

## Editor's Note

# Twentieth Anniversary Tribute: Comment on Special Commemorative Issue of *Science & Global Security*

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Editors-in-Chief

This year marks the 20th anniversary of this journal, and it seems an appropriate time to reflect on how the journal has fared—what its role has been over the past 20 years and what it might be in the future.

The journal began its life in 1989, what turned out to be the next to last year of the old Soviet Union. Its impetus came from U.S. and Soviet scientists who had been deeply involved throughout the 1980s in nuclear security issues and discussions. These included Roald Sagdeev, then director of the Soviet Space Research Institute, Evgeny Velikhov, then vice-president of the Soviet Academy of Sciences, and Frank von Hippel, a Professor of Princeton and then chairman of the Federation of American Scientists. Sagdeev and Velikhov were, in addition to their official duties, also close advisors to Mikhail Gorbachev and among the founders of the Committee of Soviet Scientists for Peace and Against the Nuclear Threat (CSS), which saw itself as a counterpart of the public-interest-science organizations in the West engaged in arms control and disarmament issues. The idea of the journal also came from Martin Gordon, the president of Gordon and Breach, the original publisher of the journal. Gordon and Breach had a long history of working with and publishing articles by Soviet scientists.

Sagdeev and von Hippel were the original co-chairs of the Board of Editors; and Harold Feiveson, of Princeton University and Stanislav Rodionov of the Space Research Institute were (as they still are) the editors of the journal.

The mission of the journal sought by its founders was foremost to become a place for scientists and other experts to publish articles setting out the technical basis for arms control, nonproliferation, and disarmament initiatives and

to make these articles available to a wide scientific community. Such an outlet was especially lacking in the Soviet Union, where there was little chance for scientists engaged to publish analyses on security issues. Even in the United States, where scientists had a long and sometimes effective history of public intervention on security issues, for example, in the pages of the *Bulletin of the Atomic Scientists* and occasionally in *Scientific American*, there were actually few places where authors could present a full analysis in enough technical detail so that results could be checked and reproduced by other experts, and in this way create an archival body of analysis. In addition, it was hoped that the journal would help to encourage the growth of a science and security community, initially in the United States and Soviet Union, and then more widely. The founders particularly hoped that the journal would encourage young scientists to engage in work on arms control and other problems of global security, and that scientists could use the journal as a way to collaborate across borders on these problems. In many respects, we believe these early hopes and purposes have been realized. Throughout the 20 years, a considerable number of ground-breaking articles were published. In the first year alone, these included: a detailed analysis by Ted Taylor of how to verify the elimination of nuclear warheads; a study by Steve Fetter, Robert Mozely, Oleg Prilutsky, Stanislav Rodionov and others, of how to detect nuclear warheads; a description by Soviet scientists at the Kurchatov Institute of a remarkable experiment where the Soviet Navy, in cooperation with the United States scientists, used a helicopter-borne neutron detector system to detect a cruise-missile nuclear warhead on a Soviet ship in the Black Sea; and a wide-ranging analysis by several American and Soviet scientists of issues raised by space nuclear power. We also reprinted a little-known article by J. Andrei Sakharov on radioactive carbon from nuclear explosions, Sakharov's early venture into political activism in arguing against atmospheric nuclear testing. The article initially was published in the Soviet journal, *Atomic Energy*, in June 1958.

In the following years, notable articles included a comprehensive study on the disposition of separated plutonium, which was one of the bases for the study the following year by the National Academy of Sciences; an article by Steve Fetter which introduced the concept of "nuclear archaeology" (notably, measurements of the isotopic ratios of trace elements in the graphite core of a shutdown reactor to determine its past plutonium production history); an article by J. Carson Mark, formerly director of the theoretical division at Los Alamos, which convincingly showed that reactor-grade plutonium could be used to make nuclear weapons; an article by Tom Neff advocating a way to blend down highly enriched uranium recovered from weapons to use in power-reactor fuel, which became the basis for the subsequent U.S.–Russian agreement; an analysis of the performance of the Patriot missile in the first Gulf Wars that contradicted the then official claims of success; studies calling into question the possibility and value of earth-penetrating nuclear weapons;

studies of innovative—and potentially proliferation resistant—reactor concepts; and others. In the past year, three comprehensive papers on the history, critical technical aspects, and proliferation implications of the gas centrifuge for uranium enrichment might be especially flagged.

As initially was hoped, the journal also has encouraged contributions from many younger scientists, and in some instances, it has facilitated their movement from careers in basic science to science and security studies. It also opened up an outlet for scientists in the weapon labs in the United States and Soviet Union/Russia to publish articles in the public domain.

At first, the journal authors were all from the United States or Soviet Union. But the circle of authors soon expanded to scientists from other countries, including notably, China, India, and Pakistan, as well as several countries in Europe and elsewhere. Several of the articles have been jointly authored by scientists from different countries, including notably a number by Pakistani and Indian authors on aspects of the nuclear arms race in South Asia. The Editorial Board has grown also to include members from six countries. The journal is now translated into Russian and Chinese and distributed in these languages in Russia and China.

In this issue, to mark this 20th year, we reprint three articles: one the aforementioned article by Andrei Sakharov on radioactive carbon from nuclear explosions, the critical article by J. Carson Mark on the usability of reactor-grade plutonium, and the Russian article on the USSR–U.S. Black Sea experiment. In the first two instances, we also reprint the appendices to the articles, one by von Hippel alone, and one by von Hippel and Edwin Lyman, putting the articles into further perspective.

Looking forward, nuclear arms control, disarmament, nonproliferation, and the threat of terrorism have a salience today that many may not have imagined when the journal was founded. Nuclear disarmament has returned to the forefront of international debate, with leading nuclear weapon states now publicly affirming a commitment to creating the conditions for abolishing nuclear weapons. Success will require detailed technical and policy studies on achieving deep cuts in arsenals, verifying warhead dismantlement, assuring transparency in a nuclear weapons free world, including the development of effective techniques of nuclear archaeology and forensics, and possible options for safe, secure and environmentally benign fissile material disposition. There also will need to be research on understanding the capabilities of emerging conventional military technologies, space-based systems, and cyber-warfare. Nuclear energy has similarly returned to center stage, with recent concerns over proliferation and the need to combat climate change. The thirty or so nations with nuclear energy may be joined over the next decade by many more countries in what some call a “nuclear renaissance.” The spread of nuclear energy may be attended by similar expansion in countries seeking national uranium enrichment and reprocessing capabilities, the search for new fuel

cycle technologies, and efforts to establish multinational or international control over fuel cycle facilities, all requiring important new analyses to clarify possible risks and benefits. It is our hope that the international debates on all these issues will continue to be informed by this journal.