

Planetary health requires eradicating nuclear weapons

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Consultant: Australian Red Cross, WHO

RACP Congress, Sydney, 15 May 2018

Thanks

- Alan Robock
 - Rutgers, New Jersey
- Michael Mills
 - NCAR, Colorado
- Ira Helfand
 - IPPNW, Massachusetts

Overview

- Consequences of nuclear war:
 - acute, largely irreversible existential threat
 - a hospitable climate is crucial to planetary health
- The growing danger of nuclear war
- The race against time to end nuclear weapons:
 - ICAN and the Humanitarian Initiative
 - The Treaty on the Prohibition of Nuclear Weapons
 - The Nobel Peace Prize for 2017





SO, WHAT DO YOU
WANT TO BE WHEN YOU
GROW UP?

ALIVE...
IF IT'S NOT TOO
MUCH TROUBLE....

GROUND ZERO
1 MEGATON
WARHEAD
YOU ARE VAPORIZED

5 MILES
YOU ARE
COOKED

2 MILES
YOU ARE
VERY DEAD









Nuclear Weapons constitute
THE GREATEST
IMMEDIATE THREAT
to the Health and Welfare of Mankind

WORLD HEALTH ORGANIZATION



Red Cross: ICRC 2013

- “the ICRC has over the past 6 years made an in-depth assessment of its own capacity, and that of other agencies, ... We have concluded that an effective means of assisting a substantial portion of survivors of a nuclear detonation, while adequately protecting those delivering assistance, is not currently available at national level and not feasible at international level. It is highly unlikely that the immense investment required to develop such a capacity will ever be made. If made, it would likely remain insufficient.”
 - Peter Maurer, ICRC President, Oslo 4 March 2013

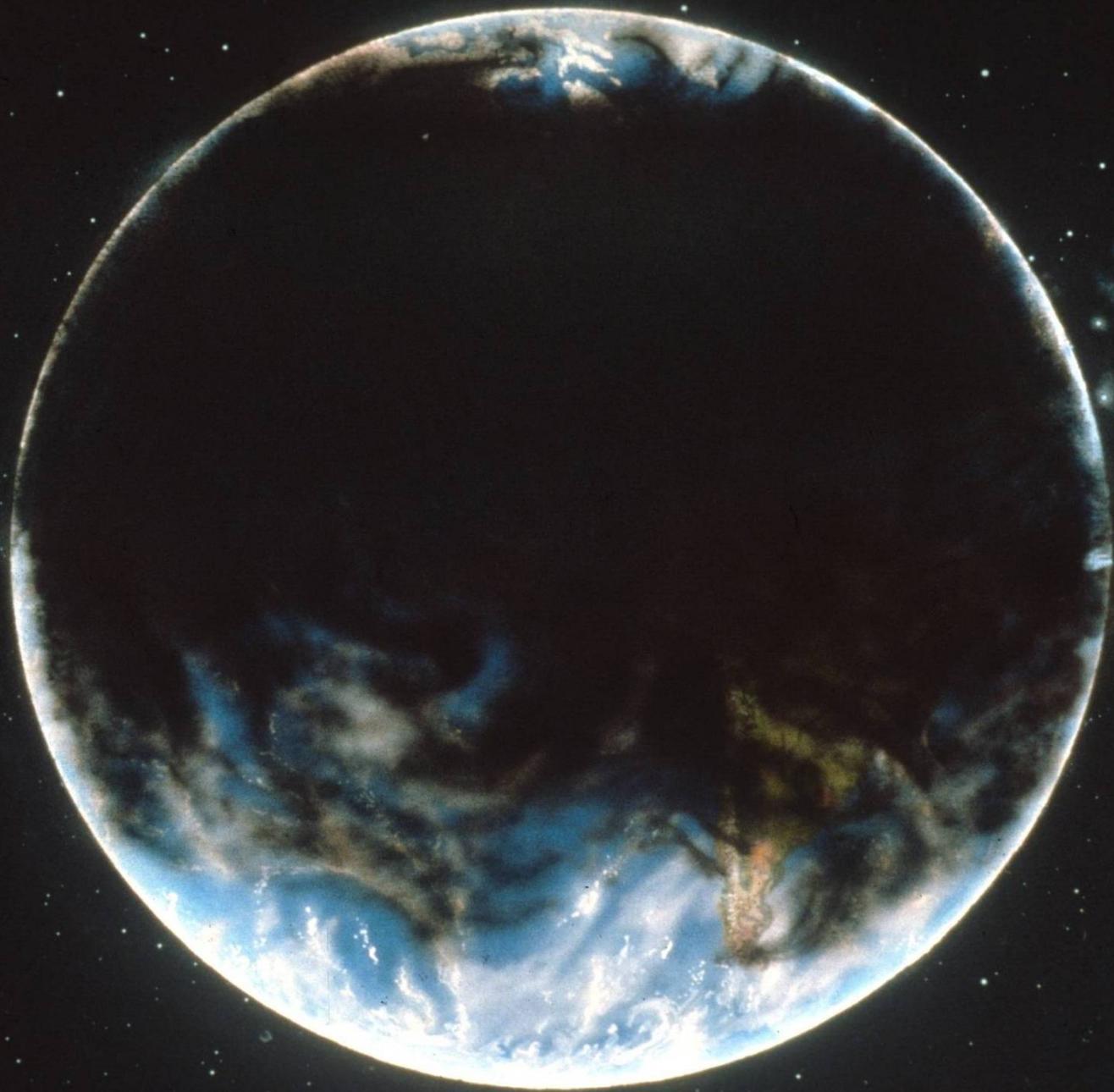


Illustration by Jon Lomborg

Nuclear weapon induced fires

“Even the smallest of nuclear weapons, such as the ~15 kt weapon used on Hiroshima, exploding in modern megacities would produce firestorms that would build for hours, consuming buildings, vegetation, roads, fuel depots, and other infrastructure, releasing energy many times that of the weapon’s yield.”

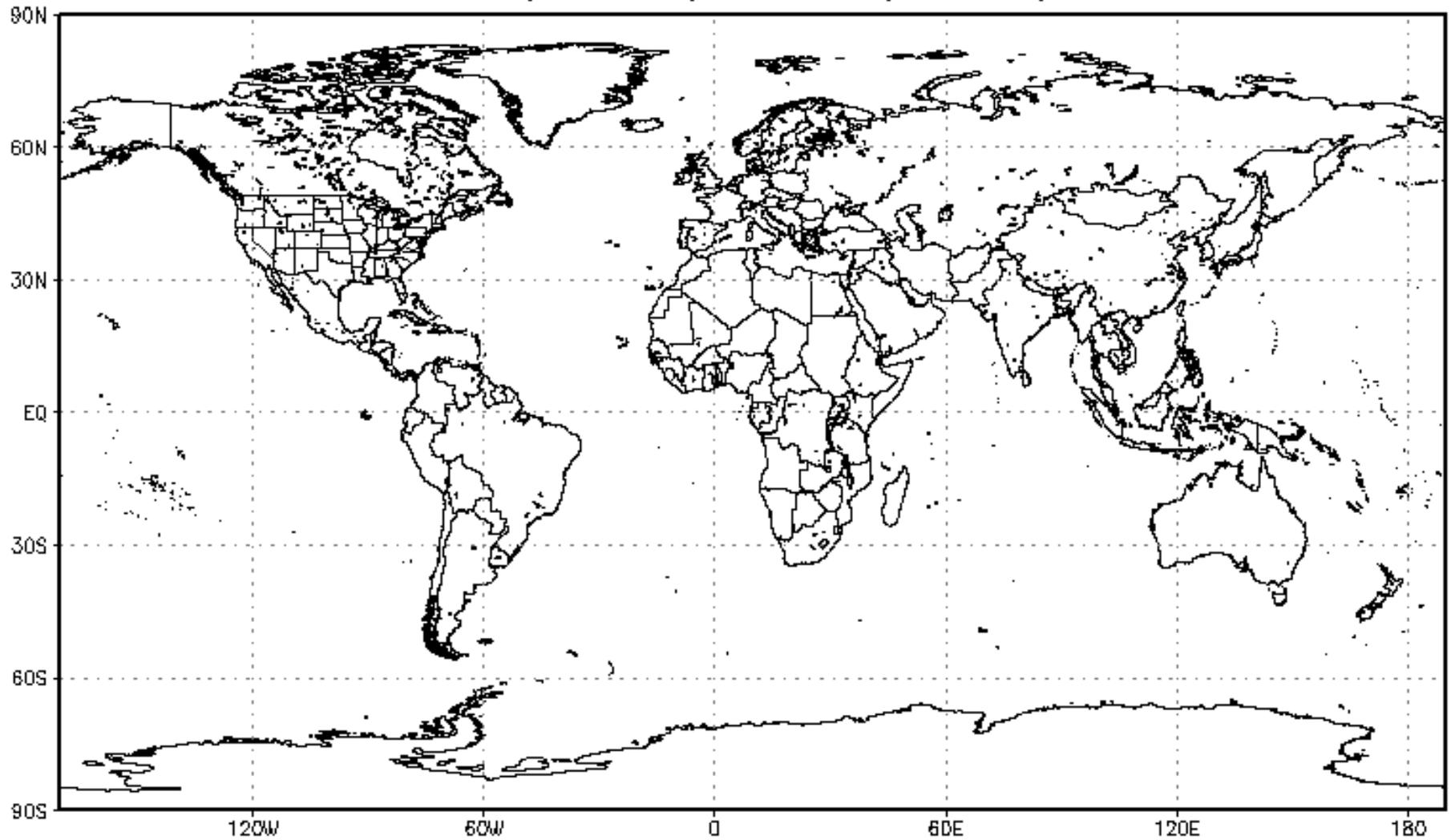
- Mills MJ, et al. Multidecadal global cooling and unprecedented ozone loss following a regional nuclear conflict. *Earth’s Future*, 2014.
doi:10/1002/2013EF000205

Hiroshima: fires released ~1000 times the energy of the n explosion

Regional nuclear war

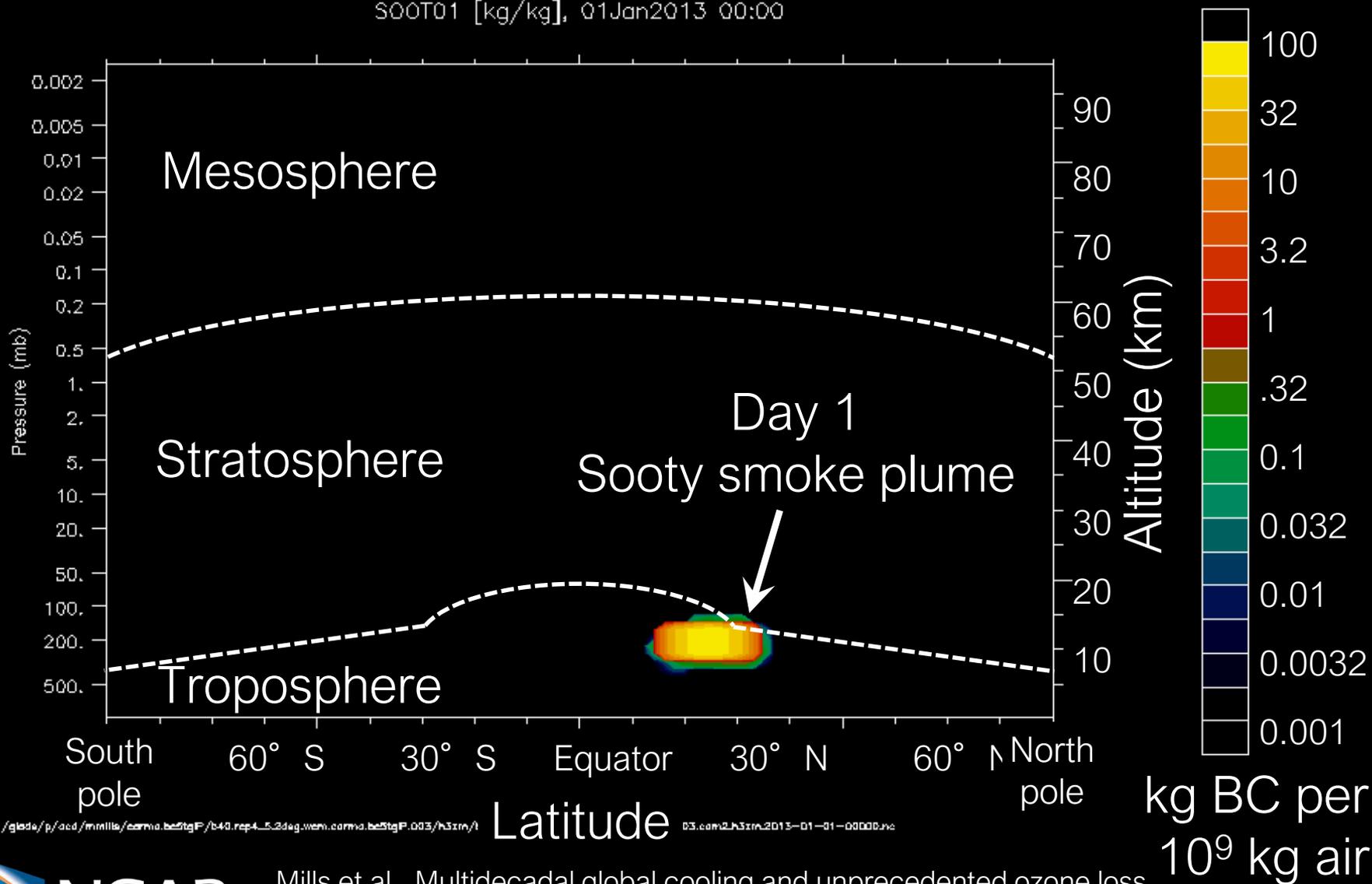
- 100 Hiroshima-size bombs
 - India – Pakistan scenario
 - Contested volatile border with daily shooting in Kashmir, 3 wars since independence, mobilised up to 1 million troops twice more
 - India “Cold Start” invasion plans, Pakistan plans early use of nuclear weapons in a war with India
 - Estimated 6 million tons of black carbon soot/smoke
- 0.4% of global nuclear weapons, 0.07% of total yield
- 44 million casualties including 21 million deaths in major cities in India and Pakistan (some studies suggest 35 m deaths)
- Radioactive contamination throughout both countries and in Nepal, Bangladesh, Sri Lanka, Tibet, China, and other neighbours
- Global climate disruption from smoke and soot

BC Absorption Optical Depth May 14th



Black carbon mass mixing ratio

SOOT01 [kg/kg], 01Jan2013 00:00

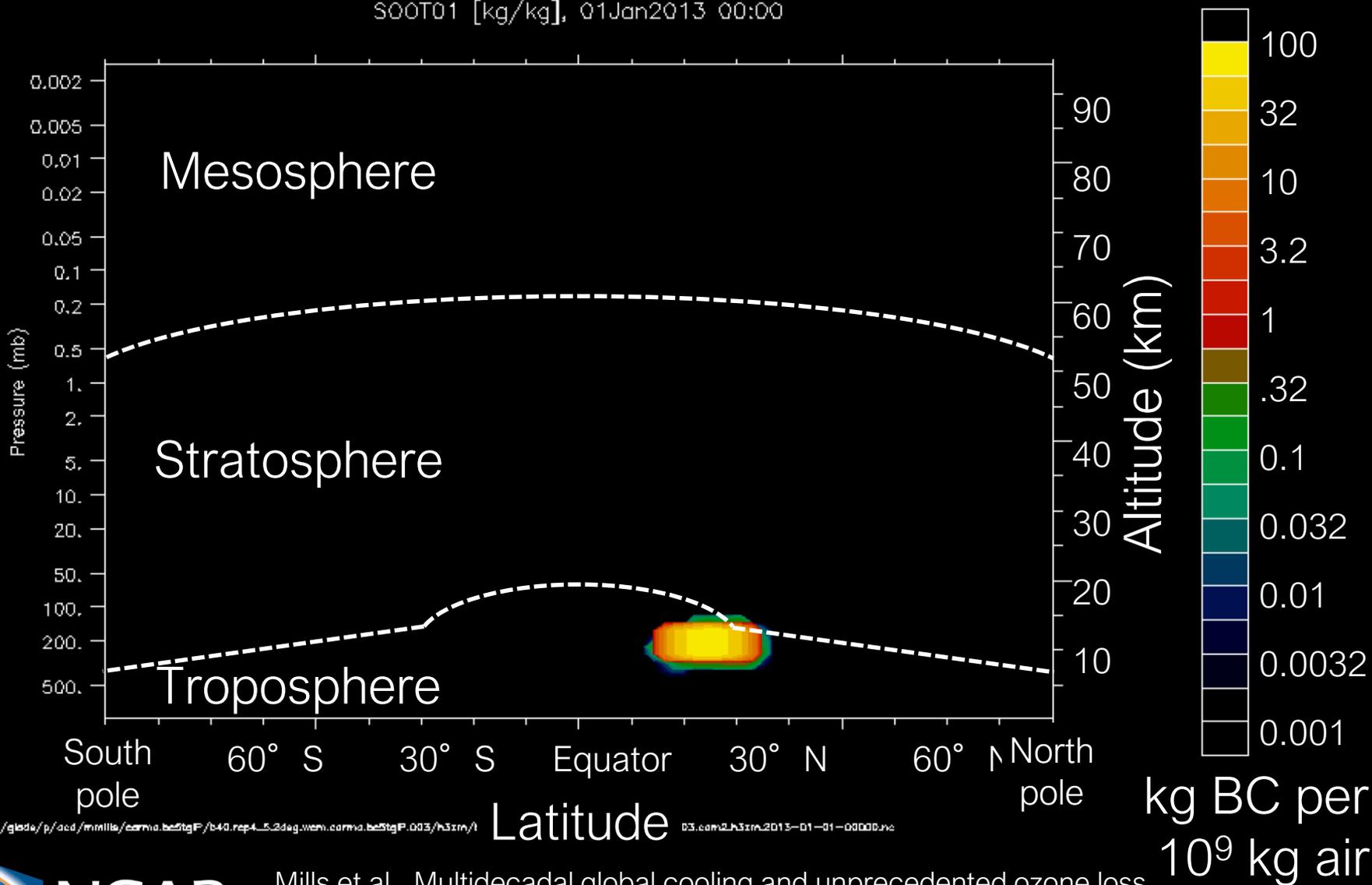


/glade/p/acc/mills/carma_bestgF/b40.rep4_5.2deg.wem.carma_bestgF.003/h3zrn/

03.com2_h3zrn_2013-01-01-0000.nc

Black carbon mass mixing ratio

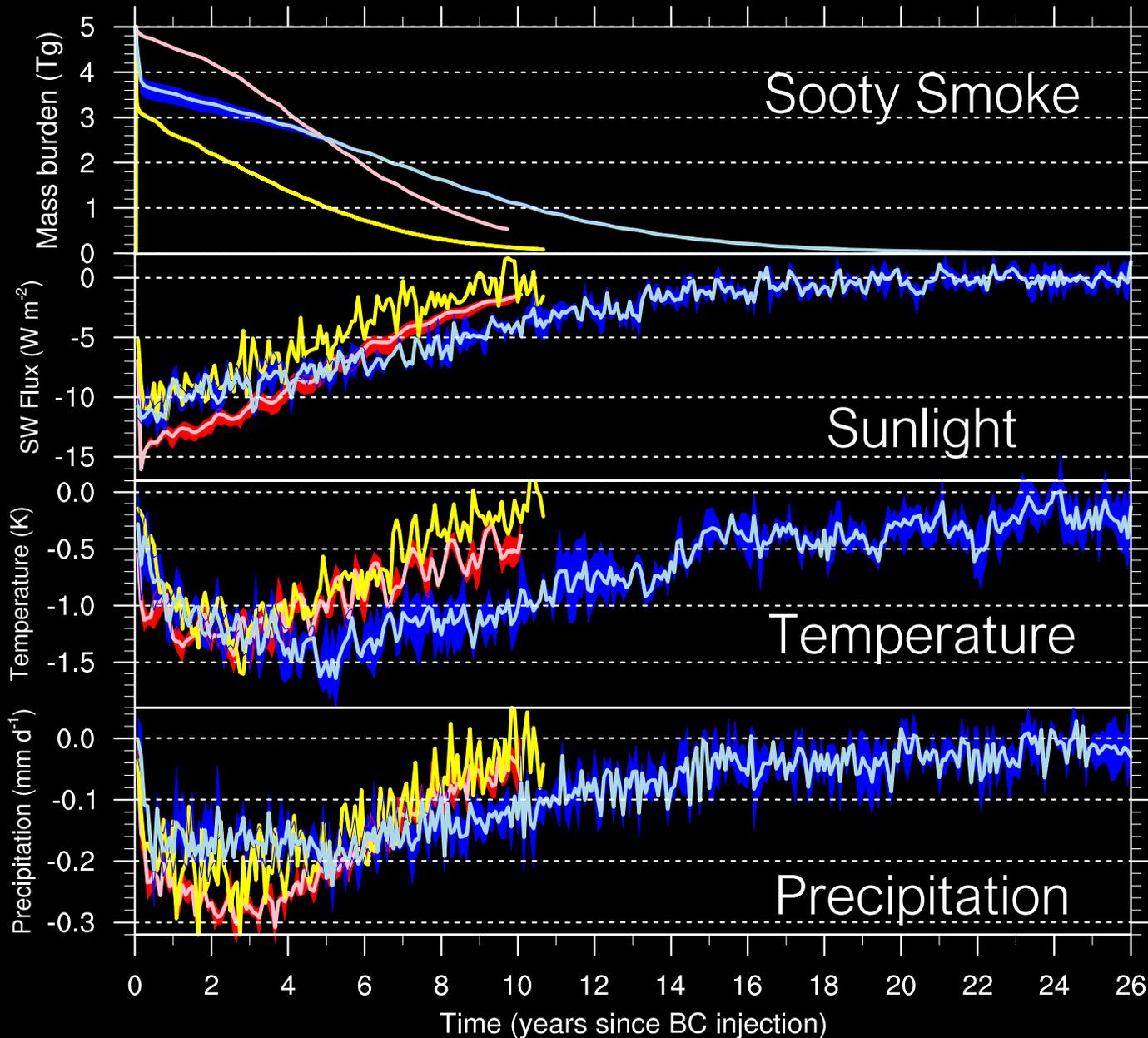
SOOT01 [kg/kg], 01Jan2013 00:00



/glade/p/acc/mills/carma_bestgF/b40.rep4_5.2deg.wern.carma_bestgF.003/h3zrn/

03.com2_h3zrn_2013-01-01-0000.nc

Global climate response to regional war



GISS Model E
full ocean
no chemistry
response
Robock et al. (2007)

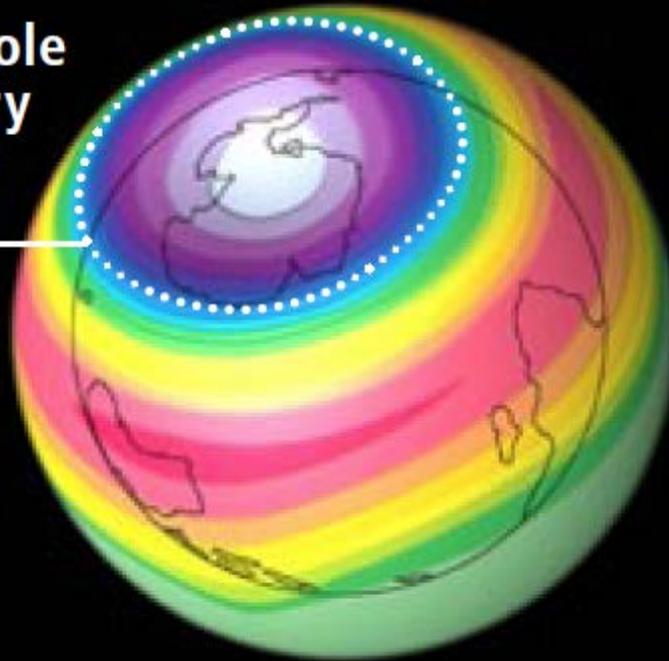
SOCOL
ozone chemistry
shallow ocean
Stenke et al. (2013)

CESM(WACCM)
ozone chemistry
full ocean,
sea ice, land
Mills et al., (2014)

Global ozone hole after regional nuclear war

**TYPICAL OZONE DISTRIBUTION
(October 2008)**

Ozone hole
boundary
(220 Du)



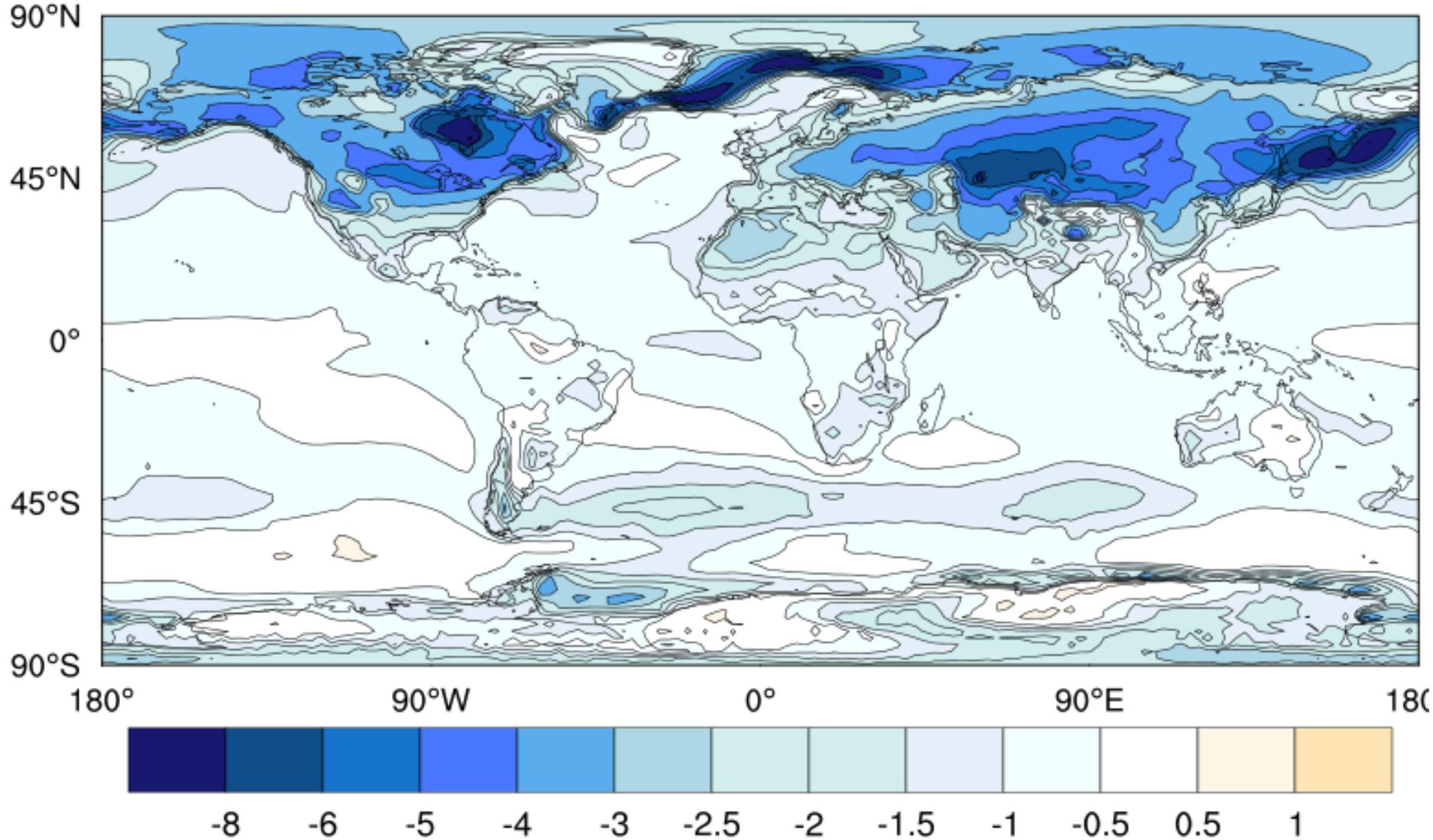
**OZONE 17 MONTHS
AFTER WAR**



Ozone Concentration (Dobson units)

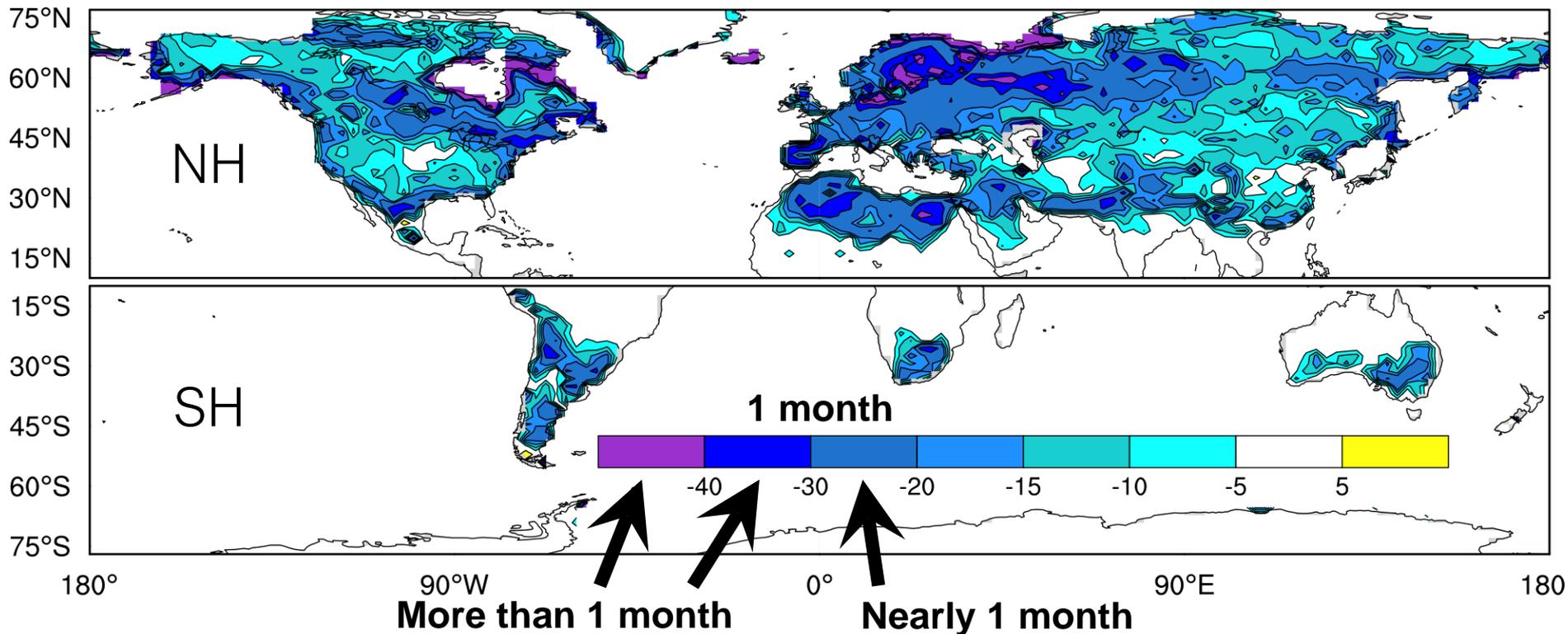
Mills et al., *Massive global ozone loss predicted following regional nuclear conflict*, Proc. Nat. Acad. Sci., 2008

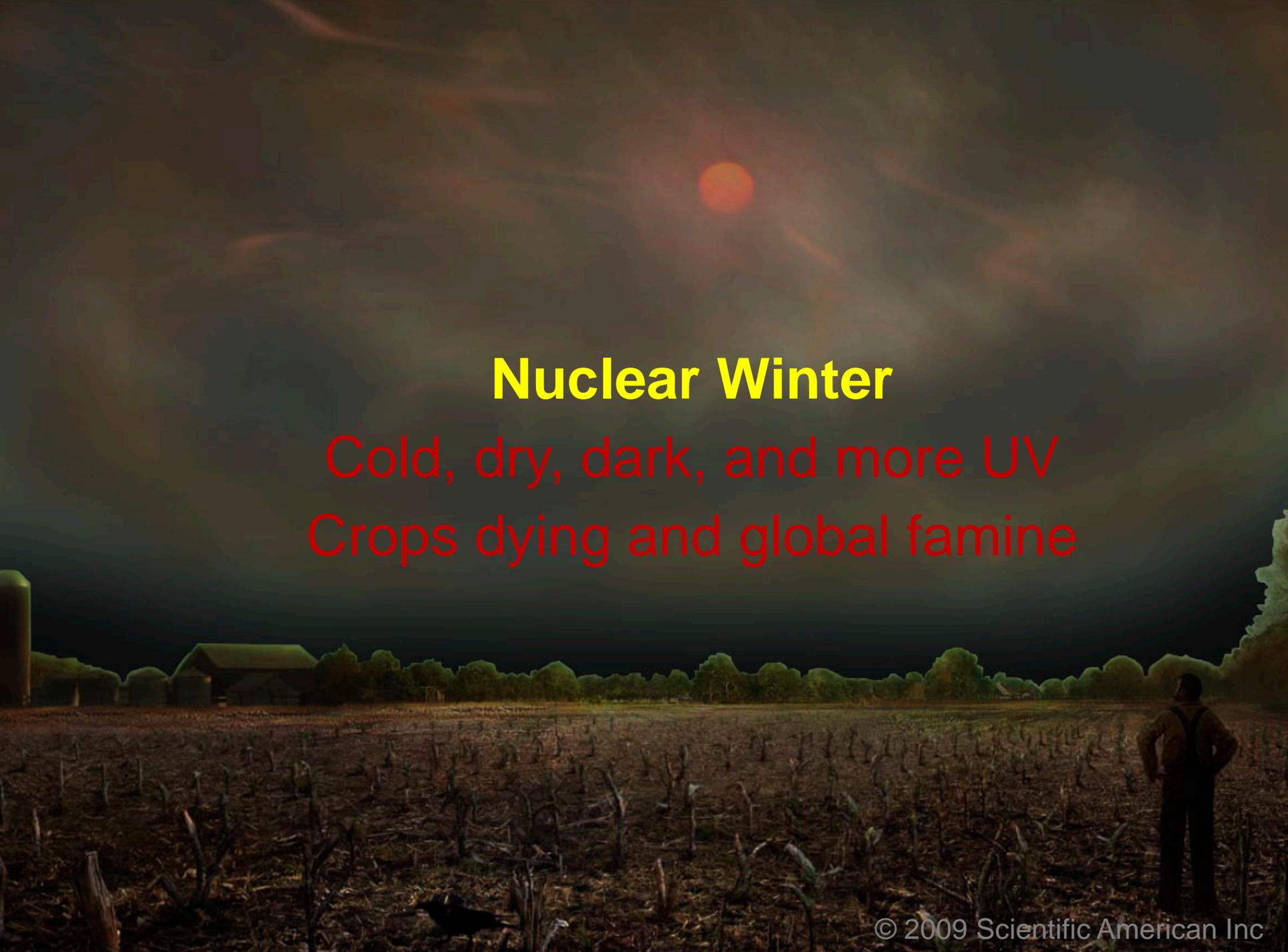
Surface temperature change (°C)



DJF average, years 1-5

Change in growing season (days), years 2-6 average



A dramatic, dark scene depicting a nuclear winter. The sky is a deep, dark brown with a bright, glowing red sun in the center, casting a long, dark shadow. The ground is a field of dead, charred crops, with a person standing in the distance, looking out over the devastation. In the background, there are silos and a barn, suggesting a farm. The overall atmosphere is one of despair and environmental catastrophe.

Nuclear Winter

Cold, dry, dark, and more UV
Crops dying and global famine

Ways agriculture can be affected by a nuclear war

- **Colder temperatures**
 - shortened frost-free growing season
 - cold spells during growing season
 - slower growth → lower yield
- **Darkness**
- **Less rainfall**
- **Enhanced ultraviolet radiation from ozone loss**
- **Radioactivity**
- **Toxic chemicals in atmosphere, soil, and water**
- **Lack of water supplies**
- **Lack of fertilizer**
- **Lack of fuel for machinery**
- **Lack of pesticides (but not of pests)**
- **Lack of seeds (and those that do exist are genetically engineered for the current climate)**
- **Lack of distribution system**

Not yet
modeled

Following a nuclear war between India and Pakistan, reduced global temperatures, precipitation, and sunlight reduce food production globally

	<u>First 5 years</u>	<u>Second 5 years</u>
US maize	- 20%	- 10%
US soybeans	- 15%	- 10%
China maize*	- 15%	- 12%
China middle season rice*	- 26%	- 21%
China spring wheat*	- 26%	- 20%
China winter wheat*	- 38%	- 23%

Özdoğan et al., Impacts of a nuclear war in South Asia on soybean and maize production in the Midwest United States, *Climatic Change*, 2012, 116, 373.

*Xia et al., Decadal reduction of Chinese agriculture after a regional nuclear war, *Earth's Future*, 2015; 3, 27-48.



Chronic malnutrition today

- 815 million people at or below this level 2016, 155m children U5 stunted, 52 m wasted (FAO, 2017)
- 108m facing crisis level food insecurity or worse 2016, up from 80m in 2015 (FAO 2017)
- 20% acute malnutrition in Kenya, Ethiopia, Somalia
- 1/3 children <5y malnourished in sub-Saharan Africa
- Major factor in 4 m (>50%) under 5 child deaths/y



Global food supply

Global cereal ending stocks 2017/18 forecast at a record level :

105 days utilisation

FAO Cereal Supply and Demand Brief 5 April 2018

People dependent on imported food for >50% caloric consumption:

>300 million



**Limited regional
nuclear war with low
yield weapons:**

**2 billion victims
of starvation
from nuclear
famine?**

+ epidemics, conflict



Ohio class submarines



- US: 14 Ohio class submarines
- 24 Trident II D5 missiles per submarine
- Average 4 warheads per missile – 96 per sub; can carry up to 144
- Warheads 100 or 455 kt – each 6-30 times Hiroshima
- 144 100 kt warheads on Chinese cities: 23 million tons of smoke

Bulletin of the Atomic Scientists

IT IS 5 MINUTES TO MIDNIGHT



Feature

Self-assured destruction: The climate impacts of nuclear war

Alan Robock and Owen Brian Toon

Bulletin of the Atomic Scientists

68(5) 66–74

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<http://thebulletin.sagepub.com>



<http://climate.envsci.rutgers.edu/pdf/RobockToonSAD.pdf>

Accidental nuclear war



9 November 1979

USA/NORAD training tapes appeared to show real Soviet strike



3 June 1980

USA/SAC faulty computer chip shows Soviet missile launches

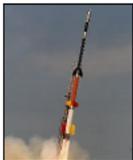


26 September 1983 – Stanislav Petrov incident

Sunlight reflects off clouds towards Soviet monitoring satellite



Soviet leadership mistakenly concluded that a large scale NATO exercise, Able Archer 83, was the cover for a planned surprise attack



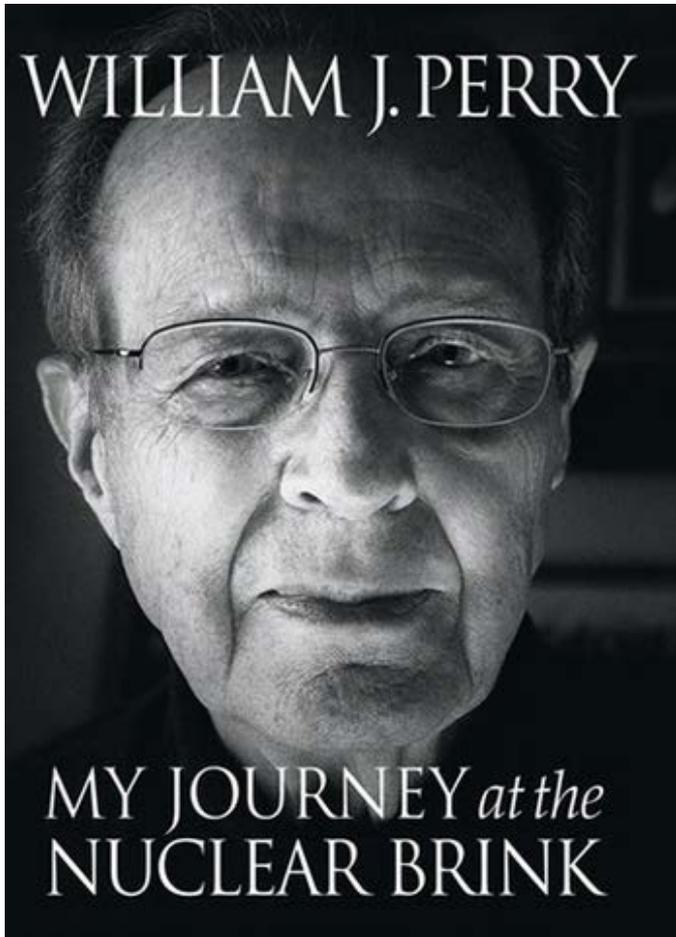
25 January 1995 – Norwegian rocket incident

Russia detects USA/Norway scientific rocket launch off Norway coast

Planned nuclear war

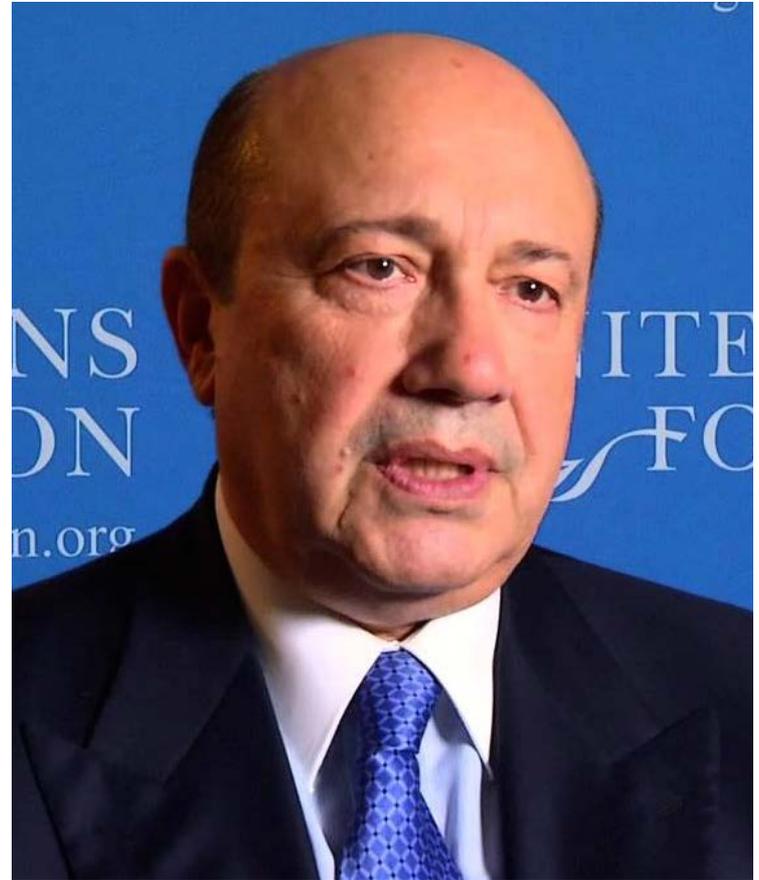
- First use considered and threatened by almost all nuclear-armed states since Japan 1945
 - eg US – at least 25 times (Ellsberg D. The doomsday machine. 2017)
 - USSR Berlin 1948,58, 61,7; Suez 56; Cuba 62; Arab-Israel 73; Iran 80
 - N Korea 1950,1,3, 1968, 76, 95, 2003, 17
 - Vietnam 1954, 68, 9-72
 - Egypt 1956
 - China 1953,4/5,8
 - Iraq 1958, 1991, 98, 2002
 - Libya chemical weapons facility 1996
- Recent escalation of threats coupled with more aggressive deployments, exercises
 - US/NATO – Russia
 - India-Pakistan
 - Israel
 - North Korea - US

A resurgent Cold War – 2016



US Defense Secretary 94-97

“The danger of nuclear catastrophe is greater than it was during the Cold War ... growing greater every year”



Igor Ivanov, Russian Foreign Minister 98-04

“The risk of confrontation with the use of nuclear weapons in Europe is higher than in the 1980s.”

Mikhail Gorbachev



“It looks as if the world is preparing for war.”

“...Trump’s administration ...orients US foreign policy toward “political, economic, and military competitions around the world” and calls for the development of new, “more flexible” nuclear weapons. This means lowering the threshold for the use of nuclear weapons even further.

... Putin ... announced the development in Russia of several new types of weapons, including weapons that no country in the world yet possesses.”

Time, 27 Jan 2017,
9 March 2018

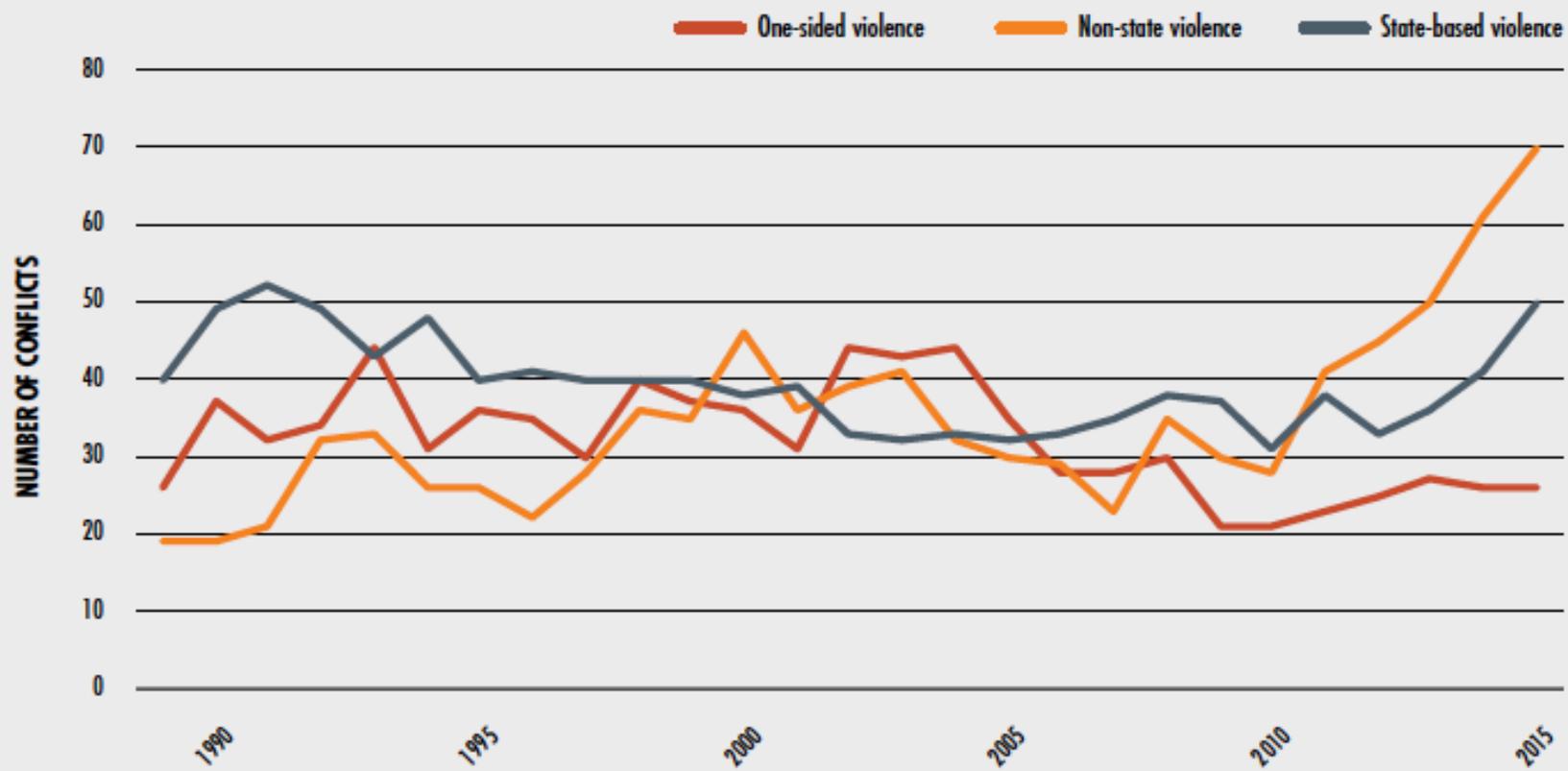
Cyberwarfare and nuclear weapons



Might be possible for terrorists to hack into Russian or American command and control systems and launch nuclear missiles, with a high probability of triggering a wider nuclear conflict

Gen James Cartwright, fmr head US Strategic Command, June 2015

FIGURE 12
MARKED INCREASE IN THE NUMBER OF CONFLICTS SINCE 2010



SOURCE: Uppsala Conflict Data Program (UCDP).

FAO. The state of food security and nutrition in the world 2017.



**2018: It is 2
minutes to
midnight**

BAS Board of Sponsors
– 15 Nobel laureates

“In 2017, world leaders failed to respond effectively to the looming threats of nuclear war and climate change, making the world security situation more dangerous than it was a year ago – and as dangerous as it has been since WW II. The greatest risks last year arose in the nuclear realm.

... Hyperbolic rhetoric and provocative actions by both sides have increased the possibility of nuclear war by accident or miscalculation.

.. the closest the Clock has ever been to Doomsday, as close as it was in 1953, at the height of the Cold War.

They can rewind the Doomsday Clock.”

UN General Assembly Resolution 1.1



Figure 3.1. The first meeting of the United Nations General Assembly, London, January 1946. Passed on 24 January 1946, General Resolution 1.1 established a commission to draw up a plan “for the elimination from national armaments of atomic weapons.” *Source: United Nations Photo.*

International Court of Justice

Advisory Opinion 8 July
1996, unanimously:

“...there exists an obligation
to pursue in good faith
and bring to conclusion
negotiations leading to
nuclear disarmament in
all its aspects under strict
and effective
international control.”





Indiscriminate &/or
inhumane weapons banned
by international treaty:

- [Dum dum bullets 1899]
- Biological weapons
1972
- Chemical weapons 1993
- Landmines 1997
- Cluster munitions 2008

- The main basis for bans on all these has been humanitarian – unacceptable harm intrinsic to any use the weapon
- Proven process: stigmatise – prohibit - eliminate

Disarmament is stalled

- No nuclear-armed state is disarming
 - (?? North Korea)
 - No negotiations underway
- All nuclear-armed states investing massively in indefinitely retaining and modernising their arsenals, adding new capacities
 - >US\$105 billion/y
 - US – US\$1.25 trillion over next 30y
- How can states without NW change the game?



i can

**international campaign
to abolish nuclear weapons**

Founded by IPPNW and MAPW in Melbourne

Campaign coalition: ~500 partner organisations in >100 countries

**Goal: A treaty for prohibit and provide for the elimination of
nuclear weapons**

Based on the unacceptable, catastrophic consequences of any use
of nuclear weapons

www.icanw.org

Bringing the era of nuclear weapons to an end

ICRC President Jakob Kellenberger
20 April 2010 to Geneva diplomatic
corps



- “Nuclear weapons are unique in their destructive power, in the unspeakable human suffering they cause, in the impossibility of controlling their effects in space and time, in the risks of escalation they create, and in the threat they pose to the environment, to future generations, and indeed to the survival of humanity.
- “... preventing the use of nuclear weapons requires ... negotiations aimed at prohibiting and completely eliminating such weapons through a legally binding international treaty.”

May 2010 NPT Review Conference

- A commitment to “achieve the peace and security of a world without nuclear weapons.”
- “expresses ...deep concern about the catastrophic humanitarian consequences of any use of nuclear weapons, and reaffirms the need for all States at all times to comply with applicable international law, including international humanitarian law.”

Humanitarian Impact of Nuclear Weapons



SECOND CONFERENCE ON THE
HUMANITARIAN IMPACT OF
NUCLEAR WEAPONS
NAYARIT, MEXICO 13-14 FEBRUARY, 2014



VIENNA CONFERENCE ON
THE HUMANITARIAN IMPACT
OF NUCLEAR WEAPONS
8-9 DEC. 2014

- **Three intergovernmental conferences on HINW, attracting most of the world's governments, concluded with no significant challenge:**
 - any use of nuclear weapons would be a **catastrophe**
 - **no effective humanitarian response** is possible
 - risk of nuclear weapons use has been underestimated, is growing, and exists as long as the weapons do
 - there is a **legal gap**: the most destructive of all weapons are not explicitly prohibited

The Austrian → Humanitarian Pledge

“Austria pledges to cooperate with all relevant stakeholders ... to stigmatize, prohibit and eliminate nuclear weapons.”

– AUSTRIAN PLEDGE

Joined by
127
states



2012-15 joint statements by states on humanitarian dimensions of nuclear weapons

- 2012 NPT PrepCom Norway : 15 states + Holy See (16)
- UNGA (Oct 2012) Switzerland : 34 states + Holy See (35)
 - “All States must intensify their efforts to outlaw nuclear weapons and achieve a world free of nuclear weapons”
 - Algeria, Argentina, **Austria**, Bangladesh, Belarus, Brazil, **Chile**, Colombia, **Costa Rica**, **Denmark**, Ecuador, **Egypt**, **Holy See**, Iceland, **Indonesia**, **Ireland**, Kazakhstan, Liechtenstein, **Malaysia**, Malta, Marshall Islands, **Mexico**, **New Zealand**, **Nigeria**, **Norway**, Peru, **Philippines**, Samoa, Sierra Leone, **South Africa**, Swaziland, **Switzerland**, Thailand, Uruguay and Zambia
- NPT PrepCom 2013: (weaker) S Africa : 79 states + HS (80)
- UNGA Oct 2013 New Zealand : 124 states + Holy See (125)
 - Counter statement by Australia (17)
- UNGA Oct 2014 New Zealand: (155)
- NPT PrepCom 2015 Austria (159)

UN Working Group on nuclear disarmament 2016



International Physicians
for the Prevention of Nuclear War



The health and humanitarian case for banning and eliminating nuclear weapons

International Physicians for the Prevention of Nuclear War (IPPNW)[†]

World Medical Association^{††}

World Federation of Public Health Associations[‡]

International Council of Nurses^{‡‡}

*Working paper submitted to the Open-Ended Working Group Taking Forward Multilateral Nuclear Disarmament Negotiations (OEWG)
May 2016*

“Banning and eliminating nuclear weapons is the only way to ensure planetary health”

“NUCLEAR WEAPONS ARE IN FACT SUICIDE BOMBS ON A GLOBAL SCALE, AND OUR KNOWLEDGE OF WHAT THEY WILL DO LEADS INESCAPABLY TO THE CONCLUSION THAT THEY MUST BE PROHIBITED AND ELIMINATED.”

IRA HELFAND, IPPNW



DOCTORS' ORDERS

PUBLIC HEALTH WARNING

The four leading international federations representing the world's physicians, public health professionals and nurses came together for the first time ahead of the May session to warn governments that urgent action is needed to prohibit and eliminate nuclear weapons. A new treaty banning nuclear weapons, they said, would be “the only course of action commensurate with the existential danger they pose”.

The World Medical Association, the World Federation of Public Health Associations, the International Council of Nurses, and the International Physicians for the Prevention of Nuclear War submitted a joint working paper on the health and humanitarian case for banning nuclear weapons.

They emphasized that a nuclear war could kill many more people in a few hours than were killed during the entire Second World War, with the radioactive fallout lingering in the environment,

**BAN THE
BOMB**



**THE BAN
IS
COMING**

**BAN ME!
IM IMMORAL**

**LEGAL
OR
ILLEGAL?**



United Nations Conference to Negotiate a Legally Binding Instrument to Prohibit Nuclear Weapons, Leading Towards Their Total Elimination

16 Feb, 27-31 March, 15 June – 7 July 2017



Conference President Ambassador Elayne Whyte Gómez, Costa Rica



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Available languages: English

UN conference to negotiate a legally binding instrument to prohibit nuclear weapons, leading towards their total elimination

A legally binding instrument to prohibit nuclear weapons would establish general prohibitions and obligations as well as a political commitment to achieve and maintain a nuclear-weapon-free world.

<http://m.webtv.un.org/search/28th-meeting-un-conference-to-negotiate-a-legally-binding-instrument-to-prohibit-nuclear-weapons-leading-towards-their-total-elimination/5496636161001/?term=28th%20meeting&sort=date>

Sue Coleman-Haseldine, Kokotha nuclear test survivor, South Australia





My father Yami Lester was blinded by the British nuclear test. Many of his family and people died and many are still suffering today. The emotional, mental and physical suffering is felt by generations.

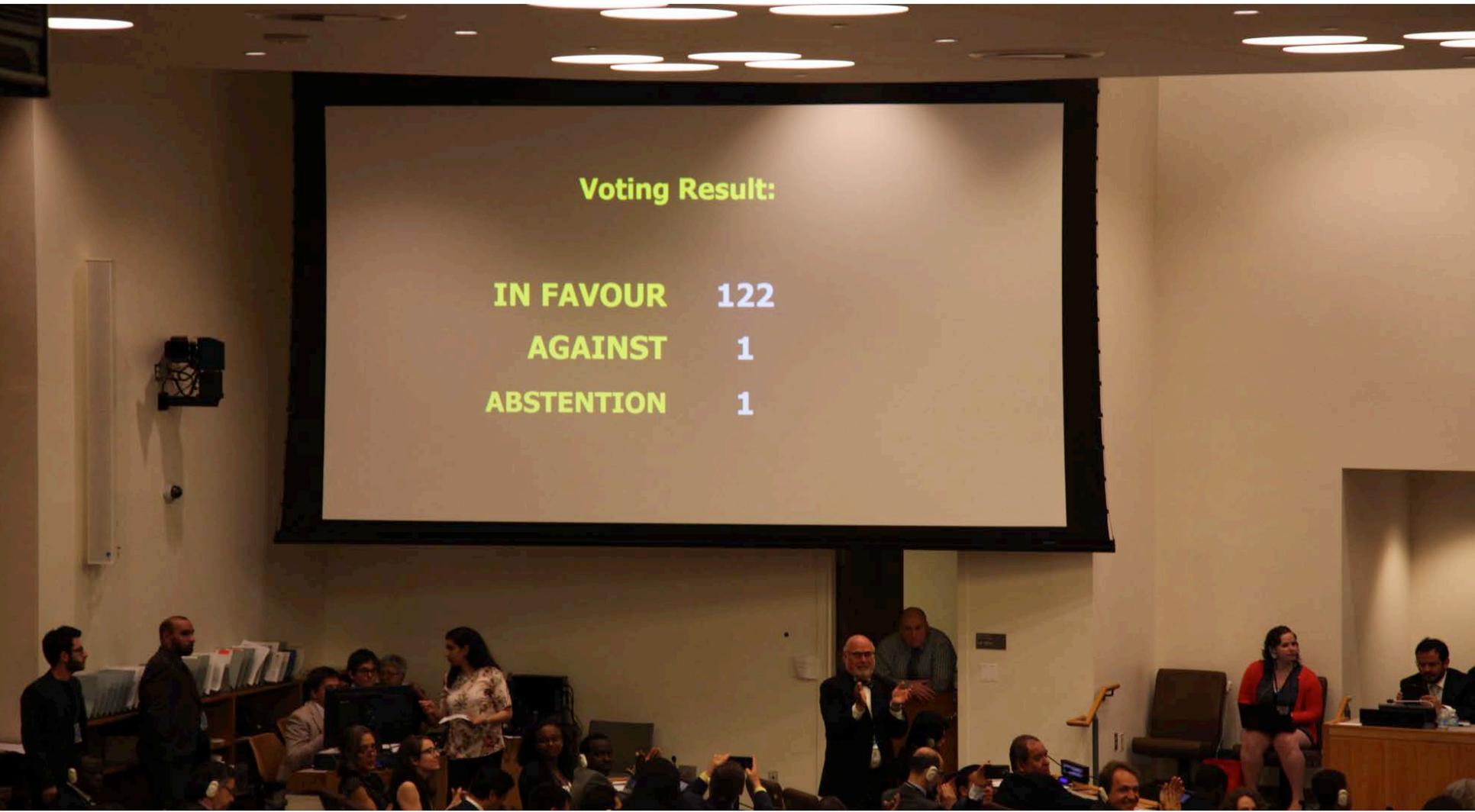
- Karina Lester, second generation nuclear test survivor from Anangu Pitjantjatjara Yankunytjatjara Aboriginal land in South Australia

Karina Lester, Anangu
Pitjantjatjara Yankunytjatjara
2nd generation nuclear test
survivor
South Australia



Voting Result:

IN FAVOUR	122
AGAINST	1
ABSTENTION	1





BIOLOGICAL WEAPONS BANNED 1972



CHEMICAL WEAPONS BANNED 1993



LAND MINES BANNED 1997



CLUSTER BOMBS BANNED 2008



NUCLEAR WEAPONS BANNED 2017!





Treaty on the prohibition of nuclear weapons

- Reflects health /humanitarian evidence
 - “Catastrophic consequences cannot be adequately addressed, pose grave implications for human survival, the environment, socioeconomic development, ... food security and the health of current and future generations
 - First disarmament treaty to cite disproportionate impact on women and girls and indigenous peoples
- Categorical and comprehensive prohibition
- Provides pathways for all states to join
 - Possess NW
 - Prior possession NW
 - NW stationed
 - Assist in preparations for use of NW
- Maintains/strengthens safeguards
- Obligations:
 - for victim assistance and environmental remediation
 - International cooperation
 - Promote universalisation
- Indefinite duration
- No reservations



“Without the leadership so ably displayed by ICAN, we would not have achieved our objective today.”

Thomas Hajnoczi, Austrian Ambassador, 7.7.17

"For the greatest benefit to mankind"
Alfred Nobel

2017 NOBEL PEACE PRIZE

International Campaign to Abolish Nuclear Weapons (ICAN)



- "... for its work to draw attention to the catastrophic humanitarian consequences of any use of nuclear weapons and for its ground-breaking efforts to achieve a treaty-based prohibition of such weapons."



"Those who have the privilege to know have the duty to act."

"The unleashed power of the atom has changed everything save our modes of thinking, and thus we drift towards unparalleled catastrophe."

Albert Einstein
1946



The NEW ENGLAND JOURNAL *of* MEDICINE

Perspective

The 2017 Nobel Peace Prize and the Doomsday Clock — The End of Nuclear Weapons or the End of Us?

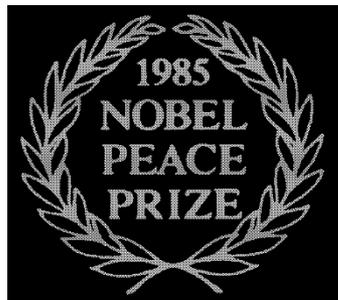
Lachlan Forrow, M.D., Tilman Ruff, M.B., B.S., and Setsuko Thurlow, C.M., M.S.W.

The awarding of the 2017 Nobel Peace Prize to the International Campaign to Abolish Nuclear Weapons (ICAN) may mark a turning point in efforts to ensure that humanity survives

stan, India, Israel, and North Korea — maintain nearly 15,000 nuclear weapons. Almost 20 years after warnings were published in the *Journal* and elsewhere about



International Physicians for
the Prevention of Nuclear War



i can
international campaign
to abolish nuclear weapons



Thank you!