Long Term Monitoring: an Integration of the Effects of Atmospheric Deposition and Climatic effects on the Arbutus Watershed in the Adirondack Mountains of New York

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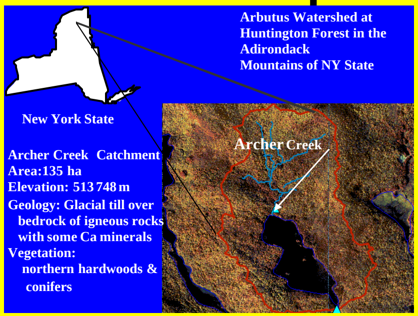
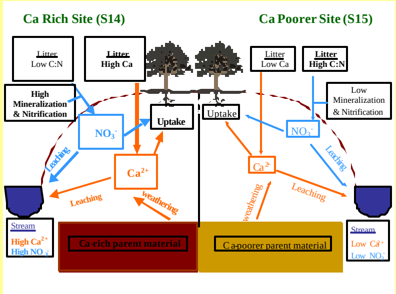
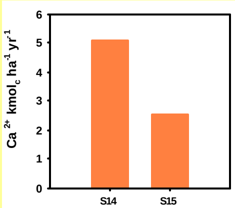
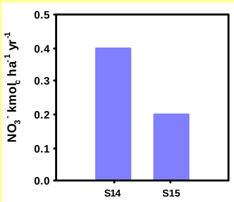






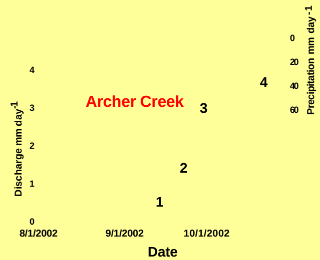


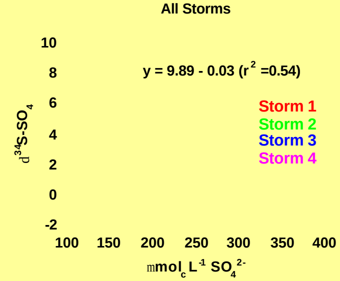
Geology influences the vegetation and hence nutrient cycling.

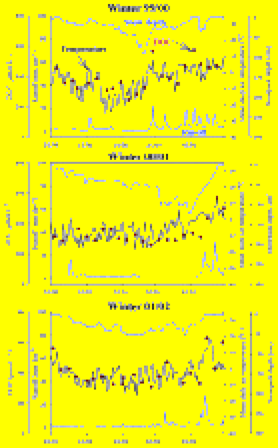
High Ca results in the dominance of sugar maple with resultant high losses of nitrate to surface waters.

(Christopher et al., 2005, Global Change Biology)

The Arbutus Lake Watershed has been gauged at the lake outlet since October 1991 with a V-notch weir. The data logger at the weir is connected to a telephone line permitting real time monitoring of water discharge from Arbutus Lake. The 130 ha Archer Creek Catchment drains into Arbutus Lake. This catchment has been monitored since 1994 using a H-flume equipped with automated discharge logging and sample collection system. Water chemistry samples are taken weekly except during storm events when more frequent sampling is done. In addition, transects of piezometers, water table wells, soil tension lysimeters, snow lysimeters and throughfall collectors, have been installed for characterizing solute chemistry. Various plots and subcatchments including both upland and wetland sites have been intensively instrumented since 1994. In addition, a detailed Geographical Information System (GIS) has been developed for the site that includes a Digital Elevation Model (DEM) with 3-m resolution and other GIS information. Detailed stream and wetland maps have been produced and sampling points located all of which are part of the GIS.







Concentrations of DOC in stream water draining a subcatchment showed immediate positive responses to rising temperatures and subsequent increases in runoff during both episodic and spring snowmelts. Changing climate can have a marked impact on DOC dynamics with a strong relationship ($r=0.64$, $p<0.0001$) found between winter temperature and DOC concentrations in stream water (Park et al., 2005, Environmental Science and Technology)

Over the past five years biogeochemical studies at the HF have evaluated a broad range of biogeochemical constituents including DOC (Park et al., 2005), S (Gbondo-Tugbawa et al., 2002; Mitchell et al., 2005), and N (Bischoff et al., 2001; Campbell et al., 2005a; Hurd et al., 2001; Ito et al., 2002, 2005; Kiernan et al., 2003; McHale et al., 2000, 2004; Mitchell et al., 2001ab, 2002, 2003). Research has also focused on the interactions between geology, soils, vegetation and biogeochemical responses (Christopher et al., 2005; Forrester et al., 2003; Lovett and Mitchell, 2004; McGee et al., 2005; Watmough et al., 2005). Also, recent efforts have focused on evaluating interactions between hydrology and biogeochemistry (Campbell et al., 2005b; Inamdar et al., 2002, 2004; McHale et al., 2002; Mitchell, 2002; Mitchell et al., 2005) including analyses of the influences of snowmelt and storms on the hydrology and biogeochemistry of this catchment. These studies have particular importance for evaluating the effects of both atmospheric deposition (Driscoll et al., 2003; Ito et al., 2005) and climate change (Park et al., 2003, 2005) on the Adirondack landscape.

References (see envelope for complete listing)

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