

Proposal for Forming an IAA Study Group SG 4.10

Title of Study:

Distributed Space Missions for Earth System Monitoring

Proposer(s): Marco D'Errico

Primary IAA Commission Preference: IV Space Systems Operations and Utilization

Secondary IAA Commission Interests: III, Space Technology and Systems Development

Members of Study Team

Chair: Marco D'Errico (Italy)

Co-Chair: James R. Wertz (USA)

Secretary: TBD

Other Members:

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Short Description of Scope of Study**Introduction:**

It is worldwide agreed that upcoming space systems will strongly make use of collaborating platforms to replace current monolithic systems and to implement missions otherwise impossible (e.g. those requiring very large sensor apertures). Such evolution calls for a revolutionary change of mentality in design, realization, and operation at different levels.

At payload level, one has to assess the capability to integrate the mission payload using different elementary payloads on board different satellites. In addition, new concepts (e.g. modularity, autonomy, standardization, plug & play components) must be explored to attain an efficient bus implementation and new subsystems (e.g. relative trajectory design, relative navigation and control, satellite interlink) are to be implemented to enable required new functions.

The approach to distributed space missions is thus inherently multidisciplinary. Nevertheless, research has produced thorough studies on selected topics, but not always accounting for all the needs.

Overall Goal:

The study group will focus on distributed space missions with application to Earth observation in order to: (1) produce a comprehensive picture of the state of the art considering current research and mission programs; (2) identify applications which could benefit from this approach; (3) analyze most significant and innovative aspects, e.g. distributed payloads and their operation, spacecraft buses able to support such missions, launcher availability and/or required developments, relative orbit design, relative navigation and control (and required sensors/actuators), inter-satellite data link (telemetry & command, payload data). Finally, critical issues will be identified and recommendations proposed. In particular, prospect and opportunities of fully-fledged autonomous formations integrating a large number of platforms as follow-on of scheduled or studied formations based on two or a few spacecrafts will be addressed.

Intermediate Goals:

Develop an agreed comprehension on the state of the art and most demanding developments from both the theoretical and implementation points of view.

Methodology:

Analysis of literature and industrial programs. Study the different aspects and technology involved. Discussions at study group meetings and on-line meeting. Organization of a specific session at the 8th IAA Symp. on Small Sat. for Earth Obs., Berlin. (First already organized and successful at the 7th IAA Symp. on Small Sat. for Earth Obs, Berlin, 6th May 2009).

Time Line:

Initial Outline Development: July 2009
Membership Definition: October 2009
First Draft Position Paper: May 2010 (study group meeting, TBC)
Second Draft: October 2010 (61st IAC - Prague)
Final Paper: May 2011 (8th IAA Symp. on Small Sat. for Earth Obs. – Berlin)

Final Product (Report, Publication, etc.):

Report to be published in a book

Target Community:

Space agencies, industries and research organizations

Support Needed:

Website for publishing progress and adding contributions. This website would also advertise study group meetings.

Potential Sponsors:

To be returned to IAA Secretariat Paris fax: 33 1 47 23 82 16 email: sgeneral@iaaweb.org

Date:

Signature:

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