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### Detecting and Characterising atmospheric gravity waves on Mars' atmosphere - Final results using data from OMEGA/Mars Express

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We present the final results from the detection and characterisation of mesoscale waves on the lower clouds of Mars [1] using images from the Observatoire pour la Minéralogie, l'Eau, les Glaces et l'Activité (OMEGA) [2] onboard the European Mars Express (MEx) space mission [3]. We used image navigation and processing techniques based on contrast enhancement and geometrical projections to characterise morphological properties of the detected gravity waves (GW), such as horizontal wavelength or packet length. Our study covers 25 months of data spanning from Jan. 2004 to Jan. 2006, and from June to July 2007, corresponding to a one Martian year [MY26- MY27]. Out of 148 detected wave packets, we were able to characterise 61 across more than 4000 images covering a broad region of the Martian globe.

Our results reveal that waves exhibit an average horizontal wavelength of 23 km, which is consistent with previous observations [4,5]. We also extend the study by characterising their packet width, length and orientation. Taking advantage of the large dataset available from the OMEGA instrument, we also conducted a spatial and temporal investigation of the waves, namely their occurrence in specific local times and solar longitudes. Our characterisation showed a higher frequency of GW during daytime hours, particularly within the 13-15 LTST range. Concerning the solar longitude that is a measure of the Martian seasons, we noted that GW activity is prevalent during the winter season in both hemispheres, suggesting a relationship between seasonal variations and gravity wave generation, which was previously mentioned in the literature [6-8]. We will also present the preliminary results of GW using the HRSC instrument.

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