Copernicus Sentinels observations as a tool to evaluate NBS implementation

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Introduction

The implementation of Nature Based Solutions (NBS) is expected to give urban planning the opportunity to play an important role in climate change mitigation/adaptation, at both local and city scales. The evaluation of the large scale implementation of NBS should be based on their sustainability potential, therefore on their environmental and socioeconomic impacts. Concerning environmental impact, urban planners need to quantitatively estimate the modification caused by NBS implementation to the energy, water and carbon fluxes, as indicated by the FP7 project BRIDGE (Chrysoulakis et al. 2015a). For example, green roofs implementation can have an impact on the temperature of rooftops, however no one knows how much this approach can cool a whole city. Only a few simulations have evaluated green roofs at that scale (Hoag 2015). Given that urban surfaces are complex mixtures of different materials, the magnitude of the energy, water and carbon balance components varies widely across a city, and it will almost certainly depart significantly from that measured by any in-situ instrumentation.

The approach for Sentinels exploitation in the NBS domain

Earth Observation (EO) provides the advantage of large-area spatial coverage at high spatial resolution. The potential of EO to support our understanding of the role of NBS in energy, water and carbon balance modification still remains underexploited. To this end the H2020 project URBANFLUXES (Chrysoulakis et al. 2015b) builds a methodology for energy flux estimation from Copernicus Sentinels. Similar approaches can be developed for water and carbon fluxes. In this way, EO-based assessment and monitoring tools can be developed capable of quantitatively estimating the modifications caused by NBS implementation of energy, water and carbon fluxes. EO-based approaches are easily transferable to any city since Sentinels cover the globe and they are capable of providing benchmark flux data for different applications, with emphasis in renaturing cities. It is therefore expected to further improve our understanding of the dynamics of urban systems so that EO can be a relevant and timely tool to help inform policy-making.

Expected Impact

The current requirements for climate change mitigation/adaptation and accounting for environmental issues in sustainable urban planning, as well as the expected scale-up of the use of NBS, have generated a need for city-scale monitoring tools. The proposed Sentinel-based approach is expected to improve the innovation activities related to the development of new products (EO-derived energy, water and carbon fluxes), new methods of production (EO synergistic observations analysis), new sources of supply (Copernicus data), and new markets (optimization/evaluation/monitoring of the implementation of NBS for sustainable urbanization).

Therefore EO-based services will support the sustainable urban planning strategies, by taking into account the spatiotemporal modification of energy, water and carbon fluxes, caused by NBS large scale implementation. Such demonstration initiatives of large scale will provide robust EU-wide evidence of NBS advantages.

Conclusions

Here we discussed the development of EO-based assessment and monitoring tools, capable of supporting the evaluation of NBS implementation. This approach is expected to support the development of strategies to mitigate overheating, improving thermal comfort (social benefit) and energy efficiency (economic benefit).

References

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