ROHP-PAZ: Radio Occultations and Heavy Precipitation with PAZ

A proof-of-concept experiment for ***polarimetric*** *GNSS Radio Occultations*

ROHP-PAZ is a mission of opportunity: The Spanish Earth Observation PAZ satellite, planned to be launched in Q4 2014, was initially designed to carry a Synthetic Radar Aperture (SAR) as primary and sole payload. It included an IGOR+ advanced Global Navigation Satellite System (GNSS) receiver for precise orbit determination. The design of this particular GNSS receiver allows the tracking of occulting signals, that is, signals transmitted by navigation satellites setting below the horizon of the Earth (or rising above it). The Spanish Ministry for Science and Innovation (MICINN) approved a proposal aimed to modify the original plans of PAZ, by including a polarimetric GNSS Radio-Occultation (RO) payload, the ROHP-PAZ experiment.

ROHP-PAZ is a proof-of-concept experiment: for the first time ever, GNSS RO measurements will be taken at two polarizations, to exploit the potential capabilities of polarimetric radio occultation for detecting and quantifying heavy precipitation events and other de-polarizing atmospheric effects (e.g. cloud ice). If the concept is proved, PAZ will mean a new application of the GNSS Radio-Occultation observations, by providing coincident thermodynamic and precipitation information with high vertical resolution within regions with thick clouds.

ROHP-PAZ potential impact: Coincident thermodynamic and precipitation information with high vertical resolution within regions with thick clouds might help understanding the thermodynamic conditions underlying intense precipitation, which is relevant because these events remain poorly predicted with the current climate and weather model parametrization.

A better understanding of the thermodynamics of heavy precipitation events is necessary towards improving climate models and quantifying the impact of climate variability on precipitation. The particular advantage of GNSS polarimetric RO is that their signals are in the microwave spectrum which, unlike infrared sensing technology, is little influenced by clouds, not even by the thick clouds that are typically associated with heavy precipitation.

ROHP-PAZ is a joint effort between the Institute of Space Sciences (ICE-CSIC/IEEC) and the company HISDESAT, which owns and operates the satellite.

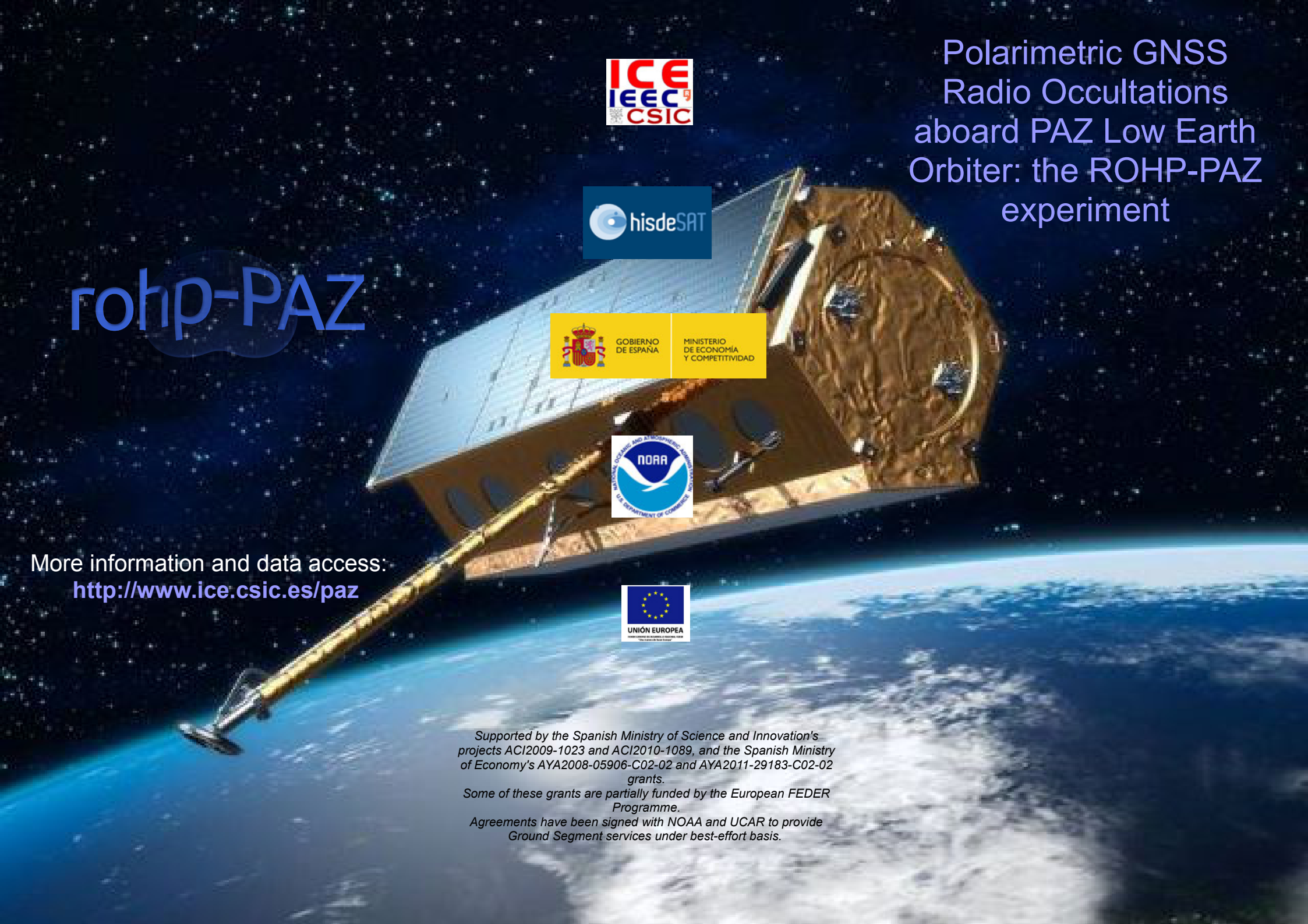
The funding to bring RO capabilities to PAZ comes from the former Spanish Ministry of Science and Innovation and the current Ministry of Economy and Competitiveness.

A significant part of the ground segment for the RO data is funded and operated by the North American National Oceanic and Atmospheric Administration (NOAA), with participation of the University Corporation for Atmospheric Research (UCAR).

A Scientific Team compound by 23 international scientists support the mission.

ROHP-PAZ in a nutshell:

Host Satellite:	PAZ (Spain)
Launch:	Q4 2014
Orbit Type:	Sun-synchronous
Orbital Nominal Height:	514 km (LEO)
Orbit Eccentricity:	1.1e-3 to 1.2e-3
Orbit Inclination:	97.4 degree
RO GNSS Receiver:	IGOR+
RO Antenna:	Aft-direction 5-element array 2-pol. (H/V) > 12.5 dB peak each port 2-freq. (L1/L2)



Polarimetric GNSS Radio Occultations aboard PAZ Low Earth Orbiter: the ROHP-PAZ experiment

rohp-PAZ

More information and data access:
http://www.ice.csic.es/paz

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Agreements have been signed with NOAA and UCAR to provide Ground Segment services under best-effort basis.