

**Institute for Astronomy,
Astrophysics, Space Applications
and Remote Sensing (National
Observatory of Athens)**

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Remote Sensing
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General description of the field

The Research activities of the Institute span a broad range: Space and ground based Astronomy and Astrophysics, Remote Sensing, Solar Terrestrial Environment and Space Physics, and Signal Processing and Applications.

• **Astronomy and Astrophysics**

- *Infrared*: Expertise in data analysis of observations taken with the NASA-Spitzer and ESA-Herschel Space Observatories on extragalactic astrophysics and, in particular, galaxy evolution, dust formation and gas depletion in interacting galaxies and Active Galactic Nuclei, gas and dust properties of Luminous Infrared Galaxies and nearby galaxies, as well as radiative transfer modelling. There is a well-established experience of team members in calibration and characterization of the Herschel and Spitzer instruments.
- *X-rays*: Analysis of data from the ESA-XMM-Newton and NASA-Chandra Space Observatories and, very importantly, strong representation (including leadership) in several long term multi-team and multi-instrument X-ray astronomy projects. Among the latter, is the ESA PRODEX program, which will build the first spectral catalogue of bright X-ray sources observed with XMM. The group is also contributing to the software development for the eROSITA instrument onboard the Russian Spectrum-RG mission, and will be involved in the creation of the ESA scientific Archive publication system
- *Gaia mission support*: The group of Stellar Systems and galaxies participated to the preparation of the ESA mission GAIA. Currently they are part of the Data Processing and Analysis Consortium and lead one of its Work Packages (unresolved galaxy classifier).
- *Ground-based Astrophysics*: The team has expertise in ground-based observations with optical telescopes in both photometry and spectroscopy and addresses crucial questions related to stellar evolution (remnants, planetary nebulae and SN remnants, massive stars) and morphology of galaxies. At the moment this research is carried out predominantly with international telescopes.

Main facility: The Aristarchos 2.3 m telescope at the Helmos Observatory. The telescope is the 2nd largest in continental Europe and saw first light in 2007. It became operational in 2013 and has, therefore, not produced research for the current evaluation period.

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- **Remote Sensing**

- *Earth Observations:* the group performs Earth observations using space-borne and ground-based remote sensing techniques. These provide real time observations to EU, ESA and to various national and international authorities responsible for civil protection and environmental monitoring.

Main facilities:

- *Meteosat Ground Station:* The group operates an integrated ground based acquisition station for satellite imagery within the MSG-SEVIRI system (part of the EUMETSAT network).
- *Atmospheric Remote Sensing Station:* Instrumentation for determining the presence of pollutant of different origins in the atmosphere.
- *EMORAL Mobile Lidar:* Portable depolarization – Raman Lidar transported in a minivan, for measurement of aerosol distribution diagnostics utilizing innovative inversion techniques.

- **Solar-Terrestrial Environment and Space Physics**

- *Solar Atmosphere:* The group studies magnetic coupling and heating phenomena in the solar atmosphere combining space and ground-based observations, theoretical modelling, and instrument design. The group has collaborations with national and international universities and research centers.
- *Earth's Magnetosphere:* The team studies planetary and interplanetary plasmas, geomagnetism and space magnetism, and space weather. Furthermore, the group provides measurements of the solar proton flux for ESA space missions.
- *Earth's Ionosphere and Plasmasphere:* The group activities range from systematic ionospheric monitoring to the development of ionospheric and trans-ionospheric prediction mechanisms based on modelling techniques of ground and space data. Their goal is to establish an international infrastructure for ionospheric monitoring and forecasting. The group operates, maintains and upgrades the European Digital Upper Atmosphere Server – DIAS.

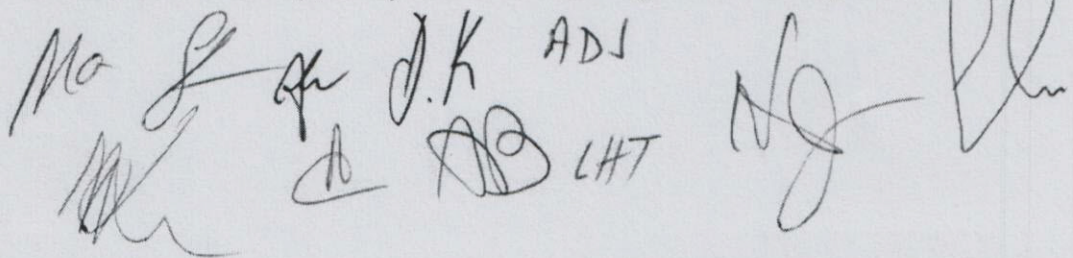
Main facilities:

- The *Digisonde Portable Sounder* for the remote sensing of the Earth ionosphere.
- *ENIGMA* an array of 3 ground-based magnetometers, part of the international collaboration SuperMAG.

- **Signal Processing and Applications**

- The group is using numerical linear algebra and probability statistic techniques to develop, analyze and validate algorithms for signal

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processing, pattern recognition, model parameter estimation, and hyperspectral image processing.

State of the art in Greece compared to Europe and the rest of the world

The X-ray, Optical and Infrared groups in NOA are the only such groups in the country. They have been utilizing international facilities to exploit data with a significant success contributing in this area with worldwide recognition (high profile scientists).

The Remote Sensing group is an established and well-recognized group on a national and international level. It practically defined the remote sensing activity in Greece from Space. Today the remote sensing data provide a significant service both to Greece and Europe.

The monitoring of the solar proton flux is important for ESA missions and space weather prediction is among the most important services for telecommunication nationally and internationally. The group is the only group providing these services in Greece.

The signal processing group is a smaller group albeit essential to the entire institute as it provides multi-disciplinary computing software applicable to all areas. These algorithms were developed by the group and are now being used internationally.

Human Capital

The workforce of IAASARS includes the Director, 23 researchers, 6 special scientific personnel, 6+1 technicians and administrators, all with permanent positions, 33 postdoctoral fellows on contract basis, and 10 graduate students. The permanent personnel is top heavy on high grades (researcher A). Four members will retire in the next year, creating a gap that needs to be filled with young researchers.

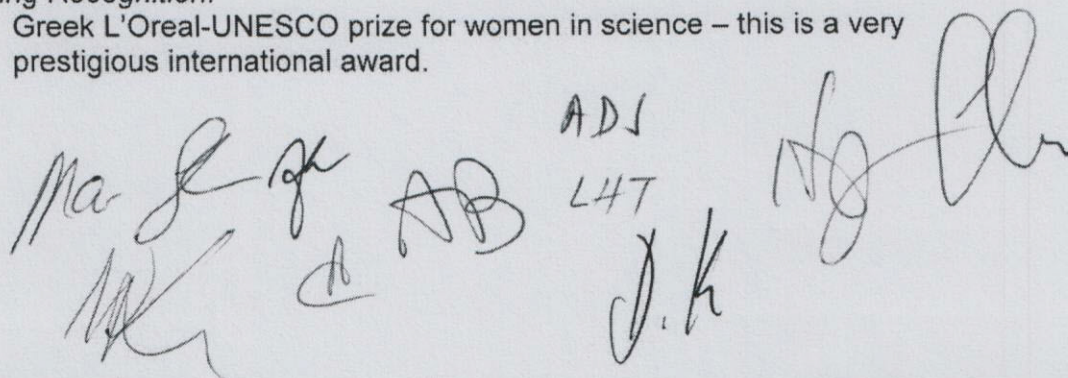
The new Director is planning to expand the collaboration with the University of Athens by instituting "Adjunct Researchers" as part of the institute structure, following upon the very successful FORTH example.

There is a very prominent lack of telescope instrumentation qualified engineering support for the Helmos Observatory.

Research Accomplishments

Outstanding Recognition:

- o Greek L'Oreal-UNESCO prize for women in science – this is a very prestigious international award.



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Excellent:

Astrophysics:

- Participation of the X-ray and IR group in multiple major surveys involving major space observatories and multi-national networks, such as: XMM/CDFS 3Ms, Chandra/AEGIS, COSMOS, XMM/SSL, GOALS, HERM33es, Herschel-GOODS and HerCULES. These surveys are very important in these fields and are bound to produce (and continue producing) ground-breaking results.
- Algorithm and Library creation (UGS, UgcLib) by the optical group as part of the DPAC consortium (an all-sky survey of unresolved galaxies and Quasars) of the recently launched ESA GAIA mission.
- ARISTEIA grant awarded in 2012 for the IR program "Revealed by their own dust: identifying the missing links in massive star evolution". This is a very promising 4-year program already started.
- Excellent outreach program utilizing the existing observatory telescopes.

Remote Sensing:

- GMES certification as a product and service development in EU level in Emergency Response and Support.
- Award of 2.3 Meuros under FP7-REGPOT-2012 to build a center of Excellence for EO-based monitoring of Natural Disasters.
- Crucial societal benefits via emergency response/support of meteo- and geo-related hazards.

Solar-Terrestrial Environment and Space Physics:

- Active and valuable membership in the DIAS-network, and the Solar Energetic Proton Flux (SERF) tool.

Signal Processing:

- Their pattern recognition algorithm has been recognized internationally and generated a lot of interest for multiple applications.

Opportunities and threats in relation to the national regional economy

Opportunities:

- Assuming that the Aristarchos Observatory is correctly evaluated and becomes part of the OPTICON network, the Helmos facility stands an excellent chance to become a national asset, bringing in international observers and contributing to the national visibility and economy.
- Potential commercialization of EO Remote Sensing products will contribute to the regional (NOA) and national economy.
- Application of the Signal Processing Algorithms to military and archaeological venues is of significant national interest.
- The proposed infrastructure roadmap program (HDEC-IRIS) is of vital importance to the national economy.

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- The coordinated synergistic operation among the parts of the newly created institute under the new direction, including the establishment of adjunct researchers, will improve the overall productivity and moral of the members and result in significant financial income enhancement.

Threats:

- All existing infrastructure must remain operational and competitive, in particular the remote sensing emergency response/support of meteo- and geo-related hazards and the Helmos Observatory.
- Future reduction of state financial support will be detrimental for the functionality of the Institute, in particular, non-replacement of retiring personnel.
- Continuous exercise of highly bureaucratic procedures are a virtual brake for sustained, and predictable funding and operations.

Recommendation and Measures to be taken

We find the scientific and societal outcome of the merged institute impressive, the lack of leadership of the previous Institute of Astronomy and Astrophysics notwithstanding. The committee is pleased to see an extremely strong person at the helm of the institute with a vision which will help to alleviate the difficulties of the merging process.

- It is clear to this committee that the Helmos Observatory needs adequate and qualified technical support to be fully operational. We strongly recommend an opening of a new position for at least one engineer at IAASARS to address this issue.
- The site of the Helmos Observatory has not yet been fully evaluated many years after first light. A proper site evaluation is direly needed. We recommend that it be performed within the next year to achieve integration of the observatory into the OPTICON network. We endorse the initiative of this integration, which will enable EU funding for the operating costs of the Observatory to be obtained, thus opening the facility nationally and internationally.
- We recommend that the government contributes national funds to ESA to enable participation of the NOA researchers in instrument building for ESA missions.
- We recommend significant reduction of the bureaucratic over-regulation, to allow Institutes and researchers to manage their funds in the most efficient and productive way. We believe that this is an important zero cost change.
- It is imperative to preserve the flow of young researchers in all centers. We find that the distribution of the research personnel within IAASARS is skewed

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towards the higher researcher levels (A) and recommend active recruiting and hiring at the lower levels (D).

- The committee endorses the vision plan of the new Director, in particular his efforts to enable better integration of the different components of the Institute into a well-coordinated and collaborating team.
- We strongly endorse and applaud the HDEC-IRIS proposal.
- The committee support, endorses, and enthusiastically applauds the Institute outreach efforts. We recommend that efforts be taken for a seamless transition to the new outreach leader after the retirement of the very successful current lead.
- We endorse the societal benefit component of the institute (emergency response/support of meteo- and geo-related hazards) and recommend that measures be taken to ensure continuation of all the related activities.

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TABLE 1

How do you evaluate the Institute with respect to

5 4 3 2 1

1. Leadership	4.00				
2. Mission and goals	4.00				
3. Strategy and policy	4.50				
4. Adequacy of the resources	4.50				
5. Funding policies	4.00				
6. Facilities	3.50				
7. Academic reputation	5.00				
8. Societal relevance	5.00				
9. Balance of the strengths and weaknesses	4.00				
OVERALL ASSESSMENT	4.3				

REMARKS

1 and 2. The evaluation is only for the period 2008-2012 and does not include the new Director. The evaluation is also taking into account the different quality contributions during the same period from the merged (previously independent) Institutes.

6. The Helmos facility is not in a condition expected five years after first light, in particular after a 10Meuros investment.

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TABLE 2

How do you evaluate **quality** of the Institute with respect to 5 4 3 2 1

1. Originality of the approach and ideas	4.5				
2. Significance of the contribution to the field	4.5				
3. Coherence of the Institute ¹	4				
4. Prominence of the Institute head	3.5				
5. Prominence of the other research staff	4.5				
6. Quality of scientific publications (scientific impact)	4.5				
7. Quality of other results	4.5				
OVERALL ASSESSMENT OF QUALITY	4.3				

REMARKS

3. The integration of the members of the former two institutes into one team is not complete.
4. This evaluation refers to the previous directors.

¹ with respect to individual laboratories

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TABLE 3

Considering the number of staff, how do you evaluate the **productivity** of the Institute with respect to

5 4 3 2 1

1. Number of Ph.D theses	4				
2. Number of scientific publications	5				
3. Number of professional publications	5				
4. Other results	5				
5. Distribution of published output within the Institute	5				
OVERALL ASSESSMENT OF PRODUCTIVITY	4.8				

REMARKS

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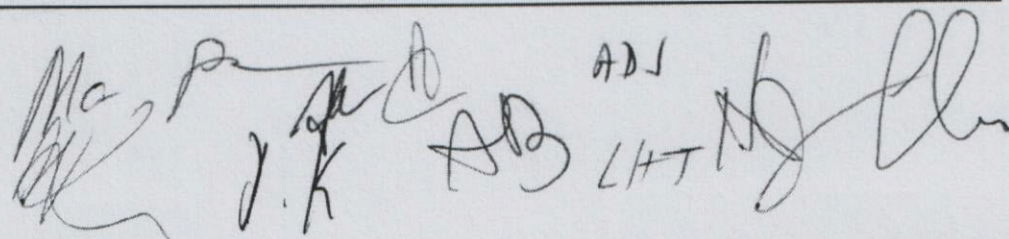
TABLE 4

Considering the objectives of the Institute, how do you evaluate the **relevance of its research activities** with respect to

5 4 3 2 1

1. The advancement of knowledge	5				
2. The dissemination of knowledge	5				
3. The implementation of knowledge	5				
OVERALL ASSESSMENT OF RESEARCH RELEVANCE	5				

REMARKS



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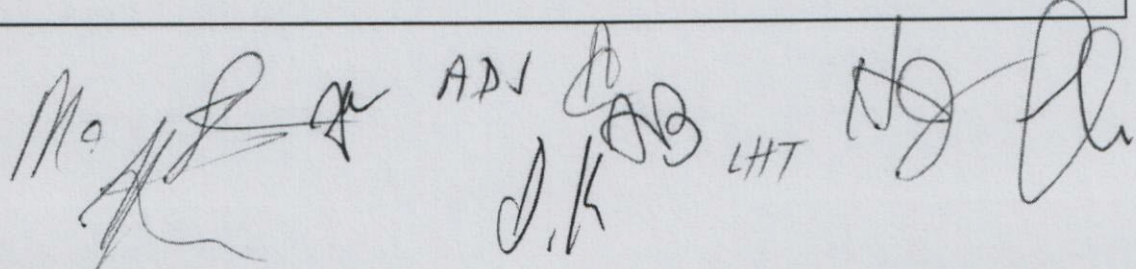
TABLE 5

Considering the present status and future developments of staff and facilities, how do you evaluate the long-term **vitality** of the Institute with respect to

5 4 3 2 1

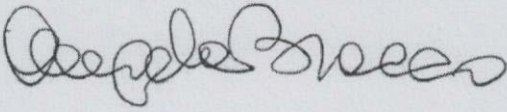
1. Its past scientific performance	4.5				
2. Its future plans and ideas	5				
3. The staff age and mobility	4.5				
OVERALL ASSESSMENT OF VITALITY	4.7				

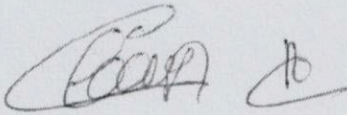
REMARKS

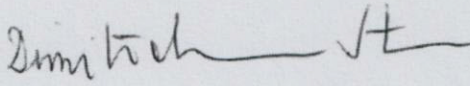


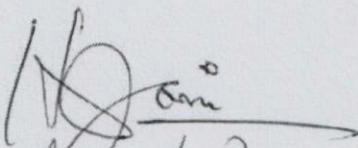
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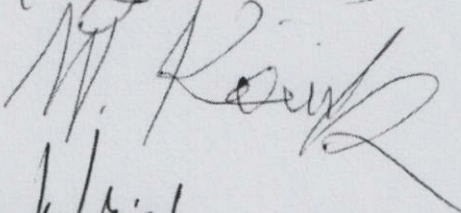
EVALUATION COMMITTEE

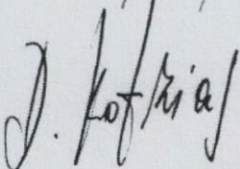
Professor Angela Bracco 

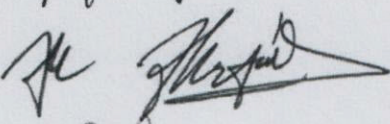
Dr. Alain Claverie 

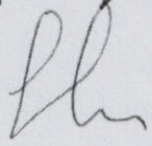
Professor Antonia Dimitrakopoulou-Strauss 

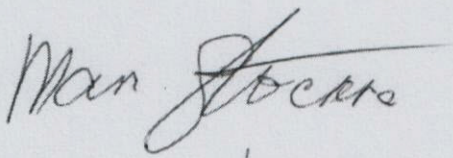
Professor Himanshu Jain 

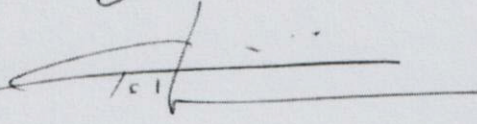
Professor Wolfgang Kautek 

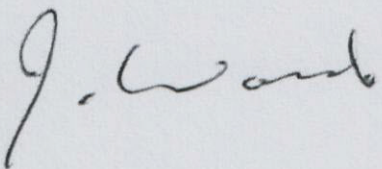
Dr. Dimitrios Kotzias 

Dr. Chryssa Kouveliotou 

Professor Silvano Massaglia 

Professor Mark I. Stockman 

Professor Lefteri H. Tsoukalas 

Professor John Wood 

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