

Participation of women scientists in ESA Solar System missions: an historical trend

Arianna Piccialli (1), Julie A. Rathbun (2), Anny-Chantal Levasseur-Regourd (3),
Anni Määttänen (3), Anna Milillo (4), Miriam Rengel (5), Alessandra Rotundi (4), Matt Taylor
(6), Olivier Witasse (6), Francesca Altieri (4), Pierre Drossart (7), and Ann Carine Vandaele (1)
arianna.piccialli@aeronomie.be (Twitter: [@Apic79](https://twitter.com/Apic79))

- 1) Planetary Aeronomy, Royal Belgian Institute for Space Aeronomy
- 2) Planetary Science Institute, Tucson, USA
- 3) LATMOS/IPSL, Sorbonne Université, UVSQ, CNRS, Paris, France
- 4) INAF, Istituto di Astrofisica e Planetologia Spaziali, Italy
- 5) Max-Planck-Institut für Sonnensystemforschung, Göttingen, Germany
- 6) ESA, ESTEC, Keplerlaan 1, 2201 AZ Noordwijk, The Netherlands
- 7) LESIA, Observatoire de Paris, Meudon, France



ROYAL BELGIAN INSTITUTE
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Why this study?

Numerous analyses have revealed that women are under-represented in science, technology, engineering and mathematics (**STEM**) careers (see references later).

Detailed statistics are only the first step to closely monitor the development of achievement gaps and initiate measures to tackle potential causes of inequity, leading to gender inequalities in STEM careers.

Being part of a spacecraft mission science team can be considered a proxy to measure the "**success**" in the field.

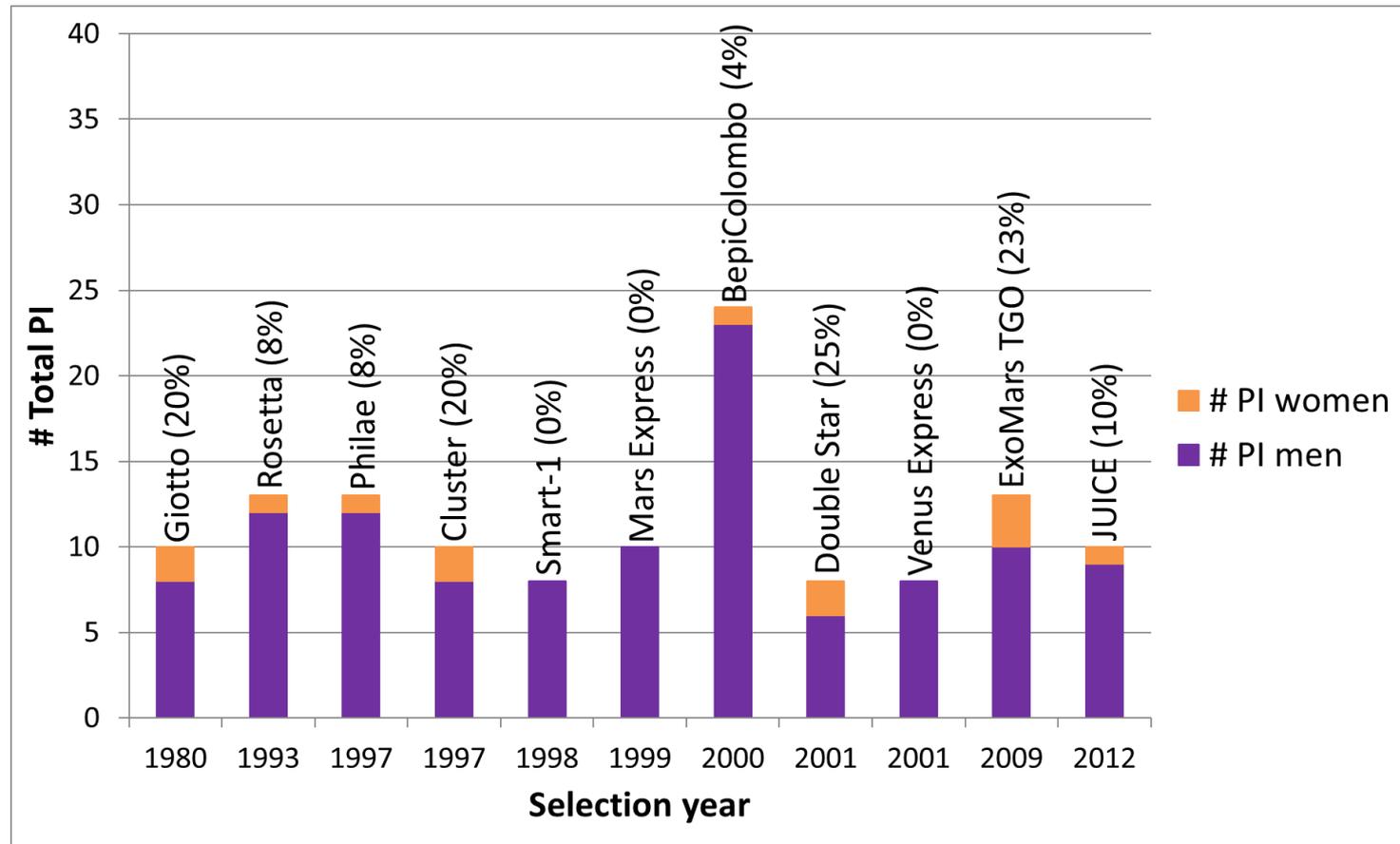


Method

- We limited our study to **ESA Solar System missions** as listed on the ESA Science & Technology web-page (<https://sci.esa.int/web/home/-/51459-missions>).
- For this study, we counted separately the **PIs** (including the Co-PIs) and the **Co-Is** for each ESA mission.
- We followed the same methodology described in **Rathbun et al. (2015)**, for consistency with their study.
- Their goal was to consider only **original team scientists** (not engineers or members of project management nor students or postdocs) in order to compare it to the composition of the field at that time.

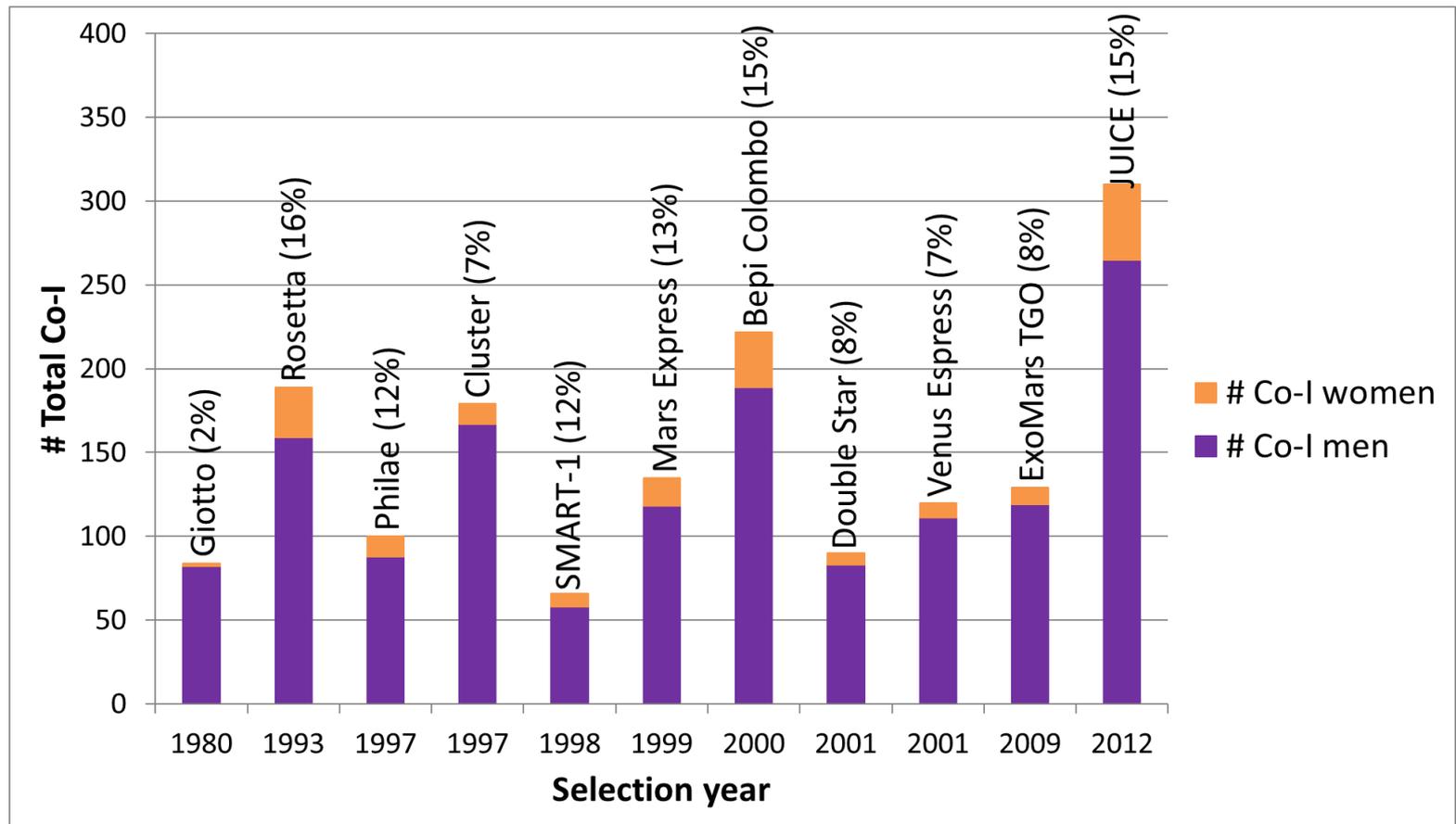


Number of PIs on ESA planetary missions





Number of CoIs on ESA planetary missions





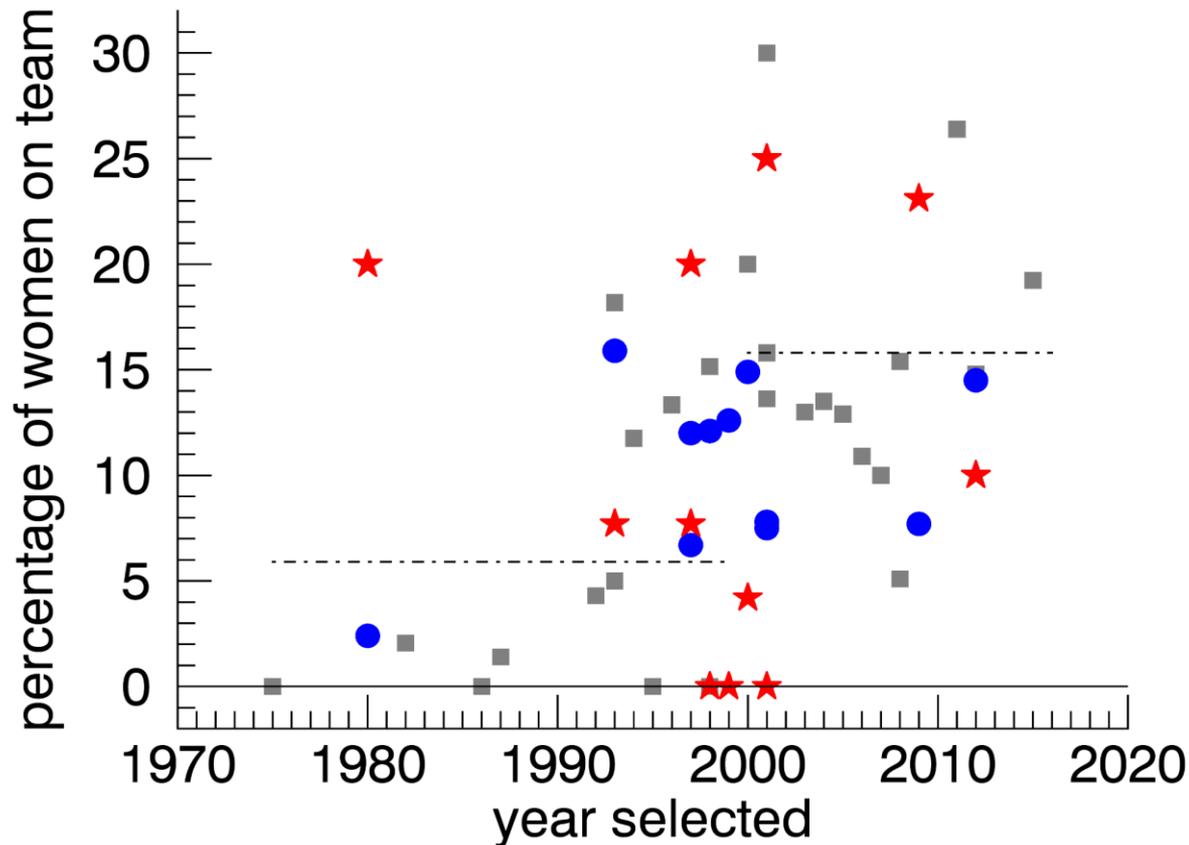
List of ESA's Solar System missions

Selection year	Launch year	Mission end	Mission Name	Target	% women PI	% women Co-I
1980	1985	1992	Giotto	Small bodies	20	2.4
1993	2004	2016	Rosetta	Small bodies	7.7	15.9
1997	2004	2016	Philae	Small bodies	7.7	12
1997	2000	-	Cluster	Earth's Magnetosphere	20	6.7
1998	2003	2006	SMART-1	Moon	0	12.1
1999	2003	-	MarsExpress	Mars	0	12.6
2000	2018	-	BepiColombo	Mercury	4.2	14.9
2001	2003	2009	Double Star	Earth's Magnetosphere	25	7.8
2001	2005	2014	VenusExpress	Venus	0	7.5
2009	2016	-	ExoMars/TGO + Schiaparelli	Mars	23.1	7.7
2012	2022	-	JUICE	Outer planets	10	14.5

Piccialli et al., submitted to Advances in Geosciences (ADGEO)



Comparison to NASA



The **grey rectangles** indicate the NASA missions. The **blue circles** are for ESA Co-Is and the **red stars** for ESA PIs.



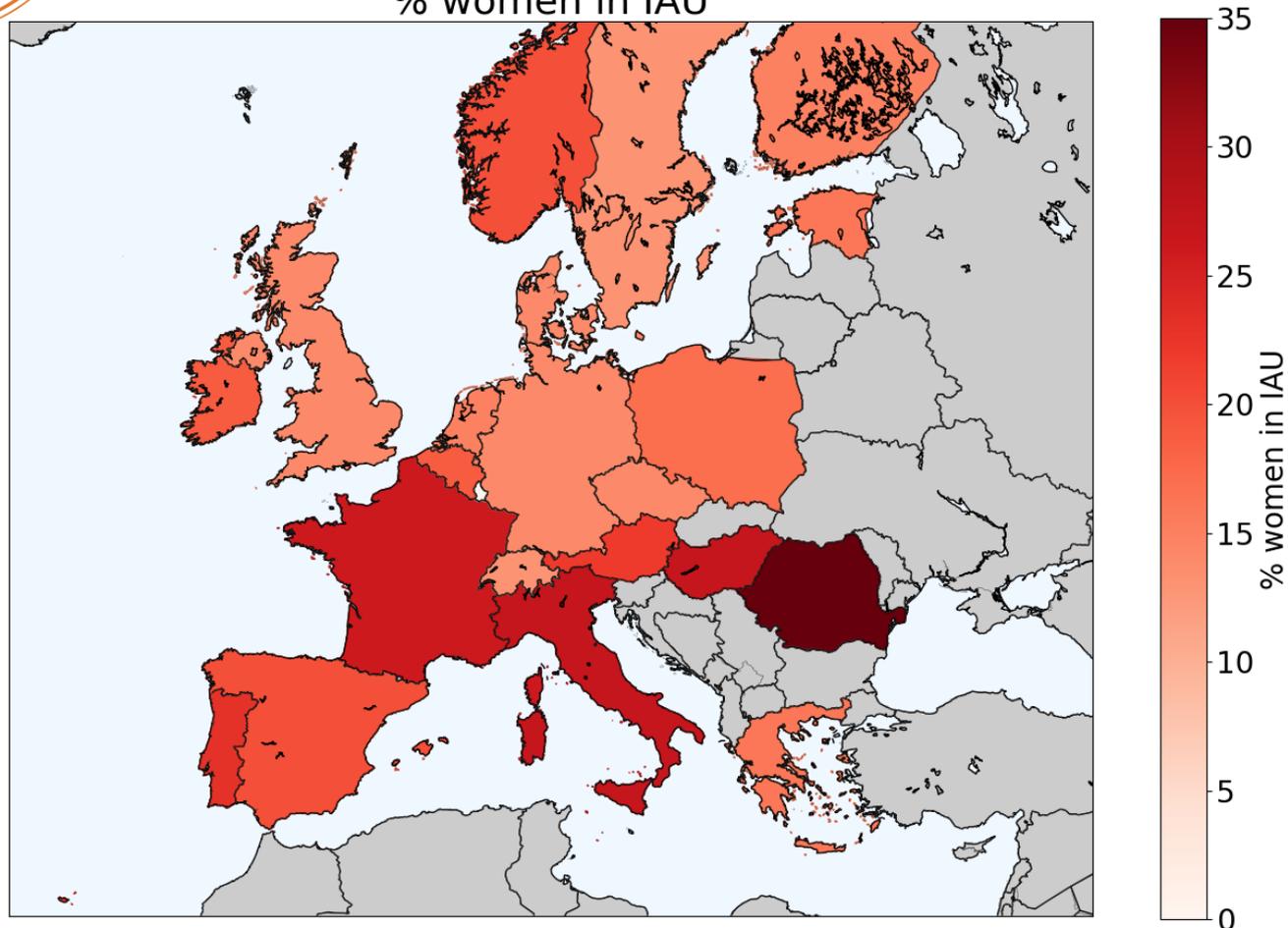
Women in the field

- To put the previous statistics in the right context, it is important to compare the percentage of women in ESA Solar System missions to the percentage of **women in planetary science in Europe**.
- This has proved **difficult** because there are **few global statistics over Europe** and it is not always easy to gather these numbers for each European country.
- As a preliminary analysis, we investigated the percentage of women in the **International Astronomical Union (IAU)**.
- IAU's demographic can give a **partial indication** of the percentage of women in planetary science in Europe.
- We limited our analysis only to **ESA's 22 Member States**.
- Notice that not all planetary scientists in Europe are members of IAU, therefore most probably these values **underestimate the number of women in the field**.



Women in the **International Astronomical Union**

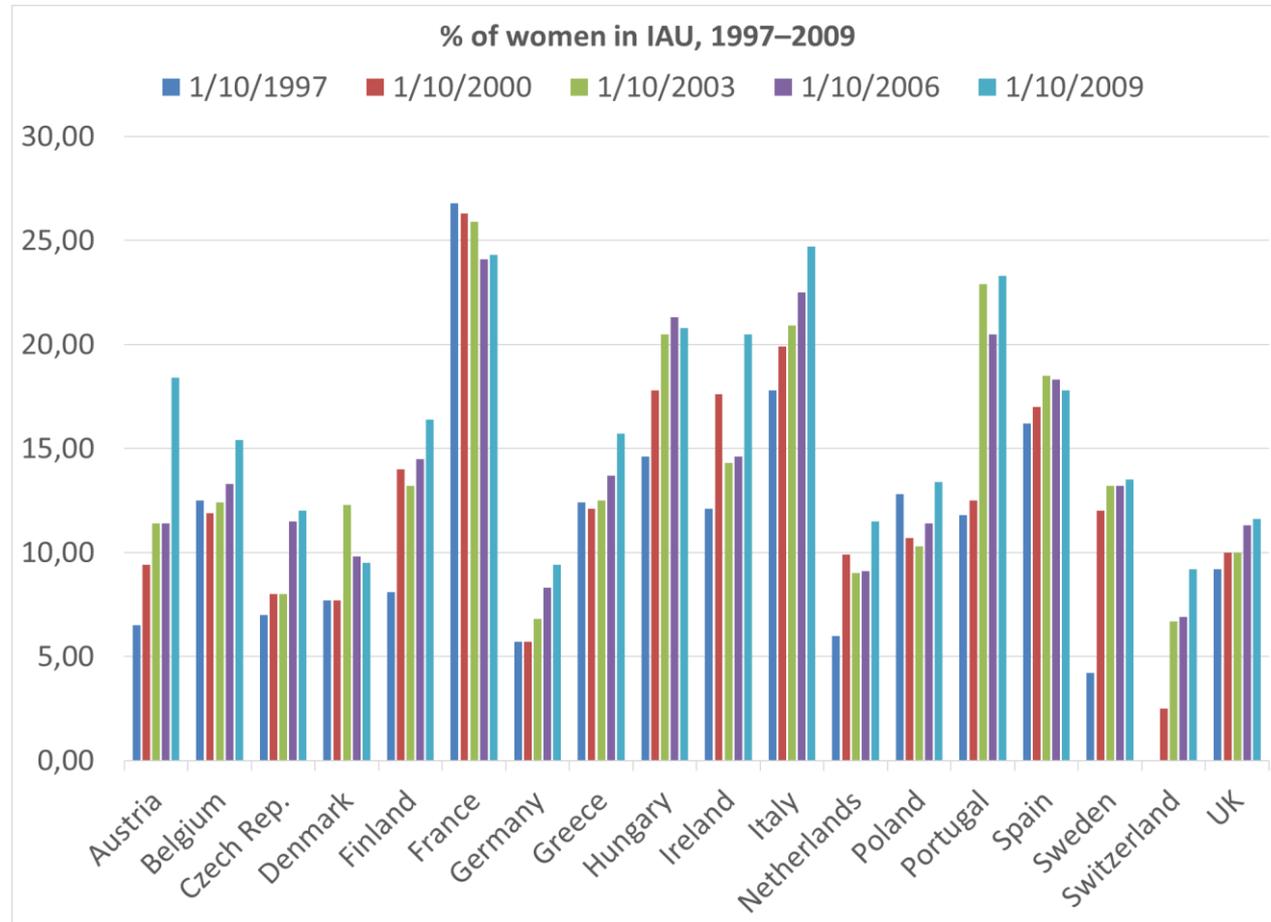
Only for ESA's Member States
% women in IAU





Evolution of women in **IAU**

Only for ESA's Member States





Conclusions

- Although the number of female scientists in the field has been constantly increasing in Europe, **we found that gender gaps that existed 38 years ago have persisted into the present**, with almost no increase of gender equality in ESA planetary missions.
- **We encountered many difficulties to gather the data for this study.**
- One difficulty we encountered was to find the original team members.
- An additional difficulty was to determine the percentage of women in the field during the missions' selection year.



What's next?

We would like to encourage international organizations (*EGU, the Europlanet Society, ESA,...*), universities, societies and the planetary community as a whole to continuously gather statistics over many years

Detailed statistics are necessary to understand the situation, and they need to be gathered regularly on long periods of time to monitor the trends.



Comments for discussion

Our research does not explain the mechanisms causing the observed gender gap or any of the underlying factors.

What should we and could we do now, to improve such ratios in a fair and honest way?

As a general suggestion, all planetary scientists should consider the demographic makeup of teams they work with, including mission teams, conference convener groups, panels, etc.



References useful for discussion

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Women academics seem to be submitting fewer papers during coronavirus. ‘Never seen anything like it,’ says one editor. <https://www.thelily.com/women-academics-seem-to-be-submitting-fewer-papers-during-coronavirus-never-seen-anything-like-it-says-one-editor/>



THANK YOU!
MORE INFO?

arianna.piccialli@aeronomie.be

Twitter: @Apic79

OUR SPECIAL
THANKS TO

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