From New Delhi by Susan Maitra

Another milestone in space science

India has successfully launched the IRS-IB, the country's second remote sensing satellite.

On August 29, IRS-IB, India's second operational remote sensing satellite, was launched from the Baikonur Cosmodrome in the Soviet Union. The satellite, which was fully indigenously designed and built, was placed in a polar orbit at about 900 kilometers height.

In announcing the news to the Parliament, Prime Minister Narasimha Rao added that the country would have its own capability to launch satellites by next year, when the Indian Space Research Organization (ISRO)'s Polar Satellite Launching Vehicle (PSLV) is ready.

With the successful satellite deployment, India has joined a select band of nations which have established the capability for remote sensing on a continuing basis. IRS-IB's predecessor, IRS-IA, was placed into orbit in March 1988, and although it has completed its three-year design life, it is expected to remain operational for another year or so.

When IRS-IA was launched, India became the first developing nation to establish its own space-based system for remote sensing. Then Prime Minister Rajiv Gandhi described the launch as, "a major milestone in our space program."

The Indian Space Research Organization's $50 million IRS-IA carried three French-supplied linear imaging self-scanning cameras.

Since it was launched in 1988, IRS-IA has covered the whole country more than 55 times—once every 22 days—and sent back more than 350,000 images to the National Remote Sensing Agency ground station in Hyderabad. The station had been set up in 1979 to directly receive data from the U.S. Landsat satellites, and was augmented in 1987 to also receive images from the French SPOT satellite.

From Hyderabad, the images are processed for use in India's National Natural Resources Management System in the areas of agriculture, mineral, and other resource mapping; drought monitoring and flood control; ground water mapping; land-use and land cover mapping; as well as numerous other applications.

Initially IRS-IB will supplement IRS-IA, and ultimately will replace it. With two camera systems (Linear Self-Scanning Sensors, fabricated at the Space Applications Center in Ahmedabad), IRS-IB is almost identical to its predecessor. One important improvement, however, is that one more axis will now be controlled by gyros instead of Earth sensors, which will qualitatively improve the visible and infrared images provided by the satellite. IRS-IB weighs about 980 kilograms.

Future satellites in the series will be more advanced both in resolution and re-visit capability, according to the Indian Space Research Organization. IRS-IC, for instance, will have a thermal imaging capability. Preliminary design has been completed for both IRS-IC and IRS-ID, and they are scheduled for launch in 1993 and 1996.

Establishment of the remote sensing capability is the fruit of a more than 20-year effort by ISRO, with the Bhabha Atomic Research Center, in Bombay, India's premier research and development center. It is an organization reputed for its dynamism and competence.

In the early 1970s, ISRO began an experimental satellite program, and simultaneously worked to develop the ground segment of reception, processing, and analysis of satellite imagery. In this work, India has used data from the American Landsat satellite and France's SPOT. Several state and central government agencies have set up remote sensing centers for various applications. So far, most of the applications work has been at the initiative of the Department of Space and not user-driven. For that reason the full potential of the program for the country is not yet visible.

Nonetheless, its economic impact is already clear: With the success of IRS-IA, India could dispense with purchase of the SPOT series of images and restrict purchase of Landsat material to thermal images only—a considerable savings in foreign exchange by itself. But the actual economic implications are much farther-reaching, as Prime Minister Narasimha Rao pointed out in Parliament, for a developing country with diverse geological features.

The experience of IRS-IA has already shown the greater accuracy and efficiency of remote sensing compared to ground surveys. IRS-IA ground water mapping was carried out in over 400 districts with a success rate of nearly 90%, compared to the 45% success rate with conventional methods. With just a few days of imaging the entire forestry of the country can be accounted for, a project that would otherwise take years.

One estimate of the cost effectiveness of remote sensing is striking. While ground-based methods can cost about 50 rupees per square kilometer of surveyed areas, airborne remote sensing costs about 13 rupees, and satellite remote sensing a mere 0.14 rupees.