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THE CLIMATE VARIATIONS ARE CONTROLLED BY THE SOLAR IRRADIANCE

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The Earth's climate is a highly complex and non-linear all observed in the last quarter of the 20th century, system affected by numerous factors, dynamics and loops of simultaneous climate changes on planets of the Solar system. feedback effects. The climate system depends at an The gradual weakening of the Gulf Stream power will result in extremely complex set of long-term (≥ 20 years) physical even stronger cooling in the zone of its action. All changes in processes in the ocean-land-atmosphere system, which, in the Earth's climate from the Little to the Big Ice Ages are due to turn, is influenced by diverse, mainly quasi-bi-centennial cyclic change in the TSI, taking into account not only direct but variation of the total solar irradiance (TSI). If we take into also more important subsequent secondary feedback effects. account only by direct impact of quasi-bicentennial variations. TSI order ~0.4%, the resulting increments in the planetary temperature are small (~0.3 K); however, they are extremely important as a triggering mechanism of subsequent multiple feedback effects, which cause a significant change in the magnitude of the Earth's Bond albedo, the content of greenhouse gases in the atmosphere, and the transmission of the atmospheric transparency window. The climatic influence of these effects depends on the duration of the variation of TSI and may affect the climate up to three times as strong as directly TSI variations do. The direct effect of the quasi-bicentennial variations of the TSI accounts for about 25-30% of the observed change in the planetary temperature, and the remaining of the temperature change are determined practically by multiple influences secondary feedback effects. Quasi-bicentennial cyclic variations of TSI along with very important successive multiple influences of the feedback effects are the main fundamental cause of corresponding alternations of climate variation from warming to the Little Ice Age and by the main factor that controls the climate system. The impact of an increase in the area of the cloud cover, presumably caused by the growth of the cosmic rays flux, on climate is practically absent. The long-term (≥ 20 years) equilibrium state of the Earth's average annual energy balance between the TSI coming into the outer layers of the atmosphere and the total energy radiation going out from the Earth into space from the entire atmosphere determines the practical stability of the climate. However, since ~1990, the Sun has been in the declining phase of the quasi-bi-centennial variation in TSI. The observed practically proportional decrease in the average annual TSI portion absorbed by the Earth since ~1990 has not been compensated by a decrease in the average annual energy radiated into space due to the thermal inertia of the oceans. Since ~1990, the Earth radiates more energy back to space than it absorbs. As a result, the Earth has, and will continue to have, a negative average annual energy balance and a long-term adverse thermal condition. Such gradual loss in the total amount of the solar energy accumulated by the oceans during the twentieth century has resulted in the beginning of a quasi-century epoch of a new Little Ice Age after the maximum phase of solar cycle 24. In fact, the warming ended in the 2016. The start of the solar Grand minimum is anticipated in the solar cycle 27±1 in 2043±11 and the beginning of the phase of deep cooling in the new Little Ice Age in 2060±11. The solar irradiance defines of the climate both of the Earth and other planets since long-term changes in the Sun's energy output can account for almost.