

HEAT WAVE OF SUMMER 2003 ENHANCED BY CLOUDLESS SKIES

The increase of temperature in summer results from various phenomena. A very important one is the energy brought by the sun radiation impinging at ground level. A large increase of this radiation enhances the increase of the air temperature, especially in the absence of wind and precipitation. This happened in July and August 2003.

The map exhibits the monthly mean values of the daily irradiation (in Wh/m²), observed over France and surroundings, for the month of August, averaged over the period 1993-2002 (left map), and for the month of August 2003 (right map). The difference is striking. One sees clearly the increase in radiation in August 2003 with respect to the mean value for the 10 previous years. This increase of approximately 1 kWh/m² is almost constant over France. It means a relative increase of 20 % with respect to the normals. The Northern part has received in August 2003 the same energy than the Southern part in normal period. The heat wave was also favored by the absence of temporal variability of the radiation: -76 % relative to the normals. That is the radiation was constantly high every day. Such a phenomenon was not observed during the 10 previous years: 2003 is an exceptional year.

The maps for the months of July exhibit the same tendency, though the increase relative to the normals is less (0.7 kWh/m², i.e. +13 %).

The geographical distribution of this increase is well marked. On both maps, the irradiation is similar (i.e. no change) for United Kingdom, Belgium and the Netherlands as well as for Spain, Corsica and Sardinia. Actually, the changes and the increase in cloudless skies occur in France, South of Germany, Switzerland and Northern Italy.

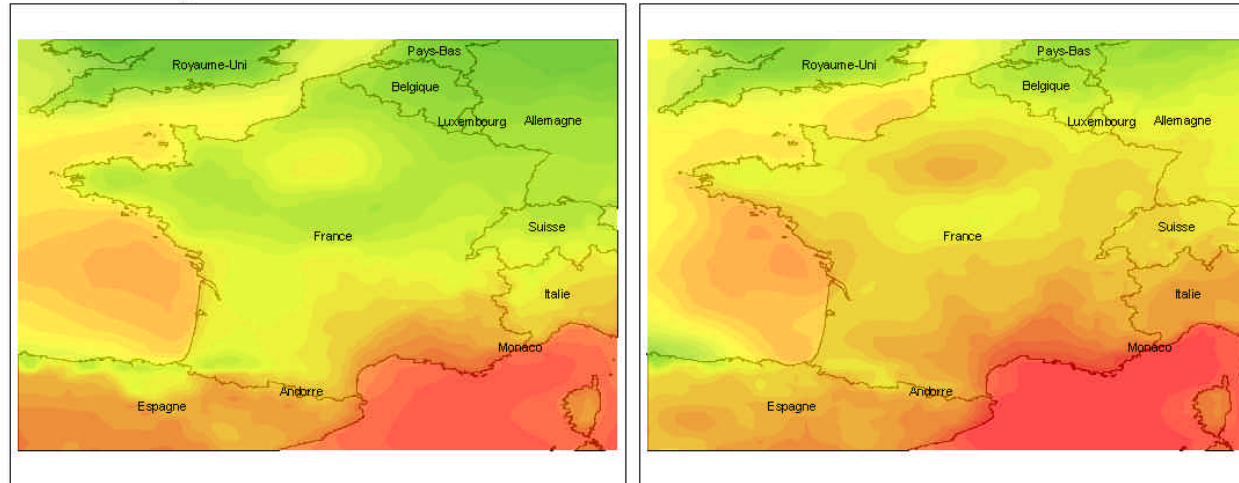
The following table reports on the situation for some large cities in France. For each city, are reported values observed for the 10-years in July and August, the increase observed in 2003 in absolute value (Wh/m²) and relative value (%). Marseille, and more generally the Mediterranean Coast, exhibits the largest irradiation. The increase is large, of order of 500 Wh/m², for each month. However, the relative value is still low (less than 10 %). Used to large irradiation, and having experienced sanitary problems due to heat wave a few years before, Marseille was prepared and the deaths were limited during August 2003 compared to the other cities. Elsewhere, relative increase was very large. The most spectacular case is that of Strasbourg: + 26 %. With values of order of 5800 Wh/m², the Paris area and Lyon experienced radiation similar to that of Costa Brava, without being prepared. One may note that the increase in July was low and similar to the inter-annual variations usually observed.

	Mean values 93-02 (Wh/m ²)		Increase in 2003 (Wh/m ²)		Increase in relative value (%)	
	July	August	July	August	July	August
Lille	4507	4075	-13	484	0	12
Strasbourg	4573	4290	499	1099	11	26
Paris	5520	5085	103	722	2	14
Lyon	5606	5011	186	750	3	15
Toulouse	5844	5240	594	782	10	15
Marseille	7609	6663	418	496	5	7

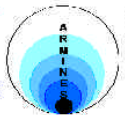
Un ciel sans nuage a favorisé la canicule de l'été 2003

Moyenne décennale du mois d'août

Août 2003



Irradiation journalière en Wh/m²



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