

# Italian all-sky imager tracks auroral red arcs over Europe

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During geomagnetic storms, stable auroral red (SAR) arcs reach down from polar latitudes, their faint glow stretching equatorward of the traditional auroral oval. Invisible to the naked eye, SAR arcs are an upper atmospheric occurrence produced by the emission of light from oxygen atoms in the thermosphere. The excitation of the ionospheric oxygen that produces SAR arcs is caused, in turn, by the conduction of heat from the magnetospheric ring current. Advances in camera optics, including more sensitive sensors and highly specific filters, have allowed researchers to track the occurrence of SAR arcs, opening a window into the dynamics of the inner magnetosphere.

In northern Italy a new all-sky imaging system, described by Baumgardner et al., uses highly sensitive sensors and a fish-eye lens to simultaneously observe SAR arc and faint auroral activity over the majority of Europe. The authors report on the all-sky SAR arc observations made during a [geomagnetic storm](#) that took place from 26 to 27 September 2011.

Comparing their observations with coincident satellite- and ground-based observations, the authors find that their all-sky imager was able to identify the lowest latitudes where magnetospheric sources can create a SAR arc.

They suggest that the detection of a SAR arc, separated from the diffuse ionospheric aurorae, can indicate the region of maximum electron heating from the inner magnetosphere to the ionosphere. They also

suggest that the new all-sky imager could be used to help interpret in real time the effect of space weather on radio communications or to help validate [space weather](#) modeling efforts.

**More information:** Imaging space weather over Europe, Space Weather, [doi:10.1002/swe.20027](https://doi.org/10.1002/swe.20027) , 2013. [onlinelibrary.wiley.com/doi/10... 2/swe.20027/abstract](https://onlinelibrary.wiley.com/doi/10.1002/swe.20027/abstract)

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