THE ROLE OF BIBLIOMETRICS IN EVALUATING SCIENTIFIC RESEARCH

Chris Belter, NOAA Central Library
Use of bibliometrics is increasing rapidly

Bibliometrics are perceived to be
- Quantitative
- Objective
- Scientific
- Accessible

So, they’re useful for evaluation, right?
Evaluation is about asking the right questions

Evaluation questions need to
- Provide useful information about a program
- Be answerable by accessible data

So: what questions can bibliometrics answer?
Answerable Questions

- Who did the research?
- What research was done?
  - What was the impact of that research?
- When was the research done?
- Where was the research done?
Who did the research?
Who: Individual Collaboration

Co-author network generated from journal articles sponsored by NOAA OER

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Who: Organizational Collaboration

Research division collaboration network based on NOAA FY12 publications
Who: Institutional Collaboration

Collaborations between NOAA and other institutions based on CY2011 publications

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What research was done?

And what was the impact of that research?
What: Semantic Maps

Word co-occurrence network from the titles of journal articles sponsored by OER

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What: Paper Citation Maps

Article citation network of OER-sponsored journal articles
# What: Research Impact

<table>
<thead>
<tr>
<th>Bibliometric Indicator</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>Number of Publications</td>
<td>452</td>
</tr>
<tr>
<td>Number of Times Cited</td>
<td>4,950</td>
</tr>
<tr>
<td>Average Number of Citations per Publication</td>
<td>10.95</td>
</tr>
<tr>
<td>H-Index</td>
<td>32</td>
</tr>
</tbody>
</table>

Standard bibliometric indicators for publications supported by OER
Percentage of publications in the top 10% for citation counts in five research areas
When was the research done?
When: Publication Trend

- All Publications
- Journal Articles
- Conference Papers

Number of OER-sponsored publications per year October 2012 NOAA Central Library
Where was the research done?
Where: Research Centers

Institutions publishing OER-sponsored journal articles

- NOAA
- University of Washington
- Woods Hole Oceanographic Inst.
- Oregon State University
- University of California System
- University of Hawaii System
- US Geological Survey
- University of North Carolina
- University of Alaska - Fairbanks
- Texas A & M University

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Where: National Mapping

Number of publications and times cited per zip code of OER-sponsored journal articles

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Where: International Mapping

Number of publications per country based on NOAA journal articles from FY12
Limitations of bibliometrics
### Limits: Why?

<table>
<thead>
<tr>
<th>Paper</th>
<th>Times Cited</th>
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</table>

**Most highly cited OER-supported articles as of 02 July 2012**
Limits: Why?

Number of OER-sponsored publications per year

- All Publications
- Journal Articles
- Conference Papers

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Limits: What Do Citations Mean?

- Measure influence?
- Measure significance?
- Measure applicability?
- Measure something else?
Limits: Citation Distributions

Limits: Citation Distributions

Citation thresholds for papers ranked in the top 10% for citation counts.

- Oceanography
- Marine & Freshwater Biology
- Ecology
- Biology
- Geosciences, Multidisciplinary
Limits: Measuring Publications

- Bibliometrics can only measure some publications

- Bibliometrics might measure a few data sets, software tools, technical reports...

- Bibliometrics cannot measure mentoring, editing/reviewing, panel participation, outreach...
How should they be used?
Use: To Complement Peer Review

- Bibliometric analysis has serious limitations
- Peer review also has limitations
- Each method partially corrects for the limitations of the other
Use: To Raise ‘Why’ Questions

- Although bibliometric analysis cannot answer why questions, it does effectively raise them.

- Bibliometrics can detect anomalies or trends that can be addressed by peer review.
Conclusion

- Evaluation should balance quantitative and qualitative information

- Bibliometrics cannot replace peer review

- Bibliometrics should complement peer review
Questions?

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