



The SWING activities and developments within the RAMOS project

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The Small Whiskbroom Imager for atmospheric composition monitoring (SWING) is a compact payload developed for trace gas mapping. It was initially designed to measure the atmospheric composition from an Unmanned Aerial Vehicle (UAV) platform. SWING is based on a compact UV-Visible spectrometer and a scanning mirror to collect scattered sunlight under the aircraft and in zenith. The spectra recorded on flight are analyzed with the Differential Optical Absorption Spectroscopy (DOAS) method. SWING was successfully demonstrated onboard a UAV during the AROMAT-1 campaign (Romania, 2014). The instrument was later mounted on a Cessna during AROMAT-2 (Romania, 2015) and AROMAPEX (Germany, 2016) campaigns. The weight, size, and power consumption of SWING are respectively 1100 g, 33x12x8 cm³, and 15 W.

In the context of the ESA RAMOS (Romanian Atmospheric Observation System) activity, BIRA has built two new SWING-type instruments. These instruments will be operated by INCAS and installed on two different INCAS airborne platforms: an octocopter UAV and a Britten-Norman 2 (BN-2) manned aircraft. A complete redesign was necessary for the integration in the BN-2. This new instrument (SWING+) is 3.8 kg. We present these SWING/SWING+ instruments and the associated characterization work in the lab. We also present the campaign plans for the first test flights in Romania in 2018. Applications of these new SWING/SWING+ observations systems include validation of air quality satellites such as TROPOMI/S5p, urban air quality studies, quantification of NO₂ or SO₂ emissions, and ship emissions monitoring.