COMBATING CLIMATE CHANGE

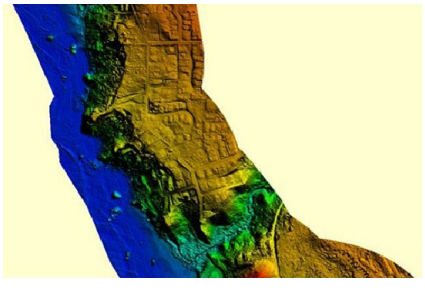
Effects of El Niño

El Niño is one of the most important climate phenomenon on Earth. It is also known as El Niño Southern Oscillation (ENSO), which includes La Niña, and consists of a powerful fluctuation of complex ocean currents. While oscillations occur naturally in oceans across the world, ENSO is an example of an oscillation having a greater impact on our climate with effects felt globally. This oscillation is caused by an alteration in wind patterns, resulting in a change in the temperatures between the atmosphere and the ocean. The unusually warmer air leads to an oscillation between cooler and warmer waters, resulting in above average ocean temperatures.

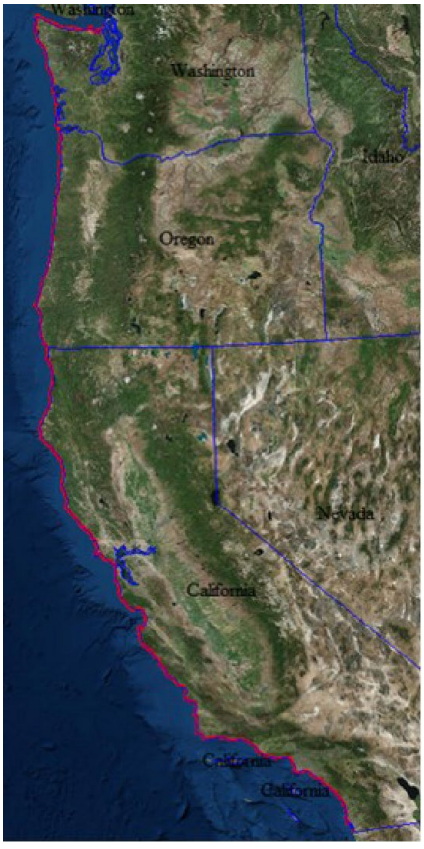
El Nino changes irregularly every two to seven years, triggering disruptions of large-scale air movements. The effects of El Niño include fewer hurricanes and tropical storms in the North Atlantic, milder winters in southern Canada and the northern continental U.S., replenishment of water supplies in the southwest U.S., drier weather in the Pacific Northwest, wetter weather in Southern California, abnormal fish migrations along the Pacific coast of South America due to cooler water temperatures, and heavy precipitation patters that can cause flooding in the Gulf Coast states.

Updating Lidar Data

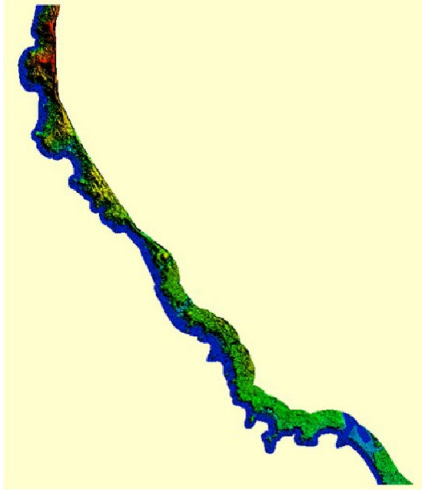
The disruptions caused by El Niño have significantly altered ground conditions along the west coast to the point that the current topographical maps are out of date. Dewberry was selected by the U.S. Geological Survey (USGS), the National Oceanic and Atmospheric Association (NOAA), and the U.S. Army Corps of



Pilot Area DEM: Oregon zoomed in

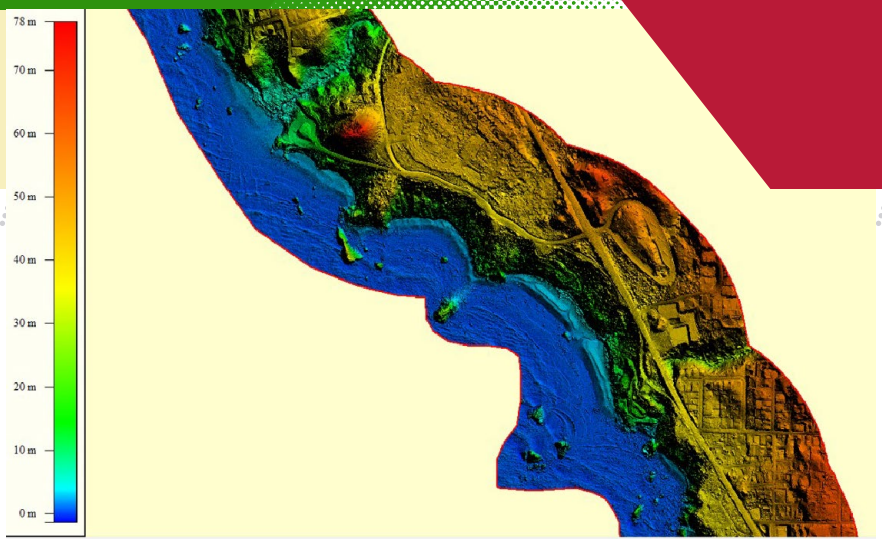


Complete west coastline of US was mapped with QL1 LiDAR (> 8 ppsm) – Approx. 1,700 line miles



Complete Oregon pilot for NOAA mapped from low water line, 500 meters inland, collected at low tide

BY ELISE MACPHERSON & JILLIAN BAYLOR



Additional Sections of DEM from Oregon Pilot with Elevation

Engineers (USACE), to produce and process new elevation models for the narrow corridor stretching along the west coast. A flight boundary was created from the U.S. and Mexico border to Port Townsend, Washington, equating 486 square miles of the Washington and California coast lines, as well as 44 square miles of USACE-defined harbors and waterways.

The updated elevation models will reflect the ground conditions on the coast post El Niño for use in various environmental and ecological studies. The geospatial team is currently processing the data to determine what magnitude the beach and cliff faces along the coast have changed since the last measurements, as well as seeing how impactful El Nino has been along the west coast.

Flying the Coast

The accuracy of the lidar data collection relies on the prediction of plus/minus two hours of low tide, in order to have uniform data showing as much of the coast line as possible. Ironically, the abnormal weather conditions in Southern California and the Pacific Northwest caused by El Niño aided in our data collection by making notoriously cloudy areas more clear.

Dewberry, along with our acquisition provider Towill, Inc., collected the lidar data and flew the entire coast within a one-month timeframe and as the project manager, I was very impressed with my team. We were able to successfully get permission from the international airports along the coast to fly in their airspace to collect the data, as well as permissions from military bases. We ran into some issues with national parks in California because our helicopters were disturbing seals that inhabit areas along the coast, but we still completed the data collection on schedule. As you can imagine, the team was able to collect multitudes of amazing imagery along the way.

After Effects

According to analyses by NASA and NOAA, earth's temperatures in 2015 were the warmest ever recorded in history. With evidence that humans have contributed to the increase in greenhouse gases, there is a possibility that El Niño also significantly contributed to earth's warming. We hope the results of our data will lead to new findings about this phenomenon and help government entities plan for the future.

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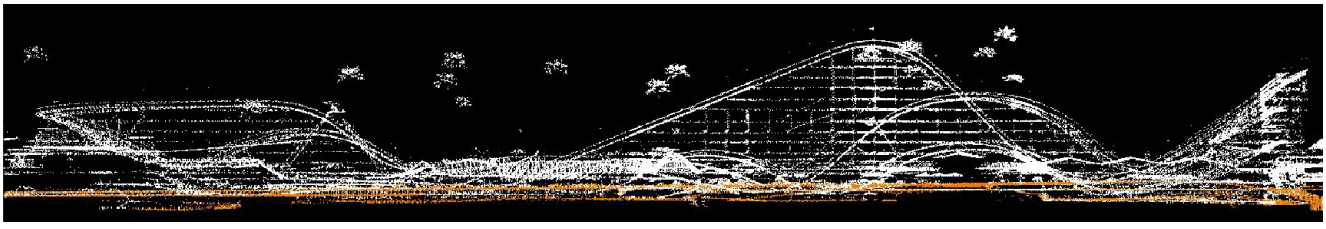
Elise MacPherson is an Associate Senior Project Manager at Dewberry and a certified Project Management Professional (PMP) with 20 years' experience in LiDAR business development and project management. At Dewberry she specializes in remote sensing projects for federal, state and local clients, including NOAA, USGS and FEMA. As an early proponent of LiDAR, she spent 11 years as a key leader and business development professional at a LiDAR services startup company introducing LiDAR solutions to photogrammetry, surveying and mapping companies, and expanding solutions to private sector clients. She managed a large multi-continent LiDAR and oblique imagery acquisition contract for Google. In other past positions, she has been in a project manager role for a wide range of projects including mobile LiDAR and high definition ground laser scanning technologies.

Jillian Baylor is a communications coordinator with Dewberry, a privately held professional services firm headquartered in Fairfax, Virginia. Baylor is a graduate of Old Dominion University, where she received a Bachelor of the Arts in English, with a focus on journalism. She has contributed to an extensive number of blogs and articles related to various engineering, architecture, and consulting principles.



Lidar profile view of the Giant Dipper rollercoaster located on the Santa Cruz Boardwalk.