board of the Vatican Observatory Foundation were made keenly aware of this at the February meeting of the Board when Dan McKenna, Chief Project Engineer, gave an honest and detailed report of the woes of the VATT. We are relying upon all of our friends to help us meet the challenges of maintaining the VATT as one of the highest quality imaging telescopes on the surface of the earth. ■

Announcing the 2007 Vatican Observatory Calendar

Colorful wall calendar that makes an ideal gift for friends, family and business associates this year!

Featuring 14 four color images of planets, nebulas, galaxies and other celestial wonders.

Includes dates of significant astronomical observances and religious holidays.

Size 11" x 10" (closed) 11" x 20" (open)
Includes self mailing envelope.

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