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NIAS Policy Brief

Satellite Remote Sensing Data Policy: Benefits of Free & Open Data

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Why free & open data is beneficial?

The economic benefits of remote sensing data are largely from the utilization of data in diverse applications. Free, open and timely access of satellite data has the potential of greatly enhancing the use of such data at national, regional and global levels and their potential for economic and societal benefits. Such data becomes valuable when they are transformed into information that could be used for decision making. Typical examples are, disasters & crisis management, advisory services to fishermen and farmers, assessment of forest wealth, crop production forecasts, ground water targeting, etc. It may be interesting to note that atmosphere and ocean related satellite data are already open and free for access and use.

Easy availability of data will also facilitate innovations, research & development by academia, enhanced research publications, value added products by private industries, new business opportunities/ startups, and so on. Due to

such aspects of data use, the global trend is to disseminate medium and coarse resolution satellite data at ‘no cost’ to users.

Global scenario

United States Geological Survey (USGS) policy on Landsat series, European Space Commission policy on Sentinel series, China-Brazil joint satellites policy on China-Brazil Earth Resources Satellite (CBERS) series, Russian and French government policies are good examples of how the world is taking active steps in providing free and open access to satellite data.

In addition to satellite data, the derived products, such as, Digital Elevation Model (DEM) from SRTM (90m resolution), ASTER Global DEM (30m resolution) and Science datasets from Ocean Color, Suomi NPP, NOAA, AVHRR are also being offered through a free and open access mechanism.

TABLE-1: Status of Satellite data availability from Indian Earth Observation Missions

Sl. no	Satellite	Brief Details	Status of Data availability		
			Access	Priced/Free	Timelines
1	CARTOSAT-2S	Optical imaging – Multispectral (2m Res) & PAN (65cm Res)	Sub-meter resolution PAN is restricted	PAN & Multispectral data are Priced	Spot Imaging mode. Prior programing for imaging
2	CARTOSAT-3	Optical imaging – Multispectral (1m Res) & PAN (28cm Res)	Sub-meter resolution PAN is restricted	Multispectral data is Priced	Spot Imaging mode. Prior programing for imaging
3	RESOURCESAT-2 and 2A	Optical imaging: LISS-4, LISS-3 & AWIFS	<i>All data are accessible from NRSC</i>	All are Priced products	<i>AWIFS and LISS-3 data are Free downloads (Bhuvan portal), With Latency of 2 years</i>
4	OCEANSAT-2	OCM-2 Coverages: GAC & LAC	Both GAC and LAC data are accessible	GAC: Free LAC: Priced	2 day repeat cycle
5	SCATSAT-1	Scatterometer (Ku band Pencil beam)	Open Access	Free	2 day repeat cycle
6	SARAL	Altika (Ka Band)	Open Access	Free	35 day repeat cycle
7	INSAT-3D & 3DR	6 Band Imager, 19 Channel sounder	Direct access to India forecasts	Meteorological Department (IMD) for Weather	
8	CARTOSAT-1	Optical imaging – Mono and Stereo with 2.5 m Res.	Mono and Stereo, including DSM are accessible	All products are Priced. DSM 30m pixel spacing, free download	Mission Closed. Past data available
9	RISAT -1	Synthetic Aperture RADAR	Multiple modes of operation and data is accessible	All products are Priced	Mission Closed. Past data available
10	All other IRS series of satellites	Optical and other spectral bands launched by ISRO	Predominantly optical data sets	Products are archived & Priced	Older Missions closed. Past data available

USGS: It has been observed that from 1972 to 2008, no more than 3000 Landsat images were ever sold in any given month.¹ In contrast, nearly **1 million** images were downloaded in 2009, the first year after the new policy for easy and free access to data was provided. There was a 20-fold increase of annual data downloads in 2017 as compared to 2009². Also, there was a four-fold or more increase in the annual number of publications (*from 400 to 1700 per year*), an increased opportunity for innovation. US Government invests about \$3.5 billion, annually, in civil earth observations systems. It is reported that an annual **benefit of \$30 billion** has occurred to the U.S economy by providing its citizen with critical knowledge about natural resources, climate and weather, disaster events, land-use change, ecosystem health, ocean trends, and many other earth-related phenomena.³

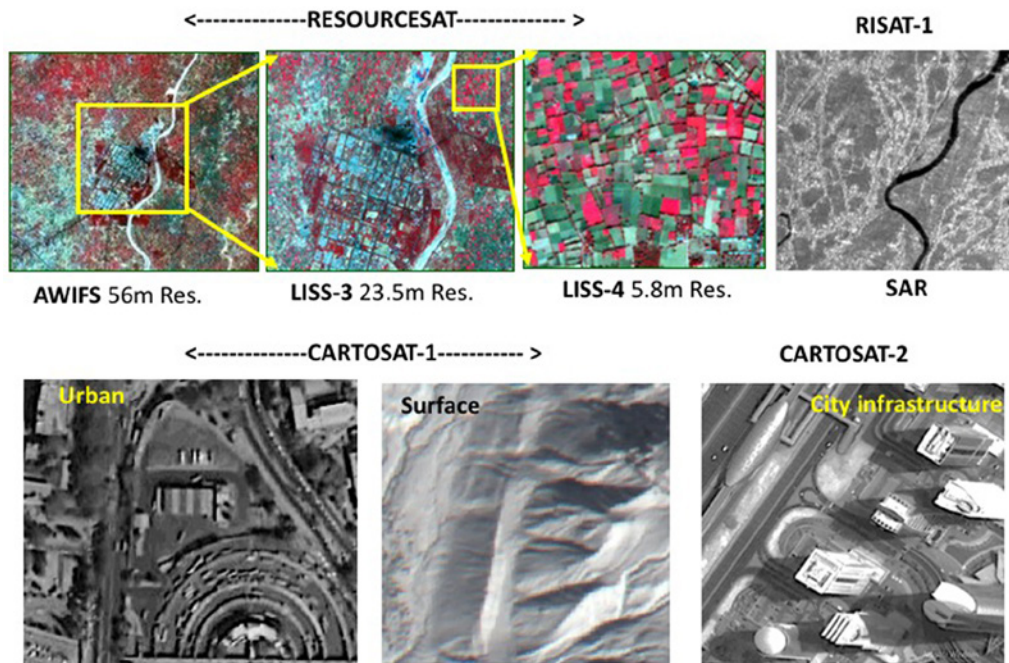
ESA: The total investment in the Copernicus program is expected to be €7.5 billion. During the period 2017 – 2035, Copernicus is expected to generate €67 to €131 billion benefits to the European society, which is 10 to 20 times the cost of the programme itself.⁴

Current Indian Data Policy

India has launched several remote sensing satellites for assessment of natural resources and environment (Table 1). Remote sensing Data Policy (RSDP) of 2001 allowed data access up to 5.8 m resolution. During 2002–2008, Data sales from National Remote Sensing Centre (NRSC), ISRO was about 3,25,094 products from seven operating satellites, with Resourcesat-1 delivering bulk of the products (1,55,119) to user community.⁵ Further, the RSDP was revised in 2011 and the non-discriminatory data access was allowed up to 1.0m resolution in the revised policy.

Bhuvan geoportal was first released for use in public domain, during 2009 and is providing open satellite data access, including derived products for developmental works and governance. It also has a provision to download coarser resolution satellite data (56m and 24m resolution), with a latency of 2 years, on free and open basis. The data downloads from Bhuvan geoportal have been on a upsurge due to this policy, particularly from the academia. The data demand is said to have grown by more than twice, for the

1 Wulder, M.A. et al. 2012. Opening the archive: How free data has enabled the science and monitoring promise of Landsat. Remote Sensing of environment, 122: 2-10.
 2 Zhu, Z. et al. 2019. Benefits of the free and open Landsat data policy. Remote Sensing of Environment 224: 382–385.
 3 http://wiki.gis-lab.info/w/Landsat_Data_Distribution_Policy
 4 https://www.copernicus.eu/sites/default/files/documents/News/Copernicus_Benefits2018_flyer.pdf
 5 CAG Report No 21 Of 2010-11.



medium resolution EO satellite data. An estimated number of about 8,00,000 data products would have been delivered to users for the year 2019 – 2020, of which 50% are likely to be from free downloads. In addition, CartoDSM (1 arc second) - version-3.0, and other Geophysical products are freely downloadable on Bhuvan geoportal.

Similarly, data from Oceansat Ocean Color Monitor (OCM) (GAC 1km resolution) - near real-time basis and INSAT Data to ESSO-IMD are open and freely accessible. This has proved to be beneficial for many national level projects in the country, including Disaster Management.

As per recently released “Guidelines for acquiring and producing geospatial data and geospatial data services including maps” (*DST F.No.SM/25/02/2020 (part-1) dated 15th February 2021*), Geospatial data with 1 m planimetry and 3 m elevation shall be freely accessible and usable.

The Implications

Satellite data are integral part of development of many services, particularly, related to weather and ocean state, and are also provided free and timely.

The National Council of Applied Economic Research (NCAER) conducted an economic benefits analysis (2015) of various satellite based services provided to user segments like Agriculture, Fishery, Ports, Offshore oil and gas exploration, Indian Navy, Airforce, Coast guard, etc. The economic benefits to farmers growing principle crops, like, wheat, paddy, sugarcane and cotton due to use of ESSO-IMD

predictions (Rs.42,000 Cr); Fishermen using PFZ inputs and savings in diesel consumption (Rs.60,000 Cr); Ocean State Forecast (OSF) for Indian Navy and Coast Guards are Rs. 4,100 and Rs. 90 Crores, respectively.⁶

India has already demonstrated many such important applications of space data for national development and economic benefits have been well documented.⁷ Studies have also shown the economic advantages, as detailed by NCAER report and other remote sensing applications. The country should now adopt free & open data policy, for both past and present acquisitions to further enrich the utility of space data in public domain.

Providing free, open and timely satellite data would make a significant impact for various sectors in the country, such as,

- Private companies, Start-ups and Incubation centers with new business prospects/ opportunities,
- Generation of Value-Added Data products – innovative business analytics
- Quality publications by Academia & R&D institutions resulting in innovations.
- Natural resources monitoring, such as, land use/ land cover, vegetation, forest, water resources, etc.
- Response to disasters, resulting in quick actionable products for decision making.
- Climate studies & change monitoring using Multi-temporal data analysis
- Data exchange with other space agencies for cross-

⁶ Economic Benefits of Dynamic Weather and Ocean Information and Advisory services in India and Cost and Pricing of Customized Products and Services of ESSO-NCMRWF & ESSO-INCOIS. NCAER, Aug 2015

⁷ Shankar, U. 2007. The economics of India’s space programme: an exploratory analysis. Oxford University Press, New Delhi.

calibration of each-others' data and furthering international co-operations

- Diversification of societal applications and reaching out to citizens at large.

It also holds, rich potential for better economic growth due to value added services, business prospects, improved science, better governance alternatives, empowerment of citizens, geosphere-biosphere programmes, new-science programs and addressing environmental challenges.

The Interventions

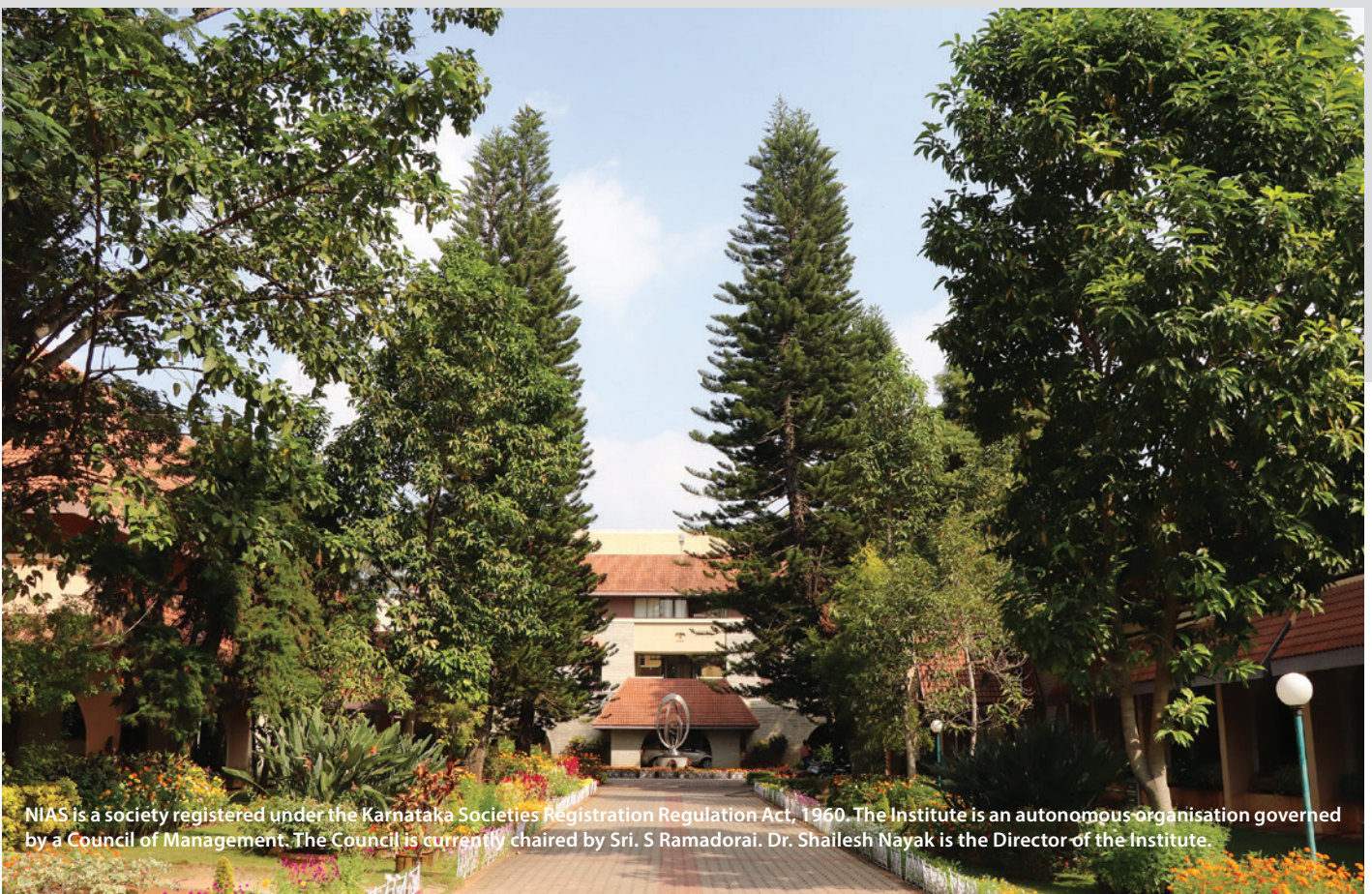
- Remote sensing data of 1 m spatial resolution and elevation data with 3m height accuracy, including value-added products should be made easily accessible and available to all stakeholders, both in human and machine-readable forms, over web and mobile platforms in near real time.
- All satellite data up to 5 m spatial resolution should be open for free download and be provided in near-real time to all users. This would help create a large global user base for Indian data. Such an initiative would assure India a unique position of leadership at national and global level. India would set a new trend in free data and first country to do so.
- A National Image Framework (NIF) and National Map Framework (NMF) to be provided by the National Remote Sensing Centre (NRSC), Indian Space Research Organization (ISRO) and the Survey of India (SoI), respectively. NRSC/ISRO and SoI should establish

national geospatial hub offering NIF & NMF foundation data through WMS or WFS through well-defined metadata.

- All satellite data should be made available from BHUVAN platform. This platform need to be made autonomous and managed by public and private partnership.
- Various thematic maps, available in the country, to be made usable through BHUVAN platform.
- It is essential to provide well calibrated space data (Radiometric & Geometric), particularly for climate studies in a timely manner, reduce data latency and provide data in real-time, improve accessibility & timeliness.
- All geospatial data generating agencies to catalogue, maintain and update datasets in a sustained and timely manner.
- To facilitate ease of business, data should be provided on an on-line portal at national level, through a cloud platform.

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