This is the print version of the Skeptical Science article 'It's not happening', which can be found at http://sks.to/warming.

Evidence for global warming

What The Science Says:
There are many lines of independent empirical evidence for global warming, from accelerated ice loss from the Arctic to Antarctica to the poleward migration of plant and animal species across the globe.

Climate Myth: It's not happening
"...these global warming studies that now we're seeing (are) a bunch of snake oil science." (Sarah Palin)

The evidence for global warming is being meticulously accumulated by scientists all over the world. This evidence includes the following independent observations that paint a consistent picture of global warming:

- Our planet is suffering an energy imbalance and is steadily accumulating heat (Hansen 2005, Murphy 2009, von Schuckmann 2009, Trenberth 2009)
- The height of the tropopause is increasing (Santer 2003, press release)
- Jet streams are moving poleward (Archer 2008, Seidel 2007, Fu 2006)
- The tropical belt is widening (Seidel 2007, Fu 2006)
- There is an increasing trend in record hot days versus record cold temperatures with currently twice as many record hot days than record cold temperatures (Meehle 2009, see press release).
- A shift towards earlier seasons (Stine 2009)
- Cooling and contraction of the upper atmosphere consistent with predicted effects of increasing greenhouse gases (Lastovicka 2008)
- Lake warming (Schneider & Hook 2010)

Ice Melt

- Arctic permafrost is warming at greater depths (Walsh 2009) and degrading (IPCC AR4, section 4.7.2.3)
- Global sea level rise is accelerating (Church 2006)
- Antarctic ice loss is accelerating (Velicogna 2009), even from East Antarctica which was previously thought to be too stable to lose ice mass (Chen 2009)
- Greenland ice loss is accelerating (Velicogna 2009, van den Broeke et al 2009)
- Glaciers are shrinking globally at an accelerating rate (WGMS 2008)
- Arctic sea-ice loss is accelerating with the loss rate exceeding model forecasts by around a factor of 3 (Stroeve 2007).
- Lake and river ice cover throughout the Northern Hemisphere are freezing later and breaking up earlier (Magnuson 2000, Hodgkins 2005)

Biological changes

- Animal and plant species are responding to earlier springs. Eg - earlier frog breeding, bird nesting, earlier flowering, earlier migration of birds and butterflies (Parmesan 2003)
- The distribution of tree lines, plants, birds, mammals, insects, fish, reptiles, marine invertebrates are shifting towards the poles (Parmesan 2003)
- Growing season is lengthening (Christidis 2007)
- Earlier emergence of Melbourne butterflies (Kearney 2010)
- Changes to physical and biological systems across the globe are consistent with warming

temperatures (Rosenzweig 2008)
- Distribution of plants are shifting to higher elevations (Lenoir 2008)
- UK Flowers blooming earlier now than any time in last 250 years (Amano 2010)
- Arctic phytoplankton blooming earlier in the year, affecting the food chain (Kahru 2010)
- Earlier emergence of Melbourne butterfly: 1.6 days per decade (Kearney 2010).
- Decline in lizard populations (Sinervo 2010)
- Drop in primary productivity due to unprecedented warming at Lake Tanganyika (Tierney 2010)
- Tropical reef corals are expanding poleward (Yamano 2011)
- Species are shrinking (Sheridan 2011)

Intermediate rebuttal written by John Cook

Update July 2015:

Here is a related lecture-video from Denial101x - Making Sense of Climate Science Denial

[*see video at* ***this link***.]

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Skeptical Science explains the science of global warming and examines climate misinformation through the lens of peer-reviewed research. The website won the Australian Museum 2011 Eureka Prize for the Advancement of Climate Change Knowledge. Members of the Skeptical Science team have authored peer-reviewed papers, a college textbook on climate change and the book Climate Change Denial: Heads in the Sand. Skeptical Science content has been used in university courses, textbooks, government reports on climate change, television documentaries and numerous books.

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