

43rd STUDENT CONFERENCE (E2)
Student Team Competition (3-V.4)

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STRATOSPHERIC DECOMPOSITION OF SELECTED CFC'S COMPOUNDS AS AN EXAMPLE OF
STUDENT BALLOON EXPERIMENT IN THE EARTH'S ATMOSPHERE - PROJECT FREDE**Abstract**

The main goal of project FREDE (FREon Decay Experiment) is to study disintegration phenomenon of chlorofluorocarbons (CFC's) - group of refrigerators commonly known as Freon's (name reserved for DuPont). As radiatively active gases present in the Troposphere and Stratosphere, they influence depletion of the Earth's ozone layer (O₃) and the increase of the greenhouse effect.

An experiment consist of test samples reservoir exposed to low and high altitude conditions (wide range of UV radiation levels, temperature and pressure) is design to collect information about CFC's decay process, especially its chemical products due to dedicated on-board measurement chamber equipped with Taguchi Gas Sensors (TGS) and Photo-ionization Detector (PID). In order to perform research on CFC compounds behavior in the Earth's Atmosphere project FREDE is design to carry out two major experiments, first in the laboratory and the other one using a stratospheric balloon which can reach altitude of 25 km above sea level. This is an altitude where Ozone concentration level can reach 8 ppm and it's close to its maximum value.

Balloon flight campaigns provide unique opportunity to study lower levels of Earth's Atmosphere (Troposphere and Stratosphere) where most of anthropological air contamination like CFC can be found. Our studies are possible thanks to REXUS/BEXUS program organized as a joint cooperation between ESA Education Office, DLR and SSC.

Experiment will fly on board of stratospheric balloon launched from Esrange (Kiruna, Sweden) by Eurolaunch in October 2013. Carefully design system of sensors supported with measurement methodology will ensure that data collected for different concentration levels of selected CFC's is reliable source of information about its decay process.