

Artist's impression of the Thirty Meter Telescope, destined for Hawaii in the next decade. (TMT)

OPINION

Making friends in high places?

Erwin Krauskopf wonders if where you observe makes a difference to the impact of your papers

In July an important decision was made by the board of the Thirty Meter Telescope Observatory, selecting Mauna Kea in Hawaii as the site for the construction of the TMT, rather than Cerro Armazones in Chile. The announcement was made in IYA2009, 400 years after the invention of the telescope, a device that has allowed people of all sorts to gaze at the sky and make new discoveries.

Currently there are 13 working telescopes – owned and run by US and international groups – close to the summit of Mauna Kea, taking advantage of the ideal climatic conditions, such as very low humidity and few cloudy days. Because the field of astronomy and astrophysics has developed around telescopes, I became interested in establishing how much the presence of this cluster of devices and the international community of scientists that it draws together, affects the research productivity of a particular location. I selected as subjects of study the two sites that were finalists for the TMT: the state of Hawaii and the country of Chile.

Both locations are world-renowned sites for state-of-the-art telescopes. Using the Web of Science database, I searched for records (on 3 August 2009) that were indexed from 1996 to 2005 and that were registered to either the state of Hawaii or the country of Chile. All records that were categorized as “Astronomy and Astrophysics” among ISI disciplines were retrieved, excluding records that were either indexed as “corrections” or “editorial material”.

As the table shows, even though Chile produced 22.5% more scientific articles than Hawaii, the country received far fewer citations per article published (31.4 citations/article for

Hawaii vs Chile in print

	Hawaii	Chile
articles	1719	2543
total cites	75586	79870
av. cites/article	44.0	31.4
h-index	112	101
hKA-index	75	55

Total number of “astronomy and astrophysics” articles produced by the state of Hawaii and the country of Chile within 1996–2005. Results calculated on 3/8/09.

Chile versus 44 citations/article for Hawaii). So it is not surprising that Hawaii presents a higher h-index (Hirsch 2007). Nevertheless, this parameter may be heavily influenced by the collaboration network surrounding the subject being evaluated. I wondered if the concentration of facilities at Mauna Kea was bringing a level of familiarity among researchers working there, that would not exist if the facilities were not physically close. In other words, does the grouping of facilities at Mauna Kea boost collaboration between observers there? I used a derivative of the h-index that I developed, named hKA. This index may be applied to people, institutions or countries/locations.

The new evaluation was made considering only the articles that registered a corresponding author from either of the two locations. The index decreased (from h-index to hKA-index) to 75 for Hawaii and 55 for Chile, as a result of the derivation process, but the difference is maintained, and in fact increases. This sug-

gests to me that collaboration with peers from different institutions and/or countries is better in Hawaii than in Chile, but that both benefit from the concentrations of telescopes. It may be that the high h-index is strengthened by the opportunities for collaboration offered by the many remarkable observatories set in Hawaii and Chile. In particular, I maintain that the presence of these major international facilities benefits research in local institutions – a factor that should be taken into account when considering the location of major new telescopes.

Facilities that can be used by institutions that do not have telescopes due to poor atmospheric conditions or lack of economic resources are a benefit in terms of inspiration and the development of research skills. The TMT observatory to be built in Hawaii will cost around \$1bn; few countries can afford such a facility. The South African Large Telescope, for example, aims to boost scientific and technical training, as well as provide inspiration for a new generation of African scientists. But this analysis suggests that the grouping of telescopes at these high altitude sites also builds collaboration in research, and can boost the research profiles of smaller groups or countries involved with these larger research powerhouses.

To some people, the outcome of this study might be obvious. However, the purpose of this exercise was aimed at weighing the undetected impact that these observatories have on the research productivity of the associated institutions allocated near the sites where these magnificent devices are being constructed. And, in the spirit of international cooperation fostered by IYA2009, perhaps this positive effect should be considered in discussions of the location of future major facilities, such as the European Extremely Large Telescope, by the prospective hosting countries to promote scientific research, and in addition the always-needed public awareness of the value of science? ●

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Reference

Hirsch J E 2007 *Proc. Natl. Acad. Sci. U.S.A.* **104** 19193.

● What do you think? Send your opinions to the Editor, Sue Bowler, at s.bowler@leeds.ac.uk.