

DECOMMISSIONING OF THE SIMULATION WATER TANK (WETS) AT JAXA TSUKUBA SPACE CENTER

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Kazuhito Shimada

Japan Aerospace Exploration Agency (JAXA) Tsukuba Space Center, Japan < shimada.kazuhito@jaxa.jp >

Introduction

The ExtraVehicular Activity (EVA) simulation pool WETS (Weightless Environment Test System) was located at Tsukuba Space Center <Fig. 1>. It was built to support design verification of Japanese Experimental Module (JEM) for the International Space Station (ISS).

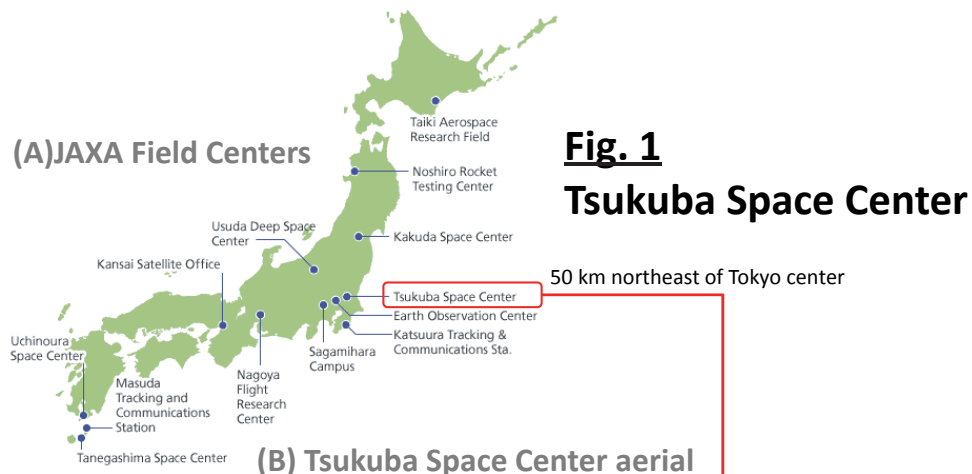
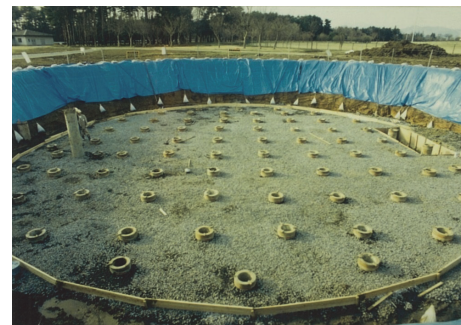


Fig. 1
Tsukuba Space Center

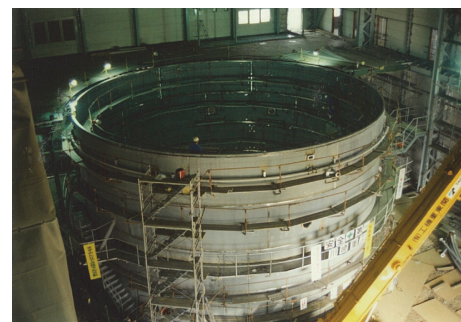


Construction

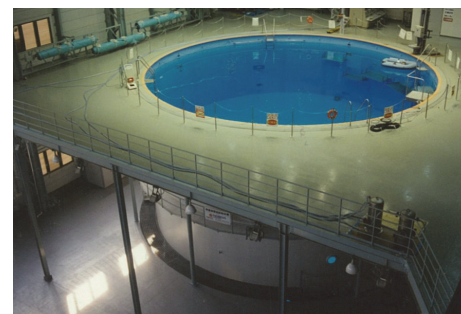
The WETS building and a steel water tank with a diameter of 16 m was built in 1993-1994 <Fig. 2>. JEM's EVA interface test was collaterally started in 1991 at NASA NBS pool at Huntsville, USA.



(A) For the safety of 4,000 ton of water in an earthquake, high density piling was conducted.



(B) A 16 m-diameter, 10.5 m water-deep tank was placed semi-underground.



(C) Two-ton air-driven crane carried mockups from the ground level into the water.

Fig. 2 Construction of the facility 1993-1994

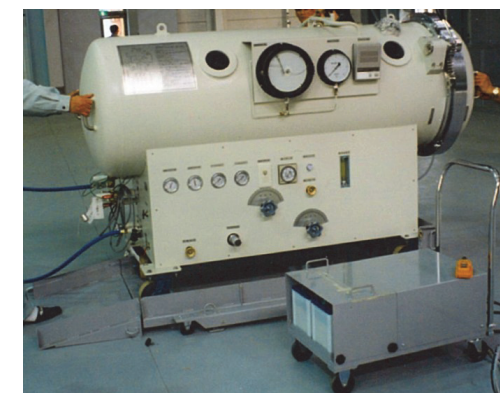
Operation

Test subjects in EVA water suit, in history, were 3 engineers (Iwai, Kaito, Ootsubo) and 17 astronauts (Barry, Chiao, Doi, Furukawa, Hoshide, Jones, Lee, Mohri, Noguchi, Parazynski, Ross, Tani, Tanner, Wakata, Walheim, Wolf, & Yamazaki). Fifteen sessions, including tests for HTV cargo vehicle were conducted during 1996-2005. Examples of support hardware are shown in <Fig. 3, 6>.

(cont.)



(A) Control Room
(B) AGA mask dummy with a medical officer of EVA suit



(C) Monoplace hyperbaric chamber temporary installed. Transportable, air pressurized, oxygen mask.

Fig. 3 WETS facility

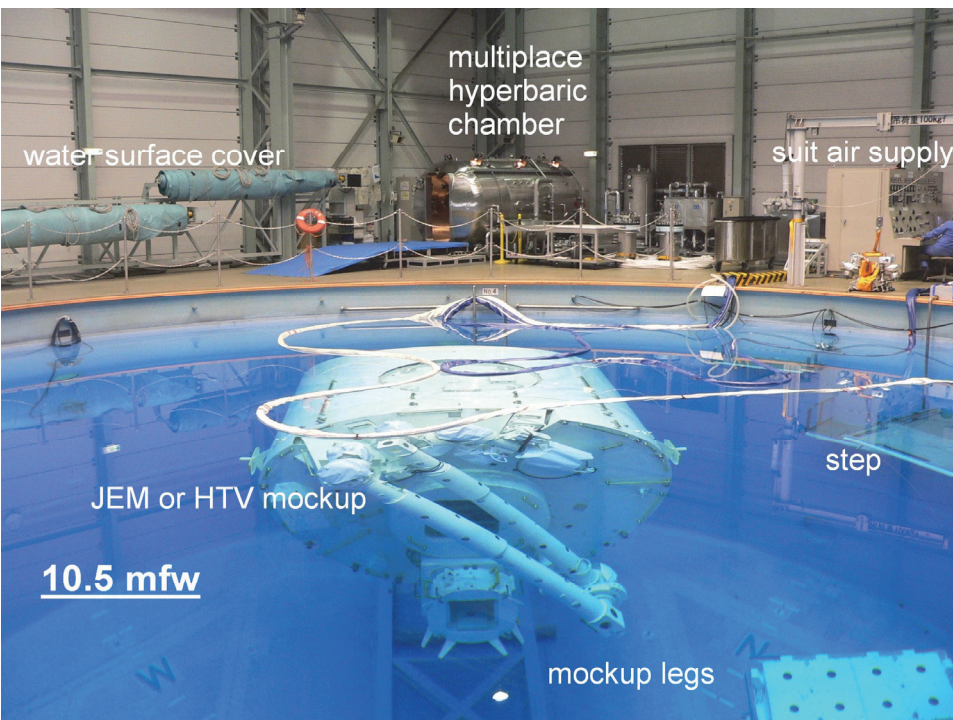


Fig. 4 WETS water tank and JEM mockup.

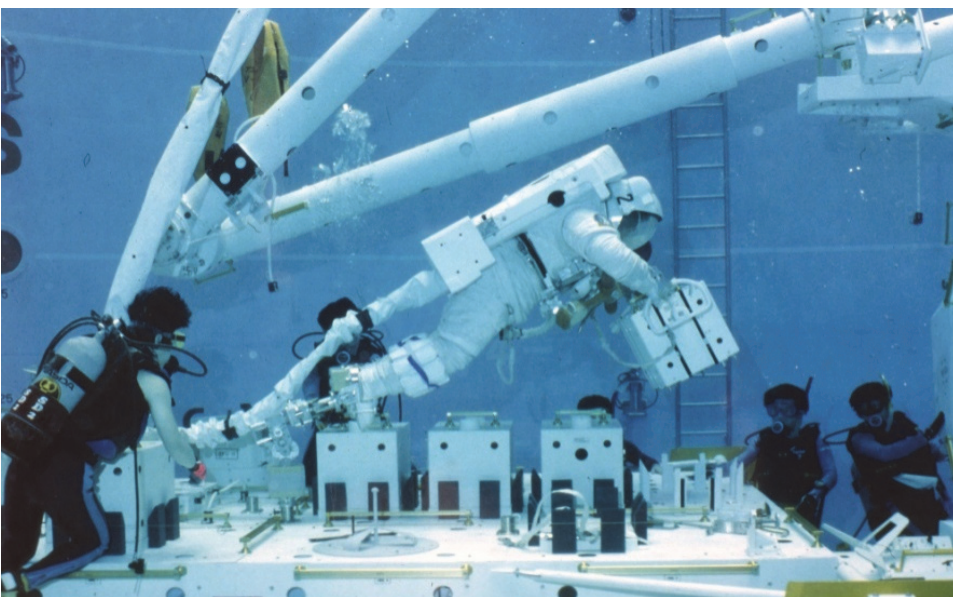


Fig. 5 Diver team on Exposed Facility mockup.

(cont.)
 Mockups were hoisted into water, then air SCUBA divers assembled them **<Fig. 4>**. Suited test subjects (one or two) were supported each by 2 safety divers, 2 utility divers with wrench, and 1 to 3 video/still camera divers, in addition to 2 supervisor divers at water surface **<Fig. 5>**.

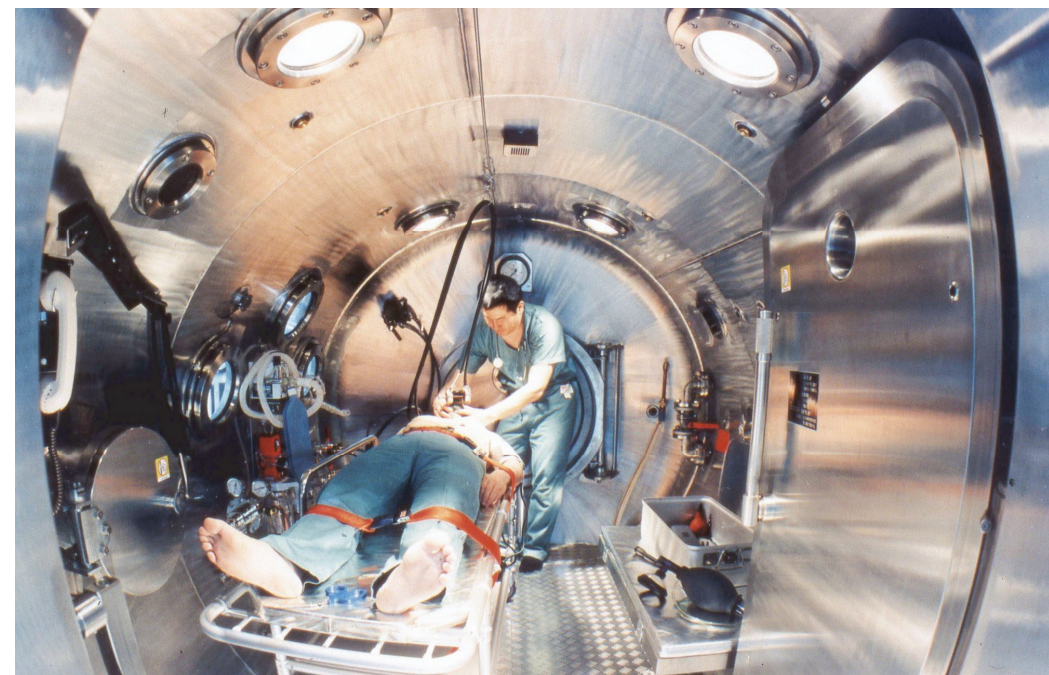


Fig. 6 Multiplace chamber with Table 6A capability.
 To fulfill a '5-min to press AGE case' requirement, a double-lock chamber was installed with 3+2 aviator masks with exhaust line, an oxygen-driven respirator and an EKG lead box.

2011 earthquake
 March 11, 2011 quake broke loose an external water circulation pipe coupling; water level came to the bottom **<Fig. 7>**. Although deformation of the tank was minor, assessment led to its removal.



Fig. 7 Tank deformation and pipe bolt extractions.
 Earthquake damage. It took 3 days for the water to drain.

Dismantling
 February 2012 saw the removal action which took two weeks.



Fig. 8 Farewell ceremony
 Two hyperbaric physicians (author with the yellow helmet).



Fig. 9 Vacancy after the demolition.
 Piles were left in the ground.

Future
 With such a heavy-load floor, the building is suitable for anything that uses heavy machinery, like a centrifuge.



Fig. 10 ex. mockup staging area
 Currently a temporary extension of astronaut gym.

Disclosure Information
 88th Annual Scientific Meeting
 Kazuhito Shimada
 I have no financial relationships to disclose.
 I have no off-label use and/or investigational use in my presentation.