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Monitoring middle-atmospheric dynamics using independent ground-based wind and temperature measurements at Reunion Island

Alexis Le Pichon (1), Alain Hauchecorne (2), Philippe Keckhut (2), Sergey Khaykin (2), Jean Pierre Camas (3), Guillaume Payen (3), Niklaus Kämpfer (4), Rolf Rüfenacht (4), and Lars Ceranna (5)

(1) CEA/DAM/DIF, F-91297, Arpajon, France, (2) LATMOS-IPSL, Guyancourt, France, (3) Université de la Réunion, Saint-Denis, France, (4) Institute of Applied Physics, University of Bern, Switzerland, (5) BGR, B4.3, Hannover, Germany

There are very few multi-instrumented sites in the tropics and particularly in the Southern Hemisphere. In these regions, developing atmospheric sounding methods in the middle and high-atmosphere provides valuable means to improve the physical representation of deep convection in atmospheric models (breaking of gravity waves, coupling between layers) and to better characterize large-scale atmospheric perturbations (cyclones, storms, tropical convection).
The Maïdo observatory at Reunion Island (21°S, 55°E) offers trans-national access to host experiments or measurement campaigns for high resolution measurements of dynamic atmospheric processes in a wide range of altitude such as Rayleigh lidar, Doppler lidar, Modem radiosonde, or microwave Doppler spectro-radiometer (WIRA, operated by Institute of Applied Physics, University of Bern). Collocated to the existing instruments, a small aperture infrasound array (CEA) has been operating continuously since 2014. In the 0.1-1 Hz band, the coherent energy is dominated by microbarom signals resulting from the non-linear interaction of large swells systems which circulate along the Antarctic Circumpolar Current (ACC). The seasonal transition in the bearings along with the stratospheric general circulation between summer and winter is clearly noted.
Interestingly, the semiannual oscillation (SAO) of the zonal stratospheric wind is well captured by infrasound measurements. It manifests by opposite ducts between 30 and 60 km that persist for several weeks during the equinox period.
For the ARISE project (http://arise-project.eu/), this multi-technology site opens new perspectives to study the climatology of SAO as well as poorly resolved atmospheric disturbances of the tropical middle atmosphere where data coverage is sparse.