## RADIOMETRIC CHARACTERISATION OF BIOLOGICAL DOSIMETERS

## D. BOLSÉE AND D. GILLOTAY

## Belgian Institute for Space Aeronomy 3, Avenue Circulaire B-1180 Brussels, BELGIUM

One of the main objectives of the BIODOS EC project (ENV4-CT95-0044) was the radiometric characterisation of existing biological UV-dosimeters according to a standard protocol. This task was in charge of the Belgian Institute for Space Aeronomy. We have developed a special calibration facility according to the following optical requirements :

- First, the intensity of the UV source has to be strong enough, in order to compensate the generally low sensitivity of biological systems (in comparison with physical detectors).
- Secondly, the stability and absolute calibration (in radiometric units) of the collimated beam provided by the source had to be carefully controlled in order to transmit a well calibrated and constant dose rate to the different dosimeters.
- Thirdly, to bring the investigations about the linearity and the spectral response of biological systems to a successful conclusion (law of reciprocity, action spectrum, potential wavelength interactions, narrowband or broadband response, etc...), we had to design a very flexible and powerful filtering system.
- Some additional requirements were for example : temperature stabilization by removing the IR radiation of the source, fine control of the exposures times (electronic shutter), etc....

We have achieved these objectives by using a solar simulator based on a 1000 W arc xenon lamp stabilized by a photofeedback system. The irradiance of the beam was measured by means of a calibrated double spectroradiometer. The filtering system implemented in the facility can be set in two modes. The first mode called **direct beam configuration** (Figure 1.) was mainly used for spectral response (by means of broadband UVB and UVA filters and narrowband interferentiels filters) and for linearity measurements (by means of neutral density filters).

The second mode called **beam conjoiner** configuration (Figure 2) was especially designed for the measurements of potential wavelength interactions. By splitting the beam in two parts, two bandpass filters were used simultaneously in parallel so that their respective bandpass were added.



Figure 1: The so-called direct beam configuration



Figure 2: The so-called beam conjoiner configuration

The so called BIODOS characterisation facility has been intensively used during the second year of the project (second laboratory intercomparison campaign) with nearly the same protocol of measurements for the four different dosimeters investigated. Preliminary results should now be available.

## References

- 1. Final report of the EC project No. EV5V-CT93-0342, Biologically weighted dosimetry of solar UV radiation.
- Saunders R. D., Shumaker J. B. Automated radiometric linearity tester. Appl. Opt. Vol. 23, No. 20: pp 3504-3506, 1984.