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Stardust component in climatic variations

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It is generally believed that the low-frequency variability of climatic parameters seems to be connected to solar cycles. The main periodicities are: 11-year (Schwabe), 22-year (Hale), 33-year (Bruckner) and 80-100 (Gleissberg) cycles. The main heliophysical factors acting on climate, biosphere and atmospheric state are solar irradiance, intensity of solar and galactic cosmic rays (relativistic particles with energies $>$ 500 MeV) changing the cloud cover of the atmosphere and UVB-radiation. The 11-year and 80-90 solar cycles are apparent in solar radiation and galactic cosmic ray trends. At the same time the bidecadal Hale cycle, related to a reversal of solar magnetic field direction is practically absent in either solar radiation or galactic cosmic ray variation. Besides nobody can identify any physical mechanisms by which a reversal in solar magnetic field could influence climate. However, the 22-year cycle has been identified in practically all regional climatic (droughts, rainfall, tree growth) and temperature records all over the world. We discuss here one a possible cause of bidecadal periodicity in climatic records. A potential reason of this phenomenon seems to be a variation of stardust flux inside of the Solar System. The most recent observations by the DUST experiment on board the Ulysses spacecraft have shown that the solar magnetic field has lost its protective power during the last change of its polarity (the recent solar maximum), and stardust level inside of the Solar System was trebled [Landgraf et al., JGR, 108(A10), 2003]. It is possible that the periodic increase of stardust in the Solar System will influence the amount of extraterrestrial material that rains down to the Earth and consequently the Earth's atmosphere and climate through alteration of atmospheric transparency and albedo. This material (interstellar dust and/or cometary matter) may also provide nucleation sites and thereby influence precipitation. It is now our purpose to investigate farther Arctic tree-ring records and to refine our understanding of the physical mechanisms that link extraterrestrial forcing and climatic changes

on decadal to centennial timescales. It should be noted that stardust would influence the Earth's climate together the other agents of extraterrestrial origin (solar radiation and cosmic rays modulated by solar activity). The work was partially supported by Russian Foundation for Basic Research (grant N 05-04-97528).