

# Research at the James: *MossCam Project (2002-2014)*

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The bryophytes, mosses, liverworts, and hornworts, are the second most diverse group of land plants. Though not as showy as angiosperms, the flowering plants, bryophytes contribute to the impressions of lushness and diversity found in many habitats of California. Beyond this appearance of lushness, bryophytes played a major role in the movement of aquatic plants to terrestrial environments and today still have key roles in ecosystems worldwide. However, despite their diversity, phylogenetic importance and critical ecological roles, many unanswered questions still remain to understanding their basic biology are poorly understood.

To increase our knowledge of this ancient group of plants, an intensive long term study of mosses was established at the James Reserve in 2002. This project applied new technological tools -- networked digital cameras -- to monitor the life cycle of moss. As the premier field testing site for technology developed by the Center for Embedded Network Sensing, the James Reserve also served as the ideal setting to launch the MossCam project and attempt the long term remote monitoring of moss.

After selecting a suitable patch of moss on a boulder, in this case specifically the species *Tortula princeps*, a networked digital color CCD-based video camera was mounted next to it. The camera was set to capture digital photographs of the moss at 30 second intervals and stored for later analysis.



What kind of information can be gotten from these photos? Besides enabling intensive monitoring, that would be impossible to do manually, these visual images that can be used to measure a variety of biological factors.



One publication (Graham et al. 2006) used the color changes of the mosses to estimate net CO<sub>2</sub> uptake. As the MossCam project has gathered and stored millions of digital photographs, researchers have just scratched the surface of potential applications of this MossCam project data. Expect many more interesting papers to come out of this exciting and unique project done at the James.

Graham et al. 2006. Use of a networked digital camera to estimate net CO<sub>2</sub> uptake of a desiccation-tolerant moss. *Int. J. Plant Sci.* 167:751-758.