

50th STUDENT CONFERENCE (E2)  
Student Team Competition (3-GTS.4)

Author: Mr. Ramiro Gustavo Tintaya Quispe  
Universidad Nacional de Ingenieria, Peru, Peru, rtintayaq@uni.pe

Mr. Martin Salazar  
Universidad Nacional de Ingenieria, Peru, Peru, martin.salazar.m@uni.pe

Mr. Julver Marrufo  
Universidad Nacional de Ingenieria, Peru, Peru, jmarrufop@uni.pe

Mr. David Arrustico  
Universidad Nacional de Ingenieria, Peru, Peru, arrusticodavid@hotmail.com

Mr. Antony Davila  
Universidad Nacional de Ingenieria, Peru, Peru, adavilap@uni.pe

Mr. Germain Rosadio Vega  
Universidad Nacional de Ingenieria, Peru, Peru, grosadiov@uni.pe

Mr. Lucas Nicolas Taipe Ramos  
Universidad Nacional de Ingenieria, Peru, Peru, ltaiper@uni.pe

Ms. MARIA NIMIA MUÑOZ DIAZ  
Universidad Nacional de Ingenieria, Peru, Peru, maria.munoz.d@uni.pe

Mr. Anibal Esquiembre  
Universidad Nacional de Ingenieria, Peru, Peru, anibal.esquiembre@gmail.com

Mr. Giusep Alexander Baca Bernabe  
Universidad Nacional de Ingenieria, Peru, Brazil, g.bernabe@unesp.br

Mr. Luis Suarez  
Peru, lsuarez@igp.gob.pe

Mr. George Steve Fajardo Soria  
Universidad Nacional de Ingenieria, Peru, Peru, george.fajardo.s@uni.pe

Mr. Dario Adolfo Huanca Paredes  
Pontifical Catholic University of Peru, Peru, dario.huanca@pucp.edu.pe

Mr. Miguel Morales Gonzales  
Universidad Nacional de Ingeniería (Lima, Perú), Peru, miguel.morales.g@uni.pe

WANKA - A MISSION TO MEASURE STRATOSPHERIC AEROSOLS CONCENTRATION USING  
LOW-COST COMMERCIAL SENSORS ONBOARD A HIGH-ALTITUDE BALLOON

**Abstract**

Interest in stratospheric aerosols has grown during the last decades, mainly because of their increase and their potential applications to control global warming, as they can scatter the radiation that enters the planet. However, there is uncertainty about their concentration and effects they cause, due to their high spatial and temporal variability, and physical and chemical processes to which they are exposed. In situ is the most affordable way for university students to measure stratospheric aerosols parameters, as ground based and space based measurements are usually performed by governmental institutions. In situ measurements can be done using a High-Altitude Balloon; however, many institutions do not have the equipment necessary to design a payload specialized in measuring stratospheric aerosol parameters.

WANKA is a mission developed by peruvian undergraduate students from different universities, which main objective is to measure the concentration of stratospheric aerosols. It was done by the launch of a payload at the High-Altitude Student Platform (HASP 2021). HASP is a program created to train students in the development of aerospace projects giving them regular flight opportunities onboard a high-altitude balloon. It is operated as a partnership between the NASA Balloon Program Office (BPO) and Louisiana Space Consortium (LaSPACE).

WANKA developed a cost-effective way to measure stratospheric aerosols concentration using two low-cost commercial light-scattering-based particle matter sensors, the Plantower PMS 7003 and the Sharp GP2Y1010AU0F. In order to perform these measurements, it was developed a system that acquires constantly samples from the stratosphere and adequate them to conditions where the sensors can operate.

WANKA team members worked mainly online due to COVID-19 restrictions and traveled to NASA facilities for the testing and launch activities. The payload was launched on September 14, 2021, from Fort Sumner, New Mexico, USA. Most of the subsystems operated as expected, however, PMS7003 failed at certain times during the flight. It was not possible to compare directly the acquired data with the one from other systems, however, the data behaved as expected. Finally, the team was accepted to participate in HASP 2022, to solve the issues from the past flight and accomplish its main objective successfully.