How to monitor the Ocean with IN-SITU observations

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Abstract

BigWaveTracker: Digitalising the World's Biggest Waves

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Nazaré, Portugal, is home to some of the biggest waves on the planet, towering up to 30 metres high and drawing surfers and spectators from around the world. But while we can see these saltwater giants from the arena-like cliffs and iconic lighthouse, measuring their raw power with accuracy has always been a challenge. +ATLANTIC's BigWaveTracker is changing that. This innovative digital tool uses video stereoscopy to capture high-resolution footage of the ocean and transform it into precise 3D models of breaking waves. The result? Unmatched accuracy in measuring wave height, speed, volume, and energy. BigWaveTracker is more than a tool for surfers—though it does finally offer a transparent, data-backed way to settle debates about who surfed the biggest wave. For scientists and engineers, it unlocks new insights into extreme wave dynamics, supporting coastal resilience, infrastructure planning, and safety. In a changing climate where coastal hazards are increasing, BigWaveTracker also contributes to early warning systems, search and rescue operations, and the development of smarter coastal planning tools. And it helps position Nazaré as a living laboratory for ocean science and innovation, converting the charming Portuguese fishermen village as a leading test site for extreme waves where digital technologies can be validated and improved. By transforming waves into data, and data into knowledge, BigWaveTracker helps us better understand the ocean's power, and live more safely and sustainably with it.