



2ND INTERNATIONAL ARA DAYS "10 YEARS AFTER ARD"

Bordeaux
Arcachon

GENERAL LOCATION

Palais des Congrès d'Arcachon
Boulevard Veyrier Montagnères
33120 Arcachon – FRANCE
(3/4 hour drive from Bordeaux
International Airport)

LANGUAGE

Papers will be presented in English.
Simultaneous translation facilities
will not be available.

SECRETARIAT



All correspondance and
inquiries should be sent to
the conference secretariat.

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THE ATMOSPHERIC REENTRY ASSOCIATION

Presents the

2ND INTERNATIONAL ARA DAYS "10 YEARS AFTER ARD"

October 21-23, 2008
Arcachon – France



PRELIMINARY PROGRAMME

Dear Friends and Colleagues,

1998, October 21. 1000 miles North East of Marquisian Islands Archipelago.

Our crew onboard the French Navy tug "REVI" is tired and passably ill after those too many days at sea, but feels a mix of emotion and pride when the boat approaches the ESA Atmospheric Reentry Demonstrator safely floating in Pacific Ocean: European Industries have just proven their capabilities in the field of return from orbit, through the first European guided and controlled reentry of an heavy Apollo class vehicle.

Post flight analysis of the Aerospatiale built capsule will confirm the ARD excellent flight conditions, from jettisoning by Ariane 503 on a suborbital hypersonic trajectory till final splashdown.

This mastery acquired through a quick and intensive 4 years development programme in full European cooperation is blazing the trail towards new space applications.

With a concrete flight experience rather than paper studies, a generation of European engineers are trained and ready to face new challenges, from manned orbital flight to reusable launchers and planetary exploration.

Objectives

10 years after this first succesful flight, it is my pleasure as chairman of the **Atmospheric Reentry Association** to invite you to participate to the:

**2nd International ARA Days
"10 years after ARD"**

that will be held **21-23 October, 2008** in the sunny town of Arcachon, France.

Mitigated programmes evolutions have occured in Europe since ARD first and unique flight.

European efforts towards a Crew Transfer Vehicle, being a capsule or X-38 derived lifting body, have ceased. German Astra and Phoenix programmes were not followed. Many demonstration proposals and roadmaps were made by industrialists and poorly followed.

However, atmospheric reentry as a discipline remains very present in 2008.

Being non exhaustive, we might mention that reentry is at the heart of US return to Moon initiative, with the developement of the ORION capsule. It is still present for LEO logistics, as COTS initiative shows. It is a determining discipline for international cooperation, with a possible SRR of russo-european CSTS mid 08. China is mastering manned flight and continuing its ambitious endeavour. Japan and India are on track. And mastering reentry remains a key for planeta-

ry exploration. 2008, we have applauded a successful reentry and retro rocketed Martian soft landing of the US Phoenix probe. In 2008, we will contemplate the progress of European Exomars project. We are also looking forward to positive decisions on the European demonstrator IXV, with a successful SRR leading to a 2012 flight. We will be interested in the development of the Italian USV programme, the German Shefex programme, and ESA preliminary demonstrators (Expert, ...).

Some weeks prior to the ESA Council at Ministerial level, the conference will gather delegates from all the community: national and supra-national agencies, customers and decision makers, prime industrialists and subcontractors, engineers, technologists and scientists, european and non-european. Outstanding papers will be presented in plenary and parallel sessions, but time will be also reserved for networking and always fruitful exchanges.

I am looking forward to meeting you again for 3 outstanding days in Arcachon, with in addition this year a friendly celebration of ARD anniversary !

Thierry Leveugle

*President, the Atmospheric Reentry Association
Vice-President, Astrium Space Transportation*

October 21st, 2008

07h45-08h45	REGISTRATION	
08h45-09h00	Welcome by the Atmospheric Reentry Association	
09h00-09h45	Introduction to Atmospheric Reentry Keynotes from Aquitaine Region ASTRIUM ST, European Astronauts	
09h45-10h30	10 years ago : the Atmospheric Reentry Demonstrator ARD movie – ASTRIUM ST Programme Managers Testimony – CNES, ESA, ASTRIUM ST	
10h30-11h00	COFFEE BREAK	
11h00-12h00	Institutional Round Table Atmospheric Reentry in Space Programmes: Vision & Perspectives ESA, DLR, CNES, ASI, CDTI, Belgian delegation	
12h00-13h15	LUNCH	
13h15-13h30	From Agencies to Industry Lifecycle of an Ambitious Project : From Agencies to Industry P. WATILLON, ASTRIUM ST	
13h30-14h30	European Programmes IXV Programme – G. TUMINO, ESA The IXV Tribute to the ARD, and the Step Beyond – F. LELEU, NGL Prime PRORA-USV – G. RUSSO, CIRA SHEFFEX – H. VOGGENREITER, DLR	
14h30-15h30	Industrial Round Table ASTRIUM ST, SONACA, SABCA, Finmeccannica, Snecma Propulsion Solide, EADS	
15h30-16h00	QUESTIONS	
TECHNICAL CONFERENCE OPENING		
16h00-16h30	COFFEE BREAK	
16h30-16h50	Session n°1 Thermal Protection Systems - 1	Session n°2 Mission & System Analysis - 1
	Development and Test of a Large-Scale CMC TPS Demonstrator R. BARRETEAU, Snecma Propulsion Solide, FR	Re-entry Analyses of the Moon Mission of a Crew Space Transportation System – R. HAYA RAMOS, DEIMOS Space S.L, SP
16h50-17h10	Development of Metallic Thermal Protection System for Re-usable Launch Vehicles: Verification and Test Activities Q.T. X. VO, Dutch Space B.V., NL	SPEM (SPacecrew EMergency system) L. FIORE, Aero Sekur S.p.A., IT
17h10-17h30	Stability and Selfhealing Ability of Chromia and Alumina Scales in a Chemically Reactive Plasma Flow P. DE HEIJ, Delft Univ. of Tech., NL	Trajectory Reconstruction of a Martian Planetary Probe Mission G. WELLS, Georgia Institute of Technology, US

October 21st, 2008

	Session n°1 Thermal Protection Systems - 1	Session n°2 Mission & System Analysis - 1
17h30-17h50	Ablative Thermal Protections for Atmospheric Entry. An Overview of Needs for Future Programmes J.-M. BOUILLY, ASTRIUM ST, FR	IXV, the ESA Re-entry Demonstrator Project L. GUILBERT, NGL Prime, IT
17h50-18h10	Corrosion of the Oxide Scale of two ODS Superalloys – K. SUDMEIJER, Delft University of Technology, NL	AEROFAST: AEROcapture for Future spAce tranSPorTation F. BONNEFOND, ASTRIUM ST, FR
18h10-18h30	The Sharp Leading Edge of SHEFEX II H. BÖHRK, DLR, DE	Orbiting and Deorbiting of the Satellite by Aerospace Plane A. LEVENKO, State Enterprise, UA
19h30	ARD 10 YEARS ANNIVERSARY TOUR & DINNER	

October 22nd, 2008

	Session n°3 Thermal Protection Systems - 2	Session n°4 Flight Test Measurements
09h00-09h20	Development of Metallic Thermal Protection System for Re-usable Launch Vehicles: Design and Analysis Aspects J. FATEMI, Dutch Space B.V, NL	Heat Flux Measurements During Re-entry Flight Using Advanced Laser Calibration Measurements S. LÖLHE, DLR, DE
09h20-09h40	Development and Qualification Program for TPS Preparation to the IXV Mission – M. ANTONACCI, Thales Alenia Space, IT	Axisymmetrical Blunt Cone Entry Probe Experiments M. SPEL, R.Tech, FR
09h40-10h00	Concept of the Transpiration Cooling Experiment on SHEFEX II H. BÖHRK, DLR, DE	Overview of the In-Flight Experimentation and Measurements on the IXV Experimental Vehicle E. COSSON, ASTRIUM ST, FR
10h00-10h30	COFFEE BREAK	
	Session n°5 EDLS	Session n°6 Flight Control / GNC - 1
10h30-10h50	Solid Rocket Motors Solutions for Mars Exploration F. DAUCH, SNPE Matériaux Énergétiques, FR	From ARD to IXV, and Beyond: Ten Years of GNC Studies on Atmospheric Re-entry P. VERNIS, ASTRIUM ST, FR
10h50-11h10	The Entry, Descent and Landing Roadmap for Exploration F. BONNEFOND, ASTRIUM ST, FR	Onboard Model-based Robust FDIR Strategy for Reusable Launch Vehicles A. FALCOZ, Univ. Bordeaux 1, FR

October 22nd, 2008

	Session n°5 EDLS	Session n°6 Flight Control / GNC - 1
11h10-11h30	IXV Preliminary Water Landing Simulation – V. BECCHIO, Thales Alenia Space, IT	The IXV Re-entry Demonstrator's Flight Control System J. SOMMER, ASTRIUM ST, DE
11h30-11h50	Onboard Terminal Area Path Planning Using Flatness Approach Application to Shuttle Orbiter STS-1 Vehicle V. MORIO, Univ. Bordeaux 1, FR	Electro-mechanical Control System for IXV Body Flaps F. DE COSTER, SABCA, BE
11h50-12h10	MHD PARACHUTE in Re-entry Flow V. BITYURIN, Russian Academy of Sciences, RU	IXV Statistical Flying Qualities M. GANET, ASTRIUM ST, FR
12h10-13h30	LUNCH	
	Session n°7 – CFD - Aerodynamics - Aerothermics - 1	Session n°8 Mission & System Analysis - 2
13h30-13h50	CFD Based Dynamic Analysis of Atmospheric Re-Entry Vehicles, M. KORFANTI, DLR, DE	Airborne Interception of the Reentry of the ATV 1 P. D. MALEY, United Space Alliance, US
13h50-14h10	Numerical Turbulence Modelling over Rough Surfaces W. DIEUDONNE, RTIME, FR	Technological Step Stones in Support to Future Space Transportation Systems – J. LONGO, DLR, DE
14h10-14h30	Simulation and Analysis of Magnetohydrodynamic Flows Using the DLR TAU Code C. BOETTCHER, DLR, DE	In Flight Research on Aerothermodynamics (ATD) and Thermal Protection Systems (TPS) for Space Transportation Systems J. MUylaERT, ESA/ESTEC, NL
14h30-14h50	Computation of Hypersonic Nonequilibrium Flow With Artificially Upstream Flux vector Splitting Schemes – É. SCHALL, Univ. de Pau et des pays de l'Adour, FR	Challenges in Mission Planning and Operations of ISRO's First Re-entry Space Capsule - SRE N. HARINATH, ISRO, IN
14h50-15h10	CFD Validation for CO ₂ Reentry Applications A. MACK, DLR, DE	Dynamics of Separation of Multi-unit Space Vehicle – D. F. FAIZULLIN, Dnipropetrovsk National Univ., UA
15h10-15h50	BREAK	
	Session n°9 System design	Session n°10 Flight Control / GNC - 2
15h50-16h10	Layout of Hypersonic Vehicles by Coupling of Aerodynamics and Flight Mechanics T. EGGERS, DLR, DE	SICVER Project: Innovative FDIR Strategies for Experimental Reentry Vehicles V. MORIO, Univ. Bordeaux 1, FR

October 22nd, 2008

16h10-16h30	Session n°9 System design	Session n°10 Flight Control / GNC - 2
	Methodology of Vibroacoustic Predictions for Future Reentry Vehicles B. TROCLET, ASTRIUM ST, FR	Post Flight Data Analysis of Guidance, Navigation and Control Experiment for DTFT1 Mission A. VITALE, CIRA, IT
16h30-16h50	Session n°11 Thermal Protection Systems - 3	Session n°12 Test Facilities
	Thermal Blankets for Cryogenic Tank Insulation – E. BRACH PREVER, Thales Alenia Space, IT	Recent Adaptation of High Enthalpy Facilities to the Latest Requirements B. VAN-OOTEHEM, ASTRIUM ST, FR
16h50-17h10	Hot Demonstrator Test of Torque Driven CMC Body Flap H. LANGE, MT-AEROSPACE AG, DE	Development of a Test Setup for a Dynamic Bearing and Load. Introduction Test Up to 1600°C I. FISCHER, DLR, DE
17h10-17h30	Generic Shingle Developments for Re-entry Vehicle TPS – P. SOYRIS, Snecma Propulsion Solide, FR	Recent Extensions to the High Enthalpy Shock Tunnel Göttingen J. MARTINEZ SCHRAMM, DLR, DE

October 23rd, 2008

09h00-09h20	Session n°13 Thermal Protection Systems - 4	Session n°14 Flight Test Measurements
	IXV Thermomechanical System: Integrated Approach and System Engineering Tools R. ANGELINI, Thales Alenia Space, IT	Characterization of the Aerothermal Environment of the IXV Experimental Vehicle by Means of WTT and CFD E. COSSON, ASTRIUM ST, FR
09h20-09h40	Thermal Design and High Enthalpy Wind Tunnel Tests of a Pressure Port Mounted to the Ceramic Flap of the ESA EXPERT Mission J. HÄBERLE, DLR, DE	Chemical Reactions at the Surface of Re-entry Thermal Protection Materials: a Theoretical Contribution L. MARTIN-GONDRE, Institut des Sciences Moléculaires (ISM), FR
09h40-10h00	Review of Heat Shield Development for Stardust Sample Return Capsule H. K. TRAN, NASA, US	Inverse Method for Pyrolysis and Ablative Materials J. COLLINET, ASTRIUM ST, FR
10h00-10h20	Thermal Deformation and Strength of Heat-protective Coatings from Carbon-carbon Composite Materials for Different Filament Winding Angles – L. I. GRACHEVA, Nat. Acad. Sci. of Ukraine, UA	FLPP Programme: IXV Vehicle Hypersonic CFD Simulations P. RONCIONI, CIRA, IT
10h20-10h40		Dynamic Stability Investigation by Forced Oscillation Method S. PARIS, VKI, BE

October 23rd, 2008

10h50-11h20	COFFEE BREAK
	Session n°15 • Mission & System Analysis - 3
11h20-11h40	Space Capsule Recovery Experiment – A Post Flight Appraisal A. SUBRAMONIAM, ISRO, IN
11h40-12h00	Historical Background and Lessons Learned of the Pre-X Atmospheric Experimental Re-Entry Vehicle J. MOULIN, ASTRIUM ST, FR
12h00-12h20	The European MoonNEXT Mission: Landing Precisely and Safely at the Lunar South Pole B. HOUDOU, ESA/ESTEC, NL
12h20-12h40	The Project of the Ukrainian Reusable Aerospace Plane and Reusable Satellite in Aerospace Complex V.I. KUKUSHKIN, State Enterprise, UA
12h40-13h00	The MarsNEXT Mission: a Stepping Stone to Mars Sample Return and a New Understanding of the Red Planet R. FISACKERLY, ESA/ESTEC, NL
13h00-13h20	CONCLUSION AND PERSPECTIVES
13h20-14h30	FAREWELL LUNCH