2 February 2011
Japan Meteorological Agency

2010, Second Warmest Year on Record

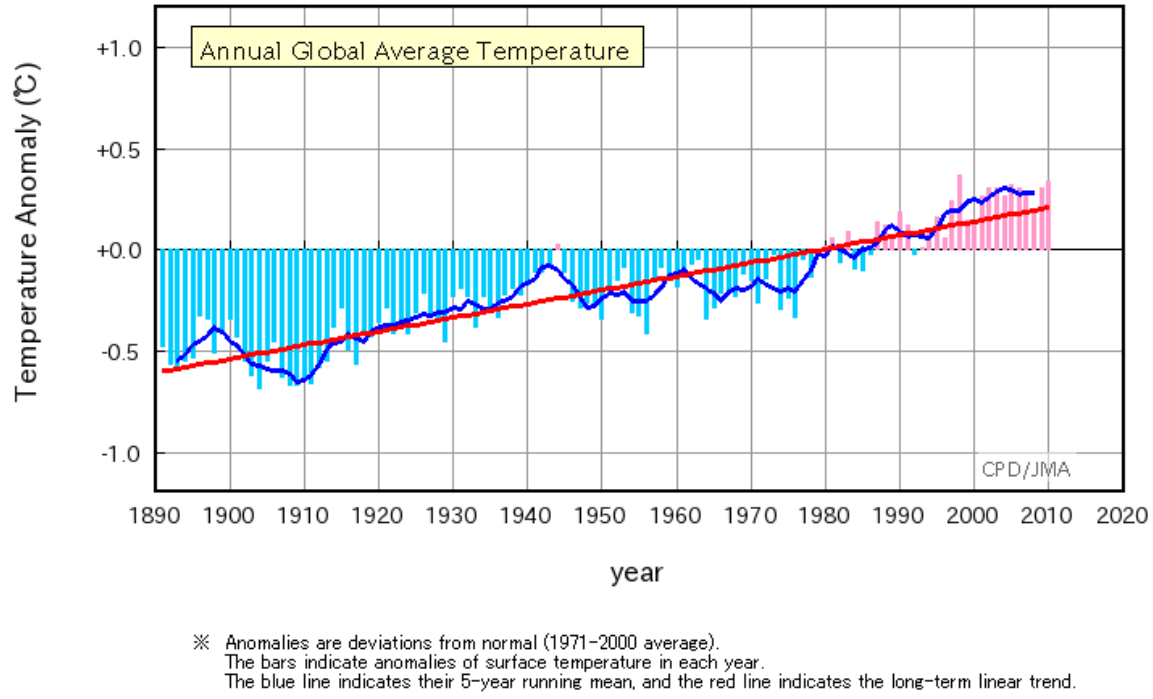
The annual anomaly of the global average surface temperature in 2010 (i.e., the average of near-surface air temperatures over land and sea surface temperatures combined) was estimated at +0.34°C above normal (based on the 1971 – 2000 average), second highest only after 1998 since 1891, the earliest year for which Japan Meteorological Agency (JMA) analyzes global temperature anomalies (Figure 1).

Warm temperature deviations are noticeable around the world, not least in the Indian Ocean and the Atlantic Ocean, with some exceptions in parts of Central Asia (Figure 2).

On a longer time scale, the annual global average surface temperature has been on a rising trend at a rate of about 0.68°C per century.

The global average temperature over land turned out to be the third on record.

It can be presumed that the high temperatures in recent years have been influenced by natural climate variability that fluctuates on a cycle ranging from several years to several decades, as well as by longer-term global warming due to an increase in anthropogenic greenhouse gases including CO_2. In addition to these contributions, the warmth in 2010 can also be attributed to an El Niño event which lasted from summer 2009 to spring 2010.



※ Anomalies are deviations from normal (1971-2000 average).
The bars indicate anomalies of surface temperature in each year.
The blue line indicates their 5-year running mean, and the red line indicates the long-term linear trend.

Figure 1 Long-term change in surface temperature anomalies averaged over the globe

Light-blue and pink bars indicate anomalies of surface temperature for each year. The blue line indicates five-year running mean, and the red straight line the long-term linear trend. Anomalies are calculated as deviations from the normal (1971-2000 average).

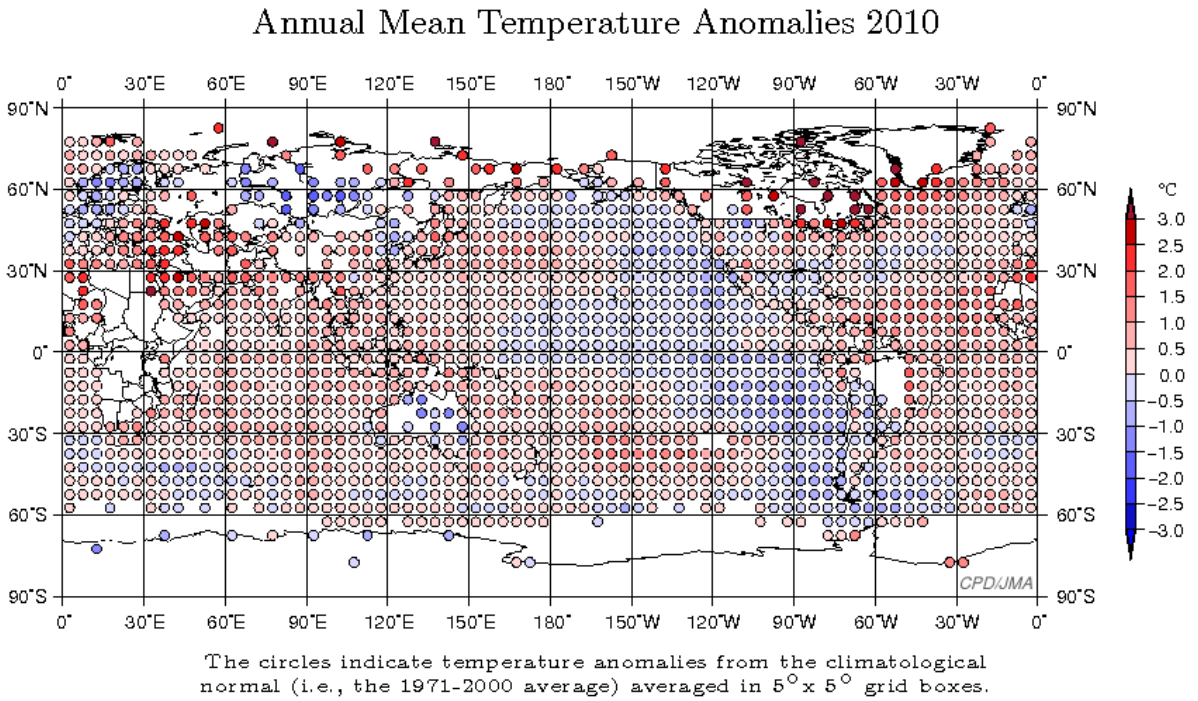


Figure 2 Annual mean temperature anomalies in 2010

The filled circles indicate temperature anomalies from the climatological normal (i.e. the 1971-2000 average) averaged in 5° x 5° grid boxes.

Ranking of annual global temperature anomalies

(shown relative to 1971-2000 base period)

Rank	Year	Temperature Anomaly
1	1998	+0.37
2	***2010***	***+0.34***
3	2005	+0.32
4	2009	+0.31
	2006	+0.31
	2003	+0.31
	2002	+0.31
8	2007	+0.28
9	2004	+0.27
	2001	+0.27