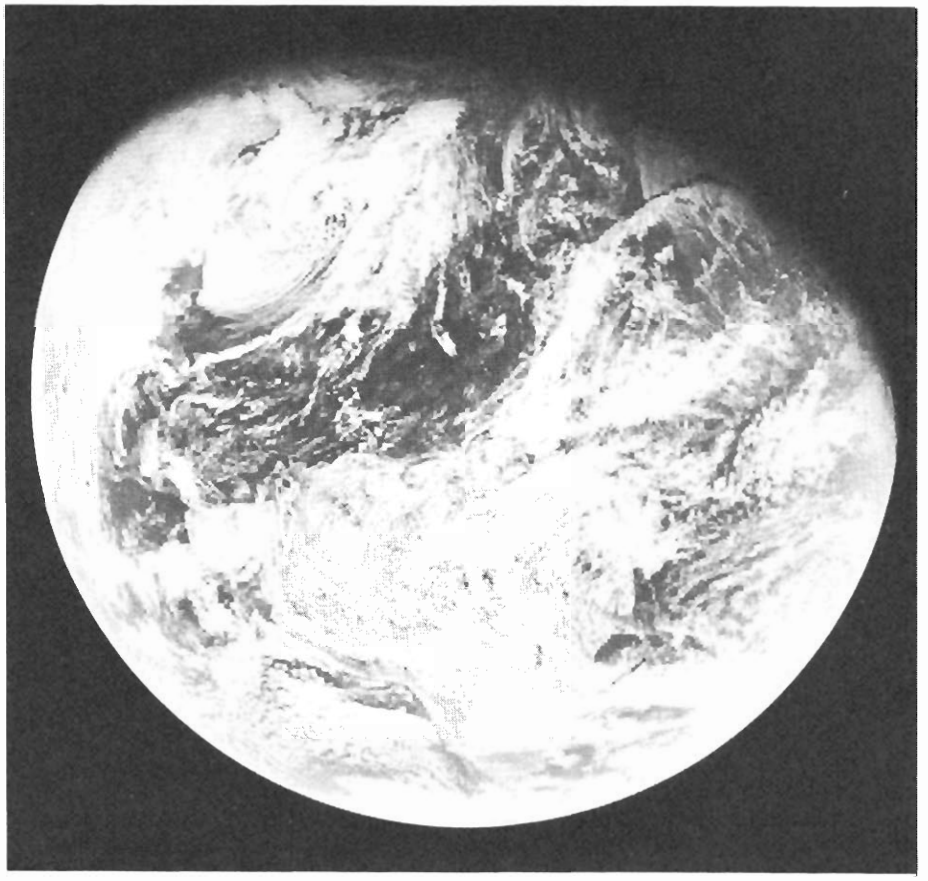
A Space Programme for Planet Earth

The ending of the Cold War is of enormous significance for everyone with an interest in the future of humanity, both on and off the surface of the Earth. Not only has it made the dream of truly global cooperation in space much more politically realistic, but it has provided a timely reminder that nothing is strictly impossible in political affairs. This is important because progress in the economic and political spheres will be just as essential as the development of new technology if humanity is ever to establish a truly space-based society.



Does planet Earth need a World Space Agency? *NASA*

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In an earlier article [1] I argued the case for establishing a World Space Agency. This Agency was envisaged as providing a coherent global strategy for the exploration of space and, in particular, a legal framework for the exploitation of extraterrestrial resources (see also Brown and Fabian [2]). At the time the political obstacles to such a development seemed insuperable, but given the more positive political climate that now exists, and the importance of institutional developments in human history, it is opportune to re-examine the arguments for the establishment of a World Space Programme, organised by central authority.

The importance of international cooperation in space was recognised by the United Nations in 1963 when the General Assembly adopted the "Declaration of Legal Principals Governing the Activities of States in the Exploration and Use of Outer Space", as a first step towards incorporating space exploration within the framework of international law. The idea that space exploration should transcend national aims and priorities was explicitly recognised in the 1967 Outer Space Treaty, the most important international agreement to result from the 1963 Declaration, the preamble to which states that "the exploration and use of outer space should be carried on for the benefit of all peoples irrespective of the degree of their economic or scientific development". Similar sentiments have been expressed in subsequent UN treaties, most notably the "Moon Treaty" (Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1979), and in the various national submissions to the UNISPACE '82 conference [3]. Indeed as early as 1958, the US Congress recognised the same ideals when it established the National Aeronautics and Space Administration; Section 102(a) of the appropriate legislation [4] declares that "it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind".

This article argues that the ideal of international cooperation in space would be best served by the formal establishment of a World Space Programme to be implemented by a specially created World Space Authority. There are a number of separate arguments to be considered, and we will take them in turn.

TREATY VERIFICATION

If international treaties are to be effective in reducing anarchy between nation-states, each must have confidence that all the others are obeying the treaty provisions. The treaty must therefore be enforceable, or at least verifiable, so that such cheating as occurs is clearly visible. Given the clear potential for the military abuse of space technology verification is especially important in this area of international law.

To achieve some degree of verifiability the 1967 Treaty (Article XII) stipulates that "all stations, installations, equipment and space vehicles on the Moon and other celestial bodies shall be open to representatives of other States Parties to the Treaty on a basis of reciprocity". However, it is obvious that great practical difficulties would be involved in any attempt to implement this particular Article. Indeed, the expense involved could be so great as to largely negate its intended function as a confidence building measure. A better way of ensuring international confidence would be for all the "installations, equipment and space vehicles" to be under the control, or even the ownership, of an international body.

This point is particularly important if we consider the longer term future of space exploration, and the likelihood that, at some point, it will become necessary to employ nuclear technology in space on a significant scale. For example, a lunar base may require a nuclear reactor to keep it functioning at night; nuclear-powered rockets may be necessary for the human exploration of Mars, and it is even possible that nuclear explosives may one day be required in the course of extraterrestrial civil engineering. As the space environment is lifeless, and is continuously bathed in solar radiation, nuclear technology may be legitimately used in outer space (i.e. be-

yond low Earth orbit) without the serious environmental problems that make it undesirable near the Earth's surface. However, before any such developments can proceed, it will be necessary to ensure that the use of nuclear technology in space does not become, and is not perceived to become, a threat to global security. Owing to the difficulties of verification it seems certain that a simple treaty agreement (such as Article IV of the 1967 Treaty, which bans nuclear weapons from space) will not be sufficient to maintain international confidence on this point. Only the joint international control of the exploration of space, and thus of any nuclear technology used to further it, will allay the very real global security concerns that would otherwise arise. This proposal parallels the 1946 Baruch plan for the international control and ownership of nuclear technology on Earth, and for essentially the same reasons.

MANAGEMENT OF INTERNATIONAL PROJECTS

One practical reason why international cooperation in space is important is that some space projects are so expensive that even the richest governments baulk at funding them, even if they are physically able to do so.

Space Station *Freedom* is a good example. Although the US is able to afford *Freedom* on its own, it has found it advantageous to seek international partners, at least in part, to minimise opposition in a cost-conscious Congress. Similar trends are seen in other big science projects, such as the Superconducting Super Collider. The establishment of a permanent base on the Moon, or of a manned expedition to Mars, would be at least an order of magnitude more expensive than *Freedom*, so an international sharing of the costs would be even more important.

It may be objected that a World Space Authority is not required for the management of international cooperation. For example, Hurst [5] has argued that "NASA and ESA already cooperate, for instance on Spacelab, and there is no reason to suppose that this would have been more successful if managed by a global space agency". Unfortunately, history suggests otherwise. In the case of Spacelab, for example, it can now be seen that, once developed by one of the international partners at considerable expense, the facility has been under-utilised because the other had a monopoly of the means of launching it, and chose to give it a relatively low priority. Another example is provided by the (then named) International Solar Polar Mission. In spite of six years of ESA/NASA collaboration and considerable European investment, NASA unilaterally withdrew from its half of the project in 1981. Even more worrying are the apparently endless changes being made to the design of the *Freedom* space station - including a recent, and now overturned, vote by the House of Representatives Appropriations subcommittee to cancel the project altogether - with only minimal, if any, consultation with other international partners.

These examples suggest that there is reason to suppose that an international agency may be able to manage large space projects more efficiently than a collection of national agencies. In any event, if long-term funding is to be secured for such projects, and if they are not to be held at the mercy of capricious governments, it will be necessary to replace the present system of inter-agency cooperation with a much stronger institutional framework.

ELIMINATION OF DUPLICATION

The creation of a World Space Programme would allow various national space efforts to be directed towards a clearly defined and internationally agreed set of objectives. By combining the individual national programmes into one global effort it will be possible to eliminate duplication and so achieve more for the same expenditure. For example, the proposed Space Exploration Initiative (SEI) will require the development of a new heavy lift launch vehicle with a payload capacity of at least 100 tonnes, compared with the Space Shuttle's present capacity of about 20 tonnes. As the Soviet Union has already developed the Energiya rocket, which has a capacity of the required order of magnitude, a World Space Programme would be able to make a start on something akin to the SEI without having to wait for the US to develop a new launch vehicle.

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In this context it is of interest to recall that the elimination of duplication was one of the reasons for the establishment of NASA in 1958. I here quote from the appropriate paragraph of the National Aeronautics and Space Act (Section 102(c) [4]) but with the words "United States" replaced by "world" and "agencies" replaced by "countries"; the changes are enclosed in square brackets:

"The aeronautical and space activities of the [world] shall be conducted so as to contribute materially to ... the most effective utilisation of the scientific and engineering resources of the [world], with close cooperation among all interested [countries] of the [world] in order to avoid unnecessary duplication of effort, facilities and equipment."

CONVERSION OF SWORDS IN TO SPACESHIPS

The end of the Cold War is resulting in significant reductions in government military spending which, in turn, must cause the defence industries to look for alternative business. Although this may initially be painful for some of the companies concerned, it is potentially very promising for the exploration of the solar system. The construction of space hardware is the obvious alternative because military and space technologies are similar and many companies already have a significant interest in both [6,7].

An additional role for a World Space Authority could therefore be to help re-direct some of the defence industry's surplus capacity towards a programme of space exploration and development. A global authority is not essential for this process of conversion, indeed individual governments could make a start almost immediately [7], but it is desirable that this potentially large source of aerospace capital and expertise be focused on a coherent set of internationally agreed objectives.

If the World Space Authority were to be responsible for placing orders with industry then, by maintaining the essentially monopsonistic nature of the market, it could ease the transition for the companies involved. Much of the Western aerospace industry, including many whole companies, is geared to the demands of a single customer - namely, the central government with its orders for military products. As a result, it is not well adapted to competition, and may find it difficult to diversify. If the proposed World Space Authority were to take over the role of customer from the various national governments, the transition from military to space production could be achieved without a major upheaval in the way the industry operates. It is interesting to note that there is already a powerful precedent for a large international organisation dealing directly with private aerospace companies; the International Telecommunications Satellite Organisation (INTELSAT) *buys* its satellites and associated equipment from the private sector, and is thus a significant actor in the international space market.

REGULATION OF PRIVATE INDUSTRY AND FINANCING OF SPACE INFRASTRUCTURE

There are those who hold that space development can and should be driven solely by private enterprise, and that as few restrictions as possible should be placed in its way. However, it is important not to get carried away by imagining that space industrialisation has progressed further than is actually the case. Competition between privately owned companies (as opposed to competition between nation-states) will have an increasingly important role to play in the development of space, but it will be some time before this extends beyond competition for government (or World Space Authority) contracts. Private capital will only be attracted into space once an extensive space infrastructure has been developed. There is abundant evidence that private industry is both unable and unwilling to take on this task, which properly lies in the province of government. Indeed,

given the scale of the undertaking, and the cosmic setting in which it will take place, it even more properly lies in the province of *international* government, exercised through an international body established for that purpose.

The appearance of private companies wishing to operate in space is more likely once the basic infrastructure has been established. This should be encouraged, but it would be a mistake to leave it unregulated. Private enterprise requires a legal framework in which to operate. Goldman [8] has given a thoughtful discussion of this subject, in the course of which he notes that "without legal and political security, private capital will not go into outer space" and that "the space community has a major role to play in the ... creation of an international regime that will allow free enterprise to develop without the risks of international chaos".

Even when private enterprise is firmly established in space, it must still be regulated so as to avoid monopolies (which would negate all the advantages of establishing a private sector in space), to maintain safety standards, and to ensure that laws governing the exploitation of space resources and the protection of the space environment are properly implemented. Just as companies are governed by anti-monopolistic, safety and environmental legislation on Earth, so should they be in space. Given that space is a transnational domain, these functions should be transferred to a World Space Authority. In this respect, the World Space Authority would have a similar relation to the private space companies of the future as the Civil Aviation Authority has to today's privately owned airlines.

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CONTROL OF EXTRATERRESTRIAL RESOURCES

An international body will be required to regulate the exploitation of extraterrestrial resources once this becomes possible. In order to make space exploration and utilisation acceptable to the developing world it will be necessary to ensure that such activities are not undertaken purely in the interests of the industrialised countries. Although in the short term the developed countries, or at least their high-technology industries, will be the primary beneficiaries of an expanded space programme, there must be some guarantee that the rest of the world is not left out. The various statements made to the effect that "space is the province of all mankind" must be given institutional reality if space is not to become another quarrelling ground for nation-states.

This has been recognised by the United Nations which, through Article 11 of the 1979 "Moon Treaty", attempted to "establish an international regime...to govern the exploitation of the natural resources of the Moon [and other celestial bodies]" in order to ensure "an equitable sharing by all States Parties in the benefits derived from those resources, whereby the interests and needs of the developing countries, as well as the efforts of those countries which have contributed...to the exploration of the Moon, shall be given special consideration". This provision is necessary if a world space programme is to attract truly global support, and the only way to ensure that the rhetoric is given substance is to create the appropriate institutional framework - namely, a World Space Authority.

Those concerned that this will inhibit private enterprise in the exploitation of extraterrestrial resources should recognise that we are still some way from that becoming an important issue. Most of the next century will be taken up just developing the necessary infrastructure, and if that long process is to attract global support, it must be perceived to be in the global interest. Moreover, many of the Moon Treaty articles are open to a fairly liberal interpretation [8], for example, the word "equitable" does not mean "equal", and appropriate fiscal measures could ensure its compatibility with the profit motive.

ENVIRONMENTAL PROTECTION OF THE SOLAR SYSTEM

There is a need to identify and protect sites throughout the solar system that are of special scientific or aesthetic importance. Although the apparent lifelessness of space means that the environmental concerns of Planet Earth are largely irrelevant to other bodies of the solar system, it is important to ensure that the exploration and exploitation of space does not result in the destruction of unique extraterrestrial environments [9]. Although mining asteroids might have little environmental consequence, it would be a mistake to allow an unregulated private company to start terraforming Mars, with possibly disastrous consequences for the future scientific study of that planet, or to begin dismantling Saturn's rings, which for all we know may be without equal in the Galaxy [10]. It will therefore be necessary to agree on which sites are of special interest and to lay down rules for their protection.

Insofar as this question has been addressed to date, the approach has been through the formulation of treaty provisions. For example, Article IX of the 1967 Treaty states that signatories will "conduct exploration of [the Moon and other celestial bodies] so as to avoid their harmful contamination". However, there is no attempt to define what is meant by "harmful", no obvious means of verification and certainly no plausible mechanism for enforcement.

CONCLUSION

These are the major arguments in favour of the establishment of a World Space Authority. The organisational structure of such a body would depend largely on the precise role defined for it, in particular, the desired balance between its regulatory and operational roles. It is clear that national governments would need to be represented (at least for as long as Planet Earth is divided into sovereign nation-states) and that, within its terms of reference, it must be free to implement projects without undue political interference. It is crucially important that its source of funding, perhaps obtained from member governments in a

manner related to GNP, be both adequate and stable.

With this in mind, it would appear that the organisational structure of INTELSAT may have much to recommend it. In a major study of INTELSAT, Levy [11] has noted that:

"INTELSAT [has] a collective identity over and above that of any member. The creation of an international secretariat and universal membership were designed to create that identity. Moreover, the ... organisation is a juridical entity with capacity to conclude agreements with states and other international organisations, and to contract, acquire and dispose of property and participate in legal proceedings. The space facilities are no longer owned by signatories in undivided shares, but are the property of INTELSAT"

The concept of the international ownership of hardware is possibly the most important institutional innovation that INTELSAT could pass on to a World Space Agency. The adoption of this approach would, by itself, satisfy most of the arguments for the internationalisation of space exploration. The fact that INTELSAT has successfully adopted this approach over many years demonstrates that the principle is basically sound.

In my earlier article [1] I suggested that a world space agency should be institutionally linked to the United Nations; given that its responsibilities will include the maintenance of international law in outer space and the provision of assistance to developing countries in the field of space research, there is no reason to change this view. Indeed there now appears to be a much greater probability of the UN taking on some much needed functions of world government, and I believe that space policy certainly ought to be one of these - a sort of Foreign Policy for Planet Earth.

Some may criticise this suggestion on the grounds that an additional layer of bureaucracy may hinder, rather than help, the exploration and utilisation of the solar system. However, it is a mistake to believe that the creation of a new international organisation would necessarily result in inefficiency; after all, it can hardly be argued that INTELSAT has produced an inefficient global communications network. Moreover even in those cases where international organisations have become bureaucratic, they often result in positive advantages. Much as we may bemoan the bureaucracy of the EEC, for example, we can still see that it is preferable to living in a continent continually at war with itself, which history has shown to be the alternative.

Space exploration organised by a World Space Authority may proceed somewhat more slowly than if driven by belligerent military or commercial competition but it would also be fairer, safer and of more value to global society. With both a universe to explore and a world to unite, can we not seize present opportunities and use one as a means to the other?

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