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Spaceship Earth: Nuclear Age Representations of Life After the Apocalypse

In 2018, Swedish company Magnet released *Aniara*, a space-based sci-fi film with heavy eco-dystopian themes. Based on a mid-1950s poem by Nobel Laureate Harry Martinson, *Aniara* is a tale of humans fleeing from a decimated earth when their spaceship unexpectedly collides with debris and is driven off course. With no way to correct the ship's trajectory, society breaks down. Cults emerge, authoritarianism reigns, and ordinary people are left to face the inevitable. The recently released film, however, features tropes common in Cold War-era dystopian science fiction. Like many post-Cold War films, *Aniara* replaces the atomic cause of global destruction with environmental degradation; this 2018 film, however, still features other prominent Cold War era concerns: debates about population, concerns about ecological devastation in an age of limits, and imaginings of how humanity might survive as a fragile, lonely species adrift in space. Curiously, these are all themes that peaked in popularity within a very short time span: 1968-1972.

Why did a film released in 2018 embrace so many tropes and ideas from one specific period of the Cold War? This article aims to answer that question. It begins by examining early Cold War concerns brought about by atomic weapons, the arms race, and nuclear testing. Next, it looks at the transitional period of 1968-1972, when biologists, ecologists, and futurists promoted ideas for global, peaceful, and sustainable coexistence on earth and in space. Finally, it examines films and books featuring tropes common during this period. From the 1972 film *Silent Running* through 2018's *Aniara*, visions of spaceship-bound humanity escaping earth have continued to fascinate audiences speculating on just what might bring about our global destruction, and whether or not humanity can survive.

Early Cold War Atomic Fears

With the atomic bombings of Japan on August 6 and 9, 1945, the world changed. Writers and scientists had long predicted an atomic bomb, but the postwar realization that humanity had entered the atomic age alarmed many Americans (Winkler 32-33; Rhodes 13-28). Some, like the scientific community, protested against further nuclear proliferation (see Rubinson). These figures – many of whom helped to design the bomb – warned that atomic warfare might not just destroy cities, but entire nations. With the production of a Soviet bomb in 1949, such warnings seemed more realistic, and nuclear weapons quickly increased in destructive power (thermonuclear weapons) and diversified their delivery systems (i.e. Submarine or Sea-Launched Ballistic Missiles, or SLBMs).[1] Not everyone, however, was skeptical about the bomb; some even promoted new uses for nuclear technologies. In the 1950s, US engineers began pondering the utility of Peaceful Nuclear Explosions (PNEs), and members of "Project Plowshare" hoped that atomic bombs could be used to clear harbors or canals (Kaufman 172). With the need to test these innovations, above-ground atomic tests became almost *passé* in Cold War life, and civil defense measures (Do-It-Yourself bomb shelters, public fallout shelters) became iconic symbols of 1950s America (see McEnaney). It took the 1962 Cuban Missile Crisis to force the superpowers to put in place preventative measures, most notably the Above Ground Test Ban Treaty of 1963, which temporarily reduced global atomic anxiety.

After a decade of intense above-ground testing, more scientists – including ecologists and biologists – entered the political fray. Arguing about the threat of above-ground nuclear tests, ecologists exposed the real dangers of radioactivity both in the atmosphere and the biosphere. Washington University biologist Barry Commoner led a study of radioactive fallout's effects. By asking mothers to mail in baby teeth, he made connections between above-ground testing and soil contamination, revealing that traces of the radioactive isotope Strontium 90 had passed through mothers' milk (McCray 22-23). That was on land, but the world's oceans were also at risk, as the superpowers dumped radioactive waste with abandon (see Hamblin 92-96, 100-01). By the mid-1960s, atomic weapons

had become more than a military issue: they were now an environmental concern. As the 1970s approached, those concerns grew, especially because of the contributions of a few major thinkers during a specific four-year period.

1968-1972: A New Age of Global Environmental Concern

The period of 1968-1972 witnessed an increased emphasis on environmentalism thanks to the efforts of scientists, activists, and futurists. Their potential to reach a broad audience was realized earlier, when in 1962 Rachel Carson released *Silent Spring*. First appearing as a serialized story in *The New Yorker*, Carson warned of the dangers of pesticides – especially Dichlorodiphenyltrichloroethane (DDT) – and their potential harm to humans (the book's title alluded to pesticides' ability to kill off bird populations). For her warnings, the chemical industry attacked Carson, calling her a hysterical and a crackpot. Still, the public took notice, and by 1968 environmentalism became a serious public concern thanks to certain specific contributors. In 1968 Paul Ehrlich released *The Population Bomb.* Essentially an update of the centuries-old "Malthusian Doctrine," Ehrlich argued that earth was reaching a point where global resources could no longer meet humanity's demands. Unless the global population was curbed, he argued, parts of the world would face starvation (3, 161). Concurrently, non-government organizations such as the International Planned Parenthood Foundation and Zero Population Growth echoed his warnings. Similar prophecies of doom appeared in literature, most notably Hal Lindsey's 1970 book *The Late Great Planet Earth* – an eschatological treatise that became the bestselling "non-fiction" book of the 1970s. By 1972, a more secular attempt to predict impending doom came from the Club of Rome. Comprised of a collection of MIT faculty, European chemists, and businessmen, its controversial publication *The Limits to Growth*, a systems-based prediction of Ehrlich-like doom, urged Americans to recognize the need for constraint in a new "age of limits" (McCray 25-32).

Living in this "age of limits" would require some innovative thinking,

such as the ideas of E.F. Schumacher. A British economist, Schumacher promoted ideas of "intermediate technologies," or tech that was "halfway between traditional and modern" (169). Instead of designing brand new devices, he implored people instead to improve upon already existing ones, be they wind turbines or compostable toilets (188-89). Schumacher's ethos became so central to the counterculture that "appropriate technologies" (AT) were featured throughout Stewart Brand's *Whole Earth Catalog*. By 1971, the eco-anarchist Murray Bookchin's *Post-Scarcity Anarchism* suggested that industrialized nations could create a utopian "ecological society, with new ecotechnologies, and eco-communities" (22). Although the adoption of DIY-technological fixes or eco-anarchistic ideas never went mainstream, their increasing prominence in Brand's catalog and in alternative communities reflected the hopeful idealism of AT proponents (Kirk 28-30).

This mixture of dire predictions and technological solutions emerged during President Richard Nixon's first administration. No environmentalist himself, but ever the political opportunist, Nixon soon publicly supported environmental initiatives. Concerning events in 1969 alone – the Santa Barbara Oil Spill, Ohio's Cuyahoga River Fire, and a Los Angeles continually veiled in smog – made environmental protection good politics. Additionally, in 1970, what started as an environmental "teach-in" had blossomed into the first Earth Day (see Rome). In Congress new initiatives such as the Clean Water Act gained public support. Assessing the electorate's mood, Nixon wrote into law a slew of environmental legislation, including the National Environmental Policy Act (NEPA), the Endangered Species Conservation Act, and the Clean Air Act. By 1972, however, the Nixon administration's façade was beginning to crack. That year Secretary of Health, Education and Welfare, Elliot L. Richardson, opined that if any nation consciously curtailed economic growth, it would bring about "the destruction of our liberties and freedom" (McCray 36). Later that year, Nixon revealed his own skepticism by vetoing the Clean Water Act, a veto Congress quickly overrode (Schulman 30-32). All told, the period of 1968-1972 – thanks to the efforts of environmentalists in writing, on campuses, and in Congress – had paid dividends.

While these events transpired on earth, it was the efforts of the National Aeronautics and Space Administration (NASA) in outer space that led to another paradigm shift in how people thought about the global environment. Also starting in 1968, a series of photographs taken from space contributed to a new conception of our world as a global community – or, as some commentators put it, a "Spaceship Earth." It was these images that provided another catalyst for the pop culture creations which attest to the impact of environmental and futuristic thought in the atomic age.

Imagining "Spaceship Earth"

While imaginings of earth from space date back at least as far as Plato, humanity had no photographic evidence until 1968. It was an auspicious year, one marked by numerous cultural and scientific achievements that led Americans to reconsider their place in the universe. It was the year of Stanley Kubrick's *2001: A Space Odyssey,* a revolutionary film featuring visions of man leaving earth. Also that year, Brand's *Whole Earth Catalog* published its first issue, offering access to do-it-yourself guides and a slew of AT gadgets to improve an increasingly fragile globe (Poole xiii-xv). In 1968, Soviet cosmonauts took the first ever black and white photograph of earth from space; not long after, on Christmas Eve, Apollo 8 astronauts captured the first ever color image of earth. Both photos presented a world without national borders or ideological divisions. The photograph was so stark it led *New York Times* journalist Archibald MacLeish to describe earth as a "tiny raft in the enormous empty night" (qtd. in McCray 22). Newspaper editorials abounded with mentions of "brotherhood on earth" and magazines featured the photograph on their front covers: *Time* captioned the image "Dawn," while *Life* proclaimed it the picture that best captured "The Incredible Year '68." Four years later, the Apollo 17 mission captured an even higher resolution photograph, the "Blue Marble" image (Poole 1-8).

Presenting earth alone and adrift in the black void of space – some called it a "Pale Blue Dot" – these images also conjured up a phrase that had been growing in popularity: "Spaceship Earth." The phrase originated with University of Michigan economist Kenneth E. Boulding, who in 1965

presented a talk entitled "Earth as a Space Ship." In it, Boulding compared two different visions of how humanity could proceed: unrestricted economic growth or a more ecologically-friendly existence in an age of limits. Soon economists like Barbara Ward embraced "Spaceship Earth" as a metaphor to promote the need for global cooperation (see Ward; McCray 23). Arguably, however, nobody more prolifically promoted this idea than R. Buckminster Fuller, who in 1969 published *Operating Manual for Spaceship Earth*. A far-thinking futurist since the 1920s, by the late 1960s Fuller had become an unlikely countercultural cult hero thanks to Brand's *Whole Earth Catalog*, which prominently featured his designs. Although a prolific designer, one design stood out from the rest: his geodesic dome, which according to historian Andrew Kirk, "became the preferred domicile for counterculture communes [as they were] cheap, easy to build, often portable, and environmentally friendly." Fuller's geodesic dome was the architectural embodiment of a countercultural, do-it-yourself philosophy, a symbol of how to maintain and care for our corner of Spaceship Earth (Kirk 58).

It may have been the counterculture's environmental metaphor of choice, but Spaceship Earth was not popular with everyone. One Nixon staffer proclaimed that those who embraced the idea would forfeit liberties and need to accept "the strictest sort of economic and technological husbandry," leading to a future that looked "much less libertarian and much more authoritarian" (McCray 36). Not surprisingly, other skeptics included futurists with a particularly Libertarian-bend, such as Gerard O'Neill. A Cornell graduate who spent his life envisioning and promoting ideas of space colonization, O'Neill detested the proposed "near-totalitarian ways that Spaceship Earth would have to be managed" (McCray 48). Instead, he saw outer space as a place where humanity could start over, a sort of galactic frontier of freedom – one that need not be the sole purview of NASA. In part, O'Neill's ideas sprang from his love of science fiction. In stories such as Robert Heinlein's *The Moon Is a Harsh Mistress,* he read how space colonies repressed by totalitarianism might respond with revolts. The lesson was clear: Space, unlike earth, should be egalitarian, not totalitarian (50). O'Neill was not working to improve "Spaceship Earth" here on earth;

he sought to create plans for a space-bound society where humanity might begin anew.

O'Neill quickly attracted a coterie of like-minded Visioneers, dreamers who wanted to take discussions of space settlement (they rejected the term "colonization" for its imperialistic implications) from the theoretical to the concrete (Anker 240). Disciples like Dandridge Cole, a General Electric missile engineer, postulated that giant spaceships might build permanent settlements on asteroids, mining them for minerals and resources. Then there was Freeman J. Dyson, the British physicist who was just as curious about space settlement as O'Neill. By 1972 the two had struck up a near constant correspondence, much of it based on their shared love of futurist John Desmond Bernal's writings – especially the notion that to survive in space, humans would need to master the "eventual modification of people's genetic materials." Alongside notions of "transhumanism," they focused on engineering issues, and imagined rotating steel cylinders that could replicate gravity in space and harness solar energy for power. In time, they reasoned, smaller space habitats would combine, their self-sufficiency ensured by the rich asteroids they mined (McCray 51-52, 62). In short, these figures didn't just muse about the economic or political potential of space colonization – they went ahead and created models of how civilization might actually thrive in space.

O'Neill and his compatriots did not just ponder how humans would live in space, but *where* they would live. O'Neill's team recognized that no large space colony could linger in earth's orbit; gravity there was simply too unstable. Instead, the group settled on two Lagrangian points, L4 and L5, for settlement. Named after mathematician Joseph-Louis Lagrange, these points, each around 240,000 miles from earth, enjoyed unique gravitational stability, making them ideal locations for long term settlement. As O'Neill engaged in numerous speaking ventures and publicity opportunities, this idea spread; soon, student groups at places like Cornell and MIT formed, and public advocacy groups, such as the L5 Society, chanted a new catch-phrase: "L5 by '95!" (56, 90).

Be it on earth or in space, the notion of Spaceship Earth grew in popularity during America's new age of limits. By 1972, the Organization of Petroleum Exporting Countries (OPEC)'s oil embargo constrained

the US economy and further validated the warnings of ecologists and economists. Quickly, popular culture presented dystopian futuristic backdrops that were thinly veiled metaphors for the 1970s ecological disaster. One example is Zero Population Growth (Z.P.G.), a 1972 Danish-American film clearly inspired by Ehrlich's writings: it features an earth so polluted that no fauna lives above ground; even breathing outside is near impossible. One year later, the dystopian film *Soylent Green* presented an earth that had become "an overpopulated, overheated, arid desert" with a starving society teetering on collapse (Canby 113).[2] Salvation seems to come in the form of "Soylent Green," a mysterious foodstuff rationed out by a now draconian government. Here was Ehrlich's *Population Bomb* brought to cinema, a world that had outgrown its food supply – although Ehrlich never predicted the stomach-churning revelation made at the film's conclusion when Charlton Heston discovers that "Soylent Green is made out of people!"

Equally disquieting sci-fi depictions soon emerged, but frequently these were set in outer space. Space colonization had become an increasingly seductive idea thanks to the beforementioned thinkers. By 1975, Brand began using profits from his *Whole Earth Catalog* to finance space-colonization research, and in 1976 O'Neill published his ideas on space settlement in *The High Frontier*. For thinkers like these, "the overwhelming majority thought space colonies could provide well-functioning environments for astronauts seeking to push human evolutionary expansion into new territories, while also saving a Noah's Ark of earthly species from industrial destruction" (Anker 239-40). Similar visions emerged in pop culture as well, and in time became common images in dystopian sci-fi during and after the Cold War. All told, the ideas that emerged during the formative period of 1968-1972 continued to inform visions of ecological disaster, not to mention the promises, and pitfalls, of Spaceship Earth.

Cultural Representations of Spaceship Earth

In 1972, Universal Pictures released *Silent Running*. The film opens with botanist Lowell Freeman (played by Bruce Dern) wandering through lush

green forests. The scene is idyllic. He swims in clear streams as contented frogs and birds look on; at one point, he holds and feeds a baby rabbit. Quickly, however, viewers see that this is no rainforest, but a greenhouse floating through space. The greenhouse's design here is telling – these are Fuller's geodesic domes. *Silent Running,* then, was a sci-fi space drama that embraced still-emerging ideas of the counterculture, a trope reinforced by Dern's protagonist. Unlike his compatriots, Lowell Freeman only eats the fresh fruit and "real food" he grows in his geodesic dome, not the synthetic and chemical-laced fare the others consume. He is constantly jeered at by crewmates who find his speeches on environmentalism childish. At one point, Freeman muses about:

> a time when there were flowers all over the Earth. And there were valleys. And there were plains of tall green grass that you could lie down in…you could go to sleep in. And there were blue skies, and there was fresh air… and there were things growing all over the place, not just in some domed enclosures blasted some millions of miles out into space. (*Silent Running*)

Clearly, Freeman is obsessed with his mission, one explained in a flashback audio clip from a bygone US President who states that "we… dedicate these last forests of our once-beautiful nation in the hope that they will one day return and grace our fouled earth." Again, the earth has become – like in *Soylent Green* – an arid wasteland. Freeman is earnest, but by comparison his churlish crewmates have so little regard for the greenhouse that they frequently crush crops and flowers with their buggies. Still, Freeman remains buoyant; he hopes one day to return to earth where his flora and fauna can re-foliate the planet.

When orders arrive for the ship to return, Lowell learns that their mission is no longer ecological; in fact, the crew is tasked with destroying the domes and returning to commercial service (the Valley Forge, after all, is owned by American Airlines). To do so, as late 1950s engineers had proposed using PNE's with Project Plowshare, they employ small scale atomic explosives to eradicate the greenhouses. Rather than destroy his own dome, Freeman mutinies, killing his crewmembers and defending his beloved forest. In the end, rather than return to earth, he decides to destroy his own spaceship with an atomic detonation, but not before saving one

final dome – an ecological Noah's Ark – with the last of his greenhouses intact, a lush and green "Spaceship Earth" left to be tended by one helpful robot. With this ending, *Silent Running* hinted at the evils of corporate power and the benefits of smaller, appropriate technology (the greenhouse robot). It also sent a clear warning about the fragility of Earth's ecosystems, one shaped by thinkers like Ehrlich and Carson.

The short-lived 1978 television series *Battlestar Galactica*, as well as its 2003-2004 reboot, also embraced ideas about life adrift on a "Spaceship Earth."[3] (In many ways, the show borrowed liberally from an earlier TV series: Harlan Ellison's 1973 show *Earthship Ark,* which, like *Aniara*, focuses on citizens grappling with life in a spaceship gone off course.) In each iteration of *Galactica*, the last surviving humans flee through space from an evil robotic race of "Cylons" in the "Battlestar Galactica," an outdated warship. While the series embraced sci-fi tropes about maniacal robots, it also captured O'Neill and his group's concerns on long term survival in space. For example, in the original series pilot, after escaping the Cylon attack, humans seek refuge on Carillon, a planet whose sole purpose is to mine "tylium" (much needed rocket fuel). In the 2004 series re-boot, the aptly named episode "Water," the Galactica's crew is less concerned about another Cylon attack and more with replenishing their water supply, which they find on a nearby moon. In each iteration, immediately after the Cylon sneak attack the most pressing issue is long-term survival in space, not military conflict.

In the 1980s, numerous works of science fiction adopted O'Neill's designs for space satellites. In 1983 Pamela Sargent's Young Adult novel *Earthseed* told the tale of project "Ship," an Artificial Intelligence-programmed satellite adrift for a century carrying DNA from a now ecologically devastated earth. Much of William Gibson's landmark 1984 novel *Neuromancer* takes place on "Freeside," a gigantic O'Neill-design cylindrical tube for vacationers which resides in "the L-5 archipelago" (Gibson 101). One year later, Greg Bear's *Eon* told the story of a Cold War standoff interrupted by the arrival of a cylindrical and hollowed out asteroid in Earth's orbit. Nicknamed "The Stone," humans soon learn that it is actually a lost space settlement named "Juno" designed to rotate and simulate gravity. In the 1990s, O'Neill's influence remained, and no

work of the decade better represented his designs, and Ehrlich's doomsday predictions, than Gene Wolfe's *The Book of the Long Sun*. Central to this four-book series is "The Whorl," an interstellar Spaceship Earth carrying the last survivors from a decimated Earth (see Gevers). In each of these examples, be they from the Cold War 1980s, or post-Cold War 1990s, sci-fi embraced fairly consistent visions of how humans might survive in space.

More examples of the Spaceship Earth-theme continued after the Cold War, but these works frequently replaced the atomic apocalypse with the realization of the Anthropocene. Coined in 2002 by Nobel Laureate Paul Crutzen, the term defines our current, human-influenced epoch of ecological destruction (Coombs 208). This is the backdrop of the 2008 Disney-Pixar animated release *WALL-E.* The film's protagonist, a cute robot, spends its days collecting and compacting trash, using it to build skyscraper-height refuse piles. There is almost no life left on earth, and the environment is arid and unstable; frequently, WALL-E flees for cover from dust storms. WALL-E (an acronym for "Waste Allocation Load Lifter – Earth Class") has only one friend, a cockroach, famously one of the few insects rumored to be able to thrive after the apocalypse. One day, WALL-E is visited by EVE (as in "Extraterrestrial Vegetation Evaluator"), a robot whose job is to assess whether plant life can again exist on earth. Discovering WALL-E's prized plant, she hijacks it, and returns (with WALL-E in tow) to an orbiting spaceship.

The humans aboard this Spaceship Earth provide quite the juxtaposition with 1972's *Silent Running*. Bruce Dern's character was a stereotypical 1970s-era countercultural environmentalist, someone who eschewed synthetic food and a disposable lifestyle. The humans of 2008's WALL-E, by comparison, are obese lay-a-bouts whose every desire is immediately fulfilled by corporate robots from "Buy-N-Large," a Wal-Mart-type super-corporation. These people don't even walk, but spend their days riding around what looks like a cruise ship. Although this is a children's film and the characters are drawn sympathetically, the overall setting depicted here is nothing short of horrific. While the film's overt attack is on consumerism driven by big box stores and corporations, WALL-E still incorporates Ehrlichian predictions of resource depletion and Carson's warnings of environmental degradation. The film also insinuates the promise of

Schumacher's AT, as it takes the efforts of two smaller, less advanced robots (WALL-E and EVE) to ultimately foil the evil plans of the corporation's computer mastermind AUTO, which seeks to keep the humans off planet.

Although much bleaker in tone, *Aniara* shares with *WALL-E* a warning about humanity's obsession with consumerism and disposable culture. In both films, the earth is rendered uninhabitable because of climate change. But this is no Disney movie; *Aniara's* Anthropocene-induced apocalypse is decidedly more graphic - in one flashback, a crewmember imagines birds in flight spontaneously combusting into flame. What makes *Aniara* unique among these examples is that it shows the dire fate in store for a spaceship *not* prepared or equipped for long periods of human survival. At the film's outset, a newly arrived crew anticipates another fun three-week trip to colonies on mars. Like in *WALL-E,* the ship here resembles a flying resort, with bars, restaurants, live shows and shopping options. After accidentally being driven off course and losing control of the ship, the captain and crew scramble to ration their supplies. For a short while, the travelers on board *Aniara* are placated with consumer distractions. In time, however, one curious amenity becomes the most important. The "Mima" is a room-sized computer that can transport travelers to serene memories in their minds of the time before earth's destruction. Over time, Mima becomes increasingly depressed after having absorbed so many nostalgic memories; it decides to self-destruct rather than continue to face the existential horror of existence. Adrift in space with no distractions and with no way to correct the ship's course, suicide becomes widespread. Through this bleak narrative, *Aniara* critiques consumerism and also implies the horrors that await humans aboard an ill-prepared Spaceship Earth.

The final example of Spaceship Earth in this essay comes from the book *Seveneves*. This work by sci-fi writer Neal Stephenson begins auspiciously; its first sentence reads: "The moon blew up without warning and for no apparent reason" (Stephenson 1). Over the course of almost 900 pages, *Seveneves* ponders how humans respond knowing that shards of the moon will rain fire down upon the earth making it uninhabitable for some 5,000 years. To preserve humanity, global governments plan to place two citizens from every nation on a "Cloud Ark" in space, while libertarian do-it-yourself survivalists build shelters underground. A third faction, unhappy

with either plan, begin to attack government rocket launches to the space station. In response, US President Julia Flaherty orders an SLBM attack on protestors in Venezuela. That once unthinkable military action, the use of nuclear force, has become, in the post-Cold War milieu of *Seveneves*, possible (277-79).

In the first half of *Seveneves* much of the action focuses on the crew of "Izzy." Modeled on the international space station, Izzy is attached to Amelthia, the pet name given to a gigantic asteroid that the crew mines for minerals in order, in time, to create new habitats in anticipation of their growing population. It's one more example of O'Neill and his cadre's vision of life in space: a series of connected satellites mining asteroids for necessary minerals. Also, as O'Neill had proposed, *Seveneves*' satellites rotate to stimulate gravity and harness solar power for energy. Stephenson even includes predictions by some of O'Neill's less optimistic colleagues – not to mention Nixon Administration appointees – regarding draconian measures to keep order on a Spaceship Earth. Not minutes after the earth is engulfed in flames, crew leader Markus Leuker enacts martial law under a Cloud Ark constitution, and bluntly declares "all nation-states of Earth, and their governments and constitutions, no longer exist." Similarly, as Robert Heinlein predicted in *The Moon is a Harsh Mistress*, before long a rebel faction on the Cloud Ark revolts, breaking off from the main colony and heading for Mars (322-24).

Seveneves borrows even more from O'Neill and the Visioneers of the early 1970s. For example, as Izzy's crew grows, and new units are continually added to the growing Cloud Ark, a rogue scientist, Sean Probst, predicts that the Cloud Ark is woefully under-supplied with water, a necessary element not just for human life, but propulsion. He and his crew set course to intercept the Grigg-Skjellerup comet (colloquially called "Greg's Skeleton") at Lagrangian Point 1 (L1); they are successful, but succumb to nuclear reactor radiation poisoning from their ship. Later in the novel, the cosmonauts of *Seveneves* seek shelter in the same gravitationally friendly Lagrangian points of the "L5 by '95!" group. Explaining the concept to a crewmate, one of the lead characters, Dinah, exclaims: "They're called the Lagrange points…and there's five of them around every two-body system" (148-49). Both ideas, of the Lagrange points and of asteroid mining in

space, were ideas born of O'Neill's team in the 1970s, but they live on decades later (McCray 56-57).

Finally, *Seveneves* borrows the radical ideas surrounding reproduction in space. Recall that Dyson's ideas on space reproduction (inspired by Bernal's 1929 writings) focused on radical surgery and the "eventual modification of people's genetic material." This is precisely how the "Seven Eves" of the story (referring to the final surviving humans in existence, all of them women) begin to repopulate Earth. As no males survived, and all organic specimens have been lost, the Seven Eves begin to lose hope, until geneticist Moira Crewe explains "We don't need sperm." Instead: "There is a process known as parthenogenesis, literally virgin birth, by which a uniparental embryo can be created out of a normal egg" (Stephenson 552). By Part III of *Seveneves,* set some 5000 years in the future, the genetic offspring of these characters frequently experience epigenetic shifts, hibernating for a time, and awaking with altered physical traits and characteristics – the confirmation, however fictional, of Dyson's predictions (595; McCray 62).

Conclusion

These examples, which span the years 1972-2018, show the longevity of a few specific ideas from the Cold War. First, ideas about the eventual end of the world, ideas made more vivid at the dawn of the Atomic Age, evolved as fears of global nuclear destruction gave way to environmental concerns. Next, the ideas promoted between the years 1968-1972 – such as Ehrlich's *Population Bomb*, Brand's DIY-Environmentalism in the *Whole Earth Catalog*, Fuller's Appropriate Technologies, and O'Neill's cadre of far-thinking space colonizers – embedded themselves into cultural visions of space settlement. Even as the Cold War gave way to new concerns about global climate change in the Anthropocene, visions of earthly apocalypse did not disappear; they simply evolved. Still, the ideas of the environmentalists, ecologists, economists, and futurists from the period 1968-1972 continue to shape ideas about global destruction and life off-planet aboard a Spaceship Earth.

The resiliency of these ideas is impressive considering shifting political and cultural concerns in contemporary America. As the 1970s gave way to the 1980s, DIY-enthusiasm and hopefulness about sustainability and AT gave way to unabashed, rampant consumerism. The 1970s-era of the rugged individualist gave way to 1980s corporate yuppies, while libertarian visions of space settlement shifted towards more earthbound endeavors. The 1986 Challenger tragedy may have contributed to reduced interest in such visionary dreams. However, in an era of private companies increasingly promoting space travel, O'Neill's vision lives on. As Elon Musk's Space-X corporation and its competition seek to reach space without government sponsorship or guidance, perhaps Spaceship Earth will become a reality. Likely, today's Visioneers will – like pop culture has repeatedly done – reference the ideas from 1968-1972 for guidance.

Notes

[1] For accessible compendiums on the atomic age, see Winkler, and Boyer. For more topic-specific treatments, see Intondi; Wolfe; Jones.

[2] Although based on Harrison, *Soylent Green* was only made into a film *after* the period of increased environmental concern examined in this article.

[3] In 2003, a *Battlestar Galactica* mini-series aired. The actual series re-boot took place a year later, in 2004

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