



# Satellite imagery assists flood emergency response and recovery

## International support for Geoscience Australia's contribution



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Heavy rainfall occurred across most of Australia between November 2010 and early February 2011 causing extreme flooding across eastern Australia, particularly in Queensland and Victoria. During the flood emergencies, Geoscience Australia provided satellite imagery and derived mapping information to support the emergency response and recovery efforts. These images came from more than twenty different satellites operated by governments and companies

from the United States, United Kingdom, Germany, Japan, Italy, France, Canada, Taiwan and the European Commission.

Between December 2010 and February 2011, Geoscience Australia acquired more than 600

**Table 1.** Detailed breakdown of each of the acquired datasets and their source.

Satellite sensor	Type	Acquisition window	Scene acquired	Resolution (m)	Acquisition method	Country of origin
Cosmo-SkyMed	RADAR	12.01.2011–13.01.2011	2	3	OGRE	Italy
RADARSAT-2	RADAR	06.01.2011–12.01.2011	4	10	Charter	Canada
TerraSAR-X	RADAR	04.01.2011–18.01.2011	9	10	Charter	Germany
ALOS, PALSAR	RADAR	04.01.2011–16.01.2011	6	10–30	Charter	Japan
ENVISAT, ASAR	RADAR	05.01.2011–17.01.2011	2	150	Charter	European Commission
Formosat 2, RSI	Optical	06.01.2011–10.01.2011	2	2–8	Charter	Taiwan
Spot4/5	Optical	07.01.2011–09.01.2011	11	20–10	Charter	France
ASTER	Optical	05.01.2011–17.01.2011	12	15	Charter	Japan
DMCii	Optical	09.01.2011–20.01.2011	6	22	Charter	UK
Quickbird	Optical	19.12.2003–22.11.2006	23	2.4	Charter	US
Worldview 1	Optical	13.01.2008–16.01.2011	331	0.5	Charter	US
Avnir2	Optical	16.01.2011	4	10	Charter	Japan
Terra, MODIS	Optical	05.12.2011–19.01.2011	10	250	GA ground station	US
Aqua, MODIS	Optical	12.12.2010–18.01.2011	6	250	GA ground station	US
MODIS Composite	Optical	19.10.2010–14.01.2011	103	500	GA ground station	US
Landsat 5, TM	Optical	05.12.2010–20.01.2011	53	25	GA ground station	US
Landsat 7, ETM+	Optical	13.12.2010–19.01.2011	25	25	GA ground station	US
			<b>Total</b>			
			609			



**Figure 1.** Landsat 5 true-colour images of Brisbane before and after the January floods. The image on the left was acquired on 19 October 2010 and shows the typical conditions around Brisbane before the floods. Urban areas appear light grey while vegetation appears green and dry areas such as farmlands appear brownish. The image on the right was acquired on 17 January 2011 and shows the conditions as flood waters receded. The flood waters appear as dirty brown while clear water is dark blue. Sediment plumes from the flooding rivers can be seen streaming out into Morton Bay from the Brisbane River. Many of the areas that appear dry (brownish) in the pre-flood image are now showing green as grasses react to the wet conditions. The cloud in this image appears grey to white.

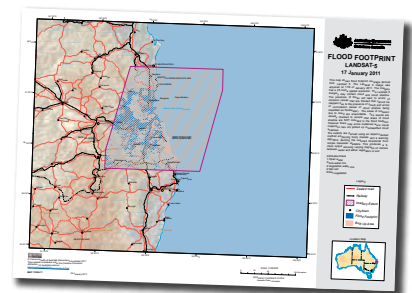
satellite images covering flood-affected areas from satellite imagery archives around the world, satellite downlink stations in Australia, international space agencies and overseas commercial imaging satellite operators (Table 1). The three key sources of these satellite images were:

- 1) Day-to-day satellite imagery acquisition from downlink stations in Alice Springs and Hobart.
- 2) Activation of the International Charter for Space and Major Disasters. The International Charter is an agreement involving 39 countries to provide satellite data during a major disaster.
- 3) The cooperative panel for Optical Geospatial Radar and Elevation (OGRE) data and services. This panel is a government procurement mechanism for accessing imagery-related data and services. The panel was established in 2010 in a joint project by Geoscience Australia and the Defence Imagery and Geospatial Organisation (DIGO).

The emergency support included the provision of satellite imagery, flood extent data and flood maps showing flood-affected areas and their surrounds. These images allowed emergency managers to carefully monitor the extent of the flooding and receding waters. Imaging satellites capture a specific point in time and so it is extremely difficult to capture the peak of a flood. In addition, many of the images are obstructed by clouds as the majority of satellites are optical satellites and cannot see through the clouds which are highly likely over a flooding area (figure 1).

## Utilisation of the satellite imagery

During the flood crises, Geoscience Australia was able to provide over 75 maps and 25 flood extent products based on the data received by emergency service agencies across Australia (figure 2). These products were used for many applications including emergency response deployment, early impact assessment, guiding Natural Disaster Relief and Recovery Arrangements (NDRRA) payments, assisting the Bureau of Meteorology with data used for flood warnings where ground instruments had been damaged, briefings and redeployment of government services such as child care facilities.



**Figure 2.** Map showing flood footprint coverage in southeast Queensland derived from the Landsat 5 satellite.

The response to the Queensland floods took the utilisation of satellite imagery to a new level for Australia and demonstrated the critical role remote sensing services have in emergency management.

### For more information

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