The Central Atlantic Magmatic Province (CAMP) may be the largest subaerial igneous province on Earth. The estimated original extent of CAMP is at least 7 million km$^2$; today CAMP dikes and sills are present on the four circum-Atlantic continents. CAMP yields $^{40}\text{Ar}^{39}\text{Ar}$ between 230 and 175 Ma with a marked concentration around 200 Ma. CAMP is associated with the break-up of the supercontinent Pangaea; climate change driven by volatile emissions from CAMP volcanism may have caused the End-Triassic mass extinction. The debate concerning the mechanism for the emplacement of CAMP is still open; the two most popular models are: a mantle plume or a shallow thermal anomaly.

The Late Triassic basalt of the Fundy Group present on Grand Manan Island in New Brunswick, Canada belongs to CAMP. Although scientists agree that large local dikes are potential feeder sources for large basin basalts, the source for the Grand Manan flood basalt is still hotly debated. The western two-thirds of the Grand Manan are comprised of a layer cake of three distinct basalt units (Fig. 1); the upper and lower members exhibit characteristic columnar jointing. Thermal contraction during cooling fractured the rock in joints perpendicular to the flow top. The size, orientation, and shape of these basalt columns record the cooling history of the magma.

During a week of fieldwork on Grand Manan, Professor Peterman and I measured the orientation and width of over 1,500 joint faces belonging to the two columnar basalt members. We also collected hand samples of the three basalt members and two mafic dikes (Fig. 1) for petrographic and geochemical analysis. In the lab at Bowdoin, I performed statistical tests on our structural measurements in order to test the two hypotheses: 1) the preferred orientation of the columnar joints in the basalts record tectonic motion related to the rifting apart of Pangaea and 2) the width of the basalt columns varies between the two basalts because of different cooling histories. Preliminary results suggest that the columnar basalt exhibits a preferred fracture orientation that is consistent with our hypothesis. The significant variation in column width is consistent with different cooling histories, both between basalts and within the lower member.

Work for this project will continue throughout the fall. Professor Peterman and I will continue to work with data collected on Grand Manan in order to further study the cooling history of these basalts. Our fieldwork will continue in Maine, where we aim to compare the composition of the Grand Manan basalts and dikes with ~200 Ma CAMP dikes in Maine to evaluate if the Grand Manan basalts are derived from the same source as the CAMP dikes, which may have implications for the source of CAMP basalts in general.

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