

PLENARY CONFERENCE

ASSESSMENT OF DANGEROUS RADIATIONS INDOOR AND OUTDOOR- IMPACT ON THE PUBLIC HEALTH

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ABSTRACT

The dangerous radiation like ultraviolet, ionized, gamma and x have been studied in order to evaluate their impact to the public health. Especially the atmospheric ultraviolet radiation, due to the ozone hole, became more and more important for the public health particularly in summer time. This research has been focused to ultraviolet radiation (outdoor) in various seasons, in different regions. Also, various types of lamps of varied power have been investigated regarding their ultraviolet radiation production (indoor). The significant conclusion is that the highest values of ultraviolet radiation are observed in summer time and specifically at noon. The milky lamps are produced less ultraviolet radiation than the transparent lamps due to absorption. Similarly is between lamp- projector without mirror with those with mirror. As more broad the spectrum of ultraviolet as the absorption from the atmosphere is more weedy.

Keywords: radiation, ultraviolet, X rays, γ - rays, lamps, public health impact

AIMS AND BACKGROUNDS

The electromagnetic spectrum is the total of electromagnetic radiations of all possible wave lengths. It is divided in the following regions: γ rays, X rays, ultraviolet, visible, infrared, radio waves.

The properties of the **Ultraviolet Radiation** are the following: it emitted from the sun, it has lower energy than x rays, it is in caused and produced by changes of energy of electrons in the individuals and the molecules and is emitted also as radiation of black body from very hot bodies, as the stars it is a soft ionized radiation, in comparison with γ and x rays. The ionization it can cause damage in the biological organisms, it is further subdivided in three sub areas A, B, and C, radiation **UV- A (315-400 nm)**: it is least absorbed, radiation **UV- B(280-315nm)** is absorbed roughly 90% ,radiation **UV-C (100-280 nm)**: is absorbed all.

Factors that influence the UV propagation from the sun to the earth are:

- the ozone
- the atmospheric suspensions
- the cloud
- the altitude
- the geographic latitude of the region
- the reflections
- the season of the year and the hour of the day

The properties of the **Ionized Radiations** are the following: Carried energy which can be transferred to in the mass. Ionizing the atoms, break hardly the chemical bonds and create biological problems in the living organisms.

The most known ionized radiation are:

γ rays :Emitted from the unstable nuclei of atoms, and

x rays : Produced in the lamps of x rays apparatus

The γ-rays: has the smaller wave length, the higher frequency, the bigger photon energy. When penetrates the mass, electrons go away from the atoms and the moles producing ions. For this reason they called also “ionized radiation”.

The properties of the x-rays are the following: They belong to the region of immediately next bigger wave lengths from γ rays, but lower frequencies, smaller energies .Their wavelengths are much smaller than the wave length of visible radiation.

Health impact due to the sun ultraviolet radiation:

Skin:

A. Acute: Sun irritant, Sun burn, Photosensitization, Photosensitive

B. Cronic: photo- oldness, Photo- cancer: melanization, Basic cell cancer, Akan cell cancer. Photo immunosuppressant:

Reaction of ultraviolet in anoxia,Immunosuppressant

Reaction in infectious patients:Virus of simple herpes,Virus of humans condylomas

Vitamin D: Cancer ,Autoimmune illnesses, Hardness in layers, Saccharine diabetes,Rheumatoid arthritis,inflammatory illness of intestine.

Health impact of ionized radiation:

Cells: chromosomal alterations – carcinogenesis, Death of cells.

Tissues and organs: Myelo- aplasia, Skin damages, Cancer of gastrointestinal, and urinary,Damnation, Effeteness, Nephron-screamness, Askitis, atrophy of thyroid of gland, fibrosis initiating,necrosis of cerebral nervous cells.

EXPERIMENTAL

The present research is focusing to:

(A) OUTDOOR

Investigation of the intensity of ultraviolet radiation of atmosphere: in various seasons of year, in different hours of day, in different regions

(B) INDOOR

Investigation of the emission of ultraviolet radiation by various types of lamps of varied power.

Outdoor Measurements

Measurements in different Prefectures, Prefecture of Thessaloniki, City center, close to the beach, Sindos, region of A.T.E.I. of Thessaloniki, Filiro Prefecture of Chalkidiki: Kallikratia, Kalithea. Prefecture of Pieria: Katerini, Paralia (beach of Katerini). (Spring- Autumn ,Sunny days,2-3 measurements in each place, Time period: 9.00 a.m. – 17.30 p.m.)

Measurements by University of Thessaloniki (Laboratory of Atmospherical Physics, Physics Department A.U.Th..) Station A.U.Th. Station Epanomi. (Four seasons, Sunny days, 4-7 measurements in each place, 24 hours the day).

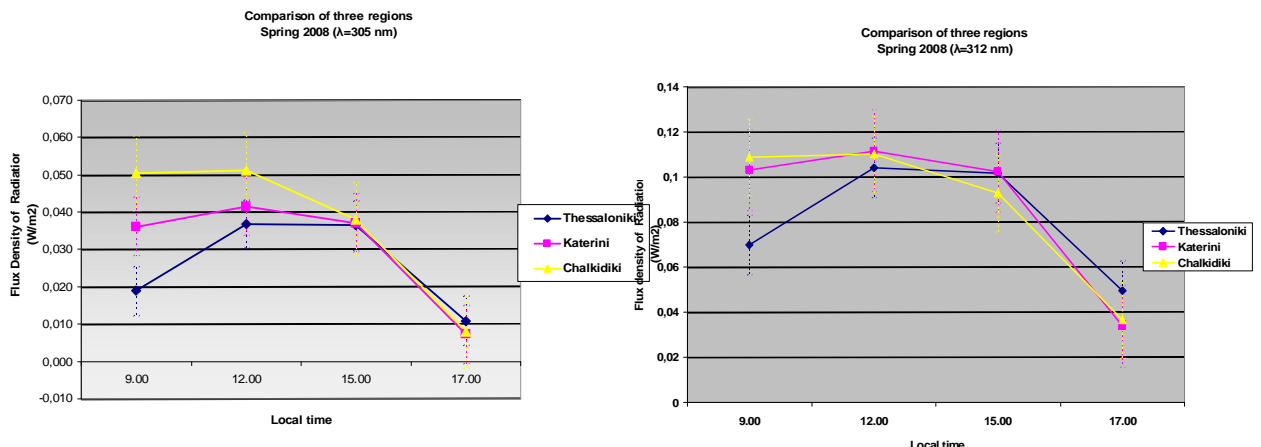
Indoor Measurements

- | | |
|---|---|
| <ul style="list-style-type: none"> ➤ Lamps-projectors <ul style="list-style-type: none"> • 75 W • 75 W (with mirror) ➤ White light lamps <ul style="list-style-type: none"> • 60 W • 100 W • 200 W ➤ Milky lamps <ul style="list-style-type: none"> • 60 W • 75 W • 100 W • 150 W | <ul style="list-style-type: none"> ➤ Color lamps <ul style="list-style-type: none"> • yellow • blue ➤ Conserving energy lamps <ul style="list-style-type: none"> • 12 W • 18 W • 24 W • 26 W • 30 W ➤ Mixed light lamps ➤ Fluorescence lamps ➤ Ultraviolet lamps |
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The outdoor measurements have be done using a Mult- channel actinometer NILU-UV while the indoor measurements have been done by Spectrographer - Charged-Coupled Device (CCD)

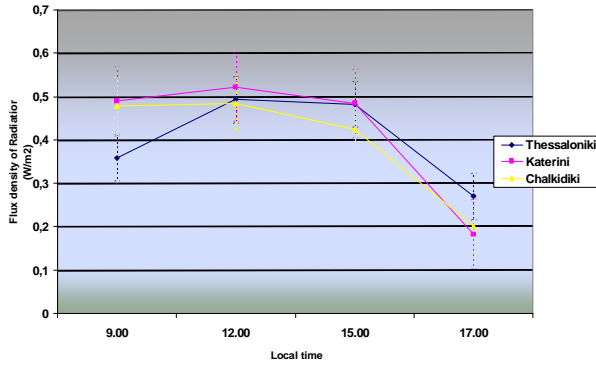
RESULTS AND DISCUSSION

Outdoor Measurements in various Prefectures

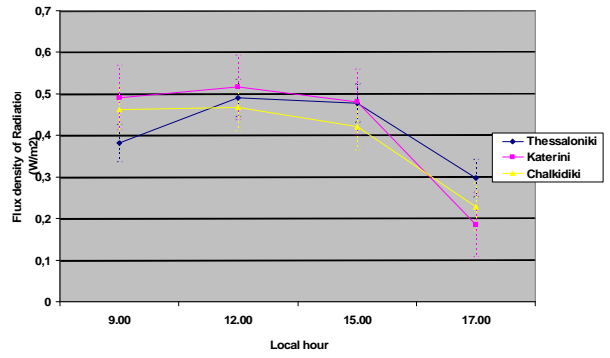


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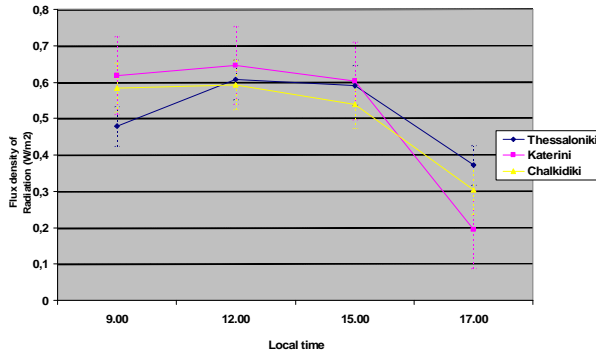
Comparison of three regions
Spring 2008 ($\lambda=324$ nm)



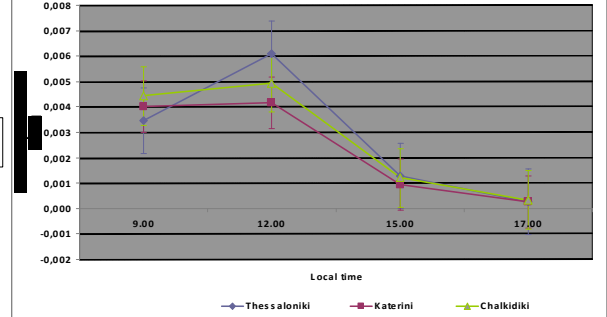
Comparison of three regions
Spring 2008 ($\lambda=340$ nm)



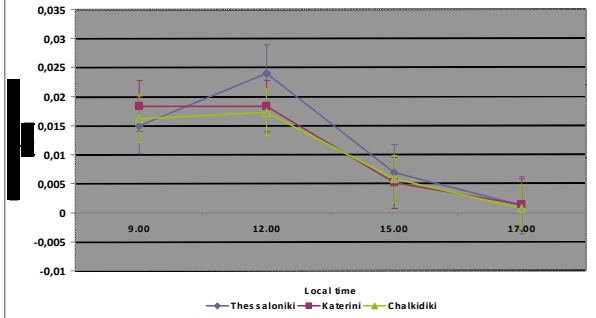
Comparison of three regions
Spring 2008 ($\lambda=380$ nm)



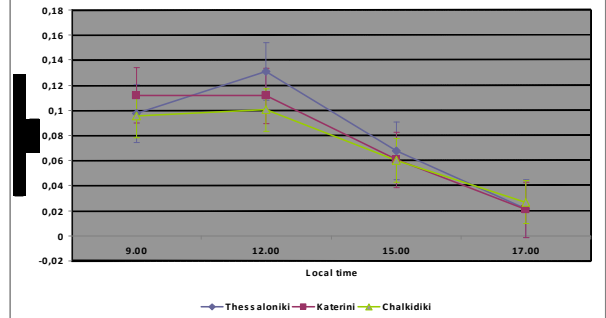
Comparison of three regions
Autumn 2007 ($\lambda=305$ nm)



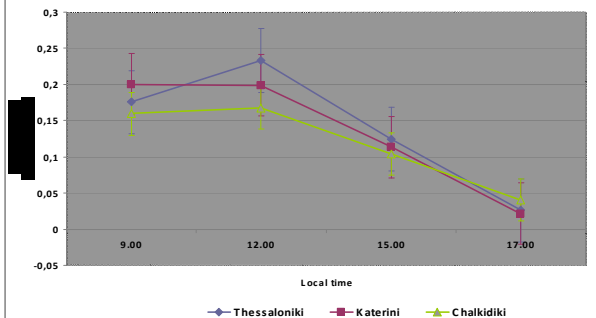
Comparison of three regions
Autumn 2007 ($\lambda=312$ nm)



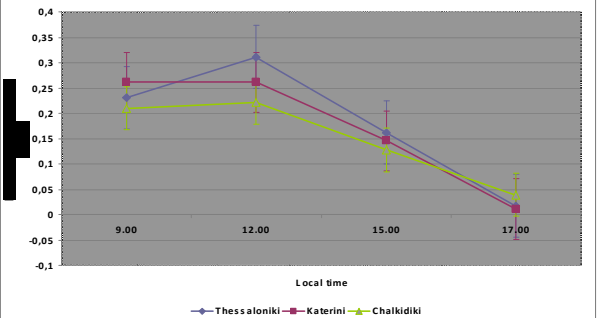
Comparison of three regions
Autumn 2007 ($\lambda=324$ nm)



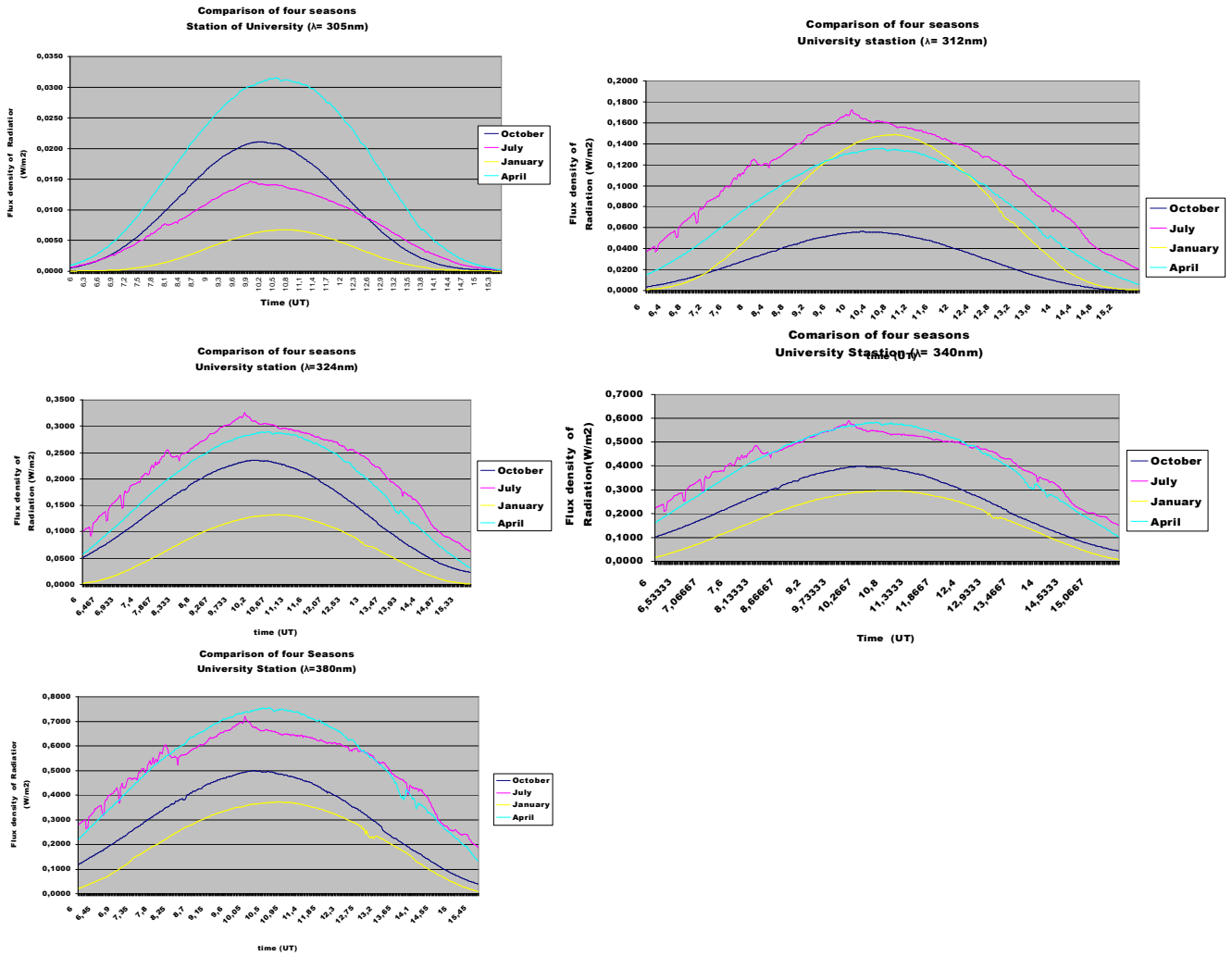
Comparison of three regions
Autumn 2007 ($\lambda=340$ nm)



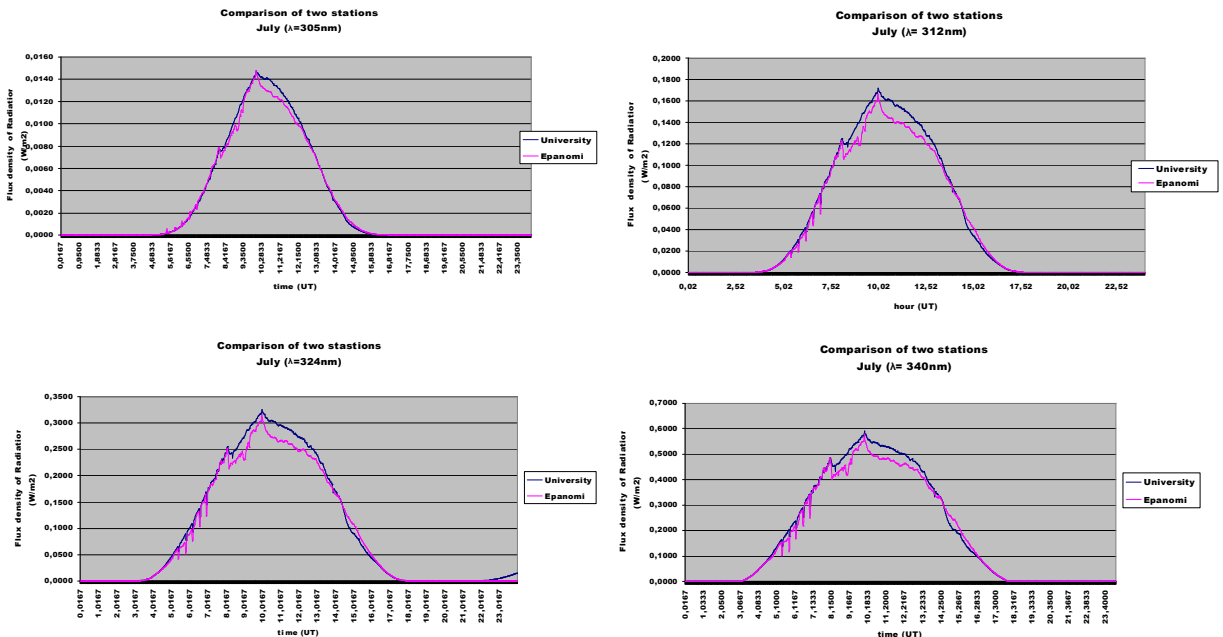
Comparison of three regions
Autumn 2007 ($\lambda=380$ nm)

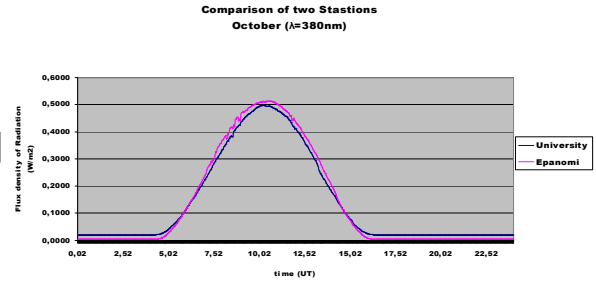
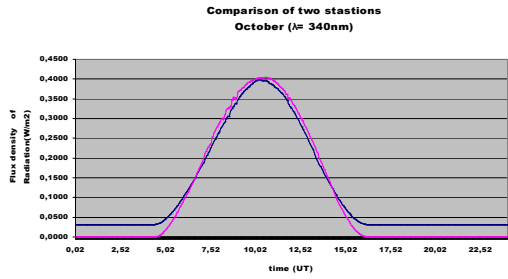
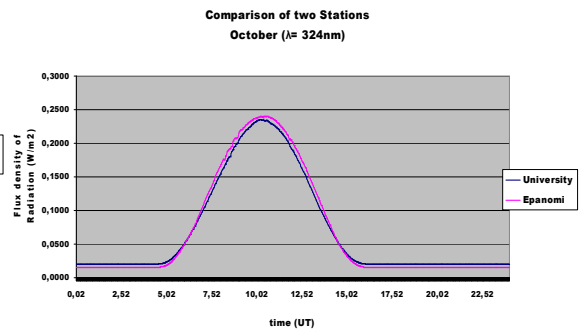
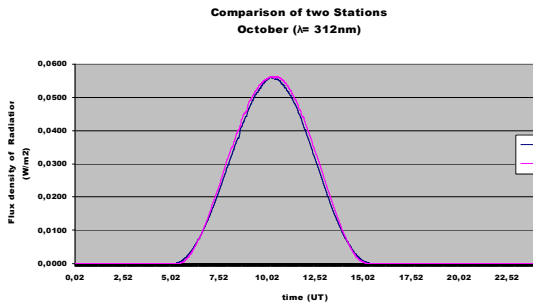
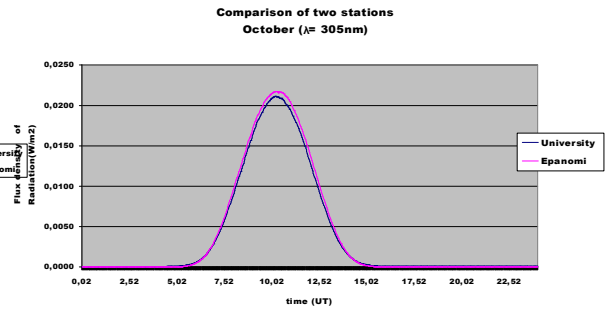
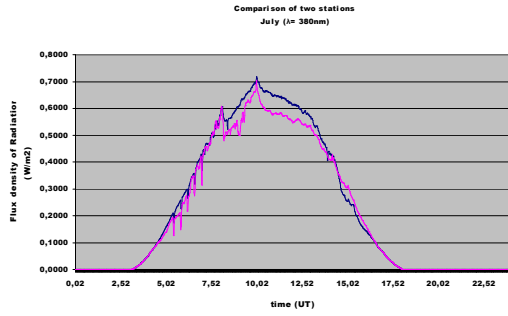


Measurements of the University Station, Comparison of the four seasons.

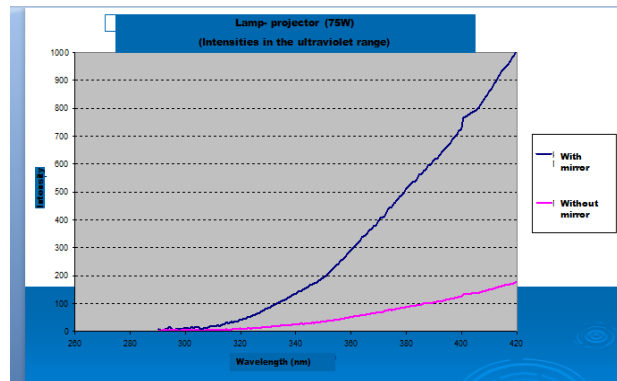
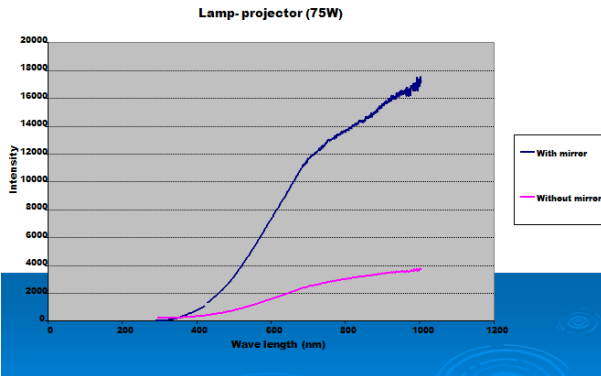


Comparison of two seasons in two different stations: (University-Epanomi)

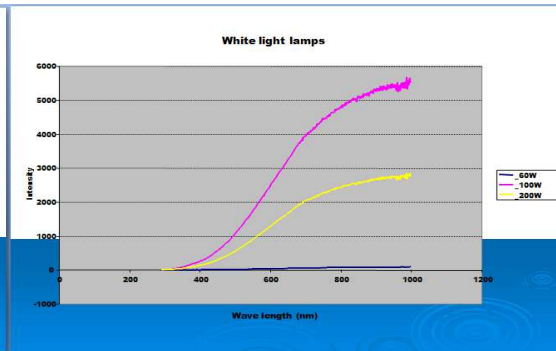
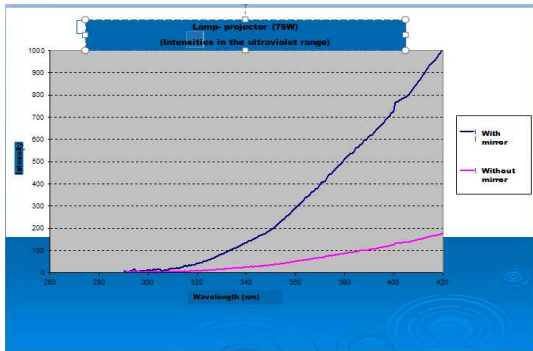




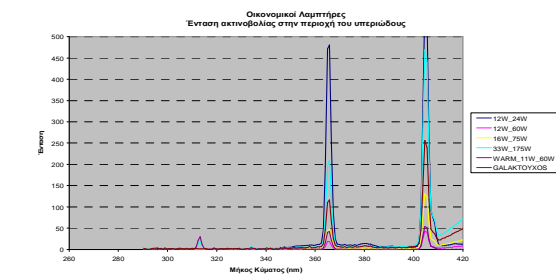
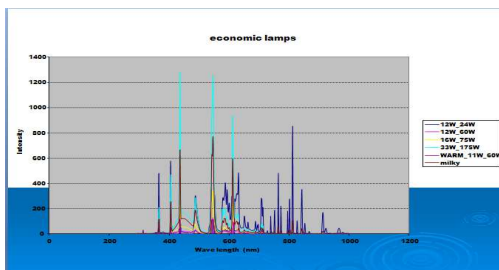
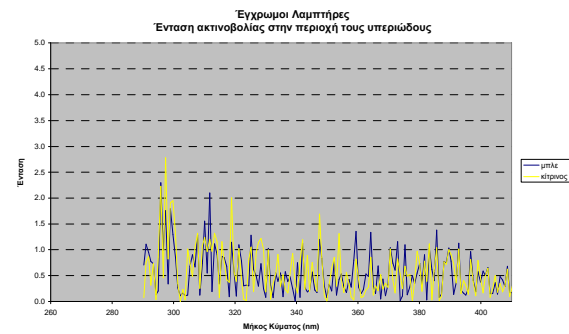
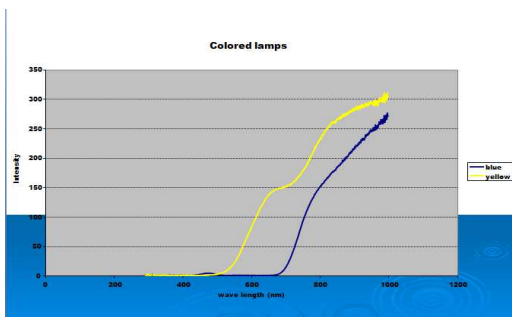
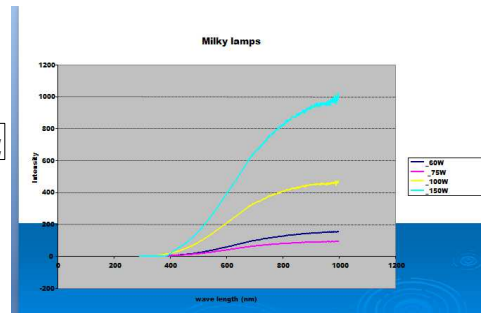
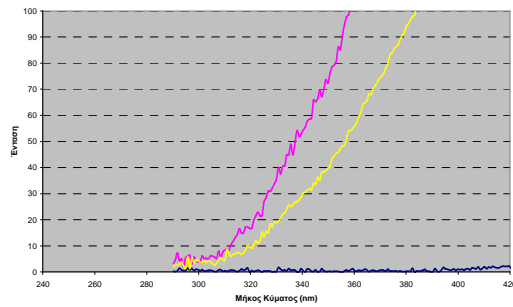
Indoor Measurements

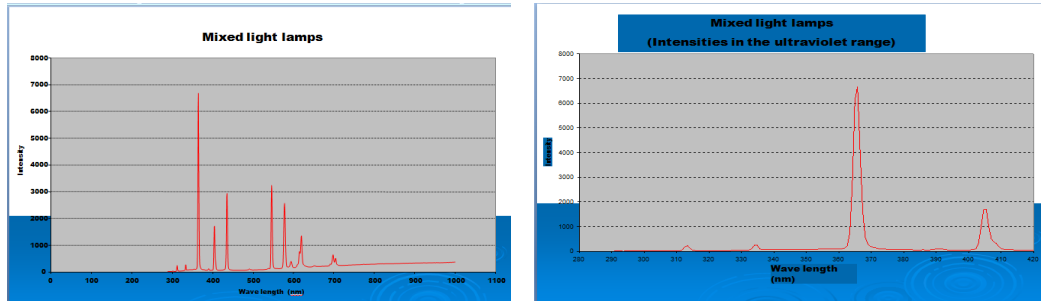


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Λαμπτήρες Λευκού Φωτός
Ένταση ακτινοβολίας στην περιοχή του υπεριώδους





CONCLUSIONS

Between the three prefectures (Thessaloniki, Pieria, Chalkidiki) there is not notable difference regarding the flux density of ultraviolet radiation (W/m^2)
The highest values of ultraviolet radiation are observed:

- During the summer time
- During the lunch hours (noon)

Measures for the solar radiation are very significant to be taken on behalf of the public health particularly in the summertime. As more broad is the spectrum of the ultraviolet radiation, as the absorption of the radiation from the atmosphere is weadier. Remarkable difference in the intensity of radiation is observed between the lamps: **Projector with mirror > projector without mirror**

In the projector with mirror it is observed abrupt (almost vertical) increase of intensity from the 310 nm and afterwards. **Transparent > milky**

The biggest absorption of the radiation from milky lamps is due to the white substance material that covers the glass of the lamp

The lamps, which often are using in the work places, are: **mixed lighting lamps and fluorescence lamps**

Both emit in small quantities ultraviolet radiation. The economic lamps emit bigger portion of ultraviolet in comparison with mixed lighting and fluorescence lamps

- It is not observed significant difference between blue and yellow light regarding their ultraviolet component.
- The lamps of **ultraviolet radiation** that are used for therapeutic and beauty's reasons should be used in low power since in the 100% of the power, the radiation is very strong and dangerous. It was observed however, that when the power is decreased to the 50%, then the intensity of the ultraviolet radiation is decreased considerably.

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