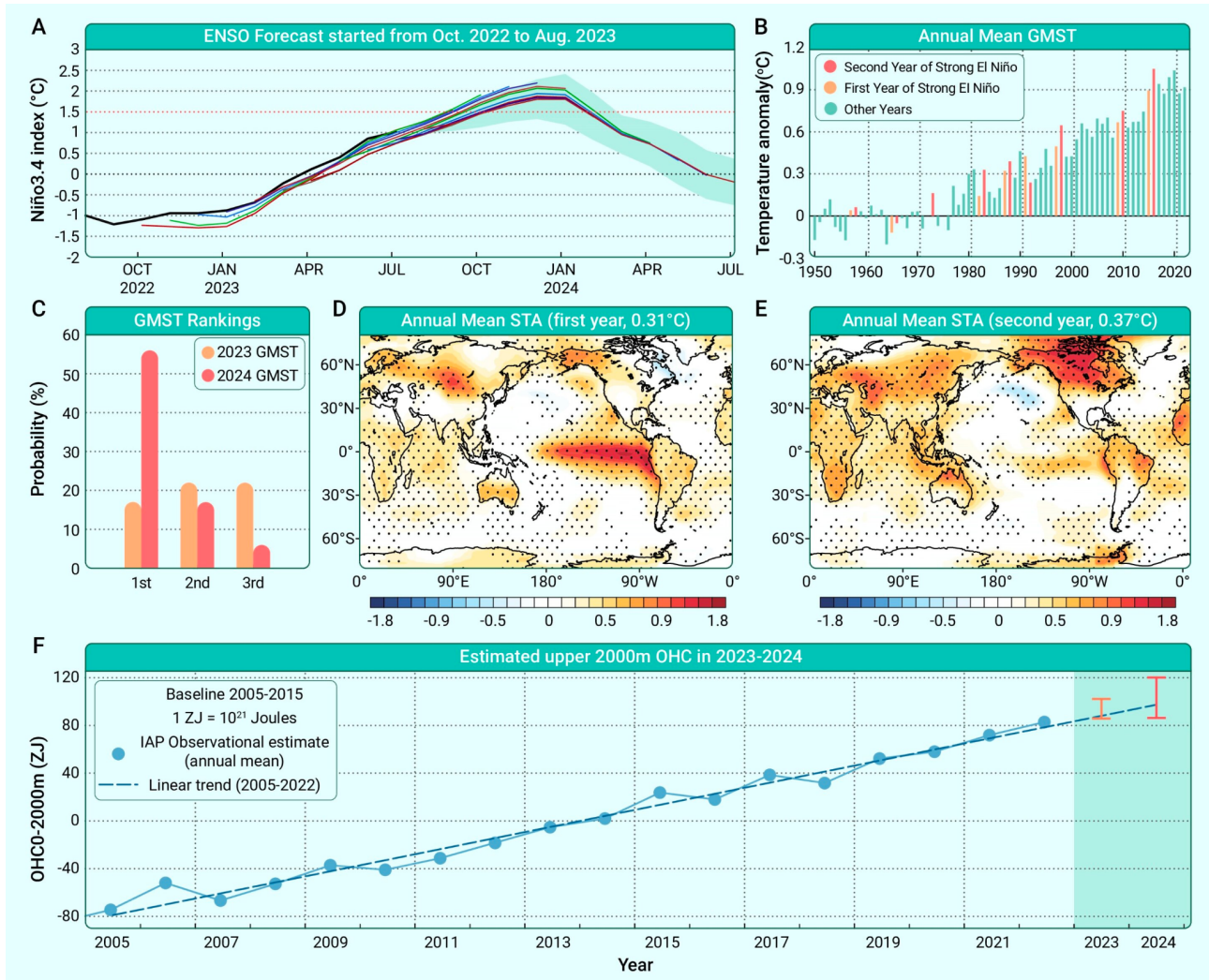


Strong El Niño expected to drive record-breaking global surface temperatures and trigger climate crises in 2023–2024



Climate crises associated with the predicted strong El Niño in 2023-2024 (A) 12-month forecasts of ensemble-mean Niño3.4 index that started from Oct. 2022 to Aug. 2023 made by IAP ENSO EPS (solid color lines), the shading shows the ensemble spread of forecasted Niño3.4 index starting from Aug. 2023, and the black solid line represents the observed Niño3.4 index from Aug. 2022 to Jul. 2023. (B) Annual time series of GMST anomalies during 1950-2022 (Datasets: BEST, GISTEMP v4). The first and second years of nine strong El Niño events are indicated by orange and red bars, respectively. (C) The statistically forecasted probability for GMSTs to be 1st to 3rd in 2023 and in 2024. (D)-(E) Distribution of STAs in the first and second years of strong El Niño composited by the nine events in B. (F) Annual time series of the OHC0-2000m during 2005-2022 (blue dots), the corresponding linear trend (gray dashed line), and the estimated OHC0-2000m in 2023-2024 (red and orange bars) based on linear regression methods with a 90% confidence interval. Credit: The Innovation Geoscience (2023). DOI: 10.59717/j.xinn-geo.2023.100030

Source: <https://phys.org/news/2023-09-strong-el-nio-record-breaking-global.html>

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A strong El Niño event is going to wreak havoc on global surface temperature and trigger several climate crises in 2023–2024, according to researchers from the Institute of Atmospheric Physics (IAP) of the Chinese Academy of Sciences.

The El Niño event, known for releasing massive heat into the atmosphere, is poised to change atmospheric circulation patterns, influence tropical-extratropical interactions, and impact subtropical jets, monsoons, and even polar vortices, and finally results in a rapid surge in Global Mean Surface Temperature (GMST).

The study was published in *The Innovation Geoscience* on Sept. 15.

GMST, which integrates global land surface temperature and sea surface temperature, is one of the vital indicators of climate variability and global warming. Its interannual variability is primarily dominated by ENSO events, with El Niño events being particularly influential due to their capacity to release immense heat into the atmosphere, leading to anomalies in atmospheric circulation and changes in the surface energy balance.

Earlier in 2023, the ensemble prediction system developed by IAP has predicted that there will be an El Niño event in boreal autumn and may be maintained throughout winter.

Based on historical climate data and prior studies, the IAP team revealed the potential extent and consequences of the extreme warming expected in 2023–2024. Their findings indicate a 17% probability that the 2023 GMST will become the highest recorded since 1950, and a staggering 61% probability that it will rank among the top three. In 2024, these probabilities suddenly rise to 56% and 79%, respectively.

During the development of a strong El Niño in 2023, warm anomalies are expected to predominantly affect the tropical central-eastern Pacific, the Eurasian continent, and Alaska. However, in the following year, 2024, warm anomalies are likely to encompass the entire continents, significantly increasing the chance of land-based heat waves, droughts, and wildfires.

According to Prof. Zheng Fei, corresponding author of the study, "In addition to the surge in surface temperatures, the strong El Niño in 2023-2024 is predicted to trigger a cascade of climate crises." These include marine heat wave intensification, ocean deoxygenation, oceanic diversity reduction, damages of marine ecosystems, sea level rise, and crop yields reduction.

Furthermore, China may face multiple climate anomalies during this period. For instance, the suppressed winter monsoon in 2023 may lead to elevated winter temperatures in most regions of China and could also increase the probability of air pollution. In 2024, northern China may experience drought in spring, while southern regions are most likely need to face the risk of extreme rainfall and flooding during the summer.

Discussion Questions

How do we describe the formation of the El Niño Southern Oscillation in words or with a well-annotated diagram?

Human-nature interactions are dynamic and complex; physical phenomena have human implications. What are some social and economic issues caused by El Niño mentioned in this article?