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Mapping of the Atomic Oxygen Nightglow Emissions on Mars in the Visible and Infrared Domains

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Nightglow emissions in the Mars atmosphere provide critical insights into its composition and dynamics, allowing remote evaluation of atmospheric constituents and photochemical processes. The UVIS spectrometer aboard ESA's ExoMars Trace Gas Orbiter (TGO) recently detected a new emission in Mars' atmosphere—the Herzberg II bands of molecular O_2—particularly intense around the winter poles. Additionally, NASA's CRISM instrument aboard the Mars Reconnaissance Orbiter (MRO) has recorded the infrared counterpart of this emission: the O_2 ($a^1\Delta$) emission at 1.27 μm.

This study aims to merge these two datasets (UVIS and CRISM) to create the most comprehensive map of nocturnal oxygen emissions on Mars to date. By integrating observations in both the visible and infrared domains, this novel approach will enhance our understanding of oxygen transport and distribution in the Martian atmosphere.

The final dataset will be compared to 3D global circulation models to provide unprecedented constraints on atmospheric dynamics, improving our knowledge of photochemical and transport processes on Mars.