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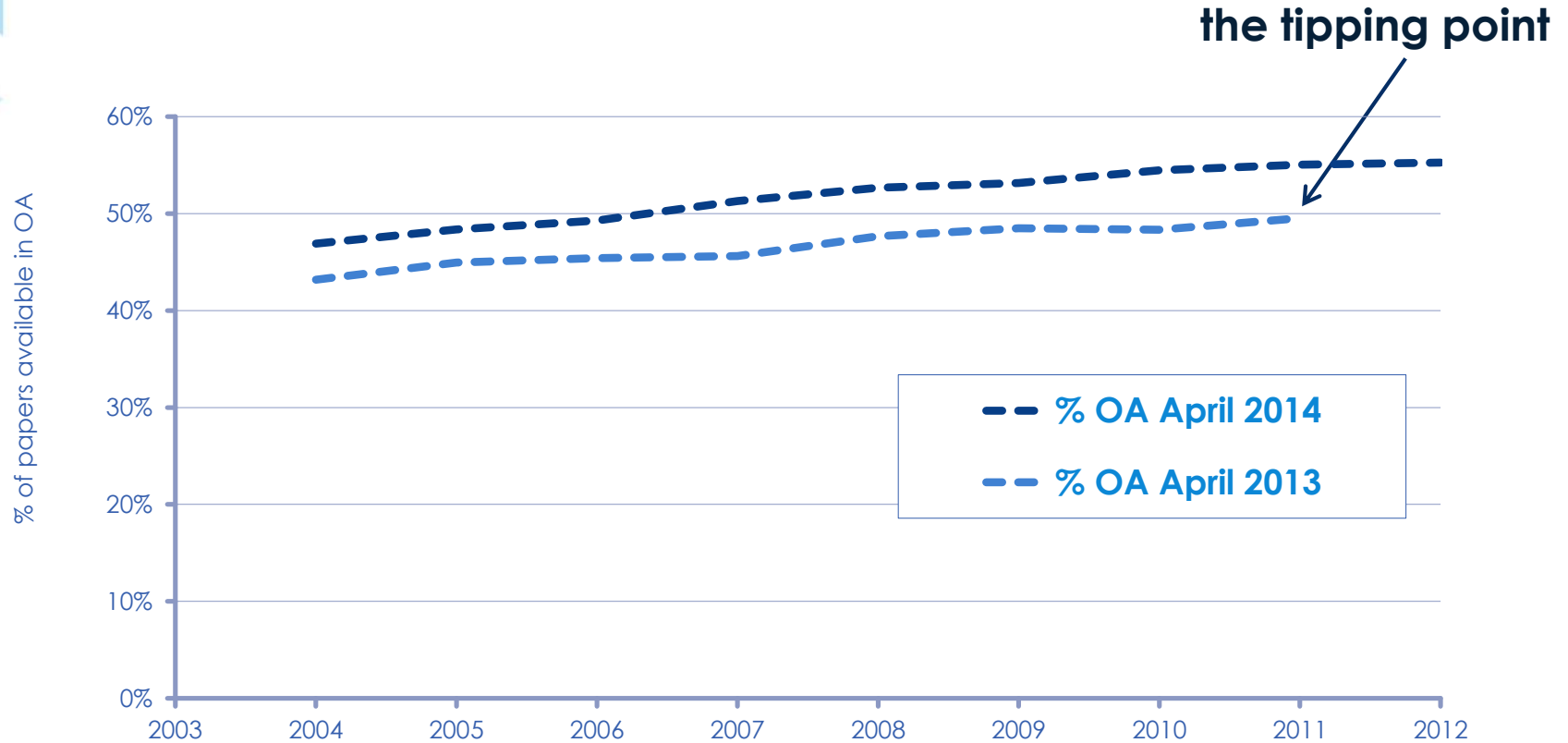
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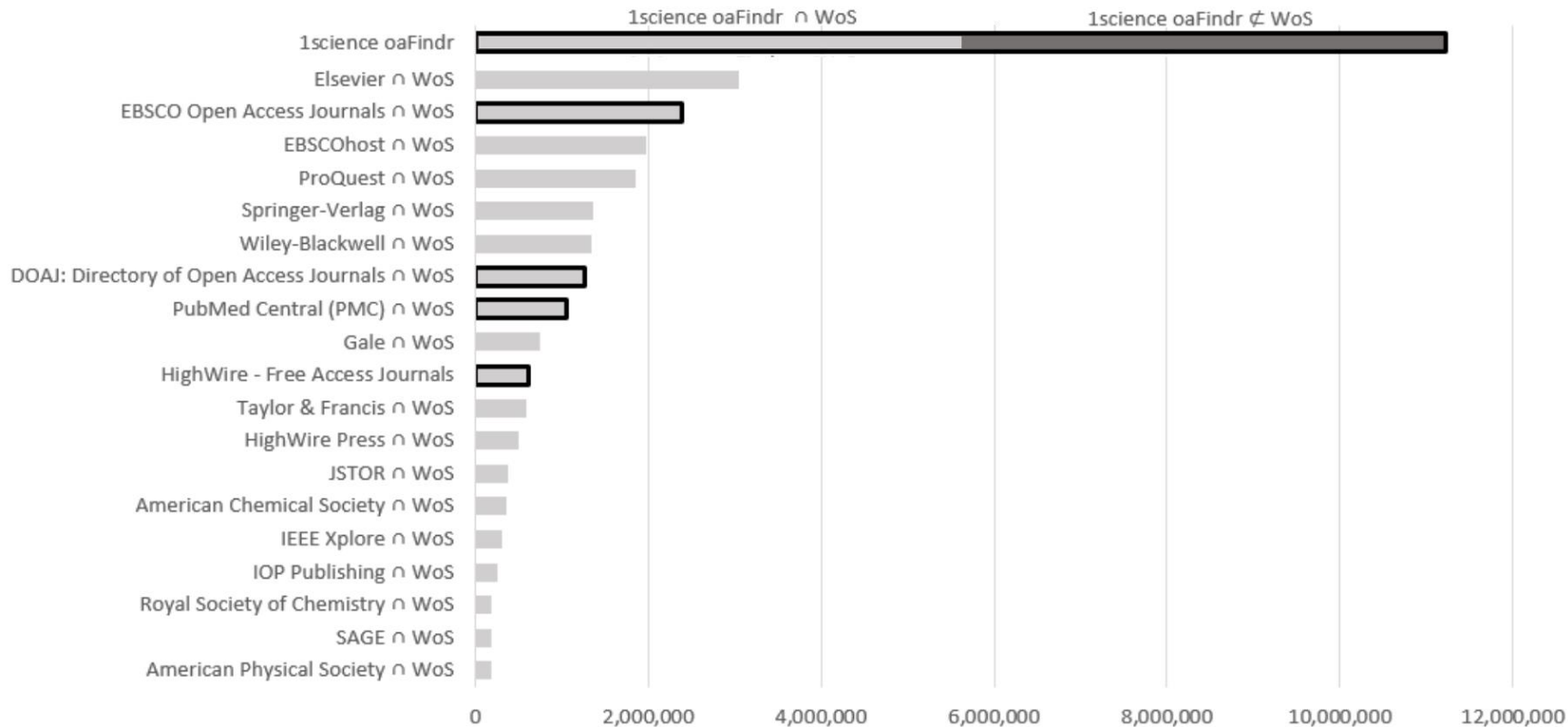


Source: Originally published in Archambault, E., et al. 2013. Proportion of Open Access Peer-Reviewed Papers at the European and World Levels—2004-2011. Produced by Science-Metrix for the European Commission.

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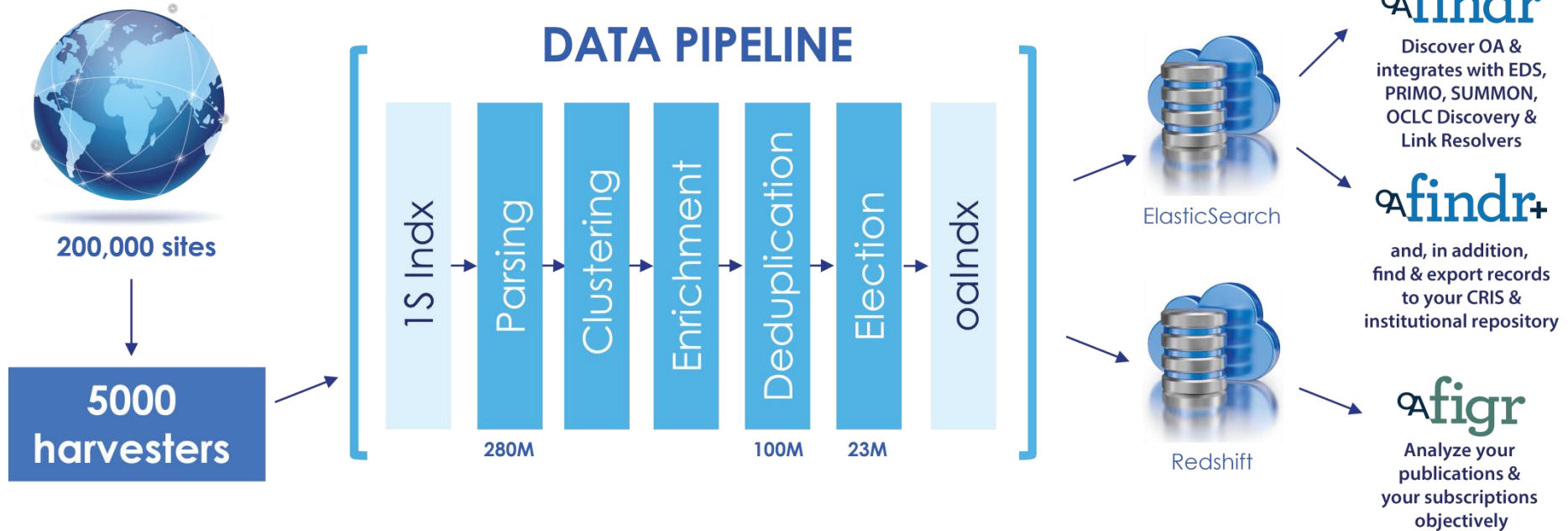
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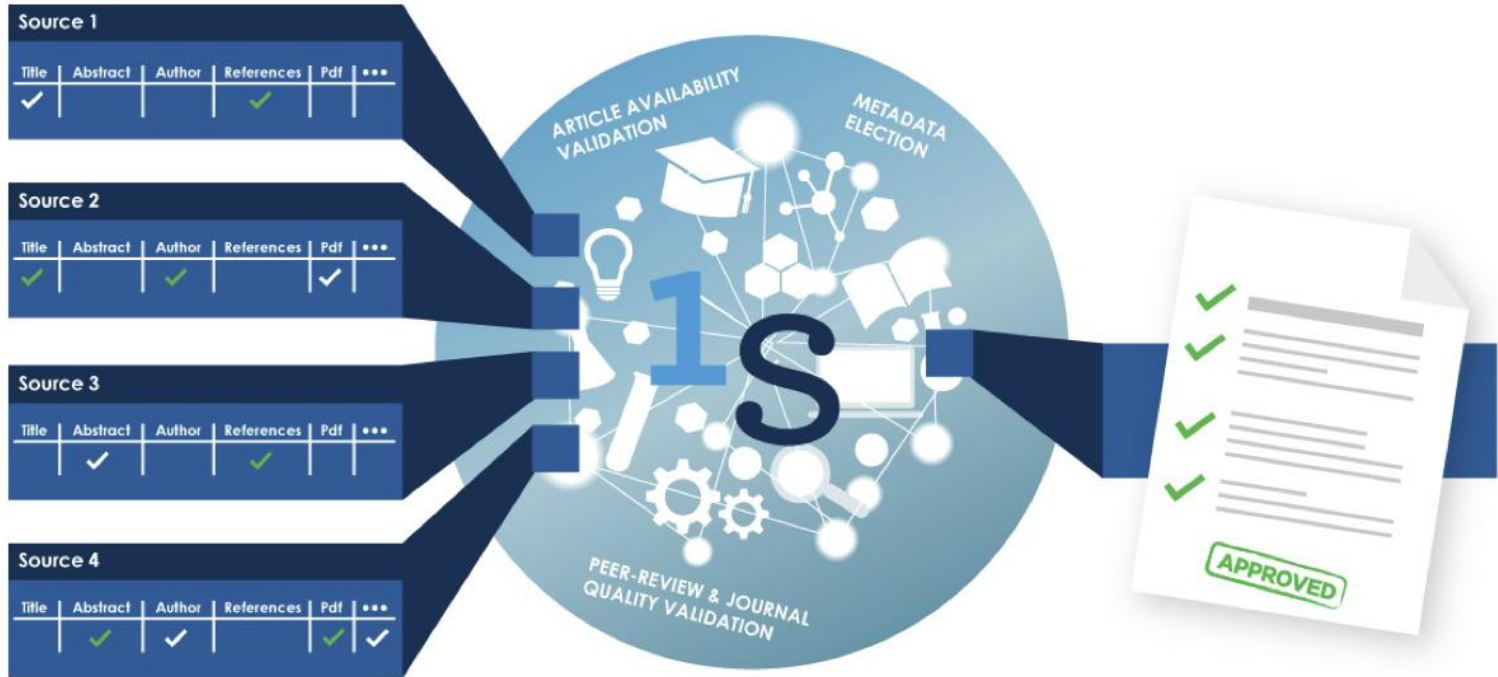
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Plate Micro-fins in Natural Convection: An Opportunity for Passive Concentrating Photovoltaic Cooling

by +Leonardo Micheli et al.

+Energy Procedia (2015)

The raise in temperature is a non-negligible issue for concentrating photovoltaics (CPV), where the sunlight is concentrated up to thousands of times and a large amount of heat is collected on the solar cells. Micro-fins have been identified as one of the most promising solutions for CPV cooling; despite its potentials, the number of publications on this subject is still limited. The present paper resumes the state-of-the-art of the research on micro-fins, in order to identify the most convenient fin geometry for CPV applications. The results of the investigation conducted in this work show that, compared to a conventional heat sink, micro-fins can improve the thermal performance and, at the same time, lower the weight of a system. For this reason, they are particularly beneficial for tracked systems, such as CPV, where a reduced weight means a reduced load for the tracker. The heat transfer coefficients measured through an experimental setup are able to predict the performance of a micro-finned CPV system in natural convection; an optimized fin array is found able to enhance the mass specific power up to 50% compared to an unfinned surface.

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ATI 2015 - 70th Conference of the ATI Engineering Association

Plate micro-fins in natural convection: an opportunity for passive concentrating photovoltaic cooling

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Abstract

The raise in temperature is a non-negligible issue for concentrating photovoltaics (CPV), where the sunlight is concentrated up to thousands of times and a large amount of heat is collected on the solar cells. Micro-fins have been identified as one of the most promising solutions for CPV cooling; despite its potentials, the number of publications on this subject is still limited. The present paper resumes the state-of-the-art of the research on micro-fins, in order to identify the most convenient fin geometry for CPV applications. The results of the investigation conducted in this work show that, compared to a conventional heat sink, micro-fins can improve the thermal performance and, at the same time, lower the weight of a system. For this reason, they are particularly beneficial for tracked systems, such as CPV, where a reduced weight means a reduced load for the tracker. The heat transfer coefficients measured through an experimental setup are able to predict the performance of a micro-finned CPV system in natural convection; an optimized fin array is found able to enhance the mass specific power up to 50% compared to an unfinned surface.

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Keywords: concentrating photovoltaics, micro-fins, natural convection, passive cooling.

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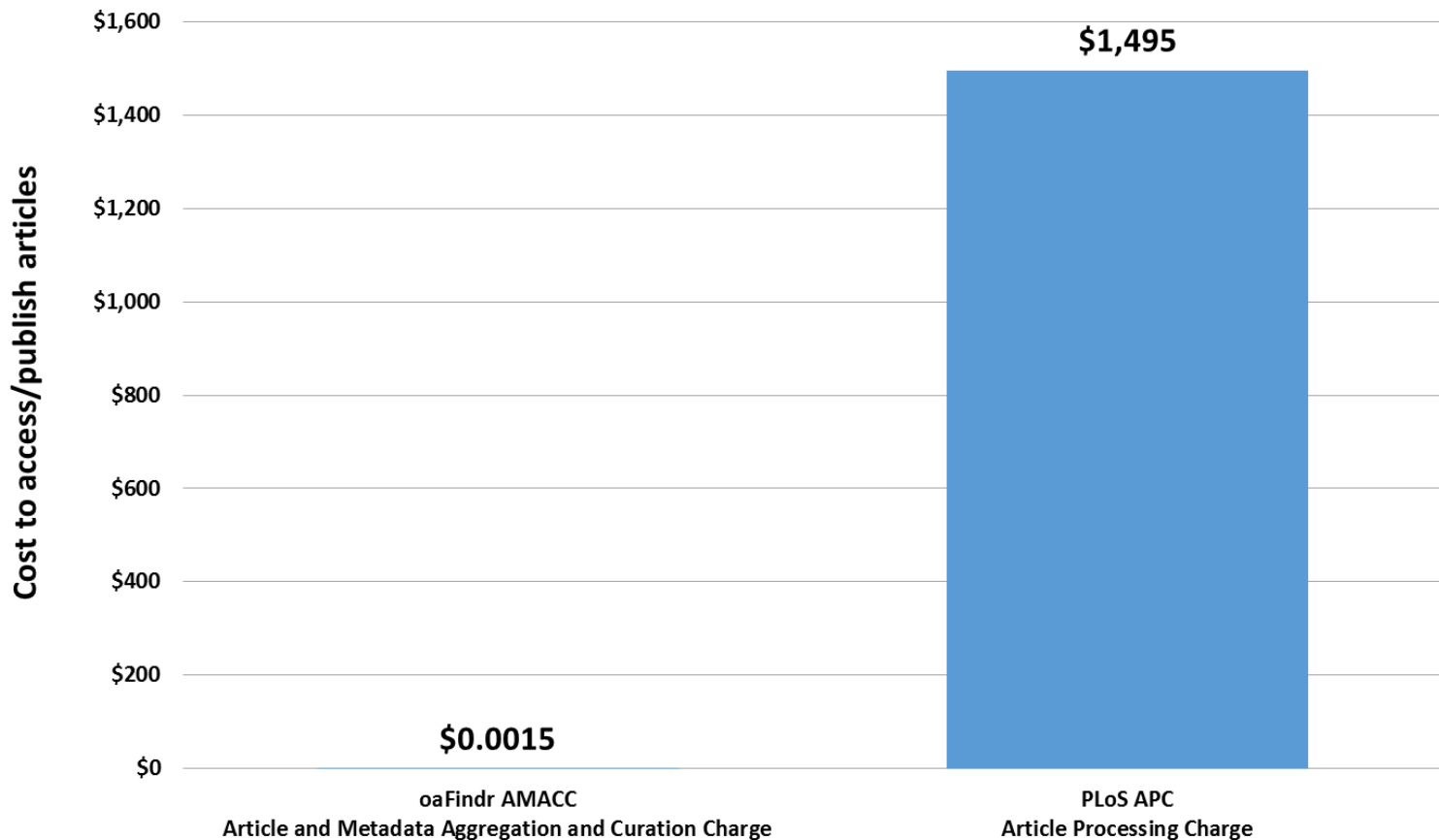
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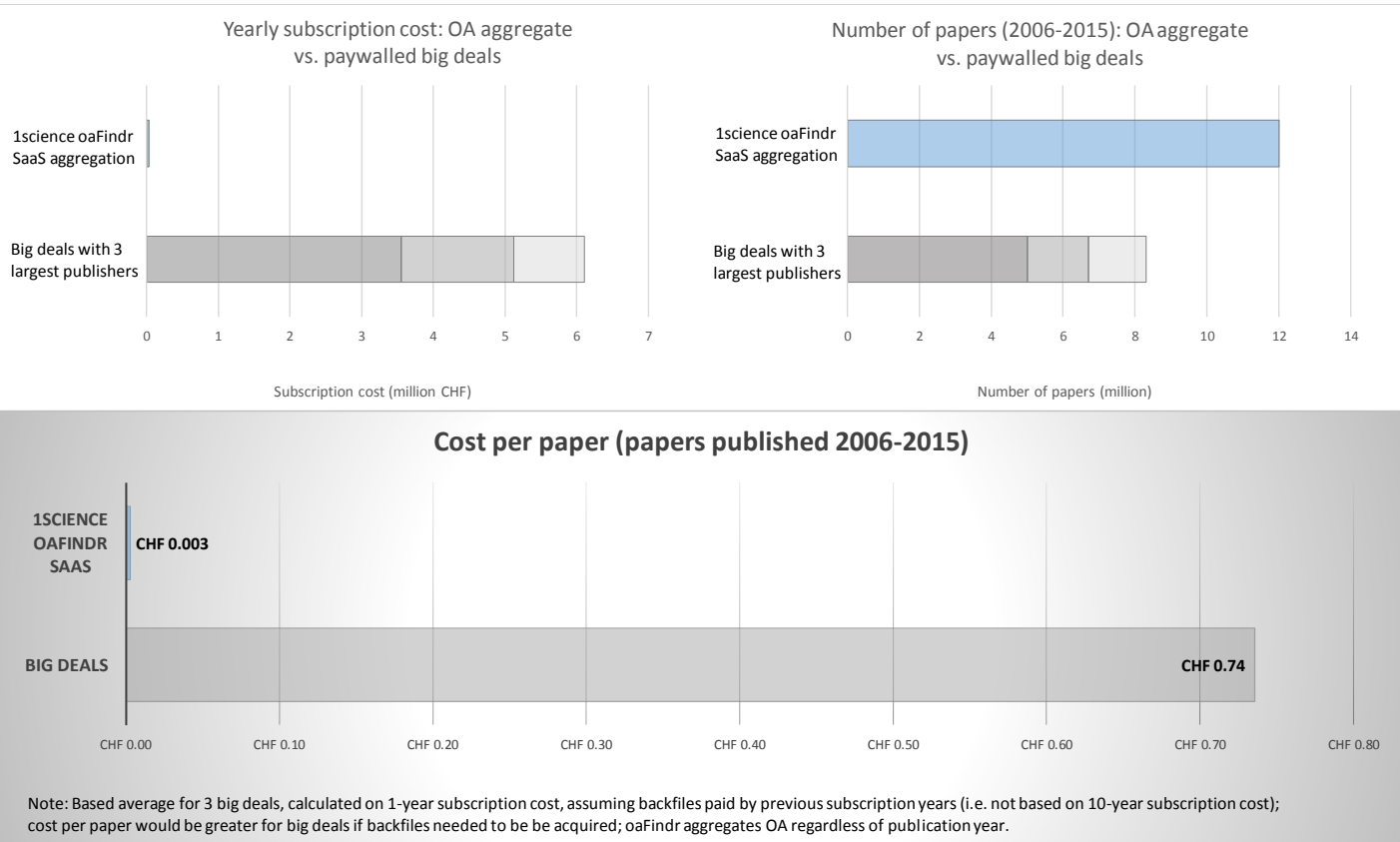


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