DOWNLOAD PDF EARTH OBSERVATION AND REMOTE SENSING BY SATELLITES (ACTA ASTRONAUTICA)

Chapter 1 : BIRD - eoPortal Directory - Satellite Missions

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The FPA is the most crucial component in terms of its technology and performance for space applications Ref. Schematic view of the RSI telescope image credit: This advanced detector array has been designed by CIS and fabricated on an 8" wafer with 0. Photo of a test chip of CIS left and the detector array on an 8" wafer right , image credit: Illustration of the filter and its spectral band performance image credit: Overview of the RSI system architecture image credit: It is an all-in-one plasma sensor with a sampling rate up to 8, Hz to measure ionospheric plasma concentrations, velocities, temperatures, and ambient magnetic fields over a wide range of spatial scales. With the comprehensive dataset from the AIP observations, the project will be able to conduct a systematic examination of the plasma parameters in the topside F region of the ionosphere, with regard to longitudinal and latitudinal distributions and seasonal variations. The collected data will not only be used for space science studies, but can also be shared by the scientific community in seismic precursors associated with strong earthquakes and co-seismic effects. These two teams have participated in many space payload missions, funded by NSPO, and in international collaborations, providing the scientific payloads. The payloads obtained their flight heritage on sounding rocket flight and on spacecraft throughout the last decade. Once the sweeping voltage is lower than the plasma potential, the electrode repels electrons and accelerates ions. As the voltage decreases, the electron current decreases rapidly. The electron temperature Te can be determined by the slope of the I-V curve by the following equation: As the slope of the I-V curve is flat, the Te is higher. As the slope is steep, the Te is lower. AIP consists of three metal grids to handle the incoming plasma Figure The first grid, G1, is an aperture grid arranged in the front of the probe and connected to a floating potential device to allow a smooth entry of the incoming plasma into the probe, not to be affected by the transverse electric field. The second grid, G2, is a retarding grid connected to a programmable sweeping voltage circuit between and 10 V. If AIP operates in the IT mode, the grid is maintained at the floating potential without repelling the incoming ions. In the RPA mode, the grid forms a potential barrier retarding voltage to block the low energy positive ions into the probe. The third grid, G3, is a suppressor grid, maintained at V to repel the incoming electrons into a quadrant metal collector; it can also reduce the photoelectrons escaped from the collector when the sunrays strike on the collector. All four metal plates of the quadrant collector are maintained at the floating potential and are connected together to an ammeter via an analog switch in these two modes. As the retarding voltage increases, the positive ions with low kinetic energy are repelled out of the probe or neutralized by the grids and interior boundary of the probe. The positive ions with high kinetic energy can penetrate through the retarding grid to the collector if they do not contact with the suppressor grid or the interior boundary of the probe. Basically the higher the retarding voltage, the lower the current is measured at the collector. Such a sampling process can be recorded as I-V curves that are embedded with information of ion temperature, composition and ram velocity. A 1-dimensional ion current equation for this application has been written down in the following form: It should be noted that the electric potential is referenced to far-away plasma the electric potential of the far-away plasma is zero. The initial ion temperature and the concentrations can be deduced from the I-V curves via a half-current approximation. To improve the quality of the output parameters, an iterated half-current method is prepared for initial guesses and a grid search method is used to refine the output parameters with possible uncertainties. To derive precise ion temperature and ram velocity, a numerical model to estimate the effects of the grid alignment and electric potential depression on the grids is required. However, each metal plate of the quadrant collector is connected to an individual current meter ammeter. The arrival angle of the incoming ions can be estimated from the current differences of the adjacent ammeters Figure The possible current ratio can be estimated by the following relation: The incident angle, , of the incoming ion can be expressed as: NCU 4 Geophysical Parameters: It is assumed that all ionospheric parameters have a slow variation within a 4-second period. After one cycle is complete, the geophysical parameters, Ni, Vi, Ti, and Te, can be derived from the steps shown in Figure Scheme of the AIP data flow to derive the geophysical parameters image credit: Mechanical specification of the AIP The sensor head is illustrated in the Figure 20 and its three-grid configuration is shown in Figure The opening of the sensor is 50 mm. All the grids are made of stainless steel , coated with gold, with 50 lines per inch in grid density and 0. The 3-D model of the AIP sensor head image credit: The profile of the AIP sensor head image credit:

Chapter 2 : FormoSat-5 - Satellite Missions - eoPortal Directory

Networks of Earth observation satellites have been proposed in order to improve upon the coverage and re-visit time of existing systems, however the very high cost of conventional remote sensing satellites has thus far made this proposal impracticable.

Gunter Schreier Acta Astronautica 57 â€" www. The global political security situation and updated legislative frameworks created new opportunities for high resolution, dual use satellite systems. In addition to new optical sensors, very high resolution synthetic aperture radars will become in the next few years an important component in the imaging satellite fleet. The paper will review the development in this domain so far, and give perspectives on future emerging markets and opportunities. With dual-use satellite initiatives and new political frameworks agreed between the European Commission and the European Space Agency ESA , the European market becomes very attractive for both service suppliers and customers. In order to create an operational and sustainable GMES in Europe by , the European infrastructure need to be adapted and extended. The necessary satellite capacity to complement existing systems in the delivery of space based data required for GMES is currently under definition. Embedded in a market with global competition and in the global political framework of a Global Earth Observation System of Systems, European companies, agencies and research institutions are now contributing to this joint undertaking. The paper addresses the chances, risks and options for the future. Schreier , space imagery in the early 90s, the limit Stefan. At the time of to the domain of about 2 m per pixel. Similar to editing this paper, a call for a second NextView the heritage of the Russian data, such informa- contract was finished and has been awarded to Or- tion was formerly only available for strictly clas- bimage. With the delay in the deployment of the sified military reconnaissance programmes of the future US military reconnaissance satellites called former military super-powers. Responding to the market is believed too small to operate such systems challenge from former Russia, US companies, util- profitable. Mean- lite systems is only partially comparable to those in while European states and other countries of the the US. With the French SPOT series, Europe was world keep up with providing similar systems and once leading the commercial supply of high resolution exploring other domains of the electromagnetic spec- satellite images. Though also used by military and se- trum, such as radar imaging. Intentionally, the contract would threats have changed this picture significantly. Therefore, a new European Defence Agency More information on these satellites is given in a sub- [5] has been established in Since then, national sequent chapter. The political drivers and activities in Europe radar satellites, which is due for operations in Meanwhile, European military agencies also act as Using earth observation satellites for securing Eu- normal customers to the existing and near future sup- ropean security interests was put on the agenda only pliers of VHR data. Systems, which can satisfy both quite recently. European space agencies are primarily civilian and public needs, have been initiated in Italy operated from a science and research perspective and and France. Only few conducted in a partnership with the Italian military and agencies belong to ministries in charge for commercial therefore classified as dual-use. Three X-Band imag- issues e. Hence, the focus similar French dual use set-up, the Pleiades system. The ESA earth observa- naissance satellite network by Spanish small satellites tion missions are characterised by their intended use with optical and radar capabilities Aviation Week, and origin. Missions, which are meant to ensure op- August 2, A more sophisticated radar sensor will offer its polarized SAR modes and phased-array ASAR and even more atmospheric sounders plus a antenna flexibility to military and security customers wide swath medium resolution imager are put on EN- worldwide. Under ESA tire global satellite capacity for non-commercial, pri- data policy, all data from the EarthWatch and Third marily scientific investigations. Cat I the imaging capacity will be exclusively sold to inter- data is delivered to scientists basically for free , upon national customers and ground stations by InfoTerra, acceptance of a science proposal. The dress specific geoscientific topics with one dedicated GMES action plan for â€", both agreed by mission. The latter initiated in its 5th of the challenging goals is to define the financing of and 6th framework programmes thematic areas ad- GMES beyond its initial phases. Besides, European with the Galileo satellite navigation system. Since then EOMD has the remote sensing of the atmosphere. The initial at- tempts started in , when the European Commis- sion, in collaboration with ESA, initiated a long term 3. GMES is defined to be driven by the demands for CEO was meant to promote the use of earth observa- geo-information services of its stakeholders. These are tion by user driven demonstration projects, services primarily identified in the various European, national and information exchange using early possibilities of and regional public services and agencies, which re- the Internet. In a series of events in Europe, it became quire up-to-date and reliable environmental informa- clear that an European Earth Observation System tion on European and global land, air and sea ar- EEOS , as proposed by CEO, need to be based on eas. Depending on the needs of entities such as urban a broader political consensus, involving further Eu- communities or the European Environmental Agency ropean stakeholders from the Commission, European EEA , the region of interest could cover small towns organisations, national governments and industry. GMES is jointly set-up by search for quite some time. Specifically under the the European Commission and the European Space headline of GMES more than 20 thematic projects Agency as an initiative to provide independent, opera- are co-funded by the European Commission. The top- tional and relevant information in support of a range of ics of these projects range from land cover change primarily environmental policies serving sustainable and environmental stress in Europe, to global vegeta- objectives [8]. Whereas tion phase by end of Following this consol- the delivered geoinformation products are involved in idation phase, ESAâ€"in co-ordination with the Com- the project, the documentation tree insured the com- mission funded projectsâ€"will select a number of ser- parison between the projects and the tabulation of re- vices in early to go into full operations by quirements, infrastructure and business plans. While these phases are still funded by ESA, latter, the socio-economic benefit is of equal impor- the service partners shall work towards a financing tance as the pure commercial revenue. It is clear that the services related to environ- The ESA GSE also listed the requirements on ment and treaty monitoring can only be financed by satellite information for their services. Medium reso- European or national government level ministries, de- lution and Landsat-alike optical and ERS-alike radar manding the high level information for their admin- data is required to service general European map- istrative work. The medium and high resolution earth ping demands for land cover analysis and change, observation data required for these services will, to a vegetation and environmental monitoring of land and large extend, be delivered by satellite systems owned G. Here, private opera- tors are asked to recover their costsâ€"if not the costs of the entire satellite and the follow-on systemâ€"by the commercial sales of the data. The commercial VHR operators are expecting larger scale contracts by na- tional and European military entities. New business models are currently under discussion by the private operators and the GMES entities. Gen- eral data purchase contracts, such as the US NextView programme, servicing military demands, could also be envisioned to serve European civil and security needs. This would require The VHR data for demands on precise mapping and the use of existing space-based assets as well as the local verification will mostly be born out of private or development of new ones. The new global security PPP public private partnership systems. As described situation and the new European Constitution, giving Fig. GMES services element implementation sequence [10]. It is intended to develop themes fence and foreign affairs form the basis for this inter- for future research and institutional actions on space est. At the European Council in Thessaloniki, Greece and security. European very high resolution satellite which outlines challenges and key threats. An imme- programmes diate action was the initiation of a European Defence Agency, which is now put in place [5]. The European White paper on space [11] not only Specifically on the space and security demands, the constitutes an autonomous access to space e. By June , some proposals from needs. Based on sations shall respond to global security issues in gen- the experiences with SAR technology from various eral. A report of this panel is expected by end of ASTRIUM contributes scenarios such as border control, infrastructure map- significantly to the project and in return receives the ping and nuclear treaty monitoring. The commercial dis- tially 25 organisations and companies in Europe will tribution is managed thru InfoTerra, Friedrichshafen, G. The other half of the satellite data will be exploited for science use by DLR Fig. Sketch of the French Pleiades spacecraft. The Spot- companies compiled a list of 10 sensors, which would Light mode will yield the finest resolution data with fulfil the market needs [6]. The sition techniques should be addressed in international ScanSAR mode delivers 16 m resolution at km partnerships, France has considered the VHR optical swath. All imaging modes offer a full polarisation ca- system as its highest priority. Based on minor contri- pability. But it is questionable, whether agility to allow flexible imaging and stereo modes. Once the market leader in that domain, the civilian side, Pleiades is the French complement to the new VHR satellites of its US competitors gain more European fleet of satellites, servicing the needs of the and more ground. Based on user requirements and GMES programme. Sketch of the Italian Cosmo SkyMed satellite. Cosmo SkyMed Italy Fig. The Rapid Eye Satellite [17]. Based on the strategy of the Italian National Space Plan PSN , the initial focus was to deploy a system for environmental observation and natural hazards mapping for the Mediterranean Basin area. Precision farming, hail damage in- the use of the French Helios reconnaissance satellite surance and agricultural mapping services are among system, was looking for follow-on capabilities. Mod- the prime application targets. To meet these require- ifying the requirements of the initial X-Band SAR ments, a five satellite constellation, with 6. Italy found here a partner in Argentina, which the State of Brandenburg, was signed in June Rapid Eye Germany in the context of this paper. Based on in question to be continued over the next years. How- application business experiences there, the idea was ever, services such as GMES are in demand for this to define a privately owned multi-satellite system for kind of data. The ESA sentinel satellite space and ground same sensor data. Deliberately, the sentinels would not system deliver information in the VHR domain. In a programme aiming for in But up to , no real follow-on etc. The interoperability shall the ESA logo. By early The precise design of and interfaces to the GMES ESA suggested to define, launch and operate a fleet of services are still under discussion. Here, the interests satellites, specifically addressing the European GMES and capabilities of theâ€”partly commercialâ€”service needs. A SAR family, providing continuity in the next chapter need to be considered. Though, to established applications and to interferometry in it seems to be a consensus that all critical systems particular. A superspectral imaging family for ter- shall not depend on one single entity or contractor. An ocean monitoring family, embark- ing a wide swath multispectral sensor as well as an altimeter.

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Chapter 3 : Earth Observation/Remote Sensing / ECSL European Centre for Space Law / About Us / ESA

After a short presentation of the Meteosat and Sirio-2 programmes, the paper describes the elements of the ESA Remote Sensing Programmes for polar, Sun-synchronous orbits: Earthnet, a network of ground stations receiving data for present and future American satellites, and future European programmes; Spacelab, whose first flight will include high resolution visible and IR cameras, and radar.

Secondary objectives involve technology demonstrations, namely the operation of a new type of infrared sensor system on a microsatellite and on-board preprocessing techniques. The bus design is modular using low-mass aluminum and honeycomb structures. Line drawing of the BIRD flight configuration image credit: Block diagram of the ACS image credit: In addition, there is a 3-axis laser gyroscope providing a resolution of 2. The mass of GEM-S is 0. BIRD reaction wheel assembly image credit: ONS provides the instantaneous nadir and along-track direction for camera pointing as well as precise position values for real-time geocoding of the imagery. Thermal control of the spacecraft bus and payload components except for the IR imager is provided by passive means, namely the use of heat transfer elements - conductors and grooved heat pipes, thermally jointing the satellite segments. Two radiators, multilayer insulation MLI blankets and low-conductivity stand-offs provide the required temperature level. The heat removal from the IR instrumentation is realized by a separate IR radiator. The on-board recorder has a capacity of 2 x 1 Gbit. The downlink transmitter frequency is The uplink frequency is ,5 MHz, the data rate is This is estimated to be enough for disaster monitoring coverage. The BIRD spacecraft with payload image credit: The energy supply is difficult due to aging batteries with resulting safemode switchings of the satellite. DLR conducts limited mission operations with daily contacts to assess the satellite telemetry. The operation activities focus on subsystem health and long term trend analysis. Currently, DLR is conducting some limited mission operations on a shoestring budget in order to test the longevity of the onboard instrumentation, in particular the performance of the HSRS instrument. The low number of good-quality observation images that can be obtained implies further reductions in spacecraft operations for for instance: On this date, the gyros of the ACS experienced a malfunction reception of wrong information from the gyroscope. Operational problems are encountered whenever insufficient solar energy is available due to adverse attitude conditions. However, only a portion of the imagery is suitable for processing and analysis, since the attitude cannot be maintained at all times as needed. The satellite control system allowed for a far reaching autonomous operation of the satellite and at the same time it ensured the survivability of the satellite with highest priority. The onboard computing system was realized as a distributed fault tolerant multi computer system which executes all control, telemetry, and monitoring tasks as well as the application dependent tasks. To achieve high dependability, safety, and lifetime, the onboard computer configuration consisted of four identical computers nodes. The architecture of the redundant control computer is totally symmetric. That meant each of the nodes was able to execute all control tasks. Two of the computers were kept in continuous operation one in hot redundancy ; the other two nodes represent the cold redundancy. A pushbroom design is employed. The two spectral bands of 3. The detectors are cooled to 80 K by an integrated cooler-detector unit of Stirling design. The two camera heads are integrated into an optomechanical structure for reasons of co-alignment. Inflight radiometric calibration is provided prior to each scene by measuring the aperture temperature. The geometric inflight calibration requires spacecraft pointing maneuvers to selected targets space and ground. Sensor head of the HSRS camera image credit:

Chapter 4 : E-CORCE - Wikipedia

Report of the International Law Association (ILA) Berlin Conference ():"Report on the Legal Aspects of the Privatization and Commercialization of Space Activities: Remote Sensing, Earth Observation Satellites" (p. 3).

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Chapter 5 : IAA | IAA Small Satellites for Earth Observation Symposium

University satellites Systems engineering Remote sensing Acta Astronautica hundreds of Earth observation satellites have been launched that provide useful.

Chapter 6 : ebrahem sanad - calendrierdelascience.com

Krejci / Acta Astronautica 74 () 55 image is 2. lower bands the data rate: that are commonly used in remote sensing such as L-band #images 60UDTÃ°min=accessÃžRb Ã°MbpsÃž or even P-band cannot be considered for Cubesats. gain orbit maneuvers for potential formation ï¬‚ight the aper. and h is the orbit altitude. enabling ï¬•ne.

Chapter 7 : George Joseph | Space Applications centre, India - calendrierdelascience.com

Small satellites for remote sensingâ€"how is a small satellite characterized, what is the basis for it, what are the trends, and what the application areas. The paper gives some insights in.

Chapter 8 : Building Technological Capability within Satellite Programs in Developing Countries â€" MIT Mo

Acta Astronautica (monthly) published in English; on Current Legal Issues for Satellite Earth Observation, Vienna, Austria, VIII Symposium Remote Sensing.

Chapter 9 : Acta Astronautica - Journal - Elsevier

The journal Acta Astronautica, pages a year, covers developments in space science technology related to peaceful scientific exploration of space and its exploitation for human welfare and progress, the conception, design, development and operation of space-borne and Earth-based systems.