

Understanding weather – reading satellite pictures

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Pictures of the Australian region – made from data from satellites – are used in newspaper, television and Internet or fax weather and climate forecasts. Usually, the pictures are accompanied by a commentary and significant features are highlighted.

If you understand what these pictures actually show, you can get more information than the commentary provides. It helps you use the pictures to make your own estimates of likely weather for your area.

Two types of pictures

In Australia the Bureau of Meteorology creates

images from a number of sources. Those most commonly seen are from data supplied by the Japan Meteorological Agency. Their MTSAT-1R satellite covers this portion of the globe.

Most broad-scale images use a resolution from 5 km by 5 km up to 20 km by 20 km for each point. Any feature would have to be the dominant item in an area this size to register a single point. Most features would not show clearly unless they cover several points. Therefore, relatively small and isolated weather events will not be apparent on satellite pictures.

There are two types of satellite pictures frequently seen: Visible (VIS) and Infra Red (IR1).

The VIS image is what a normal black and white video camera would get, looking down at the earth from a satellite. This is not used very much in

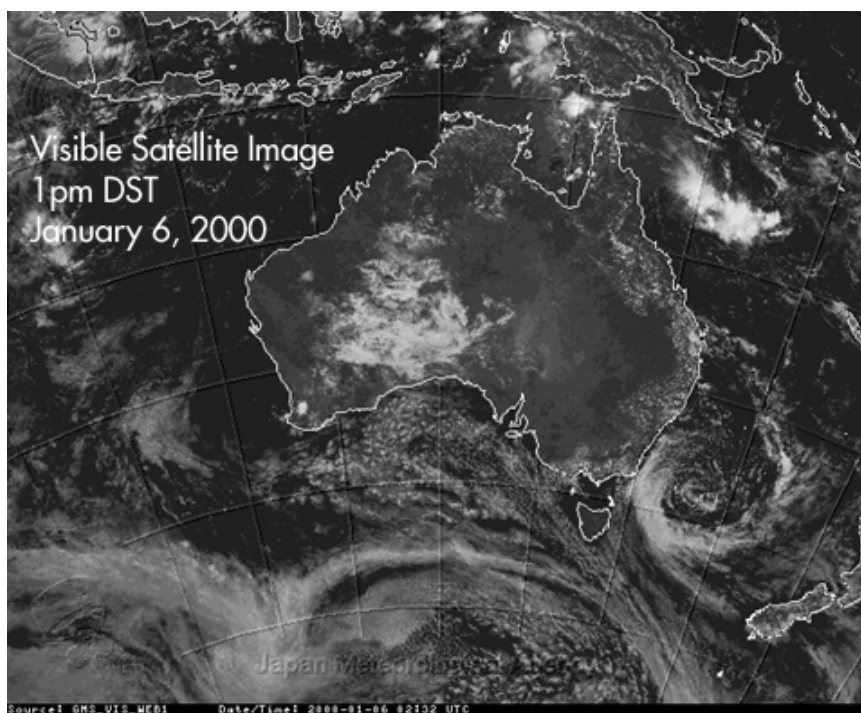


Figure 1 : Visible satellite image taken at 1pm Daylight Saving Time on January 6, 2000 – from Bureau of Meteorology courtesy of Japan Meteorological Agency.



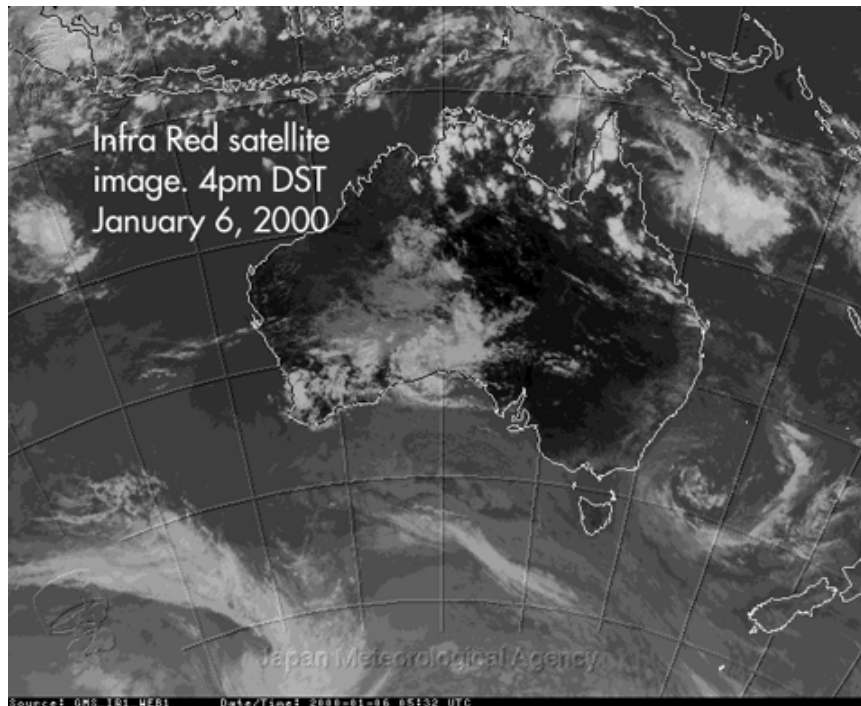


Figure 2 : Infra Red satellite image taken at 4pm Daylight Saving Time on January 6, 2000 – from Bureau of Meteorology courtesy of Japan Meteorological Agency.

public media. It shows the dense and highly reflective low-level cloud as whitest and the higher thinner cloud as duller. A major limitation is that it is only possible to record these images during daylight hours.

The IR1 image is most common. It is made up from temperature readings of each point. This is recorded in one of several infra red frequencies – hence the ‘1’ in IR1.

The different temperatures are allocated a shade of grey. The coldest and therefore highest points – usually high cloud – are shown as white. The progressively warmer points move through shades of grey and show middle level cloud, with possibly low cloud, fog, warm ocean or cool earth for the darker greys, to black for the hottest areas – usually the ground. Because they are temperature-based, the images are available 24 hours a day.

When interpreting IR1 images remember they just show the temperatures of whatever is closest to the satellite. They do not show storms, rain, cloud and cloud-free areas as is often inferred. Precipitation may be, but is not necessarily, associated with the white or grey in the image.

Satellite pictures do provide an excellent look at large-scale developments. With a reasonable understanding of how weather works and with other information – such as the synoptic charts – these pictures help to assess the chances that events like showers, storms, snow or winds are affecting a specific small area, without having to get detailed reports from a huge number of locations. Assuming weather systems will evolve

normally, this allows you to make reasonable estimates of your short-term weather.

The Visible Image is often used to distinguish between features that show up on the Infra Red image as similar shades. Unfortunately, both only show what is closest to the satellite. The higher features can sometimes obscure important weather features underneath. Other satellite data and surface, ship and aeroplane observations are used by forecasters to sort things out. These are not readily available to help you interpret satellite pictures.

Labels and attachments

The Infra Red image will often be labelled IR. However, it is the most commonly used image and is sometimes reproduced without identification. Assume an image without identification is an IR.

It should also have a ‘time stamp’ to show when it was created. Newspapers often use local time but many pictures will have ‘UTC’ or ‘Z’ time stamps. This is the coordinated universal time that is equivalent to Greenwich Mean Time. For NSW this means the pictures are not as old as the time stamp might suggest. In Eastern Standard Time add 10 hours to that shown – or 11 hours in Daylight Saving Time. Often this will mean the local date is one day later than the UTC indicated day.

Sometimes the grey scale is shown along the side of the image frame. It only gives the range of grey shades used and not the associated temperatures. These temperatures commonly range from –90°C to +60°C.

Modified pictures

Often the Infra Red image has been modified by the publishing organisation. Commonly they have a colour image of the Australian land area inserted, or have the grey scale changed into colours to highlight the colder points, or have the number of shades reduced. There may be a combination of these changes. They still just show temperatures.

Changing the background land and sea areas improve the visual attraction of the images, but often make interpretation more difficult. Features can be obscured or made smaller and mid-tone areas less distinctive. Changing the cloud colours can highlight areas of special interest, but make the general overview of large systems more difficult to appreciate.

At some Internet sites there are cloud picture 'loops' available. Some television reports use a similar display. These show the most recent 6–12 IR images in rapid succession. This gives a good view of how synoptic systems are moving by showing the associated cloud development and decay. You can get an idea of the speed and direction of movement across your area and if the systems are developing or fading away.

Images available

- The most recent satellite images, updated many times a day, roughly hourly and are available from the Bureau of Meteorology Internet site www.bom.gov.au/weather/satellite
- An image loop can be seen at the James Cook University Internet site www.jcu.edu.au/JCUMetSat/web/metsat
- SBS television uses regularly updated images in its Weather Watch sessions, and pay TV has dedicated weather channels that frequently show images.

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www.dpi.nsw.gov.au/primefacts

Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing (May 2007). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of New South Wales Department of Primary Industries or the user's independent adviser.

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