



SGF PRESS RELEASE NO. 4 - 20TH OF JULY 1999 -

Keynote Address – Arthur C. Clarke (19 July 1999)

This is Arthur Clarke speaking to you from Colombo, Sri Lanka, sending my greetings to everyone at the UNISPACE III Space Generation Forum.

It was my privilege to be at UNISPACE I in 1968 and UNISPACE '82 in 1982, and I'd particularly like to send my best wishes to any survivors from that historic occasion - hello Yash - hello Peter!

It now seems to me that UNISPACE I was somewhere back in the Late Jurassic - so much has happened since then. But the most astonishing thing is what hasn't happened. We never dreamed that by the end of the century no-one would have returned to the Moon - and no-one seems likely to do so, in the immediate future.

Of course there are lunatics who don't believe we ever went there. (Well, some of them may be only pretending to be lunatics.) Recently I was sent a news-story in which it was claimed that the whole Apollo Project took place in a Hollywood studio - and that I wrote the script! This was too good an opportunity to resist, so I wrote to the NASA Administrator as follows:

Dear Mr. Goldin,

On checking my records, I see that I never received any payment for this script. Will you please look into the matter urgently? Otherwise I will have to hand it over to my lawyers, Messrs Geldsnatch and Blubberclutch.

I'm still waiting for an answer from Dan...

The initial motivation for going to the Moon was national pride; the Space Race was a bloodless war - how much better than the old-fashioned kind! Now that we have the basic, though still primitive, technology for travel beyond the atmosphere, we have found dozens of excellent reasons for going there. Already, of course, there are multibillion dollar space industries - communications, earth-resources, meteorology, geographical information systems and the ubiquitous GPS which no hiker - and no Japanese car - can now do without. You will be discussing all of these at your conference, so there is no need for me to go into details.

Though none of the current systems require humans in space, they soon will, if only for occasional repairs and upgrading - as was brilliantly demonstrated with the Hubble Telescope. And sometime early in The next century, orbiting hotels will be established, perhaps by assembling the huge fuel tanks which are currently discarded by the Shuttle and allowed to burn up. These will be followed by all kinds of zero-gravity laboratories and workshops, prototyped by the International Space Station. Perhaps most valuable of all will be Space Hospitals. Goodbye, bed-sores and wheelchairs.

However, I'd better warn you that I've never been interested in the near future. As I've said many times, to people foolish enough to ask for my advice, "If you take me too seriously you'll go broke. But if they don't take me seriously enough, your grand-children will go broke." To help them avoid that grisly fate I'll give a few statistics about the ultimate cost of space travel. Fasten your seat-belts: you're in for some surprises....

Do you realise how little energy is needed to leave the Earth? I've just calculated that it would require a mere fifteen hundred kilowatt-hours to give me escape velocity. My local Electricity Board charges about two hundred dollars for that! Yes - two hundred dollars! But you ain't heard nothing yet.

The Earth's gravitational field is conservative, in the best sense of the word. (I'm not talking politics.) This means that what you put into it you can get out again, if you're clever enough. So if you return to Earth, its gravity will give all your energy back to you... as indeed it does to the Space Shuttle when it re-enters.

And what does the Shuttle do with all those expensively acquired megawatt-days? It just throws them away, heating up the atmosphere. What a scandalous waste! Now, in theory it should be possible to recover 80 per cent of the return energy. This means that whereas a one-way ticket to space would cost two hundred dollars, the price of a round trip would be only -- forty dollars!

Theory is all very well, you may say - but how could this be achieved in practice? At the moment, only one method is known - the space elevator, invented by the Russian engineer, Yuri Artsutanov. It's a delightfully simple idea. You lay a cable from a satellite in stationary orbit down to the Equator - then you can run payloads up and down it, purely by electrical energy.

When Yuri - who I've been in touch with ever since I met him in St. Petersburg years ago - wrote his paper back in 1960, the only material strong enough to make a space elevator was crystallised carbon. Unfortunately, diamond is seldom available in the multi-kiloton quantities needed for the job. But now we do have the right material, if only in the lab. It's still carbon - the tubular form of Buckminsterfullerene, C60 - a hundred times stronger than steel.

For construction details, I refer you to 'The Fountains of Paradise'. And here's a really astonishing coincidence. When I recorded this novel on a 12" LP (remember them?) the sleeve notes were written by Bucky Fuller himself, and he drew a sketch showing the elevator reaching up from Sri Lanka to stationary orbit. What a pity he never lived to see the discovery of the material which will make it possible - and which now bears his name!

A few weeks ago, NASA conducted a workshop which discussed the space elevator: I'm still waiting to hear details but I gather that the middle of the coming century was considered a possible date. So many of you listening to me now may be able to ride up it.

Yet even when we do have easy access to space, we'll still need some on-board method of propulsion to get around. Rockets, or similar devices, will be with us for quite awhile yet...But I suspect that they will eventually play the same role in astronautics that the balloon did in aeronautics. Because - don't laugh - I now take the old science-fiction idea of 'Space Drives' quite seriously.

Recent work in far-out physics suggests how they might operate and I'm glad to see that NASA's Advanced Concepts Institute is looking into this. After all, the care and feeding of theoretical physicists costs peanuts, compared to that of their experimental colleagues, who recently poured billions down large tunnels in Texas. (I believe some of these are now paying their way as mushroom farms.)

Frankly, I don't expect the space drive until well into the next century. But - who knows? - the technology may turn out to be surprisingly simple. Even at this moment, the neighbours of some mad inventor in Lower Slobovia may be looking up through a hole in his roof, wondering what's happened to him...

So what I am predicting is that some day the main cost of space travel will be for catering and in-flight movies. It should certainly be cheaper than air travel, where the engines have to fight enormous drag forces every inch of the way.

But I suppose I'd better forego this nostalgia for the future, and come back to the realities of the present. Obviously, the Shuttle must continue to fulfil its unique role for years to come, until it is superseded by the next Space Transportation System. Whatever that may be, it will certainly depend on some form of jet propulsion.

And here I'd like to get in a plug for the X-prize, which hopes to promote astronautics in the way that Lindbergh kick-started commercial aviation seventy years ago....

At the same time, much of the world's attention will be focussed on our advance guard of robot explorers, now heading out to the planets. The extraordinary reaction to the Mars Pathfinder mission shows how well today's computer-literate public can identify with a cute little box of electronics on another world. I hope there will be even more enthusiasm, when Polar Lander touches down in December.

And now, in the closing decade of this century, we have found the best reason of all for developing space technologies. The grandstand view we had of the earth-sized explosions Comet Shoemaker-Levy created on Jupiter was a dramatic reminder of what has happened many times on this planet - and will happen again, unless we do something about it.

A quarter of a century ago, in Rendezvous with Rama, I coined the name 'Spaceguard' for a defensive system against cosmic projectiles. I am delighted that the name has stuck, and there are Spaceguard Foundations all over the world, trying to assess the danger of asteroid or comet impact. To those who criticise such efforts and think they should remain in Hollywood, I'm fond of quoting Larry Niven:

"The dinosaurs became extinct because they didn't have a space programme." It will serve us right if we fail to learn from their example. In any event, if we cease to explore, we will cease to be human. I do not believe that we will resist the challenge of the final frontier, just when it is opening up...

For as rocket pioneer Krafft Ehrlicke put it many years ago: "If God had intended us to explore space - he'd have given us a Moon."

Thank you all, and goodbye from Sri Lanka.

The Space Generation Forum is a forum for young space professionals organized by the alumni of the International Space University with the aim to express the visions and perspectives of the youth with regards to future space activities. The Space Generation Forum is attended by over 160 participants from more than 60 nations.

Points of contact:

Mr. Norbert Frischauf
Mobile: 0676 46 42 450

Mr. Lance Bush
Mobile: 0664 565 28 46

Email: info@space-generation.org