SSA activities and projects at BITNET CCSS

1. General information:

Company name: BITNET Centrul de Cercetari Senzori & Sisteme (Research Centre on Sensors & Systems) SRL

Legal Registration Reference / Chamber of Commerce Registration No.:
J12/4162/1993
Place of Registration (City): Cluj-Napoca
Place of Registration (Country): ROMANIA
Date of Registration: 30-NOV-1993
VAT: RO5034284
EMITS Bidder Code: 81103
Entity Size: Small
Category of Firm: Research Centre (private)
Group Name: None
Contact: Octavian CRISTEA, Director, octavian.cristea@bitnet.info

Entity Description:
BITNET CCSS is a private company active since 1993 in the field of technological research & consulting. Business areas: satellite communications, passive radio and optical sensors for SSA applications, information technology. BITNET CCSS is involved in the development of the Romanian space program and has completed more than 40 R&D projects until today.

Public support for space research at BITNET:
2012: about 92 K Euro (sub-contracts not included)
2013: about 220 K Euro (estimation based on already signed contracts, sub-contracts not included).

Traditional SSA research project partners
The Technical University of Cluj-Napoca
The Astronomical Observatory of the Romanian Academy - Cluj branch

2. Public funded SSA related projects at BITNET (last few years)

- ✓ **RAMA** (2012-2014). A solar flares originated ionospheric disturbances radio monitor. Focusing on the low ionospheric layers (hard to monitor from space).

- ✓ **AMHEOS** (2012-2015). An upgrade of LEOSCOPE for MEO and high orbits.
- ✓ **LEOSCOPE** (2008-2011). An experimental ground-based Low Earth Orbit surveillance (35 Km base-line) stereoscope able to detect and provide information concerning the orbital parameters of LEO satellites and other bright space objects (meteors, comets, boosters, etc).

Some preliminary results of the LEOSCOPE project have been made public:

O. Cristea, P. Dolea, V. Turcu, R. Danescu, „Long base-line Stereoscopic Imager for Close to Earth Objects Range Measurements", Acta Astronautica 2012, in press, available on line: http://dx.doi.org/10.1016/j.actaastro.2012.10.007

Radu Danescu, Florin Oniga, Vlad Turcu and Octavian Cristea, "Long Baseline Stereovision for Automatic Detection and Ranging of Moving Objects in the Night Sky", *Sensors* 2012, *12*, 12940-12963; doi:10.3390/s121012940, ISSN 1424-8220

- ✓ **URSA** (2007-2010). Development of an experimental ground-based radio deep space surveillance facility in Romania. Main application: passive radio detection of active satellites on high orbits.

- ✓ **DOG** (2005-2006): A preparatory study supporting the development of a Romanian ground-based satellite surveillance facility (using passive optical and radio instruments).

3. Other SSA projects with BITNET involvement

- ✓ NATO STO SET 147: Microsatellite-based Surveillance of Space (2007-present)
- ✓ NATO STO SCI 229: Space Environment Support to NATO SSA (2009-present)

4. Available facilities for SSA experiments

MARISEL: A testbed for SSA experiments at 1150 m altitude, 55 Km far from Cluj-Napoca , electromagnetic quiet zone, no light pollution. Includes a small astronomical observatory, small to medium size antennas, and other facilities. Owner: BITNET CCSS.

FELEACU: A typical astronomical observatory, 750 m altitude, near Cluj-Napoca. Some light pollution. Belongs to the Romanian Academy but access is granted.

5. Potential contributions to ESA SSA, based on available expertise and facilities

1. SST related

1.1. LEOP - Launch and Early Operation
Provide orbit data and confirm event success (such as separation)

Typical sensors which can be made available (including infrastrucure, operation and prototype software for automatic detection of satellites on images):

- ✓ Small telescope with resonable FOV (few square degrees)
- ✓ Pair of synchronous small telescopes with large baseline / stereoscopic vision (for orbit depth recovery).

TRL: several years of experiments. ***We are actually providing orbit data in the framework of a NATO exercise: surveillance of space objects from the ground and space***.

1.2. Contingency Situations
Assist in cases where location of satellite is unknown or state is uncertain.

Typical sensors which can be made available:

- ✓ Same as in 1.1, excepting the FOV which is very large in this case. TRL: prototype instrument in development
- ✓ A special radiotelescope for satellite detection, Doppler shift, orbital period, signal to noise ratio, carrier frequency measurement and etc. TRL: internal project, design and preliminary experiments.

1.3. Mission Support
Survey and tracking of passive objects or components

Same as 1.1.

2. Space Weather related

2.1 Solar flares originated low layer ionospheric disturbances monitoring (hard to monitor from space) using a passive radio sensor. TRL: prototype instrument in development.

2.2 Monitoring the effects of solar CMEs on satellite orbits, using optical and radio sensors. TRL: just an idea, with some prelminary experimental results.