# 1nc

### The aff’s narrative of technological salvation from the rock guarantees unchecked space militarization

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Since the late 1980s, a small group of astronomers and planetary scientists has repeatedly warned of the threat of an asteroid impacting with Earth and causing global destruction. They foretell a large impact causing global fires, the failure of the world’s agriculture and the end of human civilization. But, these scientists assure us, we live at a unique moment in history when we have the technological means to avert disaster. They call for support for dedicated astronomical surveys of near-Earth objects to provide early warning of an impactor and they have regularly met with defence scientists to discuss new technologies to deflect any incoming asteroids. The scientists who have promoted the asteroid impact threat have done so by invoking narratives of technological salvation – stories which, like the Strategic Defense Initiative (SDI), promise security through a superweapon in space. The asteroid impact threat can therefore be located within the broader cultural history of fantasies about security and power, which, Bruce Franklin (1988) has argued, is inextricably linked to the century-old idea that a new superweapon could deliver world peace. Howard McCurdy (1997: 78–82), in his study of the ways in which the US space programme was shaped by popular culture, has suggested that the promotion of the impact threat can be seen as the completion of Cold War fantasies, which had used a politics of fear to justify space exploration. McCurdy highlights the alignment between the promotion of the impact threat and works of fiction. In this paper, I consider the reconceptualization of asteroid science that this alignment entailed. It is beyond the scope of this paper to give a complete history of the science of planetary impacts. My focus is on how a group of scientists moved from seeing impacts as significant events in Earth history to seeing them as threatening events in the human future – a move from historical to futurological narratives. Nor is there space to give a full account of the empirical developments that were used to support the construal of asteroids as a threat. Rather, I wish to make the case that these empirical developments were given meaning within a specific narrative context which drew civilian astronomers into contact with defence scientists, especially those working on SDI. A number of studies (for example, McDougall, 1985; Forman, 1987; Kevles, 1990; DeVorkin, 1992; Leslie, 1993; Dennis, 1994) have revealed the ways in which US research programmes and nominally-civilian scientific institutions originated in military programmes.1 One aim of this paper is to demonstrate how the boundary between civilian and military science is blurred not just institutionally, but also at a fundamental conceptual level. The civilian scientists discussed here followed different working practices and traded in different forms of expertise than did the defence scientists. They were typically astronomers or planetary scientists who worked for NASA or on NASA-funded research programmes at universities and private institutes. They saw themselves as distinct from the defence scientists who were typically physicists and engineers working on new weapons systems or other technologies of national security at the Los Alamos and Lawrence Livermore National Laboratories or at armed services institutions. 2 Yet the two groups came to share an interest in asteroids and with that a set of assumptions about the nature of human society, the role of technology and our place in outer space. As they came into contact, their differing backgrounds meant they disagreed over a number of issues, yet both sides pursued the collaboration despite the tensions. Many studies of the interaction between military and civilian science have focused on sources of funding and shared technologies.3 Important as these are, they fail to capture fully the dynamic between the two communities. In particular, a cynical picture of scientists simply pursuing sources of funding on any terms cannot reveal the far-reaching ways in which civilian research can become entrenched in particular patterns of thinking which are supportive of militaristic programmes. For military/civilian collaborations to be sustained, civilian scientists need to share with their counterparts in the defence sector an understanding of the overall trajectory of their research. For shared technologies to be developed, they need first to be imagined. Military/civilian interactions are therefore predicated on, and mediated through, a shared technoscientific imaginary. Despite expressing concerns about the motives and methods of the weapons scientists, the civilian scientists who promoted the asteroid impact threat drew on narratives that configured a human role in space in a similar way to SDI. These narratives helped make asteroids conceivable as a threat, yet they also served to make acceptable, and even necessary, the idea of space-based weaponry. Despite their disagreements, at the level of their shared narratives the discourses of the civilian and defence scientists were mutually supportive.

### Space weapons establish the U.S. as global sovereign, rendering all life bare

Raymond **Duvall**, poli sci at Minnesota, **and** Jonathan **Havercroft 6**, poli sci at U. of British Colombia, “Taking Sovereignty Out of This World”, October, <http://www.ligi.ubc.ca/sites/liu/files/Publications/Havercroft_paper.pdf>

This scenario is fascinating for the political logic at work within it—space weapons are required to launch an attack at an otherwise inaccessible target. The three reasons that the target might be inaccessible all have to do with potential gaps in imperial power. Either the defenses of the target country have not been suppressed, or other states have not consented to let the forces fly through their airspace, or other coalition members—presumably in NATO or the UN—have not consented to the action. The first “justification” for the use of the weapon involves clear erasure of the sovereignty of the targeted state, as it eliminates any pretense of that country’s defensibility. The second and third “justifications” diminish, by circumvention, the sovereignty of other states. All three buttress the exclusive capacity of the U.S. to act unilaterally in deciding the exception globally. In all three cases, the only practical use for this weapon is in an imperial project! The chief advantage of space weapons is their ability on very short notice to attack a target that is out of reach of conventional forces. What places these targets “out of reach” is the sovereignty of other states as exercised through those states’ abilities to defend their territory, control their airspace, and/or participate (jointly) in authorized decision of the (global) exception. The constitutive effect of these weapons, then, is to strip states of their sovereignty—they are constituted as subjects lacking authorization of decision, and lacking boundary effectively demarcating inside from outside. What modern sovereignty does (as identified in section I. above) is taken from them. Furthermore, given the potential targets that these weapons could destroy, and how they are used, space-based systems are most useful against small groups and individuals. While the purpose of the use of space-based weapons in the above example was to prevent genocide, the means by which this attack was carried out was essentially assassination—the assassination of those driving the vehicle to carry out the ethnic cleansing. Space-based weapons, then, are most useful at targeting individuals and groups on short notice in order to achieve a political objective. We have already seen potential glimpses of this type of warfare in recent years. Consider, for example, that the Iraq War began with a so called “decapitation strike” aimed at assassinating Saddam Hussein in the hope of ending the war before it began. Similar tactics have been used by the Israeli Defense Forces to kill specific leaders of the Palestinians. Also, the U.S. has used Unmanned Aerial Vehicles equipped with missiles to target specific members of Al Qaeda and the Taliban in Afghanistan and Pakistan. Placing weapons in space aimed at terrestrial targets would only accelerate the ability to carry out these types of “targeted killings” (a.k.a. assassinations). Space weapons would enable those who control them to kill any person at any point on Earth on extremely short notice. Thus, application of force from outer space would have at least three crucially important constitutive effects. First, it would constitute the possessor of these weapons—presumably the U.S.—as the center of a globally extensive, late-modern empire,68 a sovereign of the globe. But this global sovereign would exercise its power in a new way. Rather than needing to control the land, sea, and airspace of all of the Earth, it could rely on space weapons— because they enable the precise application of force at any point on earth, on short notice— to control the globe. While these weapons are not particularly useful in fighting large-scale wars, or in the conquest of territory, they make such conventional uses of military power moot, in large part. There is no longer a need to exercise sovereign power through the control of territory, all one has to do is kill—or perhaps even threaten to kill—potential adversaries around the world in order to gain one’s wishes. In short, the type of power potentially wielded by such a sovereign would be far more absolute than any encountered throughout history.69 Second, these weapons, just as space-based missile defense was seen above to do, would effectively strip states of their ability to exercise sovereignty over their territories. While de jure sovereignty may remain intact, their de facto sovereignty would be effectively erased. For decades, realist international relations scholars have promoted the idea that states secure their sovereignty through self-help.70 If states lack the capacity to defend themselves from adversaries they are particularly vulnerable to attack and conquest. While other scholars from liberal and constructivist schools of thought have questioned how closely sovereignty is linked to military capability, throughout history states with disproportionate military power have repeatedly violated the sovereignty of weaker states.71 While space-based weapons in and of themselves would not enable conquest of another state, they could be used very effectively to achieve precise political objectives without a credible possibility of retaliation. Imagine what impact these weapons would have on U.S. foreign policy with respect to two of its most pressing objectives at this point in time. Consider, for one, how useful such weapons might be with respect to preventing a rival state such as Iran or North Korea from acquiring nuclear weapons. While there has been speculation that the U.S. or Israel may launch air strikes against potential nuclear weapons manufacturing facilities in these countries, the logistics—getting access to airspace from neighboring countries, and the possibility of retaliation against military forces in the area—make such operations difficult to carry out. Using weapons in space to conduct such missions would avoid these logistical difficulties, thereby making them easier (and presumably more likely). The threat of using space weapons on either the manufacturing sites of weapons of mass destruction or on the political leadership of an adversary in most cases probably would be sufficient to alter the behaviour of governments. In short, if the U.S. were to deploy such weapons in space, they would likely be used to much the same effect as the gunboat diplomacy of the 19th century. A second contemporary policy objective is to fight specific non-state actors. The 9/11 Commission Report discussed in great detail the logistical obstacles that prevented the Clinton administration from capturing or killing Osama Bin Laden.72 The primary obstacle was the difficulty in either launching cruise missiles into Afghanistan through another state’s airspace or deploying U.S. Special Forces in an area so remote from U.S. military bases. Again, had the U.S. had space-based weapons at the time, they probably would have been the weapons of choice. When combined with intelligence about the location of a potential target, they could be used to kill that target on very short notice without violating the air space of other states, or needing to have a military base nearby to offer a support role. In effect, any person or group of people anywhere on Earth could be targeted on very short notice, thereby constituting everyone everywhere as objects of the global sovereign. All would be subject to the rule of the U.S. state. The sovereignty of states would no longer be an obstacle to killing enemies, and these assassinations could be carried out rather easily without the threat of retaliation by the state whose sovereignty has been violated. The example of using space weapons to target non-state actors such as Osama Bin Laden and Al Qaeda points to a third constitutive effect of space weapons. Because these weapons could target anyone, anywhere, at anytime, everyone on the Earth is effectively reduced to “bare life.”73 As Agamben demonstrates in Homo Sacer (1998), one of the constitutive powers of the sovereign is to determine who is outside the laws and protections of the state. While human rights regimes and the rule of law may exist under a late-modern global empire policed by space weapons,74 the global sovereign will have the ability to decide the exception to this rule of law, and this state of exception in many cases may be exercised by the use of space weapons that constituted this sovereign in the first place.

### Alternative: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

### Reject the aff’s politics of fear to fragment the ideology of asteroid paranoia

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But the focus on narrative also begs a question: Which stories would we prefer to frame our science? Should science be driven by fear or by curiosity? Should it be aimed at creating technologies of war or cultures of compassion? These are normative questions, but they are also precisely the questions that make the military influence on science such an important issue. Narratives are inherently ideological and a refusal to see them as such does no more to enhance the scholar’s objectivity than it does the scientist’s. The stories told by the asteroid scientists led them into collaborations with weapons scientists and helped fuel a discourse of fear that served a particular ideological purpose. This should be both recognized and challenged, not for the sake of regaining some impossible ideal of an undistorted science but because there are other stories, based on different ideological assumptions, that we could tell in order to guide science towards more peaceful ends.

# 2nc link – surveillance

### Surveillance transforms space into a geostrategic arena to be weaponized

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In contrast to traditional astronomical systems, which passively watched the skies, asteroid detection systems were to be surveillance systems that actively hunted the skies for objects of human import. The Spaceguard Survey was predicated on a will to action in a way in which the earlier Spacewatch Survey was not. Similarly, when it fired its impactor at Comet Tempel 1, NASA’s Deep Impact mission took a far more active intervention in space than did earlier generations of probes. This was not far from Edward Teller’s call for ‘experimentation’ with near-Earth objects to test defence technologies (Tedeschi & Teller, 1994; Teller, 1995), an idea dismissed at the time as extreme by some civilian scientists (Chapman, 1998). Likewise, one of the recommendations of the 2004 Planetary Defense Conference was that deflection techniques should be demonstrated on an actual asteroid (Ailor, 2004: 5).28 The technologization of space promoted in both the fictional works and the scientists’ technical proposals, also formed an integral part of the imagery and rhetoric that surrounded SDI, as its detractors highlighted when they re-named the project Star Wars. SDI was always premised on a vision of space as a technologized theatre of war. In the hands of a technoenthusiast such as Edward Teller, SDI was configured as a space-based technological extravaganza with few limits.29 In SDI, as in asteroid research and science fiction, space became a dynamic arena through which our technologies would move, in which our weapons would be placed, and across which our wars were to be waged.30 As discussed in the introduction to this paper, narrative is an inherently teleological form. In conventional narratives, the action is moved towards closure by the heroes of the story. In the impact narratives, the heroes are technological heroes set the task of saving the world. By drawing on these narratives and following the call for human agency inherent in the narrative structure, the scientists implicitly accepted this role as a necessary one. Having shifted apocalypse from the realm of nuclear politics to that of natural science, the impact-threat scientists were able to position themselves as heroes whose combined far-sightedness and technological know-how would save us all. Emphasizing the role of the unacknowledged hero in a foreword to a volume of conference proceedings, astronomer Tom Gehrels (2002: xiii) claimed: ‘There is a beauty also in hazards, because we are taking care of them. We are working to safeguard our planet, even if the world does not seem to want to be saved.’ In a paper in another volume of conference proceedings, astrophysicist Eugene Levy was even more explicit about the scientists’ expanded role: In the arms race, the motivating dynamic was a political one. A dynamic in which scientists and engineers provided the technical tools, but, as a group, brought no special and unique wisdom to the table in making judgements about what to do. In the present case, the dynamic is different. The adversary is not another nation; the calculus is not one of political fears, anxieties, and motivations, for which we scientists have no special expertise. Rather the ‘adversary’ is the physical world. In assessing this adversary, we scientists have special and unique expertise. (Levy, 1994: 7; italics in original) Eclipsing the political dimension of the impact threat with their appeals to the natural, the scientists appropriated for themselves a heroic role. This technological hero was a moral hero – he would warn us of the danger and save us despite ourselves. Thus the scientists frequently quoted Representative George Brown’s opening statement to a Congressional hearing when he warned that if we were to do nothing about the impact threat, it would be ‘the greatest abdication in all of human history not to use our gift of rational intellect and conscience to shepherd our own survival and that of all life on Earth’.31 Through such claims, the issue of planetary defence became a moral frame through which other threats of more human origin could also be addressed. Increased knowledge and surveillance of asteroids, the scientists insisted, would help stop mistakes by the military decision-makers by preventing the misidentification of asteroid airbursts as enemy nuclear warheads (Chapman & Morrison, 1994: 39). At the same time, destroying asteroids would provide us with a way of using up those unwanted bombs. As John Lewis (1997: 215) put it: ‘The net result of the asteroid deflection is really a twofold benefit to Earth: a devastating impact would be avoided and there would be one less nuclear warhead on Earth.’ Similarly, Duncan Steel saw the use of SDI technologies in asteroid missions such as Clementine II as ‘a prime example of beating swords into ploughshares’ (quoted in Matthews, 1997). Furthermore, the international tensions that led to the proliferation of nuclear weapons in the first place, would also be resolved by uniting against the common enemy of the asteroid. Thus Carl Sagan and Steve Ostro, although largely critical of the promotion of the impact threat, suggested that: In an indirect way the threat of interplanetary collision may have a political silver lining. They represent a common enemy to all nations and ethnic groups. By posing two different classes of danger to the human species, one natural and the other of our own making, Earth-approaching objects may provide a new and potent motivation for maturing international relations, ultimately helping to unify the human species. (Sagan & Ostro, 1994b: 72; see also Gehrels, 1988: 303) Even for Sagan and Ostro, then, as for the other civilian scientists, the impact threat offered hope of salvation.

# 2nc link – self fulfilling prophecy

### Framing is key – narratives of technological salvation necessitate militarization

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Over the past 20 years a small group of astronomers and planetary scientists has actively promoted the idea that an asteroid might collide with the Earth and destroy civilization. Despite concerns about placing weapons in space, the asteroid scientists repeatedly met with scientists from the Strategic Defense Initiative to discuss mitigation technologies. This paper examines the narrative context in which asteroids were constructed as a threat and astronomy was reconfigured as an interventionist science. I argue that conceptualizing asteroids through narratives of technological salvation invoked a ‘narrative imperative’ that drew the astronomers towards the militaristic endings that their stories demanded. Impact-threat science thus demonstrates both the ways in which scientific research can be framed by fictional narratives and the ideological ends that such narratives can serve.

# 2nc link – self fulfilling prophecy

### The discourse of danger that surrounds asteroids is self-perpetuating

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Even as the scientists themselves attempted to pull back from concrete proposals for weapons systems, their own discourse irresistibly drew them towards the militaristic intervention demanded by the narrative imperative. The identification of asteroids as a threat required a military response. Astronomer Duncan Steel (2000b), writing about the impact threat in The Guardian newspaper, put it most clearly when he stated that ‘we too need to declare war on the heavens’. Just as the overlap between science and science fiction was mutually supportive, so the overlap between impact science and defence helped legitimize both. The civilian scientists could draw on a repertoire of metaphors and concepts already articulated by the defence scientists to help make the case for the threat from space. They would no longer be a marginalized and underfunded group of astronomers, but would take on the ultimate role of defending the world. Similarly, in the context of the impact threat, the defence scientists could further develop their weapons systems without being accused of threatening the delicate nuclear balance of mutually assured destruction or, in the period between the fall of the Soviet Union and the 9/11 attacks, of irresponsibly generating a climate of fear in the absence of an identifiable enemy.

# 2nc framework

### Ideology comes first – narratives determine the research questions that guide scientific inquiry

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Several studies of the role of narrative in the production of scientific knowledge have identified it as a means of generating coherence in science that both enables and constrains further research (Haraway, 1989; O’Hara, 1992; Rouse, 1996; Brown, 1998). Richard Harvey Brown is the most explicit about what constitutes a narrative, defining it as ‘an accounting of events or actions temporally that explains them causally or motivationally’ (Brown, 1998: 98). Brown’s definition of narrative fits with that of narrative theorists such as Mieke Bal (1997) who have stressed that narrative entails not a random unfolding of events but a sequenced ordering involving a transition from one state to another brought about or experienced by actors. One implication of this is the fundamental role of causality and agency. Another is that a narrative beginning always anticipates an ending – a resolution or closure to the events that have been set in motion. Historian Hayden White (1981: 23) has argued that the tendency to present history as narrative ‘arises out of a desire to have real events display the coherence, integrity, fullness, and closure of an image or life that is and can only be imaginary’. He finds that narrative closure involves a passage from one moral order to another. ‘Where, in any account of reality, narrativity is present, we can be sure that morality or a moralizing impulse is present too’ (White, 1981: 22). In this sense, narrative is inherently teleological and ideological. The inexorable movement of a narrative towards a predetermined end ensures that its many assumptions go unchallenged. An analytical approach to the interaction between military and civilian science that recognizes the ideological function of narrative can help sidestep some of the difficulties associated with the distortionist thesis often attributed to Paul Forman’s (1987) landmark paper on the military basis of US post-war physics. Forman has been criticized for implying that without military patronage, physics would have followed an ideal direction unaffected by outside interests (for example, Kevles, 1990). By looking at what sorts of narratives scientists draw on, we can avoid Forman’s supposed idealism. The question is not so much whether science has been distorted, but through which of many possible stories a research programme has been articulated. To ask which stories have been invoked is to ask which ideologies have implicitly been accepted. And to ask that is to allow that, on ideological grounds, some stories are preferable to others.

# 2nc impact – militarization

### The need for narrative closure ensures that civilian scientists support weaponization

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The construal of asteroids as acting agents, of astronomy as the means to salvation, and of human intervention in space as a moral cause, were also elements of the stories told in the fictional works. Direct references to works of science fiction in the writings of the asteroid scientists were therefore just the most explicit traces of the asteroid scientists’ dependence on narratives of technological salvation. Science and science fiction existed in a mutually reinforcing relationship in which civilian scientists, defence experts and science fiction writers all narrated the impact threat. As science and fiction became aligned, asteroids became incorporated into the world of narrative cause-and-effect with its movement towards closure. The asteroid scientists’ reliance on such narratives meant that they could not avoid the closure demanded by their stories – they were subject to a narrative imperative. Regardless of their personal feelings about weapons in space, they regularly met with defence scientists to discuss weapons technologies to deflect or destroy an incoming asteroid, for only this could provide a satisfactory resolution to their impact stories. Despite their suspicions about each other’s motives, the civilian and defence scientists’ dependence on similar narratives of technological salvation meant that they were both drawn towards the same endings.

# 2nc impact – deterrence

### The discourse of asteroid deflection empirically legitimizes the deployment of nuclear weapons

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Like the impact threat, SDI’s technological solution to the stalemate of the Cold War was also embedded within a moral frame of technological salvation. As Spencer Weart (1988: 385, 399) points out in his history of nuclear imagery: In promoting the Star Wars program Reagan was apparently working to restore … trust by affirming that technology, even weapons technology, could be inherently moral and humane. … Through all this talk [about SDI] ran the idea of salvation by way of technology in the heavens. Appropriating images of nuclear holocaust from the anti-nuclear campaigners, the supporters of SDI spoke of protective, defensive technologies that would, in Reagan’s words, render nuclear weapons ‘impotent and obsolete’ (quoted in FitzGerald, 2000: 23). For Reagan, SDI was a moral programme to be pursued by the scientific community for ‘the cause of mankind and world peace’. Others in the defence community also spoke of a ‘moral imperative’ and of protecting the American people rather than avenging them.32 ‘Mutually assured destruction’ was to be replaced by ‘mutually assured survival’. The moral programme of SDI hinged on the notion of defensive weapons to replace offensive ones. At the level of rhetoric, therefore, SDI helped consolidate the switch from an offensive to a defensive posture. Research into the asteroid impact threat celebrated this posture. Impact threat science created an external enemy and deployed the same moral argument of ‘defence-shields-as-salvation’ as did Reagan and his supporters. Indeed, Thomas Ahrens went so far as to describe the nuclear weapons that might be used to deflect asteroids as ‘weapons of mass protection’ (quoted in Lewis, 1997: 221).

# 2nc impact – big security

### Fear of the rock spills over to create a state of permanent warfare

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The asteroid impact threat offered a scientifically validated enemy onto which could be projected the fears on which a militaristic culture depends. Far from providing a replacement outlet for weapons technologies, the promotion of the asteroid impact threat helped make the idea of war in space more acceptable and helped justify the continued development of spacebased weaponry. Arguably, with the Clementine and Deep Impact missions, the asteroid impact threat even facilitated the testing of SDI-style systems. The asteroid impact threat legitimized a way of talking, and thinking, that was founded on fear of the unknown and the assumption that advanced technology could usher in a safer era. In so doing, it resonated with the politics of fear and the technologies of permanent war that are now at the centre of US defence policy.

### Security discourse causes apocalypse in the name of survival

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(Queer Frontiers, ed. Boone, author’s italics)

Perhaps. But to claim that American culture is at present decisively postnuclear is not to say that the world we inhabit is in any way post-apocalyptic. Apocalypse, as I began by saying, *changed* – it did not go away. And here I want to hazard my second assertion: if, in the nuclear age of yesteryear, apocalypse signified an event threatening everyone and everything with (in Jacques Derrida’s suitably menacing phrase) “remainderless and a-symbolic destruction,”6 then in the postnuclear world apocalypse is an affair whose parameters are definitively *local* in shape and in substance, apocalypse is defined now by the affliction it brings *somewhere else*, always to an “other” people whose very presence might then be written as a kind of dangerous contagion, threatening the safety and the prosperity of a cherished “general population.” This fact seems to me to stand behind Susan Sontag’s incisive observation, from 1989, that, “Apocalypse is now a long-running serial: not ‘Apocalypse Now’ but ‘Apocalypse from Now On.’”7 The decisive point here in the perpetuation of the threat of apocalypse (the point Sontag goes on, at length, to miss) is that apocalypse is ever present because, as an element in a vast economy of power, it is ever useful. That is, through the perpetual threat of destruction – through the constant reproduction of the figure of apocalypse – agencies of power ensure their authority to act on and through the bodies of a particular population. No one turns this point more persuasively than Michel Foucault, who in the final chapter of his first volume of *The History of Sexuality* addresses himself to the problem of a power that is less repressive than productive, less life-threatening than, in his words, “life-administering.” Power, he contends, “exerts a positive influence on life … [and] endeavors to administer, optimize, and multiply it, subjecting it to precise controls and comprehensive regulations.” In his brief comments on what he calls “the atomic situation,” however, Foucault insists as well that the productiveness of modern power must not be mistaken for a uniform repudiation of violent or even lethal means. For as “managers of life and survival, of bodies and the race,” agencies of modern power presume to act “on the behalf of the existence of everyone.” Whatsoever might be construed as a threat to life and survival serves to authorize any expression of force, no matter how invasive or, indeed, potentially annihilating. “If genocide is indeed the dream of modern power,” Foucault writes, “this is not because of a recent return to the ancient right to kill; it is because power is situated and exercised at the level of life, the species, the race, and the large-scale phenomena of population.”8 For a state that would arm itself not with the power to kill its population, but with a more comprehensive power over the patterns and functioning of its collective life, the threat of an apocalyptic demise, nuclear or otherwise, seems a civic initiative that can scarcely be done without.

# alt – critical geography

### Reject their dangerous notions of a simplified Other and attempts to ‘map out’ space

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(1) Astrography and astropolitics, like geography and geopolitics, constitute ‘a political domination and cultural imagining of space’ (Ó Tuathail, 1996: 28). While commentators like Colin Gray have posited an ‘inescapable geography’ (eg, ‘of course, physical geography is politically neutral’), a critical agenda conceives of geography not as a fixed substratum but as a highly social form of knowledge (Gray, 1999: 173; Ó Tuathail, 1999: 109). For geography, read ‘astrography’. We must be alert to the ‘declarative’ (‘this is how the Outer Earth is’) and ‘imperative’ (‘this is what we must do’) modes of narration that astropolitics has borrowed from its terrestrial antecedent (Ó Tuathail, 1999: 107). The models of Mackinder and Mahan that are so often applied to the space environment are not unchanging laws; on the contrary they are themselves highly political attempts to create and sustain particular strategic outcomes in specific historical circumstances. (2) Rather than actively supporting the dominant structures and mechanisms of power, a critical astropolitics must place the primacy of such forces always already in question. Critical astropolitics aims to scrutinize the power politics of the expert/ think-tank/tactician as part of a wider project of deepening public debate and strengthening democratic accountability (Ó Tuathail, 1999: 108). (3) Mackinder’s ‘end of geography’ thesis held that the era of terrestrial exploration and discovery was over, leaving only the task of consolidating the world order to fi t British interests (Ó Tuathail, 1996: 27). Dolman’s vision of space strategy bears striking similarities. Like Ó Tuathail’s critique of Mackinder’s imperial hubris, Astropolitik could be reasonably described as ‘triumphalism blind to its own precariousness’ (Ó Tuathail, 1996: 28). Dolman, for instance, makes little effort to conceal his tumescent patriotism, observing that ‘the United States is awash with power after its impressive victories in the 1991 Gulf War and 1999 Kosovo campaign, and stands at the forefront of history capable of presiding over the birth of a bold New World Order’. One might argue, however, that Mackinder – as the theorist of imperial decline – may in this respect be an appropriate mentor (Ó Tuathail, 1999: 112). It is important, I think, to demystify Astropolitik: there is nothing ‘inevitable’ about US dominance in space, even if the USA were to pursue this imperial logic. (4) Again like Mackinder, Astropolitik mobilizes an unquestioned ethnocentrism. Implicit in this ideology is the notion that America must beat China into space because ‘they’ are not like ‘us’. ‘The most ruthlessly suitable’ candidates for space dominance, we are told – ‘the most capably endowed’ – are like those who populated America and Australia (Dolman, 2002: 27). (5) A critical astropolitics must challenge the ‘mythic’ properties of Astropolitik and disrupt its reverie for the ‘timeless insights’ of the so-called geopolitical masters. For Ó Tuathail, ‘geopolitics is mythic because it promises uncanny clarity … in a complex world’ and is ‘fetishistically concerned with …. prophecy’ (Ó Tuathail, 1999: 113). Ó Tuathail’s critical project, by contrast, seeks to recover the political and historical contexts through which the knowledge of Mackinder and Mahan has become formalized. V Conclusion Stephen Graham, following Eyal Weizmann, has argued that geopolitics is a flat discourse (Weizmann, 2002; Graham, 2004: 12). It attends to the cartographic horizontality of terrain rather than a verticality that cuts through the urban landscape from the advantage of orbital supremacy. Just as, for Graham, a critical geopolitics must urgently consider this new axis in order to challenge the practices and assumptions of urbicide, so too – I would argue – it must lift its gaze to the politics of the overhead. Our interest in the vertical plane must extend beyond terrestrial perspectives; we must come to terms with the everyday realities of space exploration and domination as urgent subjects of critical geographical inquiry. A prerequisite for this agenda is to overcome our sense of the absurdity and oddity of space, an ambivalence that has not served human geography well. The most obvious entry point is to think systematically about some of the more concrete expressions of outer space in the making of Earthly geographies. For instance, many of the high-profi le critical commentaries on the recent war in Iraq, even those written from geographical perspectives, have been slow to address the orbital aspects of military supremacy (see, for instance, Harvey, 2003; Gregory, 2004; Retort, 2005). Suffice to say that, in war as in peace, space matters on the ground, if indeed the terrestrial and the celestial can be sensibly individuated in this way. There is also, I think, scope for a wider agenda on the translation of particular Earthly historical geographies into space, just as there was a translation of early occidental geographies onto imperial spaces. When Donald Rumsfeld talks of a ‘Space Pearl Harbor’, there is plainly a particular set of historicogeographical imaginaries at work that give precedence, in this case, to American experience. Rumsfeld has not been slow to invoke Pearl Harbor, most famously in the aftermath of 11 September 2001; notably, in all these examples – Hawaii in 1941; New York in 2001; and the contemporary space race – there lurks the suggestion of a threat from the East.9 All of this is a reminder that the colonization of space, rather than being a decisive and transcendent break from the past, is merely an extension of long-standing regimes of power. As Peter Redfield succinctly observed, to move into space is ‘a form of return’: it represents ‘a passage forward through the very pasts we might think we are leaving behind’ (Redfield, 2002: 814). This line of argument supports the idea that space is part and parcel of the Earth’s geography (Cosgrove, 2004: 222). We can conceive of the human geography of space as being, in the words of Doreen Massey, ‘the sum of relations, connections, embodiments and practices’ (Massey, 2005: 8). She goes on to say that ‘these things are utterly everyday and grounded, at the same time as they may, when linked together, go around the world’. To this we might add that they go around and beyond the world. The ‘space’ of space is both terrestrial and extraterrestrial: it is the relation of the Earth to its firmament. Lisa Parks and Ursula Biemann have described our relationship with orbits as being ‘about uplinking and downlinking, [the] translation [of] signals, making exchanges with others and positioning the self ’ (Parks and Biemann, 2003). It is precisely this relational conception of space that might helpfully animate a revised geographical understanding of the Outer Earth. As has already been made clear, this sort of project is by no means new. Just as astropolitics situates itself within a Mackinderian geographical tradition, so a critical geography of outer space can draw on geography’s earlymodern cosmographical origins, as well as on more recent emancipatory perspectives that might interrogate the workings of race, class, gender and imperialism. Space is already being produced in and through Earthly regimes of power in ways that undoubtedly threaten social justice and democracy. A critical geography of space, then, is not some far-fetched or indulgent distraction from the ‘real world’; rather, as critical geographers we need to think about the contest for outer space as being constitutive of numerous familiar operations, not only in respect of international relations and the conduct of war, but also to the basic infrastructural maintenance of the state and to the lives of its citizenry.

# A2 threat = real

### Turn – reliance on salvation narratives corrupts scientists’ objectivity and causes researchers to construct asteroids as existential threats

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During the 1980s and 1990s, a small group of planetary scientists and astronomers set about actively promoting the asteroid impact threat. They drew on an expanded empirical base, but also on narratives of technological salvation. Despite their concerns that their warnings were greeted by a ‘giggle factor’ and that funding remained too low, they succeeded in capturing the attention of the media and of some policy-makers and in establishing the impact threat as a legitimate and serious topic for scientific study. By the eve of the new millennium, the meaning of asteroids had undergone a significant transformation. Asteroids had gone from being distant relics of Solar System history to being a hidden enemy that could strike at any time with catastrophic consequences. The reconceptualization of asteroids was accompanied by a reconceptualization of both space and astronomy. In Newtonianism, space had been conceived as an empty geometrical abstraction in which God’s handiwork was displayed to the knowing observer. Space was both predictable and distant. Now, with the promotion of the impact threat, space was configured as the source of an enemy against which we must defend ourselves. This threatening conception of space matched the conception of space as a theatre of war promoted by the supporters of SDI. Space had become a place, a technologized location for human action where wars could be fought and human salvation sought. Thus astronomy was also reconceptualized. Further developing the violent metaphors already appropriated by impact–extinction theory (Davis, 2001), astronomers recast their role as impassioned prophets of doom and saviours of mankind rather than as cold calculators of cosmic order. Traditionally, Solar System astronomy had dealt with the grand narratives of planetary history and the timeless certainties of celestial dynamics. The technologies of astronomy – telescopes and, later, space probes – were the tools through which new knowledge had been sought. They were not, on the whole, instruments of action. Now, however, astronomy was to be prophetic and interventionist. As comets had been in a far earlier period, both asteroids and comets were now treated as ‘monsters’ – portents of Earthly calamities. It was the purpose of planetary astronomy to watch for these portents. Equally, it was the duty of astronomers to warn the unsuspecting public and to intervene to save the world. Planetary astronomy was transformed from the passive observation of the heavens to the active surveillance of the heavens, and the instruments of astronomy were to be supplemented with the technologies of war. By the 1980s and 1990s, asteroid science, defence science and science fiction all presented space as an arena for technological intervention where an invisible enemy would be defeated for the greater good of mankind. Science fiction provided a culturally available resource that could give concrete form to the ideas of both asteroid scientists and weapons designers. Through narrative, the timeless and universal speculations of science could be converted into a specific sequence of events. By drawing on narratives of technological salvation, asteroid scientists made their case more compelling, but they also became dependent on narrative scenarios shared by the defence scientists.

# A2 threat = real – author indict

### Astronomers deliberately manipulate asteroids stats to get research funding

Felicity **Mellor 10**, Lecturer in Science Communication at Imperial College London, “Negotiating uncertainty: asteroids, risk and the media”, Public Understand. Sci. 19(1) (2010) 16–33

Despite frequently referring to impacts as low frequency/high consequence events, NEO scientists failed to acknowledge that this meant that annual averages were statistically meaningless. 3 Instead, by offering comparisons with such things as deaths from car crashes, they implied an equivalence between the impact risk and other death rates whose averages are statistically valid. When other scientists did criticize Chapman and Morrison’s comparisons, they did so by offering alternative comparisons—such as worldwide death rates from childhood diseases or smoking (Weissman, 1994; Sagan and Ostro, 1994)—rather than criticizing the actuarial approach itself.Yet, like the comparison between the Torino scale and the Richter scale, these risk comparisons compared quantities derived from historical data—events which have actually happened—with those based on a predicted event (the destruction of human civilization by an asteroid impact) that has never happened. As Chapman and Morrison (1994) admitted, there have never actually been any authenticated deaths from asteroid impacts. In an e-mail to the Cambridge Conference Network in the days after the XF11 affair, astronomer Duncan Steel (1998a) pushed the manipulation of statistics even further. After bemoaning the public’s “lack of understanding of probabilities” and their failure to take seriously impacts which occurred on average once every 50,000 or 500,000 years, he reasoned that car accidents, which are taken seriously, had a similar timescale: Averaged over industrialized nations I believe that the car accident rates indicate a probability of dying that way of about one in 120. For the same nations the average life expectancy is about 80 years. Thus the timescale for dying in a car crash is of order 120 × 80 ~ 10,000 years. In fact, for the US, approximately 39,000 fatalities in car crashes each year means there is the equivalent of one fatality every 13 minutes. This is the most meaningful measure for the timescale of deaths from car crashes. Since the “probability of dying” already factors in the average life expectancy, Steel’s figure is actually the time needed to kill the entire population through car crashes assuming the population to be otherwise static.4 The problems associated with the statistical framing of the impact threat mean that it should not be seen as a cognitive strategy to aid understanding. Rather, like the presumed demarcation between scientist and public, it functioned as a discursive strategy to aid the denotation of asteroids as risky and the positioning of NEO scientists as the appropriate experts to manage the risk. Among other things, this could help secure funding for NEO research. Some of the critics of the Torino scale were explicit about funding being the core issue at stake. Astronomer Mark Kidger (1999) worried that with so few objects registering on the scale at all, media interest would fall off and the public might assume the problem had gone away. “The truth is that the problem still exists, will not go away, and can only get more serious if a reduced public profile of the issue leads to a serious reduction in funding for NEO programs.” He suggested that to maintain public interest the lower end of the scale should be expanded so that it registered more objects more frequently. Another commentator, although not himself a NEO researcher, was even more explicit. Jens Kiefer-Olsen (2000) claimed that any impact scale “must serve primarily as a vehicle to extract funding from politicians. Hence the scale should produce a one-dimensional figure, namely the amount of $$$ to be allocated immediately, or over a specific period.” Brian Marsden (2003a) thought that media exposure had indeed helped secure funds for NEO research and suggested that without the XF11 coverage “NASA would have put less money into NEO searches than it now does (yes, there could yet be more!)”. Despite the scientists’ concerns about the quality of media reports on the impact threat, journalists rarely, if ever, challenged the claims made by the scientists and they accepted the statistical framing of the issue which the scientists promoted. Most journalists included statements about uncertainty in their news reports, their stories were derived from statements issued by scientific sources and they often quoted relevant experts or institutions. When revised data were released implying a downgraded risk for a specific asteroid, some news reports presented this as meaning that the scientists had made mistakes but most did not take this angle. Thus journalists were accepting of the NEO scientists’ claims and were willing to reproduce them in their reports. However, the scientists’ attachment of specific numbers and dates to possible impact solutions enabled journalists to frame their stories in terms of certain knowledge. When later reports presented equally certain, but different, knowledge claims the scientists worried that they would lose credibility. As Clark Chapman (1998b) said after the XF11 affair: “All of us, not just the MPC [Minor Planet Center], lost some credibility a few weeks ago when failures in the peer-review process at the MPC led to the XF11 scare.” Others, such as Italian astronomer Andrea Milani (1999), worried that delaying an announcement would also damage the researchers’ credibility. If the people not belonging to the rather exclusive club of specialists of orbit determination get the impression that they are not being informed, on an issue as critical as the orbits of the NEO (and their close approaches to the Earth), the credibility of the scientific community as a whole could be undermined, and this is a more subtle but very dangerous version of the crying wolf story.

### Scientists’ predictions are exaggerated

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Natural scientists often appear in the news media as key actors in the management of risk. This paper examines the way in which a small group of astronomers and planetary scientists have constructed asteroids as risky objects and have attempted to control the media representation of the issue. It shows how scientists negotiate the uncertainties inherent in claims about distant objects and future events by drawing on quantitative risk assessments even when these are inapplicable or misleading. Although the asteroid scientists worry that media coverage undermines their authority, journalists typically accept the scientists’ framing of the issue. The asteroid impact threat reveals the implicit assumptions which can shape natural scientists’ public discourse and the tensions which arise when scientists’ quantitative uncertainty claims are re-presented in the news media.

### Your scientists empirically ignore reality

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Similarly, astronomer Duncan Steel (1995: 234) recalled that the members of the Detection Committee had been ‘outraged’ by a paper presented at the San Juan Capistrano conference by Nicholas Colella, a Lawrence Livermore scientist who had called for the development of a multimilliondollar satellite-based detection system, and that Lowell Wood had been ‘roundly booed’ after criticizing NASA space missions in an afterdinner speech. Steel said that he found the Interception Workshop ‘very interesting and stimulating’, but that it was also ‘bizarre in that some of the presentations paid little regard to the laws of physics and less to any laws of economic reality’ (Steel, 1995: 232). According to Steel, some of the talks were ‘wildly in error’ and David Morrison had complained that the defence scientists lived in a ‘parallel universe’ and that they seemed to draw on science fiction rather than the laws of physics (Steel, 1995: 234–35). They did indeed draw on science fiction, but, as we will see, so too did the civilian scientists.

# A2 threat = real – media spin

### Even if the aff’s science is correct, their author’s claims are sensationalized

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Over the past two decades, British newspapers have periodically announced the end of the world. Playful headlines such as “The End is Nigh” and “Armageddon Outta Here!” are followed a few days later by reports that there’s no danger after all: “PHEW. The end of the world has been cancelled” (Britten, 1998; Wickham, 2002; Evening Standard, 1998). These stories, and others like them appearing in news media around the world, deal with the possibility that an asteroid or comet may one day collide with the Earth causing global destruction. The threat posed by near-Earth objects (NEOs) has been actively promoted by a group of astronomers and planetary scientists since the late 1980s. Construing asteroids and comets as risky objects, the NEO scientists have lobbied politicians and written popular books calling for dedicated sky surveys to identify potentially hazardous asteroids. Yet despite their own efforts to draw the public’s attention to the issue, the scientists have worried about the way in which the impact threat is reported in the news media, especially in the UK. After each episode of media coverage, they have attempted to find new ways of controlling the representation of asteroids as a risk. At the heart of their concerns has been the question of how they can manage uncertain knowledge about asteroids whilst retaining their authority as scientists. This paper examines the tensions which arise when natural scientists position themselves in the public arena as experts on risk by looking at the ways in which the NEO scientists have constructed asteroids as a risk, their struggles to control the media representation of the issue, and the assumptions on which their evolving communication strategy has been based. Since it was reports in the UK press which most concerned the scientists, it is on these that this paper focuses. Social theorist Ulrich Beck (2000: xii) has used comet impacts to illustrate how modern society has moved away from a preoccupation with natural risks: “We are no longer talking about comets crashing to earth or accidents with a greater or lesser degree of probability occurring.” In his Risk Society, Beck (1992) argues that our current phase of modernization is defined by the replacement of localized, natural hazards with global, technological risks. Yet the demarcation between natural and technological risks is not as clear-cut as Beck seems to imply. Debates about the probabilities of “natural” risks are as characteristic of the risk society as are controversies about industrial risks. As this paper shows, even astronomers— the scientists whose objects of study are furthest removed from the products of industrialization— can be active participants in the discourses of risk. We are still talking about comets (and asteroids) crashing to Earth, but we are doing so in a new way. “Natural” risks such as the impact threat are, like industrial risks, constructed through scientific discourses made available through technological developments. The impact threat has all the characteristics of one of Beck’s “risks of modernization”: it is global, unlimited in time, and invisible until made visible by science. Sociologists of science have examined the ways in which scientists construct and manage risk. Scholars such as Brian Wynne argue that risk is context dependent and that scientific risk assessments constrain discourse by rendering risk the object of quantitative analyses and by imposing a strict demarcation of risk from ethics and political values (e.g., Wynne, 2001). The issue of risk is closely related to how uncertainties within scientific knowledge are negotiated. Constructivist analyses of scientific uncertainty argue that uncertainty is not simply an absence of knowledge or an aspect of underlying reality, but something which is actively constructed and managed (Pinch, 1981; Campbell, 1985; Star, 1985; Stocking and Holstein, 1993; Zehr, 1999). Holly Stocking (1998: 168), for instance, using the term “ignorance” to cover uncertainties, errors, absences of knowledge and other forms of non-knowing, argues that ignorance, like knowledge, is “a construction embedded in diverse social interests and commitments.” The authority of science emerges as a key issue shaped by uncertainty claims. Although uncertainty can potentially undermine scientific authority in public science settings, it is often used to enhance it (Campbell, 1985; Zehr, 1999). In a study of scientific policy advisors, Shackley andWynne (1996) find that scientists manage uncertainties flexibly to facilitate their interactions with policymakers at the same time as maintaining their authority. Uncertainty can also serve to demarcate science and the public. In a study of policy advice on the risk from mobile phones, Stilgoe (2007) finds that uncertainty and public concerns are co-produced— the judgment about what forms of uncertainty are appropriate also entails a judgment about which, if any, public concerns are relevant. In the news media, too, uncertainty can offer a means through which scientific authority can be negotiated. Zehr (2000) finds that uncertainty, constructed through news values such as controversy and novelty, provided a frame for newspaper coverage of global warming. The way in which uncertainty was managed served to position scientists as the providers of authoritative knowledge and the public as misinformed. However, journalists and scientists may construct uncertainty in conflicting ways. Stocking (1999) argues that scientists often make ignorance claims to support particular actions but that such claims can be appropriated and modified by the news media to serve their, typically different, interests. This modification of uncertainty claims often leads scientists to complain that the media coverage of risk is sensationalist and aberrant (Dunwoody and Peters, 1992). As this paper shows, even when journalists uncritically reproduce scientists’ own uncertainty claims, scientists can construe news reports as undermining their credibility and can respond by seeking further control over public discourse.

# A2 we have science

### The aff’s “science” conforms to a narrative structure, not vice versa

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The asteroid impact threat was thus articulated within a narrative context that was closely aligned to science fiction and was shared by both civilian scientists and defence experts. As Veronica Hollinger (2000: 216–17) has noted, traditional science fiction is driven by an Aristotelian plot characterized by ‘a valorisation of the logic of cause and effect’. Impact narratives conformed to this traditional narrative logic: asteroids and scientists act by causing a series of events to unfold, from the approach of an asteroid and recognition of the threat through attempts at technological mitigation to resolution in salvation. These narratives configured asteroids as acting agents in human affairs and brought to asteroid science a structure in which human agents (and their technological proxies) solve the problem posed in the narrative and in so doing achieve closure. Allusions to impact narratives implied a direction and human-centredness to events that, once the narratives had been evoked, could not easily be suppressed. Despite their attempts to distance themselves from the weapons scientists, the civilian scientists experienced a ‘narrative imperative’ that drew them towards the same technologized ends as those promoting SDI. A sense of narrative agency was evoked even in texts that were not primarily narratival. Crucially, asteroids were no longer seen as signifiers of the mathematically exacting Newtonian system, distant objects moving through the empty backdrop of space. Rather, they were configured as proximate beasts, acting subjects that could turn against humanity at any moment. Thus in their many popular books on the subject, the scientists described asteroids as belonging to a ‘menagerie’ or a ‘cosmic zoo’ (Steel, 2000a: 120); they were ‘menacing’ (Kring, 2000: 171) and had ‘teeth’ (Clube & Napier, 1990: 154); they were ‘global killers’ (Lewis, 1997: 209) that could unleash ‘ferocious assaults’ (Steel, 1995: 247) on the Earth; they were the ‘enemy’ (Steel, 2000a: 153). Likewise, in their paper in Nature, Chapman & Morrison (1994: 33) stated that Earth ‘resides in a swarm of asteroids’. The construction of asteroids as the enemy was accompanied by a range of other militaristic metaphors. In the popular books, asteroids became ‘missiles’, ‘pieces of ordnance’ or ‘stealth weapons’ (Lewis, 1997: 37), which bombard the Earth with a ‘death-dealing fusillade’ (Clube & Napier, 1990: 7). In a technical paper, too, they were construed as ‘astral assailant[s]’ (Simonenko et al., 1994: 929). Where the military and the politicians talked of rogue states,27 the scientists talked of ‘rogue asteroids’ (Steel, 1995; Ailor, 2004: 3). This analogy was further reinforced by the construction of scenarios in which a small impact might be mistaken for the detonation of a nuclear warhead. One technical paper speculated on what would have happened during the first Gulf War if an atmospheric explosion that had been caused by a meteor burning up over the Pacific had actually occurred over Baghdad or Israel (Tagliaferri et al., 1994). The authors suggested that such an event would have been mistaken for a missile detonation by the opposing state. In such scenarios, the actions of interplanetary bodies were not just compared with those of rogue states but came to be identified with them. With the swarming asteroids filling space, space itself was also resignified. What had been an abstract mathematical space became a narrative place, the location where particular and contingent events occurred. Although the scientists continued to appeal to the predictability of celestial dynamics – it was this that would enable a survey of near-Earth objects to identify any that might pose a threat – they also noted that chaotic processes disturbed the orbits of comets and also, to a lesser degree, asteroids (for example, Yeomans & Chodas, 1994; Milani et al., 2000). The inherent unpredictability of the orbits was enhanced by the current state of scientific uncertainty. These chaotic and uncertain processes were projected onto space itself, construed as a place of random violence. In the popular books, the Solar System became a ‘dangerous cosmic neighbourhood’ (Sumners & Allen, 2000b: 3), ‘a capricious, violent place’ (Verschuur, 1996: 217), a place of ‘mindless violence’ (Verschuur, 1996: 18) and ‘wanton destruction’ (Levy, 1998: 13). Even in a peer-reviewed paper, Chapman (2004: 1) described space as a ‘cosmic shooting gallery’. Despite the agency attributed to the asteroids themselves, in the narratives of technological salvation it was the human agents, acting through new technologies, who moved the narratives forward. Narrative progression was thus generated through an assumption of technological progress. Through technology, humans intervene in space and become agents of cosmic events. The scientists’ promotion of the impact threat shared this assumption of technological progress. Like the US Air Force study, their technical papers on mitigation systems considered speculative technologies such as solar sails and mass drivers as well as more established explosive technologies (for example, Ahrens & Harris, 1992; Melosh & Nemchinov, 1993; Ivashkin & Smirnov, 1995; Gritzner & Kahle, 2004). Even those scientists who warned that it was too early to draw up detailed blueprints of interception technologies accepted the narratival implication that there was a problem that needed addressing, that the problem could be addressed by human action, and that this action would involve a technological solution. Technology, in this picture, was configured as inherently progressive. As Morrison & Teller (1994: 1137) put it: ‘The development of technology in the past few centuries has been towards increasing understanding and control of natural forces in an effort to improve human life.’ Those scientists who argued against the immediate development of mitigation technology shared with its proponents a belief in the inexorable progress of technology. Future generations, they argued, would be better equipped than we are at the moment to meet the technological challenge of an impacting asteroid (for example, Ahrens & Harris, 1992).

### And, their best studies cite science fiction novels

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Despite their disagreements over technical details and funding priorities, both civilian and defence scientists appealed to narratives of technological salvation. In his study of the superweapon in the American imagination, Bruce Franklin (1988) has shown how a century-long tradition of futurewar fiction shaped an apocalyptic ideology in which American technological genius was to put an end to all war and fulfill America’s manifest destiny. Franklin argues that this cultural fantasizing has been materially significant in producing actual superweapons and developing defence policy. As David Seed (1999) has also shown, SDI was made imaginable, and was explicitly defended, by science fiction writers. The impact-threat scientists took this cultural fantasizing a step further as they attempted to establish the reality of that threat. It was now nature, rather than any human foe, which was configured as the warring enemy whose technological defeat would bring Earthly harmony. Until the 1970s, most science fiction stories about asteroids imagined them as objects to be exploited for their mineral wealth.24 Scientists’ writings would occasionally reflect this interest.25 Indeed, the only paper in the 1979 volume Asteroids to allude to a future impact of an asteroid with Earth was framed in terms of the exploitation of asteroids. In a bizarre paper, which had been rejected for an earlier publication after being judged ‘outrageously innovative’ and ‘premature’, Samuel Herrick (1979) proposed that portions of the asteroid Geographos could be targeted at specific points on the Earth to produce ‘constructive’ effects, such as the excavation of a new Central American canal to join the Atlantic and Pacific Oceans. However, by the time of Herrick’s technical fantasy, science fiction writers had begun to explore the more destructive consequences of an asteroid impacting with Earth. Most notably, Arthur C. Clarke, in his 1973 novel Rendezvous with Rama (Clarke, 1991 [1973]) described an asteroid impact in 2077. A detection survey called ‘Spaceguard’ is established in response to the impact and the rest of the story deals with the investigation of what actually turns out to be an alien spacecraft that is detected by the Spaceguard survey some 60 years later. Clarke developed the Spaceguard idea further in another novel, Hammer of God (Clarke, 1995) [1993] after writing a short story on the same theme for Time magazine the previous year (Clarke, 1992b). Clarke’s impact novels were well regarded by the scientists promoting the impact threat and were cited in some of their peer-reviewed papers and policy documents as well as in their popular books. For instance, in their influential paper in Nature, Chapman & Morrison (1994: 38) introduced the idea of deflecting a possible impactor with a reference to Hammer of God, noting that: ‘Just such a scenario … is the theme of a recent novel’ (see also Morrison et al., 1994: 84; Atkinson, 2000: 36). Indeed, the scientists named their own international survey the Spaceguard Survey and their promotional organization the Spaceguard Foundation in tribute to Clarke, as they acknowledged in their technical papers (for example, Milani et al., 2002: 55). Clarke became a Trustee Member of Spaceguard, and he was a personal friend of Duncan Steel and Tom Gehrels, and wrote the foreword for one of Steel’s popular books on the impact threat and the afterword for another one (Gehrels, 1988: 236; Steel, 1995, 2000a). As Clarke himself remarked in the acknowledgements for one of his novels, ‘the strands of fact and fiction are becoming inextricably entwined’ (Clarke, 1995 [1993]: 247). Also mentioned by the scientists was Larry Niven and Jerry Pournelle’s Lucifer’s Hammer. This 1977 novel is essentially a survivalist tale about the aftermath of a comet impact. In the lawless devastation following the impact, a former Senator sets up a community that attempts to re-establish a civilized, technologized society. This predominantly white community is attacked by various predominantly violent black gangs, one of which has turned to cannibalism as an initiation rite. Despite its racism, which always went unacknowledged in the scientists’ comments, they praised this novel in their popular books. For instance, planetary scientist John Lewis (1997: 151) stated that no novel had better visualized the effects of ocean impacts, and Steel cited it as an example of ‘good science fiction’ based on ‘real science’ (Steel, 2000a: 124). Acknowledging limits to the expertise of natural scientists, Clark Chapman and David Morrison (1989: 279) suggested that ‘estimating sociological responses to catastrophe are more nearly in the purview of sciencefiction writers, like Jerry Pournelle and Larry Niven, who addressed these matters in Lucifer’s Hammer (see also Morrison et al., 2004: 378). Like Clarke, Niven had direct contact with the scientists promoting the impact threat, attending the 2004 Planetary Defense Conference in California. Despite their very different political affinities, Clarke, Niven and Pournelle all portrayed technology as a force for good. With his proposal for a Spaceguard survey in Rendezvous with Rama and with the action of Hammer of God based on board a research space vessel charged with deflecting the incoming asteroid, Clarke’s impact novels promoted salvation through technology. Despite his earlier criticisms of SDI, in 1992 Clarke gave ‘two faint cheers for Son-of-SDI’, given certain provisos, because the technology might be needed to deflect an asteroid (Clarke, 1992a: 12). Niven and Pournelle also promoted an ideology of technological salvation in their novel, despite setting Lucifer’s Hammer in the technologically compromised aftermath of an impact. The story’s denouement has the Senator’s group defending a nuclear power station, which they see as offering the means to recover civilization – a civilization fully attainable only through its technological artefacts. In this, as in other impact narratives, technology offers not the source of destruction but the means of salvation.

# A2 collision = statistically inevitable

### Asteroids predictions get hopelessly distorted when assessed numerically

Felicity **Mellor 10**, Lecturer in Science Communication at Imperial College London, “Negotiating uncertainty: asteroids, risk and the media”, Public Understand. Sci. 19(1) (2010) 16–33

Most studies of the construction of uncertainty in public science have focused on policy contexts. The asteroid impact threat offers an example of how scientists can actively construct risk and publicly manage the uncertainties in their knowledge even in a field not clearly positioned within a policy context. Indeed, the promotion of asteroids as risky objects can be seen as part of a strategy to secure increased funding by transforming asteroid research into a public policy concern. Shackley and Wynne (1996) have argued that uncertainty claims function as boundary ordering devices which can stabilize and maintain the boundary between scientists and policymakers at the same time as enabling interactions across the boundary. The absence of a prior public policy context for asteroid research meant that the uncertainty claims of the NEO scientists were often addressed, through the news media, to a wider public audience. In this context, the differing interests of the scientists (to establish their authority and gain public support) and the journalists (to entertain their audiences with newsworthy stories) meant that uncertainty claims failed to function successfully as boundary-ordering devices. However, in devising new hazard scales and communication protocols, the scientists persisted in their expectation that the quantification of uncertainty would serve their interests by controlling public discourse. As in policy-based studies of scientific uncertainty, authority emerges as a key feature of the negotiation of the uncertainties of asteroid impacts. The NEO scientists attempted to position themselves as authoritative purveyors of knowledge by transforming non-knowing (indeterminacies in orbit predictions and asteroid properties, unknown social factors, etc.) into quantitative assessments of uncertainty. Journalists were accepting of this transformation. News reports often reproduced the scientists’ uncertainty claims uncritically, as others have found of science reporting more generally (e.g., Nelkin, 1995). Despite their uncritical approach, the journalists managed uncertainty in different ways than did the NEO scientists. They drew on three key devices. Firstly, they recontextualized the scientists’ statistical statements through juxtaposition with scenarios of future impacts. These provided the specific events required of news reports. Although the scientists presented similar scenarios in their own popular writings (Mellor, 2007), they objected to the perceived certainty conveyed when such scenarios were attached to specific possibilities. Secondly, journalists were able to signal uncertainty through the use of conditionals and through caveats placed low in a story. To the scientists, such unobtrusive devices were overwhelmed by the foregrounding of possible future events. Thirdly, journalists signaled uncertainty more prominently through the use of humor and the reporting of differing predictions. The scientists interpreted these as challenges to their authority and credibility. The different representational practices used by the scientists and journalists were grounded in different assumptions about the public audience. As Stilgoe (2007) found, the construction of scientific authority and credibility through uncertainty claims also entails the construction of the public. When revising their representations of uncertainty, the NEO scientists repeatedly construed the public as ignorant and easily scared. By contrast, the journalists’ use of humor implied that their readership would get the joke and understood that an impact was highly unlikely. The use of humor thus assumed an audience capable of decoding ironic headlines as expressions of uncertainty. The scientists’ failure to acknowledge such capability on the part of the public encouraged their own (mis)reading of humor as an assault on their credibility. The question for the media coverage of risk is not so much whether reporting emphasizes certainty or uncertainty but how precisely the dynamic between the two is handled (cf. Stocking, 1999). The asteroid impact threat reveals the complexities of this dynamic, in terms of both the repeated work scientists put into controlling the public representation of uncertainty, and the layered means through which journalists are able to denote both certainty and uncertainty simultaneously. Friedman et al. (1996) have suggested that responsible journalism about risk issues should include the reporting of risk statistics and risk comparisons. The analysis presented here shows that even if journalists do faithfully report such figures, scientists continue to complain about the media coverage. More importantly, the flawed nature of many of the scientists’ numerical assessments shows that such reporting fails to provide the critical questioning one might reasonably expect of responsible journalism. This suggests that the framing of issues as amenable to quantitative risk assessments can itself be problematic. This study shows that certainty and uncertainty are inextricably interwoven. Their coproduction is accomplished in different ways by different discursive communities. Scientists use quantitative assessments, even those which are technically inappropriate, to replace uncertainty with “certainty about uncertainty” (Shackley andWynne, 1996: 281, emphasis in original). Such assessments can be developed as overt communication strategies aimed at controlling public discourse in order to assert the scientists’ authority and promote the significance of their specialism. Journalists reproduce and recontextualize these assessments, reinforcing their certainty even at the same time as they signal their speculative and uncertain nature through devices such as humor and balance. Scientists’ responses to these journalistic devices, however, can draw on assumptions about the media audience which, far from resolving the perceived problem, further entrench the discursive gap between the two communities.

# A2 we have studies

### The aff’s research is tainted by defense imperatives

Felicity **Mellor 7**, Lecturer in Science Communication at Imperial College London, Colliding Worlds: Asteroid Research and the Legitimization of War in Space, Social Studies of Science 37: 499, http://sss.sagepub.com/content/37/4/499.full.pdf

Because narratives are shared within a research community, they are not always explicitly articulated in texts. Technical papers are most likely to hide the fundamental assumptions that underpin a research area. However, literature addressed to wider audiences is often more explicit. Grey literature, such as policy reports or review papers, and popularizations written by scientists are therefore useful sources for identifying the narrative context in which a science is framed, traces of which may also be found in technical papers. While always remembering that such accounts are written with particular persuasive or marketing goals in mind, these texts nonetheless reveal what, to the scientist-author, is both thinkable and compelling. In what follows, I draw on this full range of texts, from technical papers to popularizations, to show that the scientists promoting the impact threat have repeatedly turned to narratives of technological salvation that imagined the ultimate superweapon – a space-based planetary defence system that would protect the Earth from the cosmic enemy. I begin with a brief overview of earlier conceptions of asteroids before outlining the events through which asteroids were promoted as a threat and examining the narrative context in which this occurred. I finish by arguing that the narration of the impact threat entailed a reconceptualization of asteroids, space and astronomy and invoked a ‘narrative imperative’ that helped legitimize the militarization of space.

# A2 we still solve

### Solve what? – the supposed asteroid hurtling toward earth was made up in the first place

### Even the military acknowledges that anti-asteroid tech is science fiction

Felicity **Mellor 7**, Lecturer in Science Communication at Imperial College London, Colliding Worlds: Asteroid Research and the Legitimization of War in Space, Social Studies of Science 37: 499, http://sss.sagepub.com/content/37/4/499.full.pdf

Like the civilian scientists, the US defence scientists interested in the impact threat also worked in a community influenced by science fiction. Indeed, in some sectors of the military planning community, including those in which the promoters of SDI moved, explicit links with science fiction authors were cultivated regularly. As Chris Hables Gray (1994) has noted, ‘militaristic science fiction and military policy coexist in the same discourse system to a surprising degree’ (see also Franklin, 1988; James, 1994: 200). The Air Force Academy held annual ‘Nexus’ conferences on science fiction and military policy, and other conferences, such as the ‘Futurist’ conferences, also brought together military policy-makers and science fiction authors. At one typical conference held in 1985 at Ohio Air Force base, the authors present included prominent proponents of SDI such as Jerry Pournelle (Seed, 1999: 192). Pournelle was director of ‘organizational support’ for the Heritage Foundation’s High Frontier project, which campaigned for SDI, and he was chair of a panel that in 1984 had published the pro-SDI tract, Mutually Assured Survival (Gray, 1994). He was also, for many years, the editor of the annual anthology series ‘There Will Be War!’, which mixed pro-war science fiction stories with pro-SDI non-fiction to claim that war was inevitable. The scientists promoting and working on SDI weapons were avid consumers of science fiction and some had direct links to science fiction authors. Rod Hyde, one of the Lawrence Livermore scientists who studied the impact threat, belonged to the Citizen’s Advisory Council on National Space Policy, an organization founded by Pournelle (Broad, 1985: 141). Another Lawrence Livermore scientist included references to works by Pournelle, Niven and other science fiction authors in his doctoral thesis on the X-ray laser. In an interview with journalist William Broad, he explained that he turned to such authors for ideas about his own work. ‘Writers of science fiction are supposed to look into the future. So I started looking to see what they had in mind for the X-ray lasers’ (Broad, 1985: 120). Such links were part of a broader futures planning culture within the military that relied heavily on fictional constructs. Gray (1994) argues that standard military practices, such as war-gaming and scenario construction, are works of military fiction and that this fiction-making is both directly and indirectly influenced by the ideas of pro-war science fiction authors. The 1996 US Air Force study into the asteroid impact threat is an example of such fiction-making. The study was part of a futures planning exercise that considered several possible ‘alternate futures’ for the year 2025, drawing on a ‘concepts database’ that included such science-fictional ideas as ‘force shields’ and ‘gravity manipulation’. The authors of the study noted the science fiction provenance of these ideas, at one point referring directly to Star Trek, but they took the ideas seriously nonetheless. They noted, with some understatement, that gravity manipulation was an ‘undeveloped technology’, but made no such comment about other speculative technologies such as solar sails, mass drivers or biological ‘eaters’, which were supposed to munch their way through the threatening comet or asteroid (Urias, 1996: 41–54).

# \*\*\*aff answers

# epistemology not 1st

### Overemphasis on method destroys effective IR scholarship

Wendt 2, international security studies at Ohio State, Handbook of IR, p. 68

It should be stressed that in advocating a pragmatic view we are not endorsing method-driven social science. Too much research in international relations chooses problems or things to be explained with a view to whether the analysis will provide support for one or another methodological ‘ism’. But the point of IR scholarship should be to answer questions about international politics that are of great normative concern, not to validate methods. Methods are means, not ends in themselves. As a matter of personal scholarly choice it may be reasonable to stick with one method and see how far it takes us. But since we do not know how far that is, if the goal of the discipline is insight into world politics then it makes little sense to rule out one or the other approach on a priori grounds. In that case a method indeed becomes a tacit ontology, which may lead to neglect of whatever problems it is poorly suited to address. Being conscious about these choices is why it is important to distinguish between the ontological, empirical and pragmatic levels of the rationalist-constructivist debate. We favor the pragmatic approach on heuristic grounds, but we certainly believe a conversation should continue on all three levels.

# reps don’t matter

### Discourse doesn’t shape policymaking

**Tuathail 96** (Gearóid, Professor of Government and International Affairs, Virginia Tech, The patterned mess of history and the writing of critical geopolitics: a reply to Dalby, Political Geography 15:6/7, p 661-5)

While theoretical debates at academic conferences are important to academics, the discourse and concerns of foreign-policy decisionmakers are quite different, so different that they constitute a distinctive problemsolving, theory-averse, policy-making subculture. There is a danger that academics assume that the discourses they engage are more significant in the practice of foreign policy and the exercise of power than they really are. This is not, however, to minimize the obvious importance of academia as a general institutional structure among many that sustain certain epistemic communities in particular states. In general, I do not disagree with Dalby’s fourth point about politics and discourse except to note that his statement-‘Precisely because reality could be represented in particular ways political decisions could be taken, troops and material moved and war fought’-evades the important question of agency that I noted in my review essay. The assumption that it is representations that make action possible is inadequate by itself. Political, military and economic structures, institutions, discursive networks and leadership are all crucial in explaining social action and should be theorized together with representational practices. Both here and earlier, Dalby’s reasoning inclines towards a form of idealism. In response to Dalby’s fifth point (with its three subpoints), it is worth noting, first, that his book is about the CPD, not the Reagan administration. He analyzes certain CPD discourses, root the geographical reasoning practices of the Reagan administration nor its public-policy reasoning on national security. Dalby’s book is narrowly textual; the general contextuality of the Reagan administration is not dealt with. Second, let me simply note that I find that the distinction between critical theorists and poststructuralists is a little too rigidly and heroically drawn by Dalby and others. Third, Dalby’s interpretation of the reconceptualization of national security in Moscow as heavily influenced by dissident peace researchers in Europe is highly idealist, an interpretation that ignores the structural and ideological crises facing the Soviet elite at that time. Gorbachev’s reforms and his new security discourse were also strongly selfinterested, an ultimately futile attempt to save the Communist Party and a discredited regime of power from disintegration. The issues raised by Simon Dalby in his comment are important ones for all those interested in the practice of critical geopolitics. While I agree with Dalby that questions of discourse are extremely important ones for political geographers to engage, there is a danger of fetishizing this concern with discourse so that we neglect the institutional and the sociological, the materialist and the cultural, the political and the geographical contexts within which particular discursive strategies become significant. Critical geopolitics, in other words, should not be a prisoner of the sweeping ahistorical cant that sometimes accompanies ‘poststructuralism nor convenient reading strategies like the identity politics narrative; it needs to always be open to the patterned mess that is human history.

# asteroids are actually coming

### The asteroid threat isn’t a narrative – there is a rock, it is coming, and we can actually stop it

Russell L. **Schweickart 9**, former Apollo astronaut and chairman of the B612 Foundation, Decision program on asteroid threat mitigation, Acta Astronautica 65 (2009) 1402–1408

Our highly interconnected society is vulnerable to the destructive power of impact events ranging from the 1908 Tunguska event in which the impact of an estimated 45 m diameter object destroyed 2000 km- of Siberian forest to the 12 km diameter object responsible for the Chicxulub impact 65 million years ago which is thought to have caused the extinction of the dinosaurs and 70C< of all species alive at the time. Such cosmic collisions occur infrequently juxtaposed with a human lifetime, and yet when they do happen they dwarf other natural disasters more common in human experience. Yet surprisingly in the instance of this most devastating of natural disasters we are far from helpless. With our telescopic and spaceflight capabilities we can detect and predict potential impacts, and with adequate early warning we can deploy space systems capable of altering the orbit of threatening NEOs sufficient to cause them to pass harmlessly by the Earth thereby avoiding an impact. In the event of a discovery where insufficient time is available to successfully divert a threatening NEO we will nevertheless, if prepared, be able to mitigate the effects of an impact by evacuation and other disaster preparedness measures. What is needed to match the technical capability for responding to the NEO impact challenge is an in-place international system of preparation, planning and timely decision-making. The need for attention to this issue now by the international community is driven by the rapid expansion of the number of NEOs which will be discovered and tracked in the next 10-15 years, and the inherent geographic variability associated with impact prediction and deflection operations. New telescopic resources coming into service within the next decade will dramatically increase the number of NEOs discovered and tracked. The US Congress has charged NASA with discovering and tracking 90C< of all NEOs larger than 140 m in diameter by 2020. While meeting this goal poses a considerable challenge, it is clear that with new telescopes coming online (e.g. PanSTARRS 151 and LSST [6]> this goal will be approached in the 2020-2025 timeframe. In the process of achieving the 140m goal many smaller but still dangerous NEOs (^-45 m and larger) will be discovered with the number of such objects likely to exceed 300.000. Based on current empirical experience the number of potentially damaging NEOs with a non-zero probability of impact within the next 100 years is likely to exceed 10,000 by this time. Of these NEOs with at least a small probability of impact over the next 100 years many are likely to appear threatening enough to necessitate a decision of whether action should be taken to prevent an impact. The need for international coordination in making such a decision is determined by the natural uncertainty regarding which specific populations are at risk in predicting an impact and the inherent shifting of risk in the process of deflection. All measurements have an associated uncertainty and in the instance of NEO observations these measurement uncertainties, projected forward in time, manifest as a risk corridor across the face of the Earth within which, if it impacts, the NEO will hit. While in the end an impact would occur at a specific point, at the time a decision must be made to deflect a threatening object the impact zone will extend for some distance along the risk corridor and. in fact, in many instances may well extend beyond the Earth's limbs for many Earth diameters in both directions. Hence, at the time a deflection decision must be made (to provide adequate time to conduct the operation and for the deflection to take effect) it is likely that the people of many nations will be at risk. Furthermore in the process of deflection per se, there will be a temporary shifting of risk between populations as the NEO impact point is itself shifted from a point on the Earth's surface to a safe distance along the risk corridor either ahead of or behind the Earth. Because NEO impacts can occur anywhere on our planet and affect the entire international community, a collaborative, global response is required. Furthermore it is highly desirable that a decision process, with agreed criteria, policies and procedures be established prior to the development of a specific threat in order to assure that minimization of risk to life and property prevail over competing national self interests.