Temporal patterns and drivers of conductivity in urban Piedmont streams of Georgia, USA

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Increased conductivity of streams is a common symptom of watershed urbanization and is often highly correlated with impaired biotic assemblages. However, we lack an understanding of the mechanisms behind these relationships. We identified the primary constituents and characterized the temporal pattern of conductivity in 12 piedmont streams in Athens, GA. Specific conductance (SpC), stage height, and temperature were measured every 5 min from July 2015 –July 2016 in 7 streams, while 5 streams were measured every 2-6 weeks for SpC. Nutrient and ion concentrations were collected every 8 weeks. Calcium and magnesium were the primary drivers of SpC, suggesting weathering associated with urbanization drives conductivity in this region. However, the best model explaining SpC also included nitrate and sodium concentrations (R^2= 0.97), indicating that human sources such as wastewater and runoff (e.g., stormwater) are also important drivers. Patterns of SpC were relatively stable over time, with little evidence of "first flush" phenomena, and diluted during rain fall events, suggesting chronic rather than acute sources of ions as the primary sources of pollution. For instance, some watersheds may be impacted by ground water contamination, while chronic sewer leaks may be important in others. Ongoing work will examine relationships between macroinvertebrate assemblage characteristics and drivers of conductivity to allow us to better understand how pollution is altering biological communities in Athens's streams. Additionally, we will create a synthesis of results as a tool for watershed management.