Abstract

This project examines the association of sunspots on the yields of wheat, corn, and rice, three staple crops that provide roughly half the calories consumed by humanity (Poutanen et al., 2022). Sunspots are temporary phenomena on the Sun's surface that are associated with increased solar output, thereby affecting Earth's temperature and exposure to solar radiation. Sunspots follow an 11-year solar cycle and may influence food production. The correlation between sunspot activity and crop yield data was analyzed using publicly available sources from the Global Surface Summary of the Day (GSOD) and the U.S. Department of Agriculture (USDA). From 1960 to 2000, results showed a strong positive correlation between detrended sunspot activity and wheat and rice yields ($r = 0.619$, $r = 0.712$), whereas corn yields and sunspots showed a strong negative correlation ($r = -0.671$). Compared to rice and wheat, corn yields showed significantly greater variation in output during the analysis period, suggesting that other factors may have affected the supply. After 2000, however, these correlations weakened in all three crops. Advances in agricultural technology, such as precision agriculture and the widespread adoption of genetically modified organisms (GMOs) in commercial crop production, may be why the correlations diverged after 2000. These findings support the hypothesis that periods of high sunspot activity are associated with higher wheat and rice yields to a point. However, over the past 20 years, other factors may have impacted the wheat yield data independent of sunspot activity.