

STAND With SUPARCO

(Space Technology Applications for National Development with SUPARCO)

SUPARCO- The Space Agency of Pakistan was established on 16 Sep 1961 under the advice of no other than the Noble Laureate Dr Abdus Salam, shortly after the first ever manned flight by Yuri Gagarin from erstwhile USSR. This speaks volumes about the vision of our founding forefathers. Notwithstanding the difficult road traversed, SUPARCO has come of age in providing appreciable support to National Development and Socio-Economic uplift of the country. Much of this has been made possible because of the sustained support of the Government of Pakistan in the last decade. With this pace of support there is no reason that the next decade should not see the applications of the Space Science and Technology in multi-dimensional disciplines contributing to the National Development, directly or indirectly. First manifestation of the Will of the Govt of Pakistan and that of the Engineers and Scientists of SUPARCO is reflected in the successful launching of the PAKSAT 1R; Pakistan's First Communication Satellite. The understanding of the Govt functionaries about the importance of Space Science and Technology Applications in National Development is currently at its peak in the sixty four years history of Pakistan. The approval of the "Space Vision 2040" by the Prime Minister recently for developing Pakistan's Space Program is the manifestation of this understanding. It is thus considered appropriate to let all the segments of the society in Pakistan to fully understand the real potential of what space technologies have to offer for socio-economic development.

Emerging technologies are best absorbed by the youth of any society, who then innovate tools for optimum utilization of these technologies; as has been the case in the use of computers, mobile phone etc. It is also the youth which then promote these technologies for better utilization by the societies. Some of the recent examples are Bill Gates (Microsoft Windows), Steve Jobs (Apple), Dr Umar Saif (LUMS) etc. The endeavor of SUPARCO is thus to throw the challenge to the youth of Pakistan and invite them to venture in to disciplines of Space Science and Technology, as well as to prepare them to extend necessary support in National Development by employing these technologies. Simultaneously, better understanding of space technology applications for Socio-economic Development and National Security needs to be developed in the society at large, for seeking benefits in an early time frame.

There are three specific areas which need to be focused:

- Space science studies and its impact on life on earth.
- Communication Satellites and their use in National Development
- Remote sensing satellites and their use in National Development.

Space Science Studies

Universe is boundless and studies indicate that it is still expanding, and so are the limits of Space. Focused study of Space Sciences, assists in understanding the Space on one hand, while on the other hand, helps us in improving the quality of life on earth. Some vital areas are as follows:

- Study of the Ionosphere, helps us in understanding the dynamics of the charged region of space for smooth operations of LEO satellites, uninterrupted radio communication, and improvement in the global or regional assimilative ionosphere models being used for predicting usable frequencies for HF communications.
- Active research is being undertaken to find ways and means to predict earthquakes, and space science component is being extensively investigated to help support such studies.
- The activity on the Sun is a major source of heat, light and radiations of several types. Periodically, the Sun flares cause disturbance to our communication systems, and can even damage the electronic components on-board satellites. Hence, studies about Sun activity, helps us to take measures to safeguard our communication and electronic components deployed in space.
- In depth study of space is also necessary for having a meaningful space program. It is necessary while planning various space missions, especially for launching of various types of Satellites.

The best way to facilitate R & D in the field of Space Science is to strengthen the space science departments in universities to meet the future national requirements.

Communication Satellites

Communication Satellites play a pivotal role in meeting the communication requirements of a country. It also provides a communication out-reach to all the areas within its foot-print. Pakistan now owns and operates communication satellite PAKSAT 1R, launched recently from China. Its foot-print covers parts of Europe, Africa, Middle East, Central Asian Republics, Far East and China. PAKSAT 1R with its thirty transponders provides an opportunity for the users in Pakistan (private and public sectors alike) to fully benefit from this satellite and promote socio-economic development of the country. The satellite is expected to start commercial operations by end Oct/ early Nov 2011. Following areas can benefit significantly:-

- **TV Broadcasting:** For applications like broadcasting TV channels, Digital Satellite News Gathering (DSNG) and contribution links. PAKSAT-1R has been designed not only for TV broadcasting in Pakistan but across South Asia, Middle East, Africa and Europe providing access to over 80% of Pakistani expat community.

- **Telecommunications** : Long distance communication including GSM Backhaul extending the reach of cellular mobile companies to remotest corners of the country.
- **Data & Internet:** Providing corporate data connectivity and broadband internet using VSAT networks and latest hub based technologies like i-direct and DVB-S2
- **Dedicated Govt communication,** especially to the Embassies within the foot-print of the satellite and **Communication support to security services.**
- **Tele-education:** This is a very important area for communication satellite application. Virtual University is already successfully employing this capability for higher education. However, tele-education holds tremendous potential for applications in basic education and vocational training to help overcome the infrastructure and resource gaps, thereby helping achieve maximum coverage for such programs in the most efficient manner.
- **Tele-medicine:** A large number of rural medical facilities have been set up. The quality of medical care/ diagnosis can be significantly improved by increasing the outreach of the rural medical centers to specialist advice through tele-medicine links. While some of these specialists services could be extended to international customers also, thus earning valuable foreign exchange.
- **Direct To Home (DTH) Technology:** With our own satellite in orbit, we should now focus on exploiting DTH technology for provision of quality services. SUPARCO is studying the possibilities of introducing DTH services in Pakistan in an early time frame.

SUPARCO through its commercial arm, PAKSAT International has developed a business plan to maximize the use of our National Communication Satellite PAKSAT-1R for both commercial and socio-economic applications and generate sufficient business not only to recover the cost of the satellite but is also expected to contribute towards deployment of next communication satellite.

It is important to note, that communication satellites offer countries both tangible and intangible benefits, while the tangible benefits in terms of business income from such communication satellites can be measured, the intangible benefits in the form of their indirect contribution in socio-economic development are much more significant and directly proportional to the manner in which, the available capabilities of communication satellites are exploited. It is thus imperative, that, we as a nation should fully exploit the opportunities offered by PAKSAT 1R for socio-economic development of the country.

Remote Sensing Satellites

At present Pakistan does not possess its own remote sensing satellite in orbit. SUPARCO however, plans to launch its first Remote Sensing satellite in orbit in next two to three years in line with “Space Vision 2040”. In the mean time, SUPARCO purchases required data from other satellite operators to meet its national requirements. In the recent years, SUPARCO has developed fair amount of expertise in remote sensing applications to support the socio-economic development in the country. SUPARCO is currently meeting the requirements of large number of national organizations inclusive of Federal ministries and Provincial Departments. At present SUPARCO is working closely with various international agencies like UNESCO, FAO, UN ESCAPE, ICIMOD, APSCO, JAXA, World Bank, ICHARM, WWF, IUCN, UNSPIDER USGS and others on various projects employing remote sensing technology for socio economic development in Pakistan. The main areas in which support is being provided or could be provided are:-

- **Agriculture:** SUPARCO issues a monthly agriculture bulletin, which is also available on SUPARCO’s web site; while hard copies are provided to main stake holders. It assists in monitoring the condition of the crop; enables estimation of yields; provides information on prevailing conditions in different agriculture areas, to enable planners, policy makers and other end-users to take timely measures to maintain the quality of the crop. Currently, this activity is restricted to monitoring of the main cash crops. Other areas where SUPARCO plans to extend assistance after necessary capacity building include:-
 - o Identification of agriculture land which remains out of cultivation to enable provincial govts to initiate measures to bring it under cultivation.
 - o Undertake estimation of extent of fruit orchards. (A project for Date Palms in Baluchistan is being initiated shortly).
 - o Provide inputs on agriculture in mountain areas.
 - o Facilitate water regulation for agriculture purposes. (in this context a project each for Sindh and Punjab has already been completed).
 - o Provide inputs on the extent of various types of crop cover each season, for prospective planning and ensuring food security.
- **Forests:** SUPARCO using remotely sensed data, provide information to the concerned authorities in the management and monitoring health of forests. Satellite data has also been used to identify deforestation. Besides assistance can be provided in planning for tree plantations campaigns. SUPARCO also regularly undertakes monitoring of mangrove forests all along the coastal regions.
- **Monitoring of Mega Projects:** Under the direction of the President of Pakistan, SUPARCO is already monitoring progress of several mega projects and providing inputs to concerned authorities.

- **Glacier Studies:** These studies are being undertaken in coordination with several international organizations to investigate the effects of environmental changes on Glaciers. These studies are of special significance, since these glaciers are the main source of water for Pakistan.
- **Disaster Relief and Mitigation:** SUPARCO provided valuable information during the earthquake of 2005 and the floods of 2010 to NDMA, UNO and other agencies involved in disaster relief, early recovery and rehabilitation/reconstructing phases. Besides this, SUPARCO monitors the state of flood protection bunds. As a matter of fact SUPARCO in coordination with other departments can provide necessary inputs to find long term solution to manage flood and store water for future use. Studies on this aspects are already underway.
- **Land Management:** Satellite imagery and GIS can be effectively utilized to develop computer based land holding records. SUPARCO has already done a pilot project as proof of concept. A detailed data base can be created to support various applications of land management, water and electricity distribution networks, roads infrastructure and others, for rural and urban areas alike. By adding different layers of specific information for different users a useful tool for planning and management can be created in consultation with various organizations and ministries, for tehsils , districts, cities, Provincial and Federal Government Administrations besides other users.
- **Environmental studies:** SUPARCO is actively involved in a number of environmental studies of varying nature and provides services to both pvt and public sectors. A major study was also undertaken to understand the genesis for fog/haze in Punjab and a detailed report containing the qualitative assessment of its adverse impact on health, agriculture and economy has already been published.
- **Geological Studies:** SUPARCO works closely with Geological Exploration Agencies of Pakistan to support earth investigations for various purposes.
- **Mineral Prospection:** SUPARCO is making an all out efforts to harness new technologies to support mineral prospection in Pakistan. Latest state of the art remote sensing technologies greatly contribute in identifying mineral rich zones over large areas in less time, and at relatively cheaper costs. The way forward to fully exploit the mineral riches of Pakistan for the benefit of its people, is to harness related technologies including remote sensing technologies for utilization by all stake holders.
- **Water Prospection and Archeology:** Modern remote sensing techniques also enable exploitation of subsurface water resources, as well as searching buried archeological sites. Another area where SUPARCO is building its capacity, to support concerned departments in their efforts in these specific areas.

It is In view of all these above mentioned applications, so important for socio-economic development of Pakistan, that SUPARCO has developed a comprehensive program to harness all these technologies in the immediate future. SUPARCO also plans to launch a series of remote sensing satellites in the next several years, to meet the emerging national requirement and to speed up the pace of socio-economic development.

In short SUPARCO has come of age and is focused to bring the benefits of Space Technology Applications to the People of Pakistan. The Prime Minister of Pakistan has paved the way for harnessing space technologies with his approval of Space Vision 2040. The President of Pakistan, convinced of the potential of the Space Technology Applications has already directed all departments to employ remote sensing in projects where ever applicable. SUPARCO also stands to its commitment to make all out efforts to support all segments of society involved in use of Space Technology Applications for Socio- Economic Development.

In this context, there is a need that all segments of the society learn more about what Space Technology has to offer. There is a need that all the educational institution incorporate in their curriculum, aspects pertaining to Space Science and Technology, to enable our future leaders to fully grasp the true potential of Space Science, Technology and its Applications. There is also a need, that, the media makes special efforts to bring to the masses, awareness of the role of Space Science and Technology in socio economic development of Pakistan.

SUPARCO is ready to exploit **S**pace **T**echnology **A**pplications for **N**ational **D**evelopment, in coordination with all the other organizations/stake holders in different fields for the socio-economic uplift of the country. SUPARCO invites all the organizations/ institutions in Pakistan (both in private and public sectors) to **“STAND with SUPARCO” in this Endeavour.**