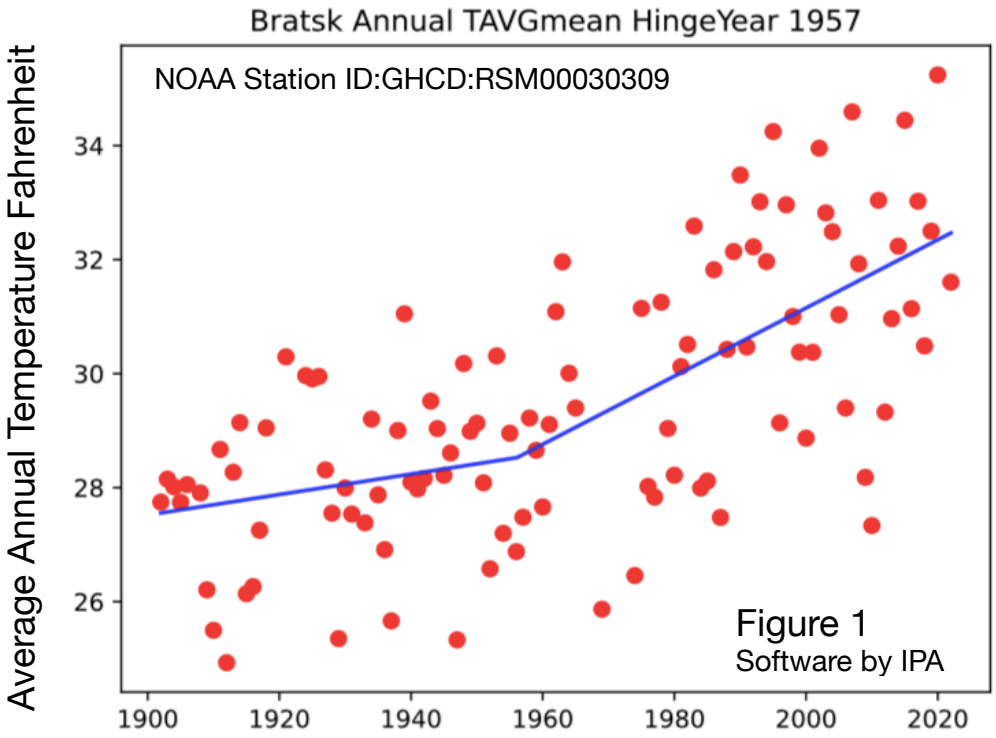
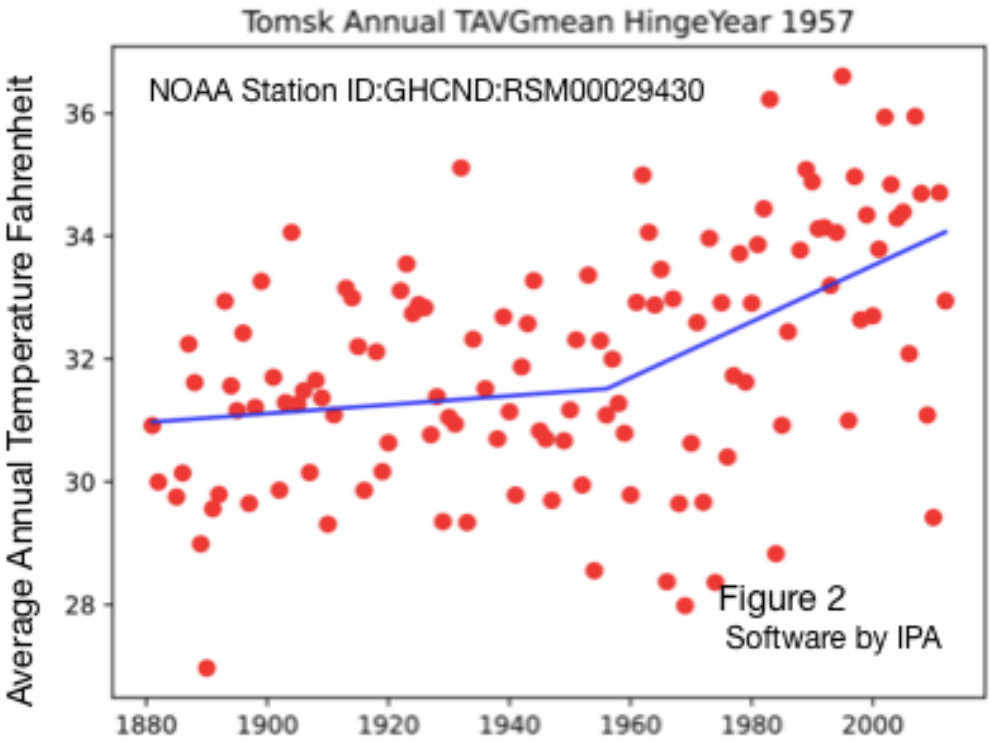
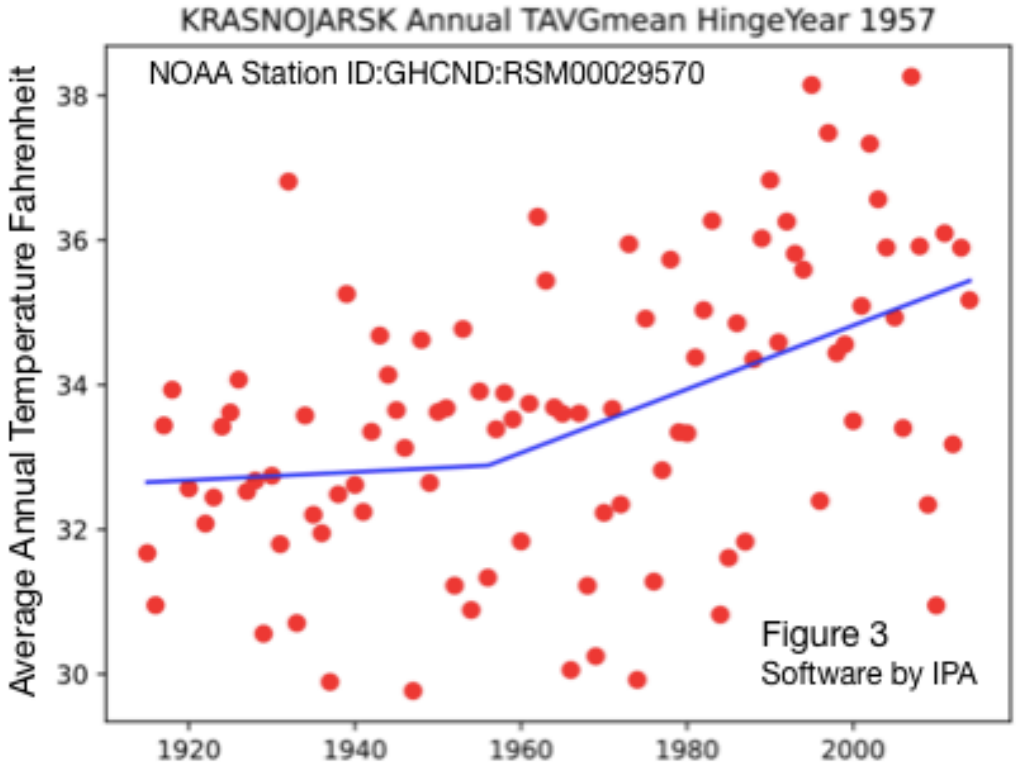
Central Siberia Weather Data Corroborates Rapid Warming by Hydroelectric Arctic Mega Power Plants



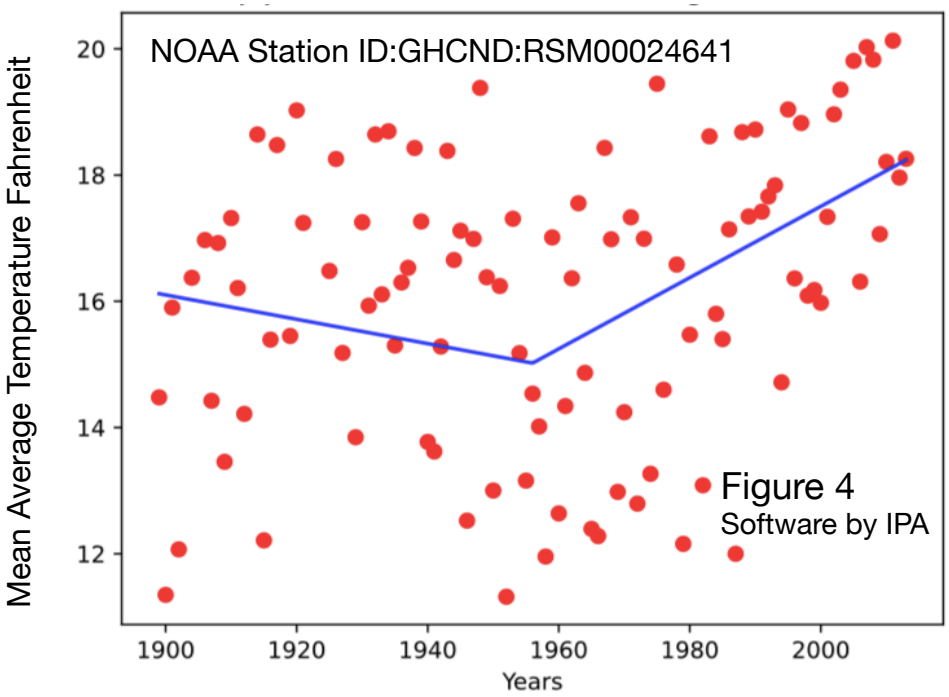
Since the 1950s, Arctic mega power stations (AMPS) have been built in the watersheds of almost all of the major rivers flowing into the Arctic's coastal seas and James and Hudson Bays. Their combined spring freshet energy force, which, for millennia, has helped power ocean currents and shape world climate, has now been suddenly and markedly attenuated by flow regulation. Also, these human regulated dam releases have suppressed the spring and summer flows and increased the cold season flow volumes. This has created for the first time in the geologic history of the cryosphere, warmer wintertime ice-free river flow. The 1957 hinge year coincides with Novobirsk's commissioning.

Between 1956 to 1972, the Soviet Union built six hydroelectric AMPS, the Krasnoyarsk on the Yenisei, the Irkutsk (1956) and Bratsk on the Angara River, and the Novosibirsk (1957) and Bukhtarma on the Irtysh and Ob Rivers, respectively and one on the Vilyuy River. The heat polluting Soviet experiment at the Irkutsk AMPS was just as successful at these other five AMPS. The magnitude of heat trapping water vapor emissions caused annual average winter temperatures to suddenly and rapidly increase as was recorded at nearby weather stations. (See Figures 1-4) The Tomsk station is near the Novosibirsk AMPS which was commissioned in 1957. (See Figure 5)


Tomsk Annual TAVGmean HingeYear 1957
NOAA Station ID:GHCND:RSM00029430
Average Annual Temperature Fahrenheit
36
34
32
30
28
1880
1900
1920
1940
1960
1980
2000
Figure 2
Software by IPA


KRASNOJARSK Annual TAVGmean HingeYear 1957
NOAA Station ID:GHCND:RSM00029570
Average Annual Temperature Fahrenheit
38
36
34
32
30
1920
1940
1960
1980
2000
Figure 3
Software by IPA

Viljujsk RS Annual Average Temperature Hinge Year 1957



The following excerpts from, **Environmental Change Tied to Soviet Dam**, published in the Jackson Sun of March 26, 1981, highlight that the Vilyuy and its 280 mile long reservoir has warmed the region and increased the humidity by 33 percent:

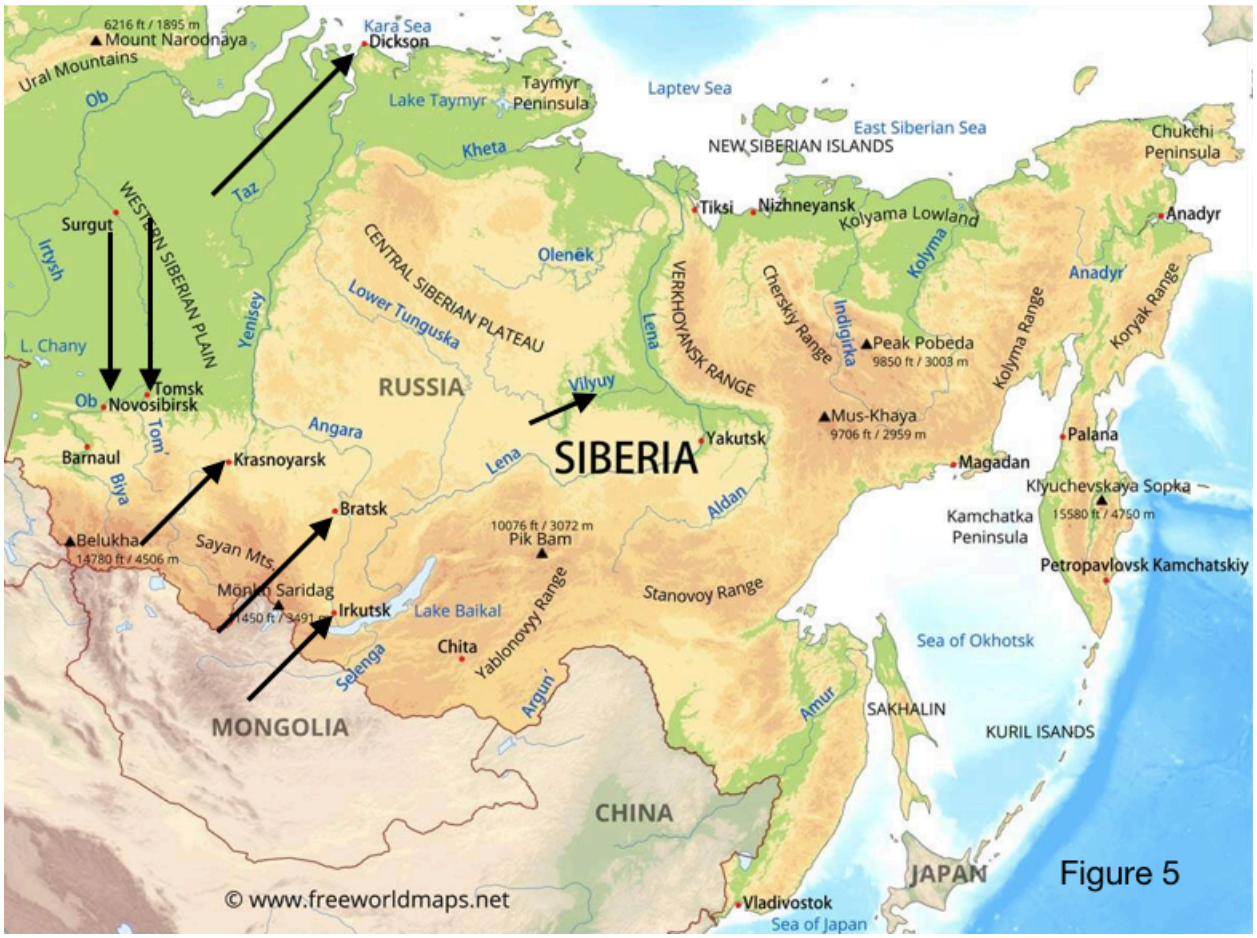
"Our dam has altered the local climate for the better, declared Boris A. Medvedev, 52 director of the Chernyshevsky hydroelectric project of the Vilyuy River…"

and

"The reservoir cools the air in summer and warms it in winter. Like the sea, the reservoir has a softening effect on the climate, Medvedev said."

and

"The lowest record temperature here was minus 69 centigrade (-91 Fahrenheit), years ago. Now there's a definite warming trend, he said. Before the dam, July was the only month a year when temperatures didn't go below freezing. Now the summer temperatures are cooler and season longer, ***influenced by the 33 percent increase in humidity form the huge reservoir****, The engineer said."*



Novobirsk, Krasnoyarsk, Bratsk, Irkutsk and Vilyuy AMPS and Tomsk Weather Station in Central Siberia, and Dikson Weather Station on Kara Sea's Coastline

The distance between Dikson weather station and Krasnoyarsk AMPS is about 1,200 miles. For perspective, the distance between the Tomsk weather station and Novobirsk hydroelectric AMPS is about 125 miles. Th Vilyuy AMPS is on the Vilyuy River, a tributary of the Lena which flows into the Laptev Sea.

The Angara, Yenisei, Ob, and Irtysh Rivers, drain into the Kara Sea and their 5 human inland seas have flooded thousands of square miles of central Siberia's river valleys. This has enhanced evaporation, permafrost thaw and rapid warming of the Kara Sea. The extent of August sea ice in the Kara Sea has declined by 100 percent from 1980 to 2020. (**Arctic Blue Deserts** 2021)

"According to Roshhydromet (Russia's state agency of meteorological and environmental monitoring), the Kara Sea has experienced the most dramatic boost in air temperature over the last 20 years. Since 1998 the average temperature of the area has been increased by as much as 9 degrees Fahrenheit". (Staalensen, 2018)

Forty-three years earlier, there were newspaper reports confirming the validity of the Russian hypothesis and highlighting that these Russian mega dams and reservoirs had also warmed Central Siberia:

"Ten years after the completion of the Bratsk power station with its annual output of more than 28 billion kilowatt hours of electricity, the evidence is mounting that perhaps they tamed and transformed it just a little bit too much. The Bratsk dam and others like it along the Angara have warmed up Central Siberia by at least 10 degrees in the past 10 years."

and

In effect, what the Russians have done in their drive to industrialize Siberia and exploit its enormous wealth of raw materials is to create inland oceans which account for more humidity, more rain, less seasonal fluctuation in temperature and more frequent change in the weather. Indeed, Siberians proudly call their lakes, both the natural and man-made ones—"seas". The 2,200 square mile "sea" that has built up behind the Bratsk hydroelectric station is but one of four such man-made reservoirs along the Angara. Between them the four hydroelectric dams along the river produce 60 billion kilowatt hours of electricity annually. Whatever their feeling about it, however and regardless of the potential ecological impact, Siberians are going to have accustom themselves to Siberia getting warmer and warmer." (**Huge Man-made lakes warming up Siberia** by John Dornberg and published in the Miami Herald on September 14, 1975)

Typically, the icy cold water of a river's spring run-off equals about one half of its annual discharge into its estuary. These hypolimnion-release dams often seize 50 to 75% of the ice cold spring runoff waters where the summer sun's energy is captured and stored in the AMPS's inland sea sized reservoirs. Thermal stratification of the reservoirs water column commences the first summer and creates water temperatures of about 39 degrees Fahrenheit year-round in perpetuity below the thermocline. The thermocline is the transition layer between the warmer and colder water. The water in the regulated dam releases is from below the thermocline. This deep warmer water is called the hypolimnion.

The volume of the regulated winter hypolimnial discharges from these dams produces downstream winter flows 24/7 commonly 4 to 8 times greater than the colder pre-dam flows. These increased winter discharges of much warmer water have thermally contaminated our northern regions with possible strong global climate implications. For example, after the Krasnoyarsk Dam was built on Siberia's Yenisei River, its larger and warmer discharges prevent the Yenisei from freezing over for up to 190 miles downstream of its hydroelectric turbines. With the presence of Siberia's cascading dams, like on the Angara and Yenisei, vast sections of these continent crossing rivers are no longer locked in ice during the long winter months.

Altering the chemistry of the atmosphere with fossil fuel emissions is warming the planet, but it is my hypothesis that the increased water vapor from huge Arctic reservoirs has supercharged the weakening of the Siberia High forcing Arctic and northern hemispheric warming. The unprecedented and almost instantaneous increases in Siberian air temperatures, humidity levels and precipitation rates (See Essay 4), following the filling of these man-made inland seas, were cataclysmic events in a region with comparatively minimal CO2 emissions.

Given the magnitude of these weather factor changes that co-incided with the timing of the completion of the dams and filling of their reservoirs, I would further hypothesize that reducing global carbon emissions would have little, if any, impact on slowing down Arctic warming. Humidity from these inland seas and the heat transport by thermally contaminated Arctic rivers should be at the forefront of climate change discussions.