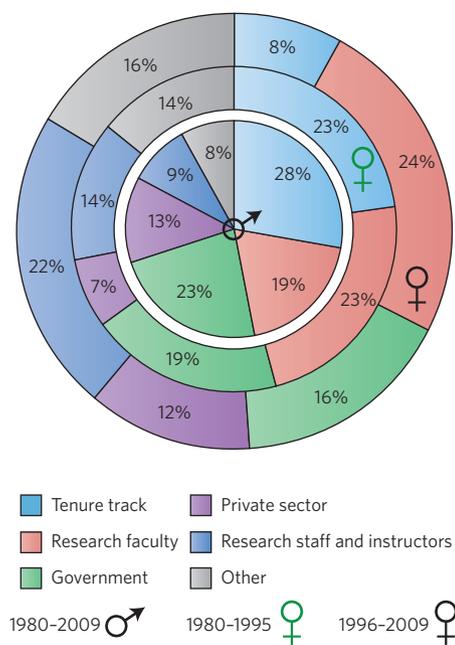


# Closed ranks in oceanography

To the Editor — Between 2001 and 2005, women earned 28% of awarded PhDs at the 17 US institutions with physical oceanography graduate programmes, yet only one out of eight talks was given by a female presenter in many of the relevant sessions at the February 2010 American Geophysical Union ‘Ocean Sciences’ meeting. An analysis of the type of jobs held by physical oceanography PhDs in the United States reveals that for those who earned PhDs from 1980 to 1995, the chances of attaining a tenure-track position were almost equal between men and women. Since then, the situation has deteriorated: for those who earned their PhD between 1996 and 2009, the fraction of women in the tenure track was only about a third of the fraction of men who passed that hurdle.



**Figure 1 |** The gender gap in physical oceanography. Whereas 28% of the men in our sample who earned their PhD between 1980 and 2009 (inner circle) obtained tenured or tenure-track positions, the fraction of women holding these positions dropped sharply from 23% (middle circle) to 8% (outer circle). At the same time, more women were employed as research staff, instructors or research faculty.

To investigate the observed gender dichotomy between the research and tenure tracks, we examined career paths of men and women in physical oceanography. Specifically, we conducted a retrospective analysis of individuals who obtained PhDs from six main US oceanographic institutions between 1980 and 2009. We determined the present (or terminal, if retired) position of these 257 men and 92 women by performing searches of university, laboratory and corporate web pages; we located all but ten men and one woman. We sorted individuals into seven categories based on job title and function: tenured or tenure-track faculty, academic research faculty, civil/contract employee at a government laboratory, private sector position, academic research staff/lecturer and finally those that could not be found or were not employed in science. We excluded graduates holding postdoctoral positions as of 2009.

We found substantial gender differences, particularly for the second period (1996–2009): whereas about a quarter of all men entered the tenure track consistently throughout time, the fraction of women securing such a position dropped dramatically, from 23% in the earlier period to a mere 8% more recently (Fig. 1, see also Fig. S1).

We suggest two possible interpretations for our results. First, family relationships affect women's academic careers more than men's. Academic women typically have a spouse employed full time<sup>1</sup>, and women with children are less likely to enter the tenure track than men<sup>2</sup>. It is possible that more women are choosing to have children and to marry than in previous decades. Alternatively, institutions could have changed hiring practices, putting less effort into balancing the gender distribution of those considered for tenure-track positions to reflect the broader applicant pool. The critical mass for minorities to achieve adequate representation in employment groups is 15% (ref. 3). In our sample, women obtained 20% of the tenure-track faculty positions before 1996, suggesting a critical mass of women in faculty ranks during this time interval. Women awarded PhDs after

1996 obtained only 11% of the tenure-track faculty positions.

We also found that women in physical oceanography were more likely to populate the research faculty (see Table S1), where positions are fixed-term and funded primarily from research grants. The disproportionate absolute number of men at the full professor rank is probably related to the later arrival of women to the field. However, it is harder to explain the gender distribution of the research and tenure tracks.

In conclusion, although female PhDs are reaching parity with male PhDs in physical oceanography, women are not transitioning to tenure-track faculty positions at the same rate as men — despite compelling reasons for departments to achieve gender equality<sup>4</sup>. □

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## Additional information

Supplementary information accompanies this paper on [www.nature.com/naturegeoscience](http://www.nature.com/naturegeoscience).

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