A photograph of two astronauts in white space suits working on a spacecraft in space. The Earth's blue and white horizon is visible in the background. The text is overlaid on the image.

The Increasing Importance of Female Astronauts to Space Exploration

Carol Norberg
Department of Physics
Umeå University



Marcus Wandt (Image: Axiom Space)



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The Mercury Seven (Image: NASA)

“Mercury 13”



Images: NASA & Netflix



Jerrine Cobb and Janey Hart before congress

John Glenn, 1962 “The fact that women are not in this field is a fact of our social order.”



Wally Funk (Image: Blue Origin)

The first female astronauts



Valentina Tereshkova, Vostok 6, June 1963

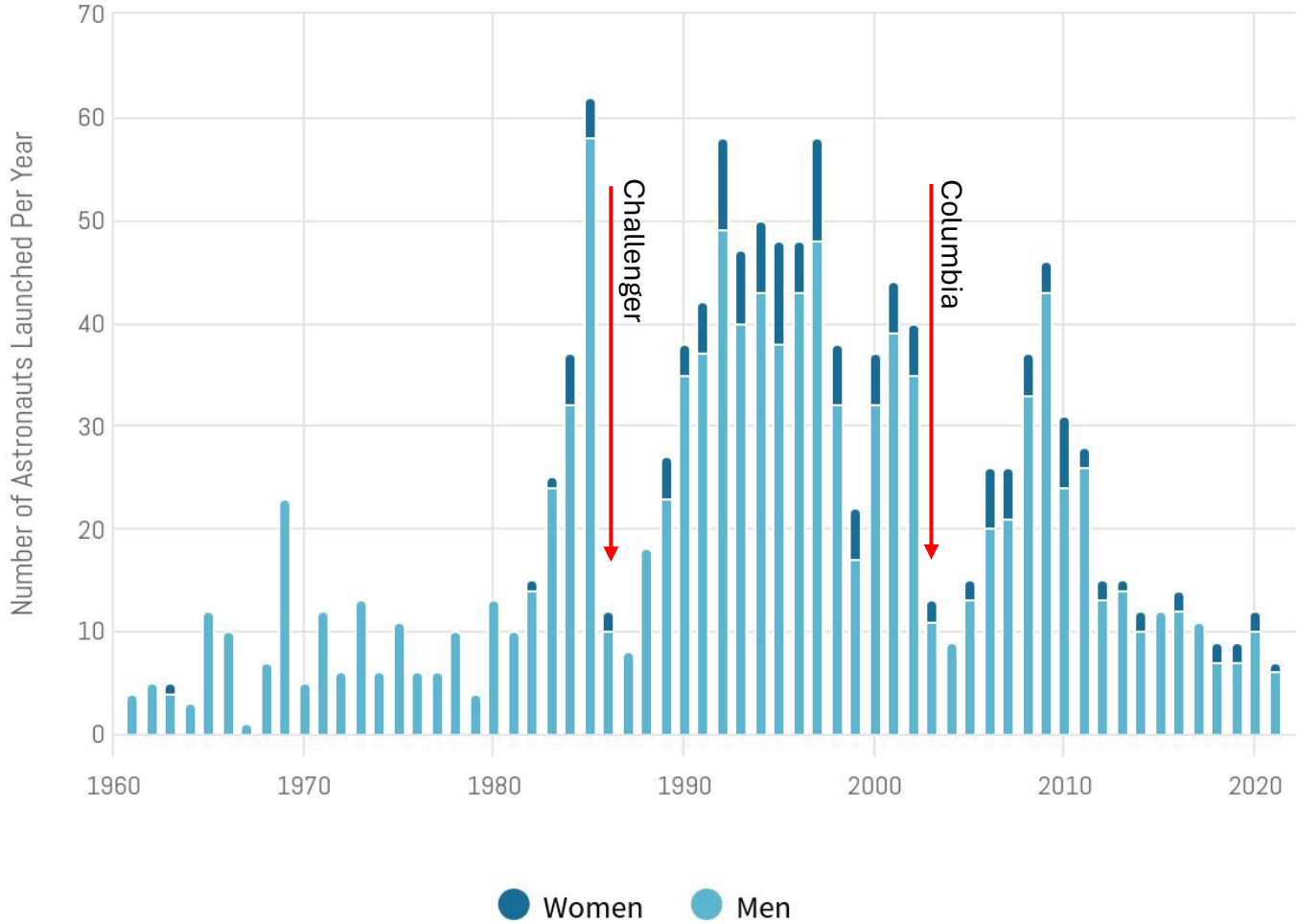


First female astronauts recruited by NASA in 1978

(Image: NASA)

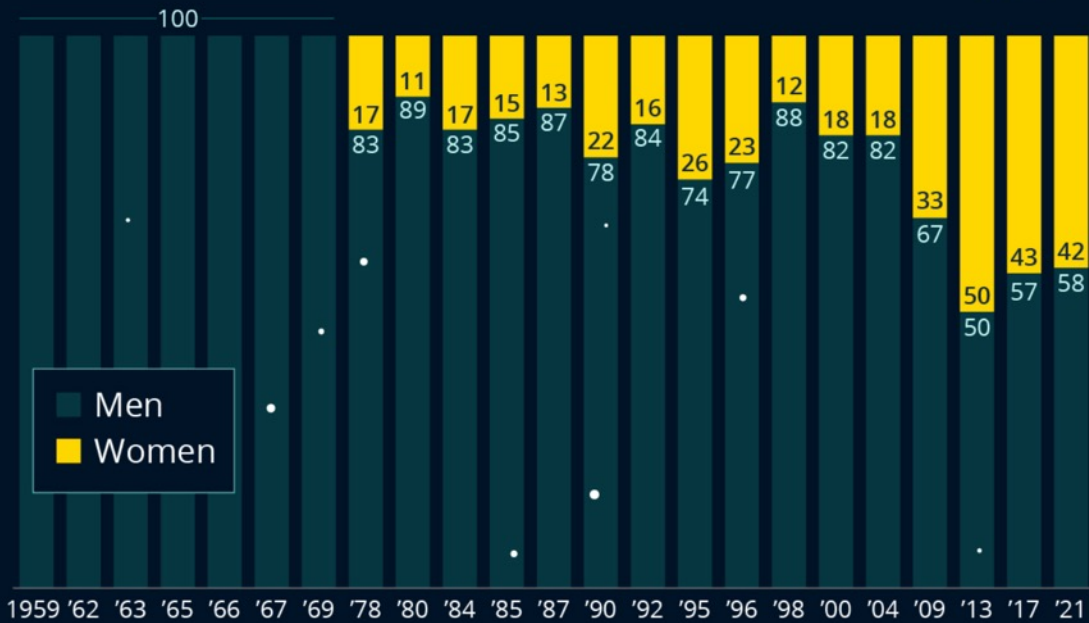
Astronauts Launched by Year

Click the legend to view astronauts launched by gender



Female Astronauts on the Rise at NASA

Gender breakdown of graduates from NASA astronaut class, by year of cohort (in %)



Source: NASA Astronaut Fact Book, Collect Space



statista



ESA (Image: European Space Agency)



UAE (Image: Mohammed Bin Rashid Space Centre)

Daily mass balance

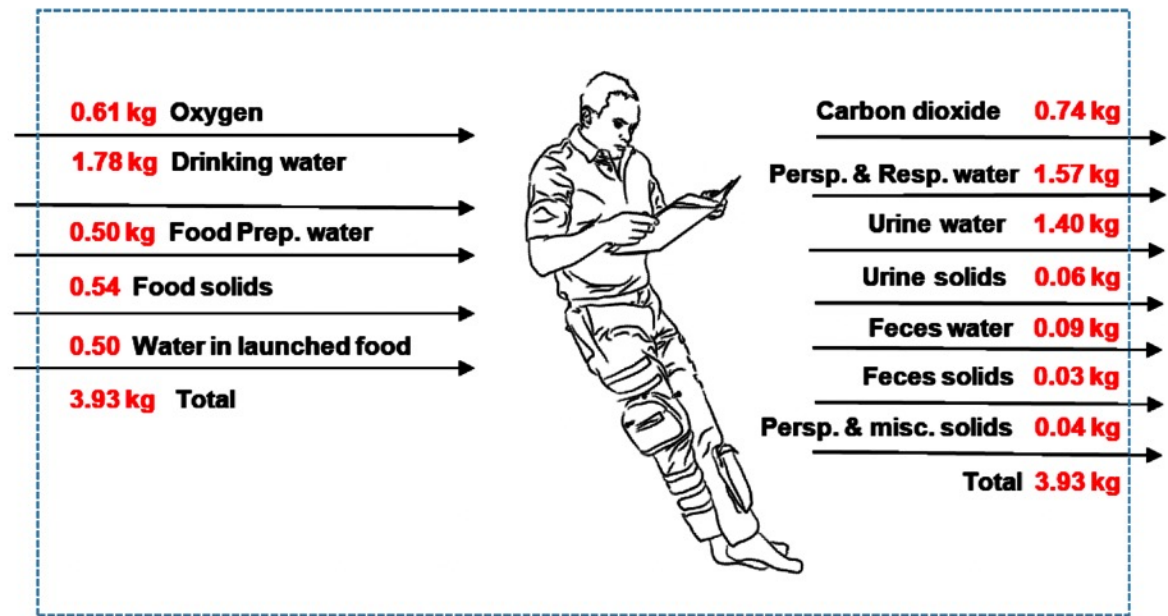


Figure 4. Daily mass balance of a 5th percentile astronaut

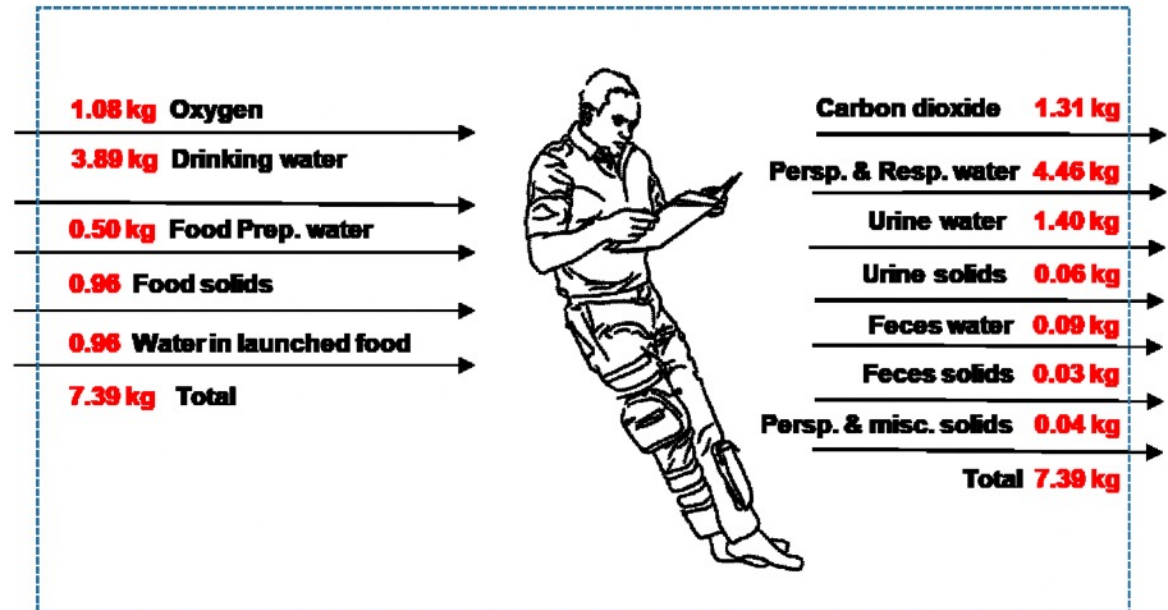


Figure 5. Daily mass balance of a 95th percentile astronaut

Metabolic rate profile

$$q_{met,2} = q_{met,1} \left(\frac{weight_2}{weight_1} \right)^{0.75}$$

Where:

$q_{met,1}$ = Metabolic rate of person 1

$q_{met,2}$ = Metabolic rate of person 2

$weight_1$ = weight of person 1

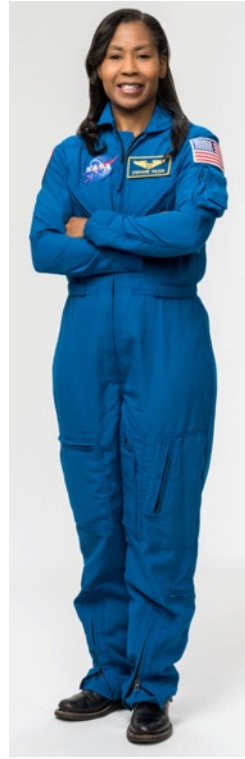
$weight_2$ = weight of person 2

Kleiber relationship

Table 4 Metabolic rates for different size individuals. *The first 2 are for medium fitness level. High fitness level is also shown for the 95th percentile to show overall worst case.*

Description	Metabolic Rates (kJ/hr, W)				
	Sleep	Nominal	Aerobic	Resistive	
Japanese female	5 th Percentile	218, 61	345, 96	2126, 590	863, 240
	HIDH	317, 88	500, 139	3486, 968	1251, 347
American male	95 th Percentile	367, 102	580, 161	5193, 1442	1452, 403

Life support resources for all-female crewed exploration missions

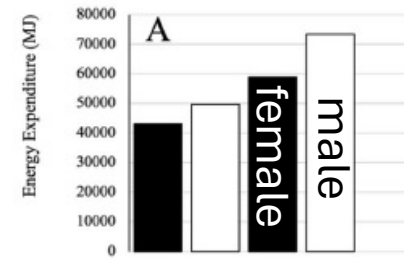


Images: NASA

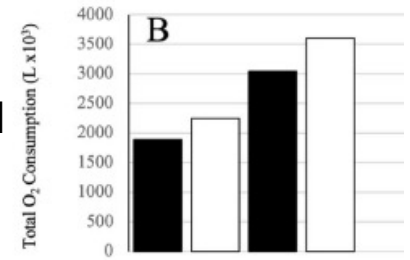
1.50m to 1.90m

Effects of body size and countermeasure exercise on estimates of life support resources during all-female crewed exploration missions
 Scott & al. (2023)

Energy used

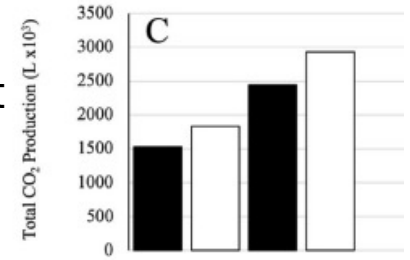


O₂ used

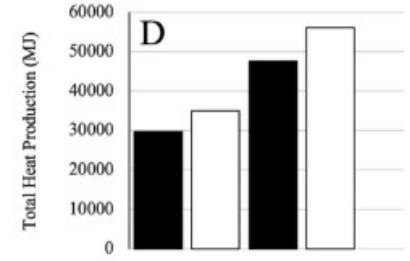


1080 day mission with exercise

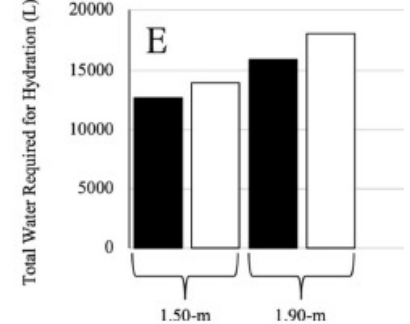
CO₂ out



Heat out



H₂O in



ILC International Latex Corporation



1959 bra and girdle sets- a must for the 1950s silhouette



Hazel Fellow, machine sewing an Apollo spacesuit at ILC.
(Smithsonian National Air and Space Museum)



UMEÅ UNIVERSITY

Thank you for your attention!

Carol Norberg
Carol@irf.se



Image: Robert Norberg & Chat GPT