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## Dependence of solar radiative forcing of forest fire aerosol on ageing and state of mixture

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**Abstract.** During airborne in situ measurements of particle size distributions in a forest fire plume originating in Northern Canada, an accumulation mode number mean diameter of 0.34  $\mu\text{m}$  was observed over Lindenberg, Germany on 9 August 1998. Realizing that this is possibly the largest value observed for this property in a forest fire plume, scenarios of plume ageing by coagulation are considered to explain the observed size distribution, concluding that the plume dilution was inhibited in parts of the plume. The uncertainties in coagulation rate and transition from external to internal mixture of absorbing forest fire and non-absorbing background particles cause uncertainties in the plume's solar instantaneous radiative forcing of 20-40% and of a factor of 5-6, respectively. Including information compiled from other studies on this plume, it is concluded that the plume's characteristics are qualitatively consistent with a radiative-convective mixed layer.

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