

# Satellite ground station expansion shows Pakistan's reliance on China

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**Pakistan has upgraded its main ground station to support two new satellites. Nick Hansen examines the expansion of infrastructure at the site in the context of Pakistan's limited space programme**

## Key Points

- The SUPARCO satellite ground station at Rawat near Islamabad doubled in size during 2017–18 to support the PRSS-1 and PakTES-1A imaging satellites.
- China sold Pakistan a turn-key system for the PRSS-1 satellite and it is likely that China retains the capability to operate the satellite.
- Pakistan's space programme remains dependent on foreign suppliers for most of its satellite subsystems and lags far behind the programme of its main strategic rival, India.

Pakistan has upgraded the country's first Landsat-receiving ground station to control and receive images from its two new imaging satellites, the Pakistan Remote Sensing Satellite-1 (PRSS-1) and the Pakistan Technology Evaluation Satellite (PakTES-1A). The satellites were launched in July 2018 by China and Pakistan claims that they are for civil purposes, although their capabilities have military applications.

The station is located in the Islamabad/Rawalpindi suburb of Rawat. As of November 2018, the station maintained six major steerable dish antennae, measuring between 5 metres and 10 m in diameter. From early 2016, construction started on facilities that doubled the size of the ground station. This was to support the PRSS-1 and PakTES-1A imaging satellites.

The ground station is run by Pakistan's national space agency, the Space and Upper Atmosphere Research Commission (SUPARCO), and is co-located with the Institute of Space Technology, its affiliated Center of Aviation, and the Science School. The three schools appear to be civilian-run. However, the ground station has security check points at its three vehicle entrances and a helicopter landing pad that may indicate a military presence.

## **Evolution of the station**

Pakistan set up a portable Landsat receiving station in Rawalpindi in 1976 with the assistance of the US National Aeronautics and Space Administration (NASA). This station was operated by SUPARCO. In 1989, a permanent ground station became operational for Landsat earth resources imagery in Rawat.

The station operated with Landsat until December 1999, according to the United States Geological Survey listing of historical contributors to the Landsat programme. A report, 'Pakistan's Space Programme', accessible on SUPARCO's website, noted that the station began collecting imagery from the French earth observation (Satellite pour l'observation de la Terre: SPOT) satellites in the late 1990s, when the station was upgraded. SPOT imagery collection continued into the mid-to-late 2000s.



*A Long March-2C rocket carrying two satellites for Pakistan – PRSS-1 and PakTES-1A – is launched at the Jiuquan Satellite Launch Center on 9 July 2018 in Jiuquan, Gansu province. China is Pakistan's main space supplier for satellites, ground systems, and launches. (China Great Wall Industry Corporation/China News Service/VCG)*

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The station archived all its data and in 1989 sent 2,540 high-density tapes of Landsat images to the Earth Resources Observation and Science (EROS) data centre in Sioux Falls, South Dakota, for digital processing and storage, according to the website of the Landsat programme. It is likely that the ground station was also intended to support SUPARCO's Chinese-launched Badr-1 communications satellite. However, that satellite failed 35 days after its launch on 16 July 1990. The Badr-B/2, a small earth observation mission, also failed several months after its launch from Baikonur by the Russian space agency on 10 December 2001.

### **Layout of the station**

As of 1989, the Rawat Landsat station is likely to have included the control building, a 10-m dish antenna (antenna 1), and an L-Band (1.67–1.71GHz) tower-mounted antenna for receiving US National Oceanic and Atmospheric Administration (NOAA) satellite real-time weather imagery. The 10-m X-Band Landsat antenna may still be in use. A likely antenna was visible mounted on the tower from the first high-resolution commercially available

imagery coverage in May 2003 until before 2009. This may have been an L-Band antenna used to receive Advanced Very High Resolution Radiometer real-time weather imagery from US NOAA satellites.

The 3-m antenna (antenna 2) was also present in the earliest available imagery in 2003, and may be used as an acquisition aid for the 10-m antenna. A 5-m antenna (antenna 3) was visible under construction in May 2003, and was operational by April 2005. The function of this antenna is unknown. Cable trenches from the control building to antennae 1 to 3 were also present in the 2003 and 2006 images. The helicopter pad was added during this period.

The large control building was also present in 2003 and is used to control the various antennae to acquire, track, and receive the downlink data. Inside the building, the data will be processed into images, analysed, and archived.

On the roof of the large control building there are three likely 2-m satellite communication (SATCOM) antennae. These were installed between late 2012 and early 2013. Two of them are pointed on an azimuth of approximately 210 degrees and the other on approximately 222 degrees. All three are at low elevation angles and are likely to be working with geosynchronous communications satellites.

New construction started in an open field at the southern end of the ground station in early 2016. The expansion included three new antennae and a large control building. The first of the new antennae (antenna 4) is 7 m in diameter and was completed in July 2017. It has a cable trench connecting it to the original control building and the new control building. The second antenna (antenna 5), mounted by March 2018, is a 6.5-m dish in the original antenna field. This antenna was subsequently covered by a 12-m geodesic radome by August 2018 and was connected to the new control building by a cable trench.

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