First Systematic Review on Aerosol Bound Water: Exploring the Existing Knowledge Domain Using the CiteSpace Software

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Abstract : The presence of PM bound water as an integral chemical compound of suspended aerosol particles (PM) has become one of the hottest issues in recent years. The UN climate summits on climate change (COP24) indicate that PM of anthropogenic origin (released mostly from coal combustion) is directly responsible for climate change. Chemical changes at the particle-liquid (water) interface determine many phenomena occurring in the atmosphere such as visibility, cloud formation or precipitation intensity. Since water-soluble particles such as nitrates, sulfates, or sea salt easily become cloud condensation nuclei, they affect the climate for example by increasing cloud droplet concentration. Aerosol water is a master component of atmospheric aerosols and a medium that enables all aqueous-phase reactions occurring in the atmosphere. Thanks to a thorough bibliometric analysis conducted using CiteSpace Software, it was possible to identify past trends and possible future directions in measuring aerosol-bound water. This work, in fact, doesn’t aim at reviewing the existing literature in the related topic but is an in-depth bibliometric analysis exploring existing gaps and new frontiers in the topic of PM-bound water. To assess the major scientific areas related to PM-bound water and clearly define which among those are the most active topics we checked Web of Science databases from 1996 till 2018. We give an answer to the questions: which authors, countries, institutions and aerosol journals to the greatest degree influenced PM-bound water research? Obtained results indicate that the paper with the greatest citation burst was Tang In and Munklewitz H.R. 'water activities, densities, and refractive indices of aqueous sulfates and sodium nitrate droplets of atmospheric importance', 1994. The largest number of articles in this specific field was published in atmospheric chemistry and physics. An absolute leader in the quantity of publications among all research institutions is the National Aeronautics Space Administration (NASA). Meteorology and atmospheric sciences is a category with the most studies in this field. A very small number of studies on PM-bound water conduct a quantitative measurement of its presence in ambient particles or its origin. Most articles rather point PM-bound water as an artifact in organic carbon and ions measurements without any chemical analysis of its contents. This scientometric study presents the current and most actual literature regarding particulate bound water.

Keywords : systematic review, aerosol-bound water, PM-bound water, CiteSpace, knowledge domain
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