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Further studies on the modulation of fossil fuel production by global temperature variations

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Abstract

This study extends the earlier work of Rust and Kirk (1982) on the inverse modulation of global fossil fuel production by variations in Northern Hemispheric temperatures. Recent revisions and extensions of the fuel production record are incorporated and a much improved temperature record is used. The new data are consistent with the predictions of the original Rust-Kirk model which is extended to allow for time lags between variations in the temperature and the corresponding responses in fuel production. The modulation enters the new model through the convolution of a lagged averaging function with the temperature time-series. Explicit terms account for the perturbations caused by the Great Depression and World War II. The final model accounts for 99.84% of the total variance in the production record. The temperature modulation produces variations of as much as 30% in the total production. This modulation represents a feedback which is consistent with the predictions of the Gaia hypothesis for a planetary greenhouse temperature control. The new model calculates 20-y fuel production predictions for three temperature scenarios which hopefully bracket the possibilities for temperature behavior during that time.

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