Optimization and validation of fire model coupled with Hadley Centre General Circulation Model

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The objective of work was to improve the existing fire-module coupled with Hadley Centre General Circulation Model (GCM). Equations which are different to those in the original model structure have been proposed and tested.

During the study the simple off-line model (not coupled with GCM) has been developed (performing about 200 times faster than GCM). It has been found, that results from off-line fire model and from GCM are in good agreement, and the off-line approach could successfully be employed in the process of fire-module optimization. The process of optimization based on maximizing the spatial correlation coefficient between computed and observed burnt fraction: GFED database.

The final verification of optimal parameters found in off-line model has been done by their implementation to GCM. In effect of presented optimization, the spatial correlation coefficient between improved fire model and observed burnt fraction has been increased from R=0.15 (original model) to R=0.35 (modified one).Computed burnt area has been validated against other products of burnt area (L3JRC).

As a part of this study a few climate properties (1.5m temperature, dew temperature and moisture content in top soil layer) produced by GCM has been compared to ERA40 reanalyzes data.