

NORTH CAROLINA SENIOR GAMES 2009

SILVER/LITERARY ARTS: ESSAY

SPACE TRASH

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SPACE TRASH

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Must we trash the Heavens also? The collision in February, 2009, of two huge earth-orbiting satellites precipitated my question. A few people are aware of debris accumulation in the sky but most do not even dream that the existent, rapidly growing, heavenly clutter is having more collisions -- and more clutter -- which result in a mine field of swirling sky junk.

The world's burgeoning population -- with its escalating consumption of material goods but with minimal awareness of the effects of its discards, debris, and detritus -- risks self-destruction from its own waste. There are too many examples of this phenomenon.

People use the shoulders of the roads as repositories for the miscellany they don't care to share with their car/truck, e.g. burger wrappers, drink cups, underwear -- you name it. Prisoner gangs with shotgun-armed guards are charged in many places with retrieving our mess from the roadsides. Elsewhere families, clubs, companies and other volunteers patrol the bermes to restore some grace. The dales and vales of our North Carolina hills famously collect tires, refrigerators, plastic chairs, and other discard.

In February 2009, two submarines armed with *atomic* warheads overcame high-tech precautions and collided -- doing so, we are assured, without spill or human injury. In March a *nuclear* sub collided with a surface ship; "no spill" we are told. The seas are not of sufficient volume for the machines of war?

According to the Green Burial Council and Wikipedia we bury with our dead in the US 1.6 million tons of reinforced concrete; 827,000-plus gallons of caustic and toxic

embalming fluid; 90,000 tons of casket steel (14,000 tons more steel for burial vaults); 2,700 tons of copper and bronze for caskets; and 30,000,000 board feet of hardwood board *annually*. That's good for the planet? This earth cannot absorb an infinite proliferation of people, their demands, their discard, their waste. But let's just address trash in space, the earth's atmosphere, in this essay.

In the early 1960s when efforts to propel rockets with varied propulsive chemicals, spy gear, potential weapons, dogs, apes and people into space were first penetrating the dense cowl about public awareness, my casual conversation with a colleague revealed his concern about the human race fouling the atmosphere about our earth. I was little impressed and, not then being willing or able to conceive of such a problem, even used the inane expression 'infinite dilution' to explain how there was nothing to concern ourselves about. Over the years many horizons and concepts have expanded. Among notions I have entertained in that time, 'infinite dilution' was -- I hope -- the most absurd.

Fiction writers and scientists have filled volumes with ideas of space travel for centuries. But what is orbital space travel? Relative to the earth, 'orbit' refers to having a track, path or course completely around our globe. To be put in orbit is to overcome gravity at least temporarily but not to go up with such force that the object at question leaves the planet's gravity totally and disappears into outer space. The first successful orbital launch was the Soviet Union's Sputnik I in 1957. The United States followed in 1958 with Explorer I, France put up Asterix in 1965, Japan hoisted Osumi five years later. These were succeeded by China, UK, India, Israel, Ukraine -- in that order through 1995. Iran challenged the world with Omid I this year, 2009. These nations plus the European Space Agency have independently launched satellites on their own indigenously developed launch vehicles. Forty-one, give-or-take one or two, more nations have had successful launches with the aid of

other nations. Private aerospace firm SpaceX launched Falcon I into orbit September 28, 2008. Iraq and North Korea have claims, unconfirmed, of orbital flight. South Korea had launch plans with Russia for later in 2009. Other nations are in various planning stages. One can reasonably ask if there will be a nation without its flag adorning an orbiting satellite by 2020? Surely Vatican (0.17 sq. mi.), Monaco, and The Most Serene Republic of San Marino will follow.

As Yury Zaitsev of RIA Novosti (Russian news agency) expressed it in 2007, “When it launched its first satellite, humankind not only opened a window on the Universe, but also unveiled a sort of garbage chute which is quickly turning near-Earth space into a giant waste dump filled with space and rocket debris. At altitudes of 200 kilometers and more, we find the last stages of launch vehicles, booster sections, nose cones and decommissioned and retired satellites.” Add to that fragments of all sizes from collisions and exploded space gear and even tools that strayed from astronauts. The US and Russia are the two countries that monitor for space junk with radar, optical and other sophisticated instruments. In cooperation with the United Nations much -- but far from all -- data regarding paths of satellites and space junk are shared among the nations represented in space.

Nearly 5000 spacecraft have been orbited, about half of those remain high above us at this time. About half have returned to Earth’s atmosphere, some burning to destruction, others or their fragments have struck animals, a human (non-fatal), houses and a wide variety of landscape. Of those yet orbiting, three-quarters have completed their missions and have been abandoned. Most range from a kilogram (over two pounds) to 20 tons. Most of the launchings result in one or more of the rocket stages rushing about, still in orbit. Objects and equipment accessory to the launchings abound in space. There are about 20,000 objects being routinely monitored by the concerned agencies. A large number of other objects are

monitored when they approach our satellites, the International Space Station (ISS), or other designated stations. Generally objects less than about 10 cms. diameter (baseball size) are too small to detect but even marble-size objects, commonly traveling at speeds like 17, 500 mph can destroy a space craft or satellite because of the potential impact energy represented. Management of space trash, debris, junk, is a monstrously large, complex and expensive set of operations. That being said, we have just begun. There is so much yet to be developed and used to 'clean' space.

Recent collisions and near collisions in space focus a bright beam on a concept promulgated by NASA scientist Donald J. Kessler in 1978. The scenario as expressed by Wikipedia is that "...where the volume of space debris in Low Earth orbit is so high that objects in orbit are frequently struck by debris, creating even more debris and a greater risk of further impacts. The implication ... is the escalating amount of debris in orbit could eventually render space exploration, and even the use of satellites, unfeasible for many generations." Manned space exploration would be too dangerous to continue.

Why are we in space anyway? There are many good reasons. The need to understand the significance of rapidly occurring changes to our orb including C02 build-up and serious alteration of 40 % of the land surface has shown the need for unique data from remote sources. Consequently, the US, Canada, and Japan initiated in 1999 NASA's Earth Observing System (EOS) comprised of a series of satellites, an advanced computer system, and worldwide teams of scientists. Management of climate change or what is popularly called "global warming" is at stake. TERRA is the name for the 15 year program to help unravel the mysteries of environmental change. Its fleet of satellites adds to the mix.

observations of the land surface, biosphere, solid Earth, atmosphere and oceans. ... EOS enables an improved understanding of the earth as an integrated system. The EOS Project Science Office is committed to bringing program information and resources to program scientists and the general public alike.” Examples: The Calypso satellite helps determine how clouds and aerosols affect earth’s climate; also, it provides improvement in weather forecasting.

‘Spy’ is a favorite adjective of news mongers for satellites; ‘reconnaissance’ is the modifier of art in government circles. A ‘spy’ is an EOS or communication vehicle deployed for military or intelligence applications. Certainly a craft that collects information through photography and/or electronic signals is a ‘spy’ satellite. Spy functions obviously can be combined with other functions; one rocket launch can put more than one satellite in orbit. The use of euphemisms by government organizations for the satellite functions is a bit ludicrous, as the massive constant scrutiny by the monitoring agencies keeps the major players aware of who has what in orbit for which purpose.

Transmission of collected information by spy satellites has improved considerably in sophistication since the first generation type (e.g. CORONA) which took pictures and ejected film canisters via parachutes which would be retrieved in air. Now there are digital imaging systems and images via encrypted radio links. On March 16, 1955, the USAF ordered the development of an advanced satellite that was to provide surveillance of “pre-selected areas of earth” to determine “the status of a potential enemy’s war-making capability.” This preceded the USSR’s Sputnik, the first man-made object to be put into space, by over two years.

Updated April 21, 2009, Wikipedia noted various categories of ‘reconnaissance’ satellite missions: high resolution photography, measurement and signature intelligence,