

By Max Tegmark

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We know that an all-out U.S.-Russia nuclear war would be bad. But how bad, exactly? How do your chances of surviving the explosions, radiation, and nuclear winter depend on where you live? The past year's unprecedented nuclear saber-rattling and last weekend's chaos in Russia has made this question timely. To help answer it, I've worked with an amazing interdisciplinary group of scientists (see end credits) to produce the most scientifically realistic simulation of a nuclear war using only unclassified data, and visualize it as a [video](#). It combines detailed modeling of nuclear targeting, missile trajectories, blasts and the electromagnetic pulse, and of how black carbon smoke is produced, lofted and spread across the globe, altering the climate and causing mass starvation.

As the video illustrates, it doesn't matter much who starts the war: when one side launches nuclear missiles, the other side detects them and fires back before impact. Ballistic missiles from U.S. submarines west of Norway start striking Russia after about 10 minutes, and Russian ones from north of Canada start hitting the U.S. a few minutes later. The very first strikes fry electronics and power grids by creating an electro-magnetic pulse of tens of thousands of volts per meter. The next strikes target command-and-control centers and nuclear launch facilities. Land-based intercontinental ballistic missiles take about half an hour to fly from launch to target.

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