

Visualization of Earth observation Data and Archival System (VEDAS)

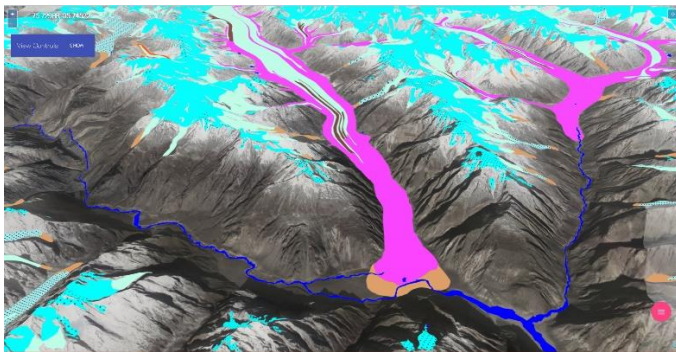
<https://vedas.sac.gov.in>

This website contains vast and varied geospatial information available at SAC (ISRO) for visualization and analysis. The website hosts useful thematic content, information systems and Applications. The site has developed functionalities which enable some user defined web processing. VEDAS provides a platform for utilisation of information derived over land using mainly Indian sensors to develop custom crafted geo-spatial applications which can support the decision making system.

Salient features of VEDAS are:

- Provides platform for Research & training to Academia
- Data visualisation and graphical analysis on web
- Geo-processing tools for analysis on web
- Integrate Web Map Service from various sources

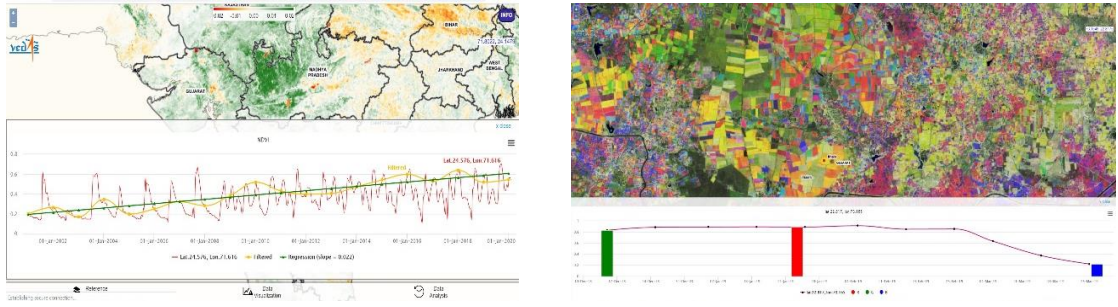
VEDAS provides platform to motivate young researchers and academia to showcase their spatio-temporal analytical skill using Indian EO data and build geo-spatial applications. It is a step toward expanding the societal benefits of the nation's investments in ISRO's Earth science research. It is expected that with a handshake between data generators and potential analysts, newer and innovative processing tools and geo-spatial applications will emerge.



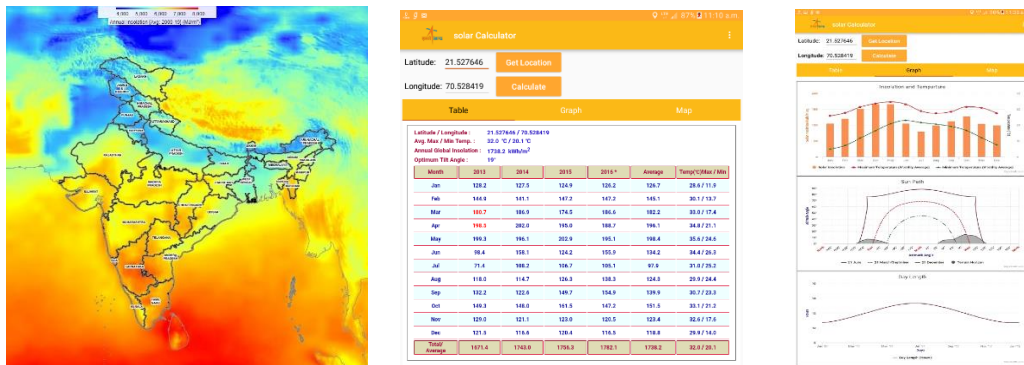
VEDAS hosts and facilitates Data Visualisation & Dissemination for various themes such as Agriculture, Forestry, Desertification, Wetland, Snow & Glacier, Coastal zone studies, Marine Ecosystem, Polar Science, Hydrology. Atlases prepared using EO data such as National Wetland Inventory, Desertification Status Mapping, Corel Reef Atlas, Shoreline Change, Planetary Science, Polar Science are made available to user community.

Some of the important applications and web-analysis tool developed and serviced through VEDAS are (i) Vegetation Monitoring, (ii) New & Renewable Energy, (iii) Urban Sprawl Information System, (iv) Hydrological applications, (v) Cryosphere Applications and (vi) Air Quality Monitoring.

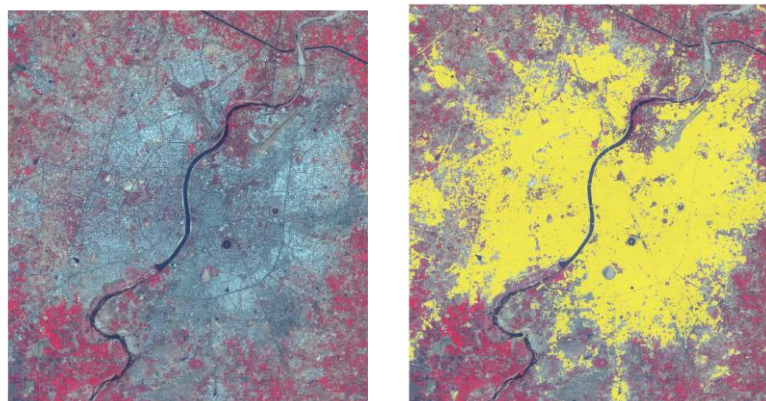
- (i) The main objective of vegetation monitoring is to provide access for visualisation to Inventory of NDVI, Soil Moisture, temperature and rainfall and to facilitate user defined visualization and analytics on the web. Key analysis tools developed are Image differencing, Temporal classification, Range Analysis (for persistence), Principal Component Analysis, Temporal NDVI Composite, long term statistics and Customised s/w developments (e.g. Dashboard for Vegetation Condition Assessment; Village level NDVI profile, ...). It also provides key functionalities such as Temporal profile and Year – on – Year (YoY) graphical comparison and analysis on web.



- (ii) New and renewable energy application provides inventory of solar, wind and wave Energy. It also provides, for solar energy, a 72 hour forecast at 15 minutes interval. VEDAS has developed Solar and Wind Calculators Android App for mobile phones as well as Solar Calculator for Africa at the behest of International Solar Alliance. Roof-top Photo Voltaic (PV) potential in 98 smart cities and 60 solar cities estimated and made available. Also a solar site selection tool is provided for selection of site for solar energy using multi-criteria analysis.



- (iii) Urban Sprawl Information System provides large scale impervious surface mapping using Artificial Intelligence (AI) based Convolutional Neural Network (CNN). UNet-AP is developed, trained and used for large scale impervious surface mapping for Indian cities. This application supports identification of potential areas for urban development by providing forecast of urban growth.



- (iv) Under hydrological applications, altimeter and scatterometer derived water level at selected locations (~150) over rivers and reservoirs are provided. Experimental forecast product of water level (inundation) for Brahmaputra river during monsoon is provided.

- (v) For cryosphere studies, long term (2004 to till date) decadal (10 – day) snow cover maps for about 30 basins of Himalaya is provided. Information on Melting status, number of melt days and average melt for Greenland along with sea ice trends and elevation are provided. For south pole, sea ice thickness, sea ice probability, sea ice maps, sea ice trend and elevation are provided. A safer ship navigation advisory tool to assist in Indian Antarctic Science Expedition is also provided.
- (vi) Under Air Quality Monitoring application, information on Aerosol Optical Depth (AOD) estimated from INSAT and MODIS, fire locations as extracted from INSAT, MODIS, Suomi NPP along with 72 hour forecast of wind, dust and RH. Tools for seeing 30 and 60 day AOD profile and PM2.5 and PM10 at a few locations of CPCB ground station in Delhi are available.

Various in-house developed **Mobile Android Apps** such as Solar Calculator (India), Wind Calculator, National Wetland Inventory Assessment (NWIA), Track Record (it supports collecting geo-tagged video data), Mobile Data Collection, Solar Calculator for Africa are developed and can be downloaded from this platform.

It is expected that with use of information and geo-spatial analysis tools available on VEDAS, it will enable / facilitate the following tasks:

- i. Data, products and information on Website will assist citizens and resource managers in assessing crop response and monitoring crop growing environment
- ii. Forecasts of NDVI will enable in devising appropriate crop management advisories
- iii. Identification of potential areas for tapping Renewable energy
- iv. The 72 Hour forecast of insolation at 15 minute interval for optimum harnessing of energy
- v. Pre-Investment towards greater collaboration in applications of Satellite derived products for Energy (solar, wind and wave) Sector
- vi. Apps for mobile phones provide easy access to location-based information of potential of these renewable energies to the end-user
- vii. Website and Applications will benefit urban planners for decision making
- viii. Urban Sprawl and Forecast will help in understanding environment changes and its interaction with urban fabric
- ix. Information on hydrology and cryosphere themes help in planning for water security, monitoring of and prescribing management plans during disasters
- x. Mobile friendly Apps developed provide systematic and customised long term archival of valuable field data collected at great cost and efforts

To sum up then, VEDAS provides a platform (data, infrastructure and guidance) for utilisation of information derived over land using mainly Indian space-borne sensors to develop custom crafted geo-spatial applications which can feed into or support the decision making system. Some of the geo-spatial analysis tools have been developed and deployed so that decision maker can suitably tailor their geospatial queries [ranges (or thresholds) and visualise 'what-if' scenario. It is expected that such a platform will facilitate identifying hot-spots and discovering hidden patterns in the spatio-temporal data.