Introduction:
The interaction of a tropical cyclone (TC) with mesoscale topographic features is not well understood. Significant variations in wind, pressure and precipitation distribution have been observed over mountainous regions. This gives rise to forecasting nightmares for meteorologists. In the last 20 years or so, significant progress has been made in the area thanks in-part to numerical models.

Most of the studies on TC topographic interactions have involved the island of Taiwan. Taiwan is an island of very high terrain in the central part of the island, Central Mountain Range, with some mountains reaching in excess of 3000 m. The topographic structure of Taiwan is very similar to the topography of Puerto Rico and Hispaniola in the Caribbean. The highest mountains in these Caribbean islands are in the central part of the islands with mountains near 1000 m in Puerto Rico and near 4000 m in Hispaniola.

Wang et. al (1980) studied a great deal on tropical cyclone tracks when interacting with high terrain. Using a conceptual model he found that TC’s exhibiting a continuous track will have its circulation modified only slightly by terrain. While TC’s exhibiting a discontinuous track will have a secondary low formation on the lee side of a mountain or a “jumper”. Chang (1982) using a primitive equation model showed that mountain induced flow deflections occur mainly at lower levels. His results agreed with Wang’s conceptual model. Bender et. al (1985) using the GFDL Hurricane Model, showed that cyclone central pressure filled much more rapidly when interacting with high terrain. This study also determined that there was a reduction in the supply of latent heat and kinetic energy into the storm’s core. Bender et. al (1987) examined tropical cyclones under three different topographies and easterly mean zonal flows (5 and 10 m/s).
study concluded that stronger mean zonal flows produced smaller deflections and vice versa in storm track.

The case study we have decided to apply to these theories is Hurricane Georges (1998). Hurricane Georges was a powerful Atlantic Cape Verde Hurricane which formed off the coast of Africa on Sept 15 and had a continuous west/northwest track through the Caribbean. Georges made a direct landfall on Puerto Rico, crossing the entire length of the island, and a direct landfall on Hispaniola 12 hours later. This hurricane is an interesting storm to study because of interaction with the high terrain of two islands separated only by 100 km. In addition, global forecast models did not accurately predict Georges’ landfalls. This study will investigate many of the theories applied by previous authors to the Caribbean islands and will attempt to detect some reasons for global model forecast errors.