Robert Henson The Rough Guide to Climate Change – The Symptoms, The Science, The Solutions, Rough Guides, London and New Delhi, 2011

Part 3: The Science – How do we know what we know about climate change. Heat at a height, page 200 to 204

Rising temperatures refers to temperatures at ground or sea level. But temperatures in the troposphere influence surface temperatures. The troposhere is the first layer of the atmosphere. It rises between eight and 16 kilometers above ground and sea level. So it is important to take into account temperatures high above the earth's surface. There are two methods for determining these temperatures from higher altitudes. There are radiosondes (balloon-borne instrument packages) and satellites. It is generally accepted that satellite measurements are superior to those generated by radiosondes.

In 1988 Spencer and Christy found satellite data indicating no temperature rise in troposphere. This contrasted with observed warming at ground level. Climate science assumed close correlation of ground level and tropospheric temperatures. So, one of these readings had to be wrong.

Sceptics questioned whether ground level temperatures had increased, as claimed by climate scientists. A lengthy controversy in the climate science community ensued. The first Spencer-Christy report showed no discernible tropospheric temperature trend between 1979 and 1990. By comparison surface temperatures had warmed roughly 0,2 degrees centigrade in the 1980s. The Spencer-Christy data showed no warming throughout the 1990s. The data generated by radiosondes corroborated this.

In 2000 US National Academies confirmed surface temperatures. But they said that external factors cooled the troposphere. These factors were a colder stratosphere and sulphate and emissions. The sulphate and emissions arose from the 1991 Mount Pinatubo eruption. But since 2000 measured tropospheric temperatures have climbed. New analyses of the earlier data separated the stratospheric cooling effect. This showed stronger tropospheric warming.

The 2006 US Climate Change Science Programme confirmed that satellite and surface measurements aligned. The 2007 Intergovernmental Panel on Climate Change (IPCC) Report concurred. The IPCC released data. Since 1979 surface temperatures increased by 0,16 to 0,18 degrees per decade. The tropospheric temperature increased by 0,12 to 0,19 degrees centigrade.

(summarised by Paul Hendler)