

# INTA'S DEVELOPMENTS FOR UAS AND SMALL PLATFORMS: QUASAR

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## 1. INTRODUCTION

The INTASAR Program, developed by the Radar Laboratory of the Spanish National Institute for Aerospace Technology (INTA) has as main goal to acquire know-how in all the segments of SAR technology, from airborne SAR systems development to SAR signal processing and remote sensing applications implementation, encouraging the development and use of SAR technology and data in Spain, in research, business and civil services.

The strategy that follows the program to achieve these objectives is to obtain a technological base by means of the development of SAR prototypes, on board an aerial platform, that allows to test SAR sensors in a flexible and controlled way, to implement SAR signal processing and to get image products and tools for the use of SAR data by users in applications such as ships and pollution detection, traffic monitoring or ground use.

At present, INTASAR program is growing up in three directions:

- Development of SAR systems for INTA's CASA-212 platform.
- Development of SAR systems for small platforms (motorgliders / UAV's).
- Participation in the Spanish SAR satellite: PAZ.

This paper will outline the objectives, deployment and features of the main development in SAR systems for small platforms, QUASAR (Quicklook Unmanned Aerial SAR), an interferometric and fully polarimetric Ku-band SAR with ground segment station for mission planning, image formation and data exploitation.

## 2. OBJECTIVES AND MISSION

The development of the project, first on board a Stemme S15 motorglider, later on a MALE class UAV (INTA MILANO), has the objective to be able to get SAR systems on board small platforms, being exploitable with performances in agreement to the needs of potential users and scalable to commercial versions.

In this line, the system priorities will be covering fast reaction applications such as mapping in support of emergency teams, coastal and marine surveillance, ground and marine traffic surveillance, detection and tracking of oil spills, agriculture or resources management.

With respect to the RADAR Laboratory, this field of research will contribute R&D in four directions:

- Data processing: on board / on ground real time processing, developments in navigation support, spotlight mode processor, MTI, control and commanding, developments for design and support of missions in real time.
- System: design of a new generation of sensors, operating in Ku Band, with patch antenna technology and miniaturization of prototypes.
- Integration: smaller platforms with higher ceiling of flight, use of pods, datalink in LOS, data compression.
- Ground station: Design and development of portable ground segment stations for planning, configuration, control and operation in real time.

### 3. DEPLOYMENT

QUASAR concept is split two subsystems, Ku-band sensor subsystem and ground segment subsystem. The capacities of both will lead the roadmap through prototypes on board Stemme S15 and MALE UAV MILANO.

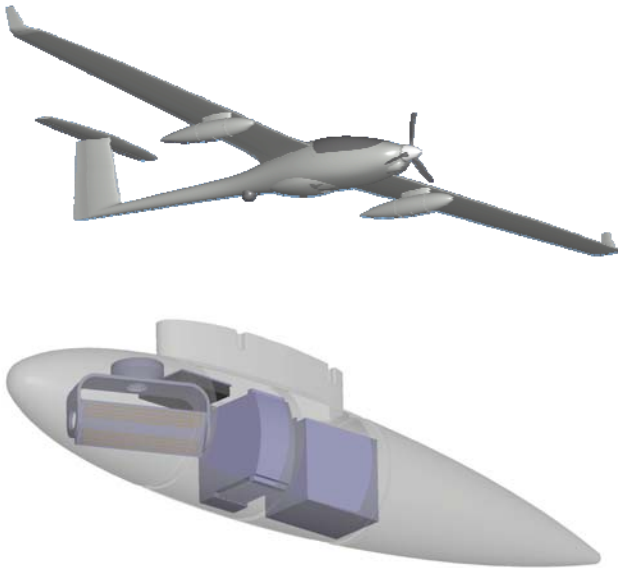


Fig. 3.1 QUASAR ON STEMME S15

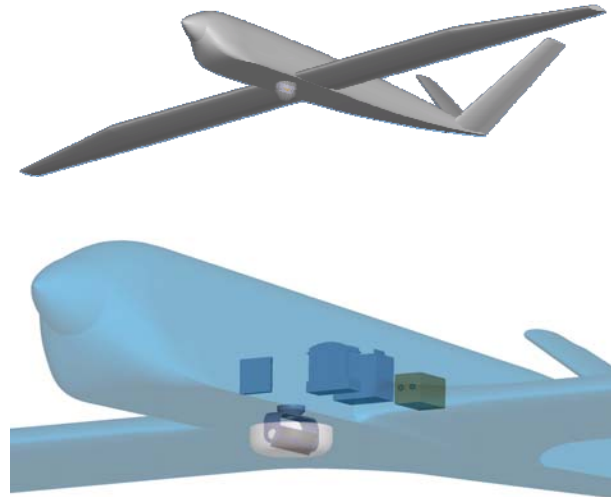


Fig. 3.2 QUASAR ON MALE UAV

### 4. FEATURES

- SPOTLIGHT and STRIPMAP modes
- Real-time image formation on board / on ground
- Ground Moving Target Indication
- Interferometry and full polarization.
- Incidence angles: 20° - 80°
- Swath: > 7 Km.
- Resolution up to 0.2 m
- Max. Bandwidth 1 GHz
- Ku Band
- On board data storage: 512 GB
- Weight < 35 kg

### 5. CONCLUSION

INTA's developments in UAS and small platforms are planned to be operative in 2011 and fully equipped in 2013. One key point in the QUASAR project is to achieve the capability of being integrated in a operative system since the early stages of development, so its roadmap is driven by two integrations in a MALE UAV made at INTA facilities, MILANO. At the same time, developments for QUASAR project will increase the know-how in the INTA RADAR laboratory in four key areas of interest: sensor, processing, integration and ground segment stations.