VENUS

ALMA to the rescue

Astron. Astrophys. http://doi.org/b9p8 (2017)

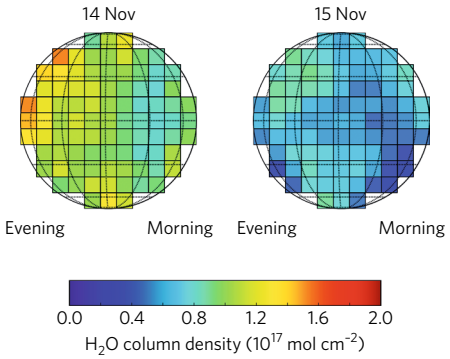

Image credit: EDP Sciences

Far less hospitable than Mars and enshrouded in a thick layer of clouds that hinders the view of its surface, Venus is nonetheless no less interesting, especially for atmospheric science, as its thick atmosphere (90 bar at the surface) hosts complex dynamics and chemistry. However, Venus is a bit neglected when it comes to mission selection by space agencies. The Atacama Large Millimeter/submillimeter Array (ALMA) is perfectly suited to compensate this relative lack of monitoring from spacecraft, as the submillimetre range includes lines of many gaseous species present in Venus's atmosphere. Arianna Piccialli and co-authors present the most complete analysis of ALMA data for Venus to date.

Piccialli et al. use observations obtained in November 2011 to extract simultaneous full-disk maps of the temperature profile in the mesosphere (70–105 km in altitude) together with SO, SO_2 and H_2O column abundances. The Venus disk has a diameter of 11 spatial units in these observations, which mostly cover the dayside. There are many bits of information we can get from this comprehensive dataset, such as the presence of a temperature inversion whose altitude increases from the morning to the evening, or the strong variation of H_2O abundance from one day to another (pictured). Even more valuably, this kind of simultaneous mapping can provide much-needed constraints on the interaction of these minor gases, and consequently on the physical and chemical processes active in Venus's upper atmosphere. The complete ALMA configuration will help improve data quality and new observations have already been obtained.

Luca Maltagliati

Published online: 28 August 2017
DOI: 10.1038/s41550-017-0226-x