Abstract
The main goal of this study was to analyze the microbial community that thrives in the snowfields on the east drainages of Mt. Conness (Sierra Nevada, CA), where C. nivalis is found. We tested the hypothesis that this environment supports other lines of microbial life that could potentially be detected through spectroscopy or other techniques. Counts of DAPI-stained bacterial cells indicated that the number of bacterial cells sampled from 4.1 to 6.9 x 10^5 cells per snow melt, and the number of algal cells from 1.1 to 1.8 x 10^5 cells per ml of snow melt. The structure of the bacterial community was more complex than the structure of the eukaryal invertebrate, as shown by the higher overall number of phyotypes detected by 16S rDNA and 18S rDNA gene fragments. A clone library was constructed from the most diverse sample of the vertical profile (50 to 100 m). Sequence analysis confirmed the presence of C. nivalis as the most abundant eukaryotic microorganism in the snow in addition to a number of other eukaryotic organisms (both single and multicellular forms). Bacteria (dominated by Betaproteobacteria) were the most abundant in the bacterial community. Chlorophyll a concentration was correlated with numbers of algal cells throughout the vertical profile. The concentration of inorganic sources of nitrogen and dissolved organic carbon (DOC) showed a tendency to increase with depth in the vertical profile, particularly in those layers were the presence of microorganisms decreased. Future work will include the creation of other clone libraries, in order to determine the identity of the phytophas by phyllogenetic relationship.

Introduction
In the snowfields of the Sierra Nevada of California and other mountain ranges, patches of red-colored snow are due primarily to the presence of a cosmopolitan, green, snow-associated alga, Chlamydomonas nivalis. Several studies have focused in the biology of this alga, tolerance to UV radiation and its life cycle. Most recently, remote sensing using imaging spectroscopy has been utilized to detect these algae in spring and summer time and estimate their abundance (Douss & Hobram; 2000; Painter et al., 2001; Thomas & Duwel, 1995). As part of a NASA Astrobiology Institute research program aimed at studying the potential for life in icy worlds, we are interested in extending the technologies for remote detection of life beyond just the algal component of snowfields. The reflective index of carotenoids and chlorophylls and a and b has been used by Painter and collaborators (2001) as a signature of algae in the snowpack, allowing the creation of maps of spatial distribution and cell concentration. Reflectance data acquired for the east drainages of Mt. Conness, CA, allowed to estimate the mean chlorophyll a concentration on the top 10 cm of the snowpack (3.3 x 10^5 to 1.7 x 10^6 cells/ml) (Painter et al., 2001). The main goal of this study was to analyze the microbial community that thrives in an extraterrestrial icy world: the snowfields on the east drainages of Mt. Conness (Sierra Nevada, CA), where C. nivalis is found. Our specific objectives were to (i) estimate algal numbers and describe its distribution along a horizontal transect and a vertical profile and (ii) describe the structure of the microbial community co-inhabiting the snow, during the summer season of 2009. Identifying microorganisms thriving in the snowfields will extend our knowledge about other possible signers of life different than pigments (e.g., chlorophyll).

Methods
Mount Conness is located north of Tioga Pass (37°58′01″N 119°58′01″W) in the Sierra Nevada, CA. Samples were collected at a location indicated by a previous study (Painter et al., 2001). A -12 m long horizontal transect was established using the core field (meter 1, 3, 4, 5, 7, 9, 11). Between meter 4 and meter 5, a vertical transect was excavated (surface = 0.0 m, 0.2, 0.3, 0.6 and 0.9 m below the surface).

Results I: Confocal Microscopy

Conclusions

References