

Exploring the Atmosphere of MArS and VEnus with Remote Observations: A Belgium-Japan partnership (AMAVERO)

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<http://c.gp.tohoku.ac.jp/~www/amavero.html>

Recent successful explorations of Mars and Venus atmospheres by numerous spacecraft and ground-based telescopes have suggested their active photochemistry and dynamics on the planets. Characteristics of spatial and temporal variations of temperature, wind, and atmospheric constituents are essential to understand the photochemistry and dynamics. However, (1) "3D distributions (i.e., spatial variation + vertical profiles)" of temperature, wind, and trace gases on Mars, and (2) those at the middle atmosphere (from the cloud top to the upper atmosphere, 60-140 km) of Venus, are still poorly understood.

In 2017-2018 FY, Japan-Belgium collaboration program, AMAVERO (Exploring the Atmosphere of MArS and VEnus with Remote Observations: A Belgium-Japan partnership) is running. In this project, we study those aspects by collecting unique observational datasets from Belgium and Japan. Belgian side provides the data taken by European Mars orbiter Mars Express (MEx) and Trace Gas Orbiter (TGO), and Venus Orbiter Venus Express (VEx). From Japan, we provide the data taken by ground-based and space-borne telescopes with Japanese Venus Orbiter Akatsuki. Moreover, we share tools to analyze the observational datasets, and develop the numerical models of the atmospheres to interpret the observational results.

In the spring in 2017, we sent scientists from Japan to Belgium and initiated the following researches based on the exchange of young research staffs, postdocs, and graduate school students: (1) Collaboration of ground-based observation data, taken by ALMA sub-mm array, SOFIA IR airborne telescope, and MIRAHI IR heterodyne spectrometer. (2) Development of Limb retrieval code JACOSPAR for the utilization to ExoMars Trace Gas Orbiter and its test application for H₂O vertical profile derived from Mars Express data. (3) Distribution and dynamics of Venusian atmosphere observed by Akatsuki IR imagers. (4) The intercomparison of MGCMs with water cycle in different approaches.

This project was generated from the long-term collaborations between Japan and European groups for Mars and Venus sciences associated with Mars Express (2003-), Venus Express (2005-2015), CrossDrive project (Collaborative Virtual Environments for Mars Science Analysis and Rover Target Planning, 2014-2016), ExoMars Trace Gas Orbiter (2016-), with groundbased and numerical simulation works. Any proposals which enhance the activities are welcomed.