
bhuvan
INDIAN EO VISUALISATION
Gateway to Indian Earth Observation
...get the visualisation advantage
www.bhuvan.nrsc.gov.in

One-stop versatile web based Earth Observation Visualisation System

Bhuvan – Gateway to Indian Earth Observation

- Explore, experience and visualize Indian Remote Sensing (IRS) images
- Rapid access to 3D geospatial data powered with highly-efficient streaming technology enabling unparalleled 3D realism.
- Easy access to rich information on natural resources in a geospatial domain.
- Real-time fusion and streaming of massive raster and feature data "on the fly"
- Robust and open API with rich capabilities to utilize in a wide range of applications and systems
- Supports real-time data sharing and collaboration providing a true Common Operating Picture

Vision

To evince the distinctiveness of Indian imaging capabilities through online rendering of multi-resolution, multi-temporal and multi-sensor IRS imagery overlaying value added thematic maps on 3D globe whilst serving for societal good.

Know Bhuvan

What is it?

Bhuvan is an interactive versatile visualization system that allows users to navigate (or “fly”) the entire globe, scanning satellite imagery with overlays of natural resource information, roads, geographic features, and numerous other location-specific data points. Users can add their own points of interest and share them with others, chart routes, plot areas, calculate distances, and overlay separate images onto the application. Bhuvan connects to the Internet, making online resources available in connection with particular places.

Users can show or hide available layers in any combination. Using the scale and the robust measurement and terrain analysis tools, this user could plot mileages, calculate elevation difference and slope angle between two or more points in the 3D View, terrain elevation profile along a path, find places of interest along the way, and link to Web sites to contact those establishments.

What it can do?

Bhuvan has become a favorite for people needing to easily show locations, such as a mining company giving a presentation about current or potential sites. Many educators use Bhuvan to help students understand subjects ranging from sciences to History. Geologists can take students—virtually—to an area being studied and show them the topography and surrounding areas, quickly zooming out and flying to other locations. Other scientists overlay images of different thematic information, such as land use, relating the land use to images of the real world. Some administrators have also found the application valuable for monitoring various developmental schemes at grassroots level.

How does it work?

It is a free web based visualization system. By just logging on to www.bhuvan.nrsc.gov.in and downloading and installing the plug-in (for first time use), users can access Bhuvan and can fly to locations around the world by either entering the names of places or the latitude and the longitude coordinates. Zooming in and out determines the number and kind of features or locations displayed as the resolution changes. As you zoom closer to a built-up area, for instance, smaller details and their names begin to appear. On rendering, the thematic maps and its details are clickable, opening a pop-up window with information about its feature, links to related resources, photos, or other information. Users can change the orientation of the compass points of the map and adjust the aspect, such that the map is shown at any angle—from directly above to horizontal. For areas rendered in 3D, adjusting the aspect gives the impression of moving through a real space. Users can add 'Placemarks', which are clickable indicators of particular locations, and create 2D and 3D features, share, collaborate and chat, use powerful urban design tools that integrates into Bhuvan.

Why is it significant?

With Bhuvan, scientists, academicians, policy makers, or general public can leverage this integration of vast amounts of geospatial data in an easy-to-use interface without any additional resources. The tool's visual immediacy could prove enormously beneficial, for example, for a survey of various geological structures in a region. Individually, students can use Bhuvan to know and examine places they are studying. As it is interactive, the application encourages users to keep coming back to it and explore places of interest, scenes of events in the news, or parts of the country they may never visit in person.

More than just a map, Bhuvan lets users create and share personal resources. Browsing and exploring distant locales augmented with contributions from other users presents a compelling opportunity for discovery and learning. Contributing anecdotes, stories, and histories will allow users to communicate in a context of geography.

Where is it going?

Bhuvan has become more sophisticated, with additional tools and increased coverage of high-resolution imagery. The number of places that offer 3D imagery has also expanded. The dramatic views and capabilities of the program have spawned communities of users who develop content—'Placemark' collections on particular topics, 3D structures—that is available to others. Acting as a technical infrastructure, Bhuvan allows users to share personal histories and enabling virtual collaboration. Geographic notations can be found on many topics for many different places, and by integrating with other existing applications, Bhuvan is positioned to become a spatially based collection of profound information coupled with facts and knowledge.

Blogs, user groups, social networking sites and forums are enabled where, they share ideas and experiences, using Bhuvan in various scenarios, as well as post case studies they have created that use the application. As tools emerge to export content from Bhuvan to other applications, such as video files, users will be able to create projects using Bhuvan and share those projects with others.

Bhuvan gives you an easy way to experience, explore and visualize IRS images

ISRO is well known amongst space faring nations for its world-leading reputation in developing new, indigenous and innovative service oriented applications using remote sensing technology. Over the past 2 decades, ISRO has mastered the art of developing these unique applications using various spectral, spatial and temporal resolutions offered by the versatile IRS satellites and these have been successfully institutionalized in many important areas of policy making, natural resources management, disaster support, and enhancing the quality of life across all sections of the society.

Bhuvan, an initiative to showcase this distinctiveness of Indian imaging capabilities with a focus on Indian region including the thematic information derived from such imagery is of vital importance to common man. Bhuvan, an ambitious project of ISRO to take Indian images and thematic information in multiple spatial resolutions to people with a web portal through easy access to information on basic natural resources in the geospatial domain. Bhuvan showcases Indian images by the superimposition of the IRS satellite imageries on 3D globe. It displays satellite images of varying resolution of India's surface, allowing users to visually see things like cities and important places of interest looking perpendicularly down or at an oblique angle, with different perspectives and can navigate through 3D viewing environment.

The degree of resolution showcased is based on the points of interest and popularity, but most of the Indian terrain is covered upto at least 6 meters of resolution with the least spatial resolution being 55 meters from AWifs Sensor. With such rich content, Bhuvan opens the door to net centric visualisation of digital geospatial India allowing individuals to experience the fully interactive terrain viewing capabilities.

Multi-resolution images from multi-sensor IRS satellites of India is seamlessly depicted through the Bhuvan web portal to enable common man to zoom into specific area of interest at high resolution as per the prevailing Remote Sensing Data Policy (RSDP) of the government. Bhuvan brings a whole lot of uniqueness in understanding our own natural resources whilst presenting beautiful images and thematic information generated from varieties of geospatial data. Bhuvan also attempts to bring out the importance of multi-temporal data and to highlight the changes taking place to our natural resources, which will serve as a general awareness on our changing planet. There are lot more value added services which will be enabled onto this Indian EO visualisation system in due course of time and each one of those services are going to be unique to preserving and conserving our precious natural resources through public participation.

Knowledge - Insight - Awareness - Action

Bhuvan 2D

The two dimensional (2D) Bhuvan, a web mapping service application based on OpenLayers open source project, offers powerful, user-friendly mapping technology to organise the satellite and map data along with myriad information geographically with no server-side dependencies in an easy way.

Bhuvan 2D is a slick, exciting on-line mapping application. It provides a highly responsive, intuitive mapping interface with detailed imagery and map data embedded. Some of its functional capabilities include map navigation, map panning, drawing line, point polygon, overview map, linear and areal measurement. These capabilities combine to make Bhuvan 2D a compelling product.

Bhuvan 3D

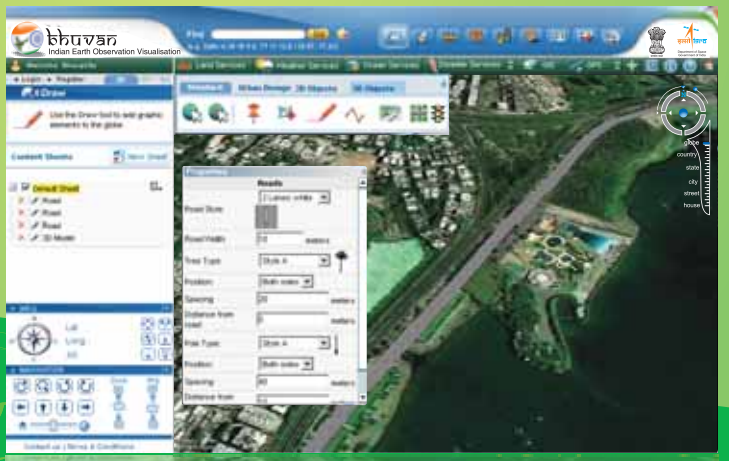
Bhuvan 3D showcases images in a Multi-sensor, Multi-platform and a Multi-temporal domain. It lets you access, explore and visualize IRS image and a bundle of rich thematic information in 3D landscape. On Bhuvan 3D, users can fly to different locations on the terrain and experience unparalleled 3D navigation.

3D Bhuvan has many unique features and easy to use intuitive interface, where users can virtually experience the physical characteristics of the terrain, especially the Indian landscape. The urban design tools are a magic galore. Here you can virtually build roads, junctions and traffic lights in an urban setting! Experience all this just on Bhuvan 3D!

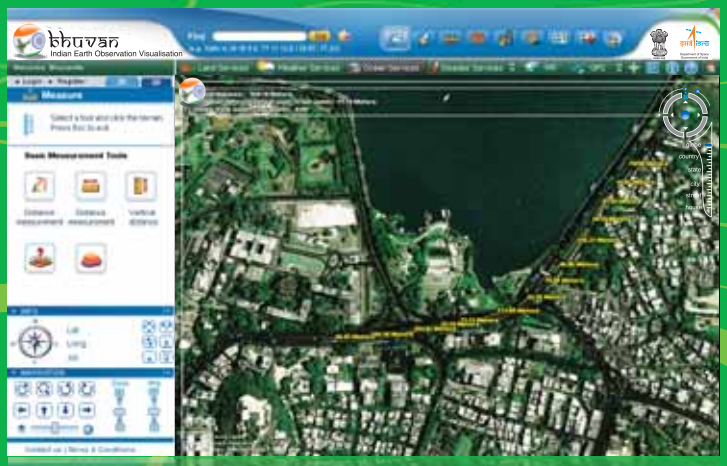
Snapshots of Bhuvan Functionalities

3D Visualisation – Badrinath

Urban Design - Road with trees on both side

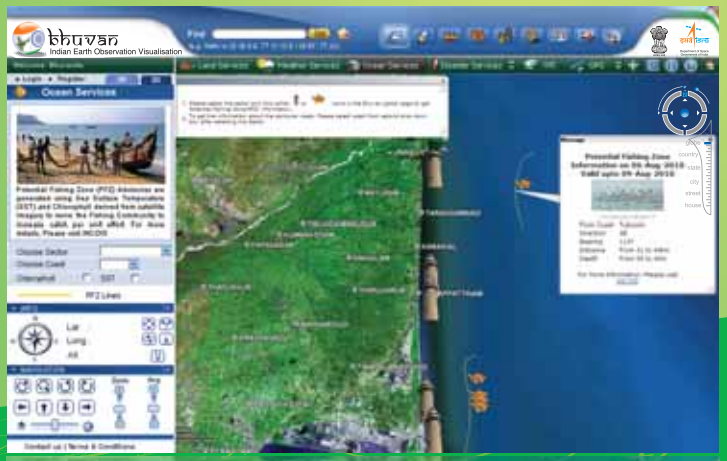


Distance Measurement - Horizontal



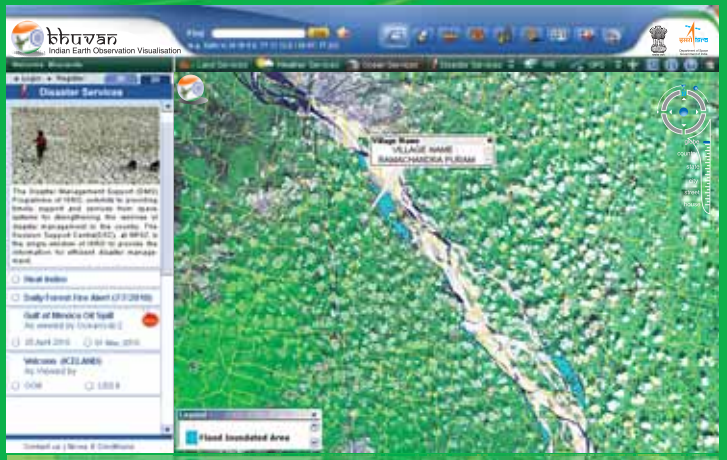
Snapshots of Bhuvan Services

Potential Fishing Zone Information



Visualisation of near real time Weather Parameters (AWS)

Flood inundated area



Bhuvan
Societal Applications

Wasteland information

Ground water potential zones

Soil information

New Features on Bhuvan

- Add different Imagery and Elevation layers onto the terrain database.
- Load OGC Web Feature Service data (polygons, polylines, and points WFS layer shape types)
- Perform attribute query on the map (search for attributes on Bhuvan, according to the search criteria)
- Load WMS and WFS data on Bhuvan.
- GIS tools (Query of attribute data, Buffer analysis)
- Terrain Profile tool(helps view the terrain elevation along a path and related information)
- Threat Dome tool (helps view the volume that is visible a given point in the 3D View)
- Video on terrain (helps play a video file onto any selected area of the terrain)
- Community tool (allows the user to lead, follow, and share in real-time with other users)
- Bhuvan 2D (A highly responsive intuitive web mapping interface with capabilities for map navigation, map panning, adding vector, measurements)
- Developers (An assortment of functional code for developers that can be changed and used for various purposes)
- Public layers (allows the user to add geographic information layers from remote or local databases)
- Add content (allows users to add, assemble and disseminate Volunteered Geographic Information, mark content using 'placemarks')
- Rediff maps (Live map data integrated with Bhuvan to help users navigate, locate and search the India map)

Basic Features of Bhuvan

- Access, explore and visualise 2D and 3D image data along with rich thematic information on soil, wasteland, water resources etc.
- Visualise multi-resolution, multi-sensor, multi-temporal IRS image data
- Superpose administrative boundaries of choice on images as required
- Visualisation of AWS (Automatic Weather Stations) data/information in a graphic view and use tabular weather data of user choice
- Fly to locations (to fly from the current location directly to the selected location)
- Heads-Up Display (HUD) navigation controls (tilt slider, north indicator, opacity, compass ring, zoom slider)
- Navigation using the 3D view pop-up menu (fly-in, fly out, jump in, jump around, view point)
- 3D fly through (3D view to fly to locations, objects in the terrain, and navigate freely using the mouse or keyboard)
- Drawing 2D objects (text labels, polylines, polygons, rectangles, 2D arrows, circles, ellipse)
- Drawing 3D Objects (placing of expressive 3D models, 3D polygons, boxes)
- Snapshot creation (copies the 3D view to a floating window and allows to save to an external file)
- Measurement tools (horizontal distance, aerial distance, vertical distance)
- Shadow analysis (it sets the sun position based on the given time creating shadows and effects the lighting on the terrain)
- Urban Design Tools (to build roads, junctions and traffic lights in an urban setting)
- Contour map (displays a colorized terrain map and contour lines)
- Terrain profile (displays the terrain elevation profile along a path)
- Draw tools (creates simple markers, free hand lines, urban designs)
- Navigation map (to jump to and view locations in the 3D India)
- Metadata for satellite images

There would be many more value added functions and facilities which will be added from time to time. Particular interest of ISRO/DOS would be to provide such functionalities to common man to engage in participatory approach with scientists to solve simple problems easily and interactively.

About NRSC

National Remote Sensing Centre

A key constituent of Indian Space Research Organisation (ISRO), Department of Space, Government of India, is at the heart of India's efforts to advance and benefit from the Indian Earth Observation Programme. NRSC strives to provide high quality, actionable data products and services in a timely, cost effective and efficient manner, facilitating enhanced utilization of remote sensing and geo-information in addressing societal needs and national imperatives.

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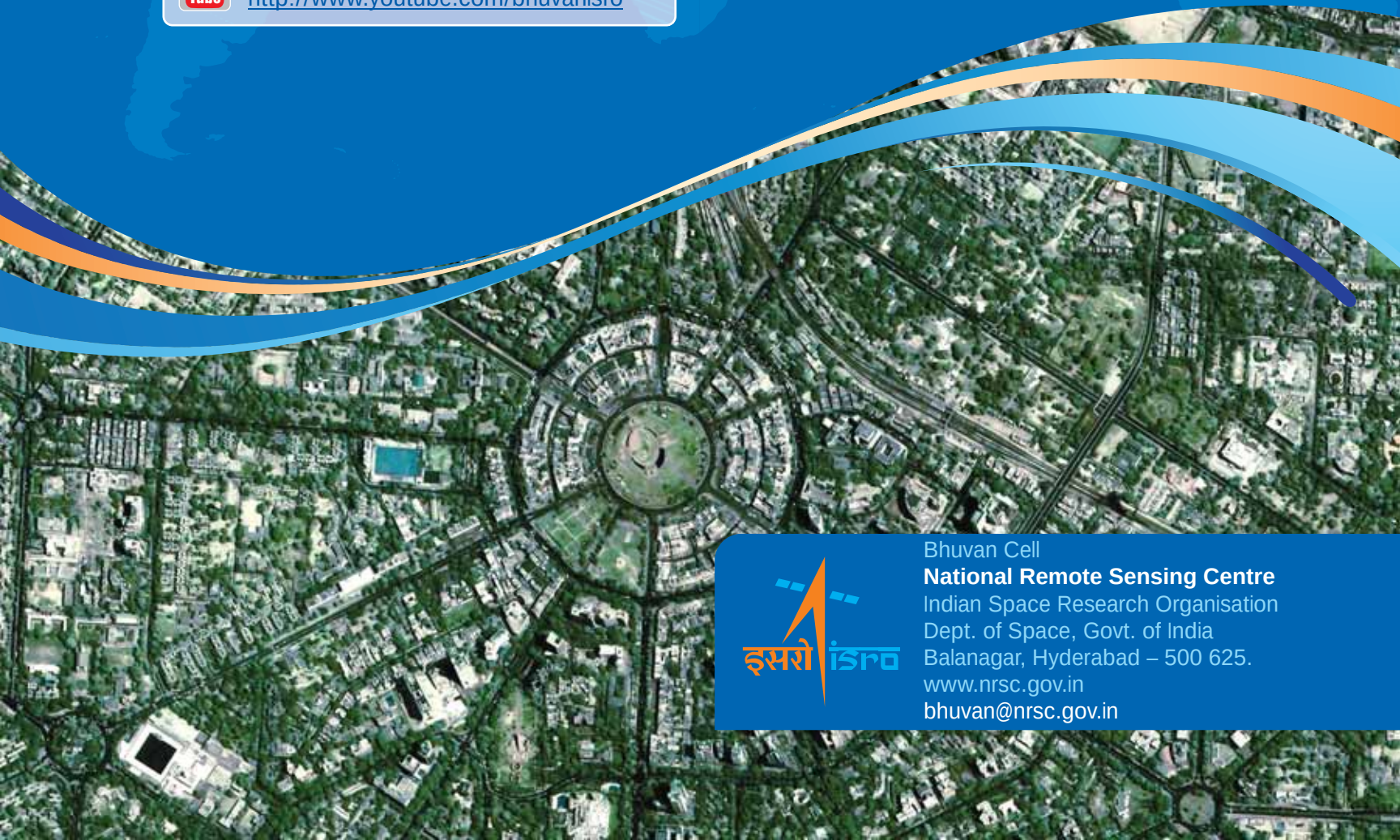

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