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New observational strategies for reconstructing the solar UV flux for space weather applications

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Many applications in space weather and in space situational awareness require continuous solar spectral irradiance measurements in the UV range. However the continuous monitoring of the solar UV irradiance is a difficult task. Present Si photodetectors exhibit serious limitations in performance and lifetime. Moreover filters suffer from a rapid degradation which limit the duty cycle of the mission. Here we give a theoretical view of one kind of degradation based on the formation of pinholes on the optical surfaces.

We propose a solution which is expected to overcome, at least partially, these problems. We propose therefore a new approach based on the idea that it is not necessary to measure the all spectrum but that a few bands suffice to retrieve all the other wavelengths. Then we propose a new instrumental concept with detectors using only wide band gap materials. Those detectors select directly the desired spectral range without using upstream filters which are the main source of measurement degradation. Five channels are at least needed to retrieve the full UV spectrum with an accuracy as good as the actual spectrometers for space weather applications. We strongly believe that this work could be an asset to the definition of future instruments in the framework of the Space situational Awareness raised by the European Space Agency.