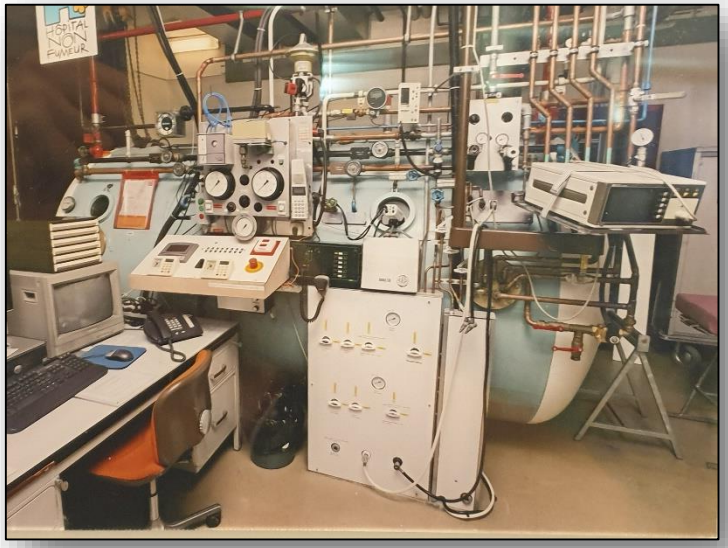
# PLONGEE A TRES HAUTE ALTITUDE : L'EXPERTISE MARSEILLAISE

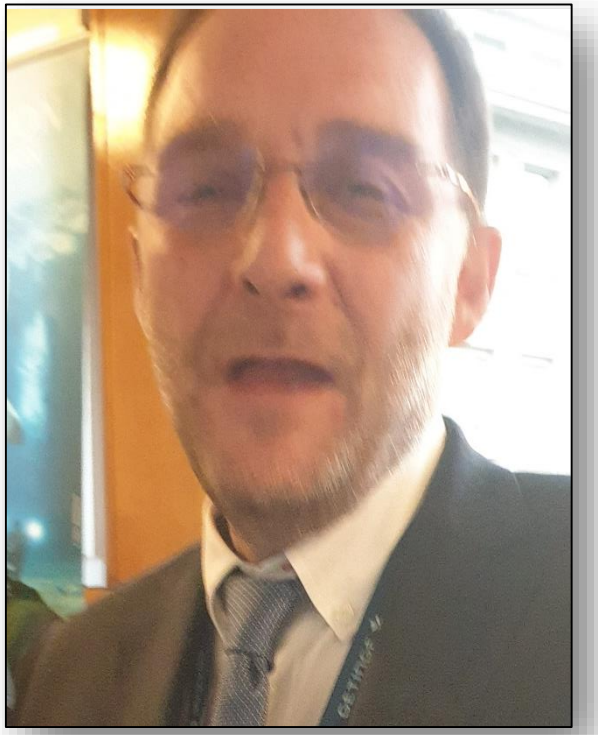
## ICHF – GENEVE - 2019

Mathieu.coulange@ap-hm.fr

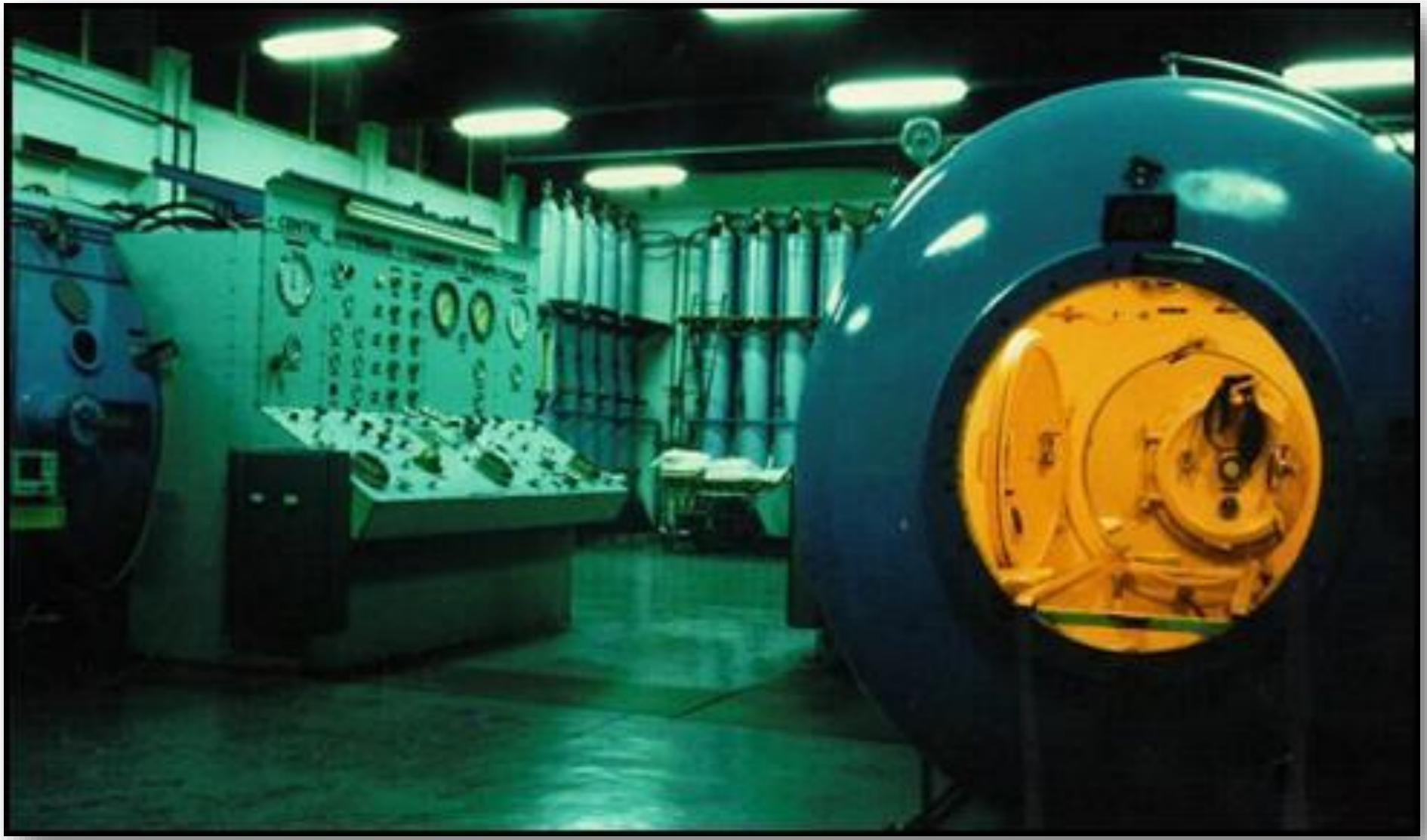

gure 3 : de gauche à droite et de haut en bas : JY Berney, D Neuenschwander, M Freiburgho
MA Chamot, V Neuenschwander, PA Clément, E Guex


HOPITAL
NON
FUMEUR


HAUX-STARMED



- Bref **historique**
- Perspective avec **COMEX Espace**
- **Plonger à 6.300 m** d'altitude dans l'étendue d'eau la plus haute du monde



**1970**

# THE INCREDIBLE CHALLENGE

130,000ft

97,500ft

65,000ft

42,000ft

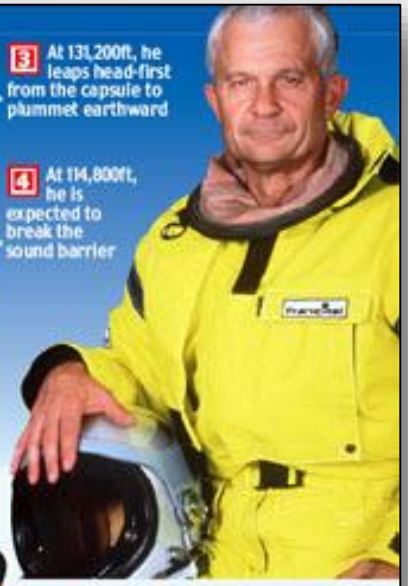
32,000ft

**2** Wearing a specially designed space suit, Fournier can withstand termperatures as low as -100c

**1** Michel Fournier will travel in a pressurised capsule attached to a helium balloon, taking three hours to ascend

**3** At 131,200ft, he leaps head-first from the capsule to plummet earthward

**4** At 114,800ft, he is expected to break the sound barrier



**5** Reaching speeds of up to 1,000 miles per hour, Fournier will freefall for seven minutes

The balloon will take 40 minutes to return to the ground

Concorde used to fly at 59,000ft

Boeing 757 42,000ft

Mount Everest 29,078ft


**6** His parachute is deployed at about 9,800ft and he will land in Saskatchewan, Canada

Mail Graphic PAUL McCALLUM

1970 **2004**

60

0,8b

1970 2004 **2008**

Etude par tubomanométrie des effets de l'hypobarie et de l'hypoxie sur le système isobarique de l'oreille moyenne

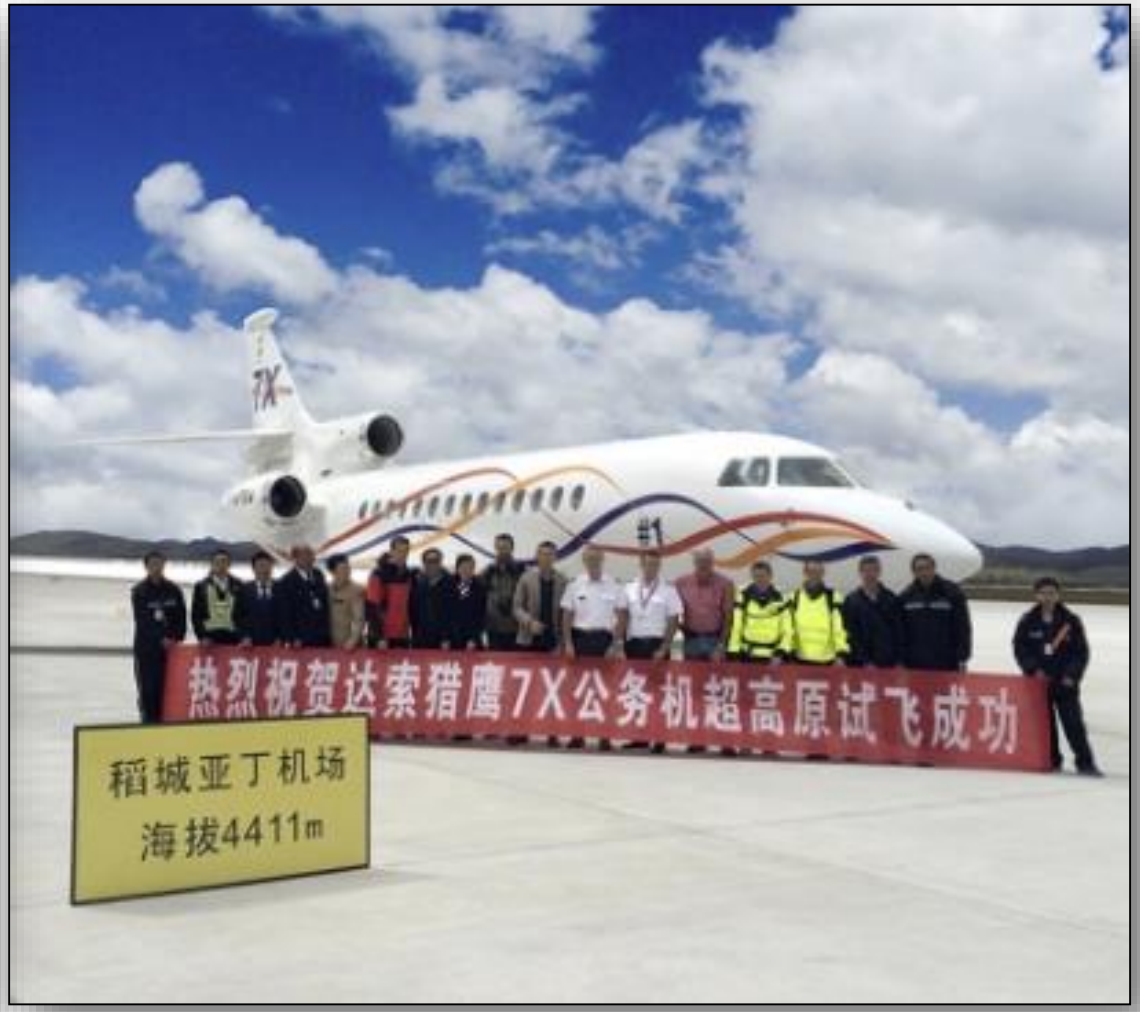
Collin M, Coulange M, Mancini J, Devèze A, Jammes Y, Estève D, Lavieille J-P.

Aix*Marseille université

60 **180**

**0,8b** **0,5b**

1970 2004 2008 **2012**

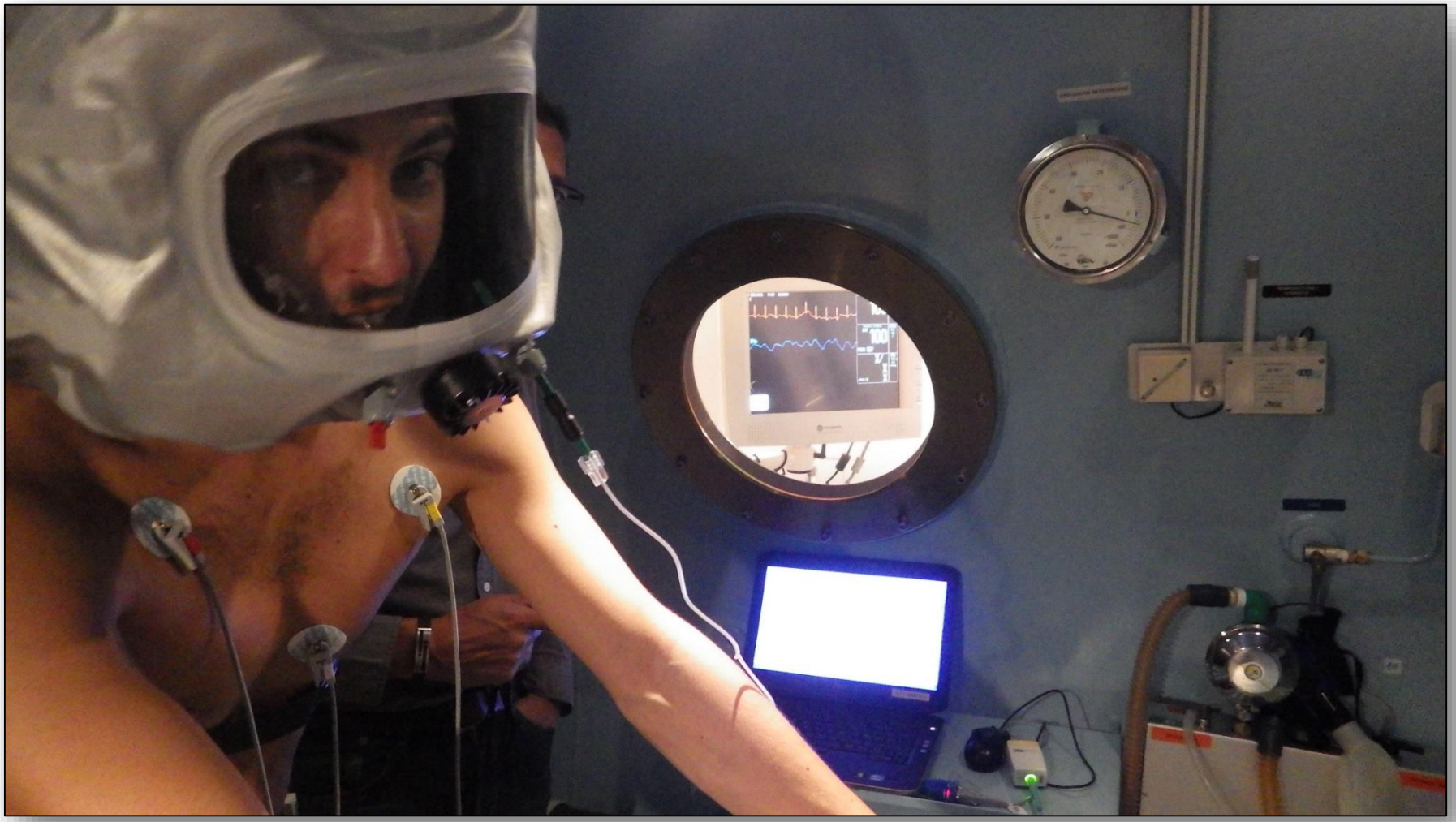



DASSAULT AVIATION

60 180

0,8b 0,5b

1970 2004 2008 2012 **2014**



AIR LIQUIDE™

60 180

0,8b 0,5b

1970 2004 2008 2012 **2014**

# Evaluation of Transport Ventilators at Mild Simulated Altitude: A Bench Study in a Hypobaric Chamber

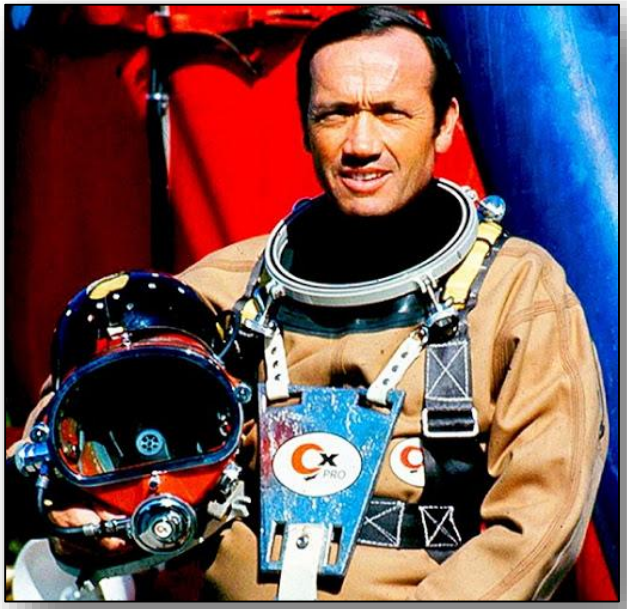
Salah Boussen MD PhD, Mathieu Coulange MD PhD, Marc Fournier MD, Marc Gainnier MD PhD, Pierre Michelet MD PhD, Christophe Micoli, and Lionel Negrel

**BACKGROUND: Previous studies on ventilators used for air transport showed significant effects of altitude, in particular with regard to accuracy of the tidal volume ($V_T$) and breathing frequency. The aim of the study was to evaluate transport ventilators under hypobaric conditions. METHODS: We conducted a bench study of 6 transport ventilators in a Comex hypobaric chamber to simulate mild altitude (1,500 m [4,920 feet] and 2,500 m [8,200 feet]). The ventilators were connected to a test lung to evaluate their accuracy: (1) to deliver a set $V_T$ under normal resistance and compliance conditions at $F_{IO_2}$ = 0.6 and 1, (2) to establish a set PEEP (0, 5, 10, and 15 cm $H_2O$), and (3) to establish a set inspiratory pressure in pressure controlled mode, (4) at a $F_{IO_2}$ setting, and (5) and at a frequency setting. RESULTS: Four ventilators kept an average relative error in $V_T$ of < 10% without effect of altitude. The Medumat ventilator was affected by the altitude only at $F_{IO_2}$ = 1. The Osiris 3 ventilator had > 40% error even at 1,500 m. We found no change in frequency as a function of altitude for any ventilators studied. No clinically important differences were found between all altitudes with the PEEP or inspiratory pressure setting. Although $F_{IO_2}$ was affected by altitude, the average error did not exceed 11%, and it is unclear whether this fact is an experimental artifact. CONCLUSIONS: We have shown that most of the new transport ventilators tested require no setting adjustment at moderate altitude and are as safe at altitude as at sea level under normal respiratory conditions. Older technologies still deliver more volume with altitude in volumetric mode.** *Key words: ventilators; hypobaric chamber; altitude; bench study.* [Respir Care 2014;59(8):1233–1241. © 2014 Daedalus Enterprises]

60 180

0,8b 0,5b

1970 2004 2008 2012 2014 **2016**



comex


AIRBUS

Collins Aerospace

B/E AEROSPACE

ZODIAC AEROSPACE

Air Liquide
creative oxygen

ULMER AERONAUTIQUE

Jump simulation from FL350 at the COMEX.Sa. VHAPOS is the best ever solution designed specifically for HAHO-HALO.
#comex #hahohalo #fl350 #ulmeraeronautique #henrimarotte #comexsa #vhapos #hipub #upos #upom #micos #specialoperations #specialforces #**hahohalojump**


AIRBUS

Collins Aerospace

Air Liquide
creative oxygen

ULMER AERONAUTIQUE

B/E AEROSPACE

ZODIAC AEROSPACE

La Provence ÉCONOMIE | Marseille : la Comex décroche son agrément pour les...

MARDI 11/09/2018 à 09H50 | ÉCONOMIE | MARSEILLE,ÉDITION MARSEILLE

# Marseille : la Comex décroche son agrément pour les essais cliniques

Par M.Dg.



comex


60 180 **400**

0,8b 0,5b **0,2b**

1970 2004 2008 2012 2014 2016 **2019**


comex


comex