

Documenting Coral Reefs with “Immersive” Video



Kitty Currier

Planetary Coral Reef Foundation and Department of Geography, University of California, Santa Barbara

The Planetary Coral Reef Foundation

(PCRF) was founded in 1991 to monitor coral reefs worldwide. Between 1995 and 2008 PCRF volunteers conducted approximately 50 site studies, characterizing the condition of hard coral and the species richness and abundance of fish at each site.

From 2007-2008 PCRF partnered with the Immersive Media Company (IMC) to collect video footage with IMC’s Dodeca 2360 system, a camera that captures video footage in 11 directions radiating outward from the camera’s center.



Figure 1. Camera in underwater housing, and base station (<http://www.immersivemedia.com/products/capture.html>).

Video capture was conducted by a crew of four to five PCRF volunteers. At each site, footage was shot along the reef edge at a constant depth. A global positioning system (GPS) receiver recorded the location of the base unit, which followed the camera at the surface onboard a dinghy.

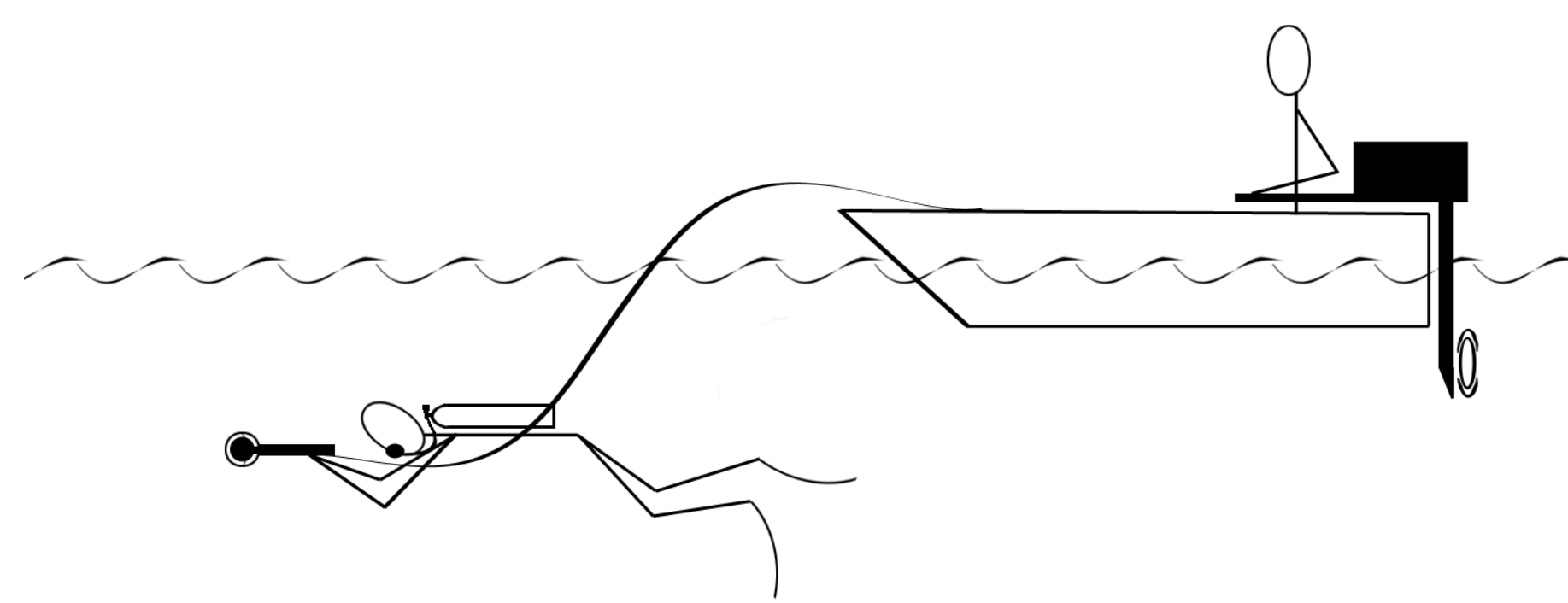
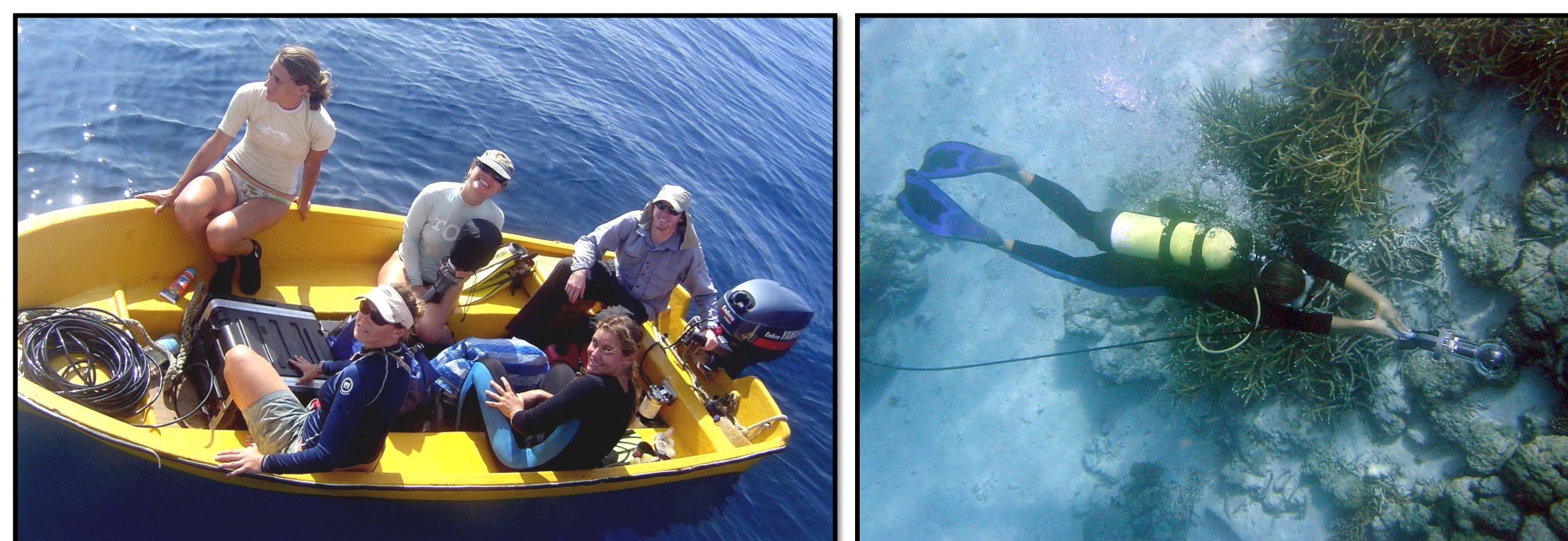


Figure 2. Filming set-up: diver swims with camera, which is connected via cable to the base station in the dinghy.



Figures 3 and 4. Film crew with camera equipment; capturing reef footage.

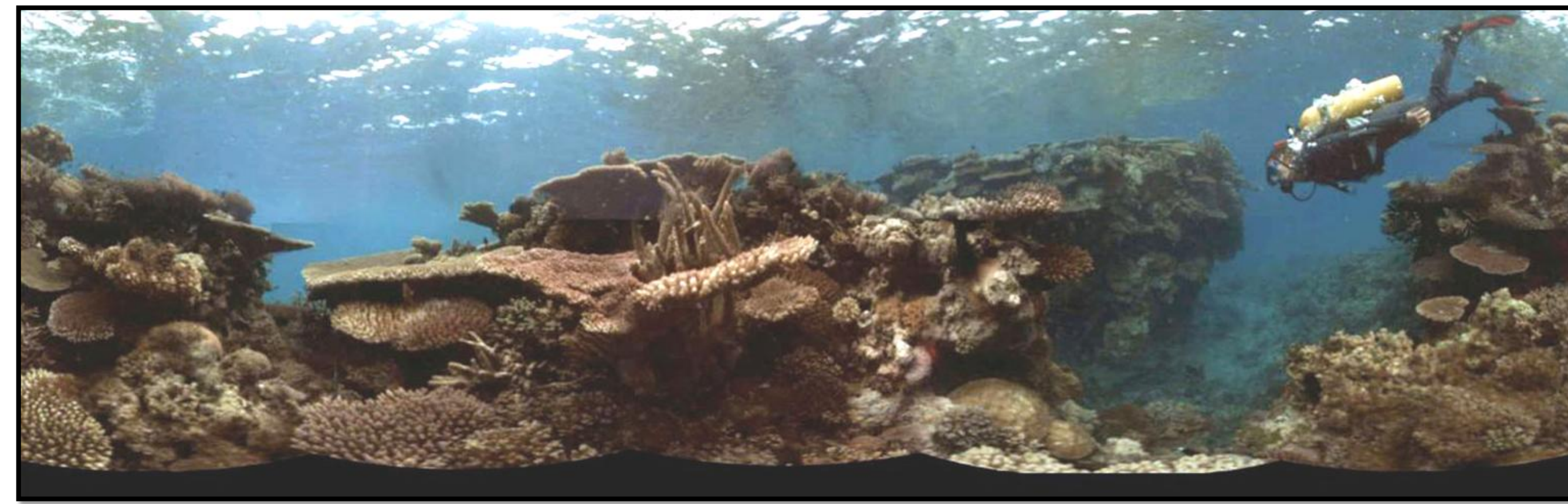


Figure 5. “Unwrapped” (panoramic) view of the stitched footage (Gau, Fiji).

Post-processing of the footage was performed by IMC and included “stitching” the 11 separate video feeds together. The resulting image was projected onto a sphere for viewing through an interactive viewer.

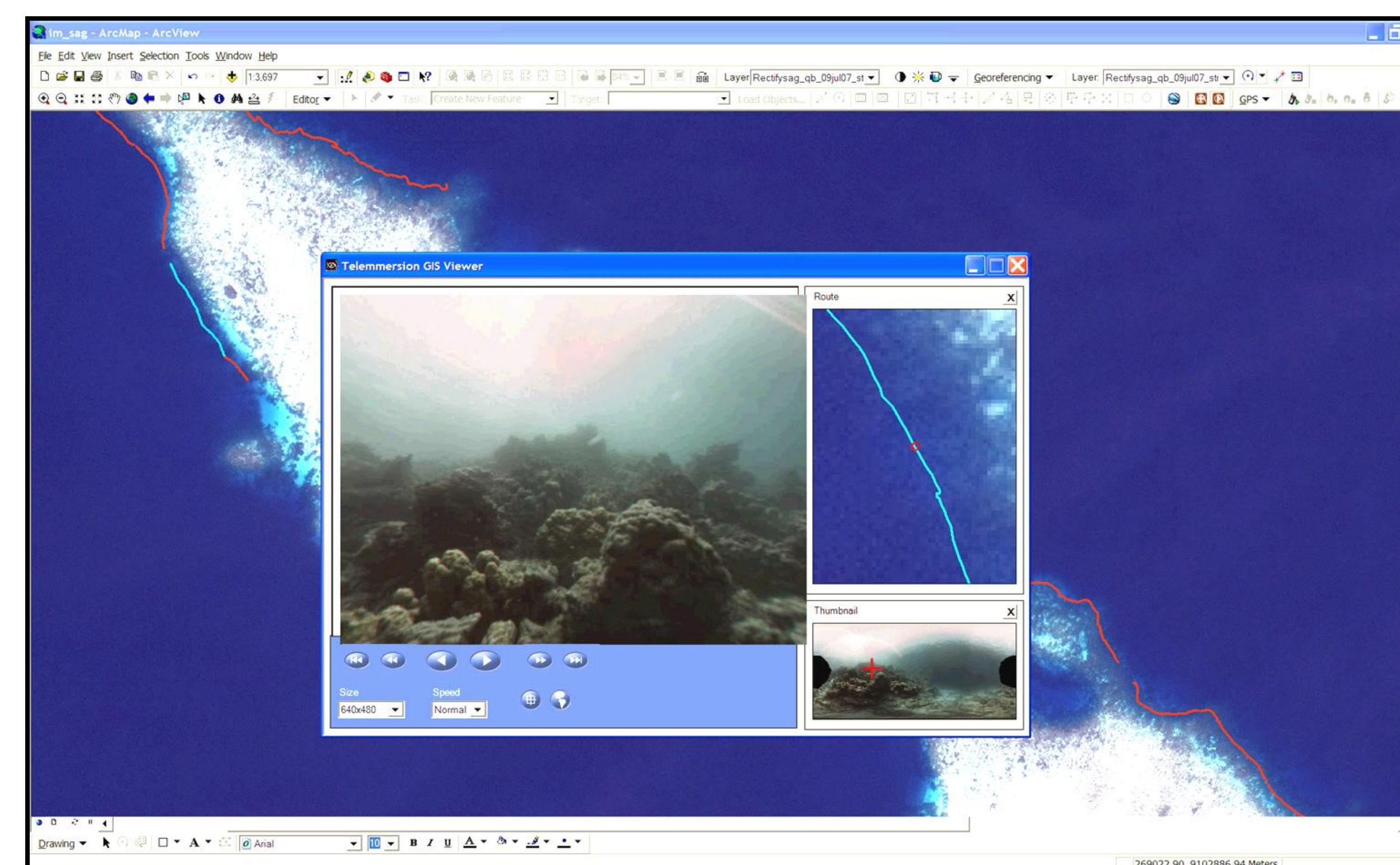


Figure 6. Screenshot of ArcMap with viewer plug-in (IKONOS base image, Sagharughombe, Solomon Islands).

Integration with ArcMap was achieved with IMC’s plug-in for ArcGIS. The video tracks are displayed as a layer in a map document, and clicking anywhere along a track allows viewing of the footage associated with that location.



Figure 7. “Unwrapped” (panoramic) view at the beginning of a track (Sagharughombe, Solomon Islands).

Online access to selected footage is provided through IMC’s OnScene interface. After choosing a starting point from the overview image on the left of the screen (Figure 8), the viewer can explore the video footage shown on the right. Clicking and dragging in the video window allows one to “look” in all directions.

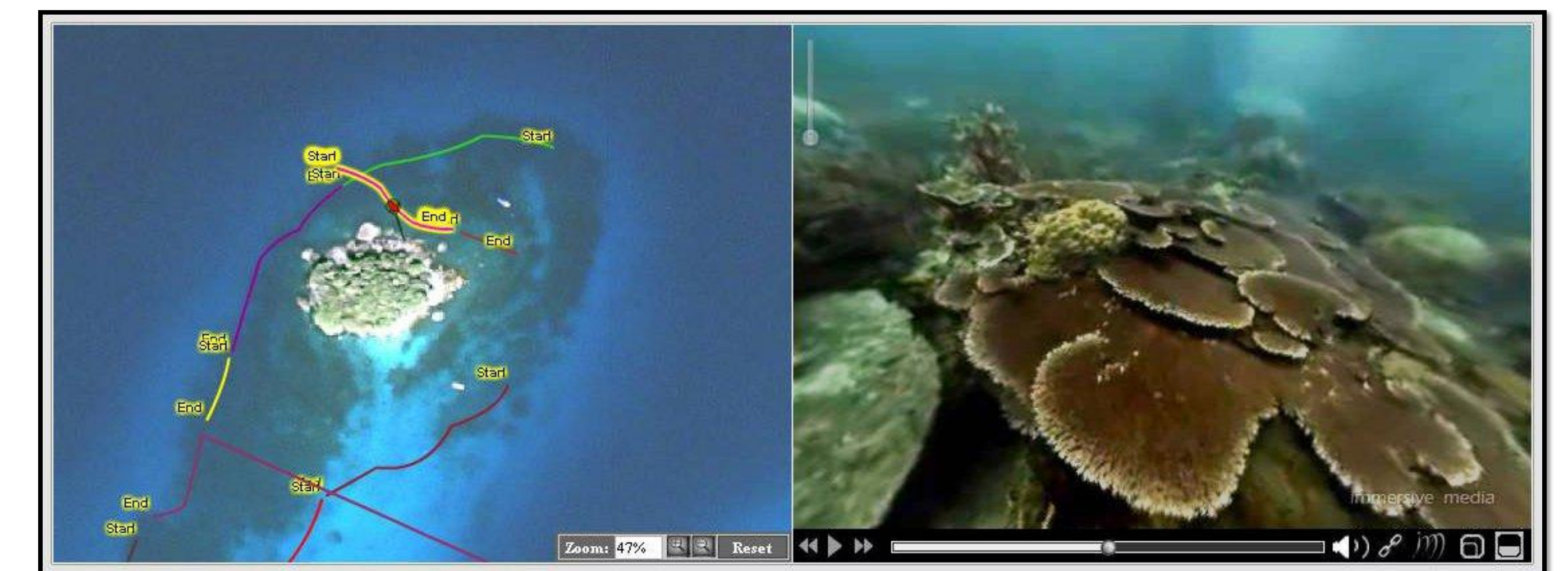


Figure 8. OnScene view showing overview image with filming tracks on the left and footage view on the right (IKONOS base image, Renggis Island, Tioman, Malaysia).

Four coral reef sites were filmed with the Immersive camera during 2007 and 2008. Investigations are underway to determine whether three-dimensional feature geometry can be extracted from the unprocessed footage in order to create digital surface models of the reef formations.

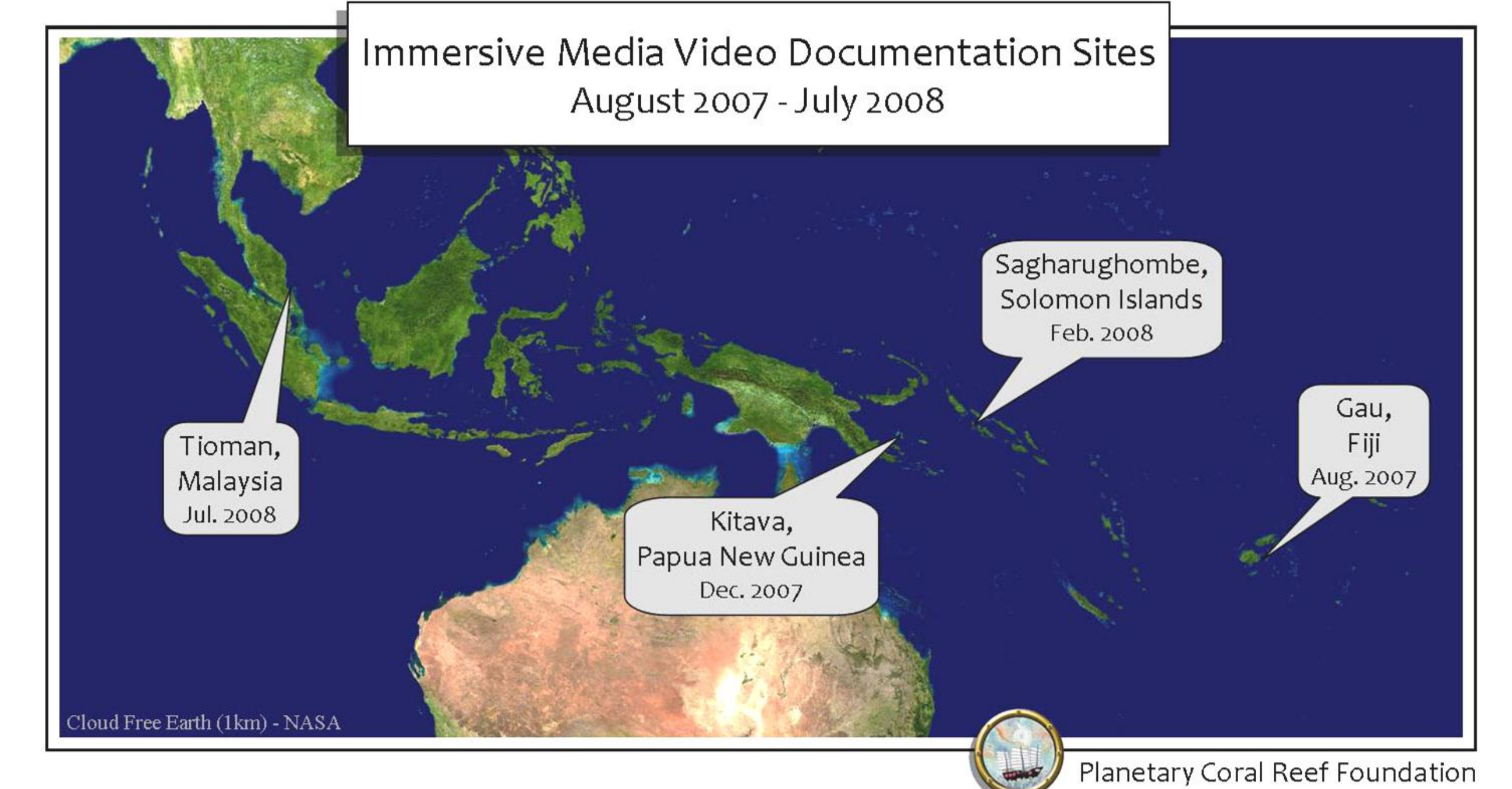


Figure 9. Reef filming locations.

Acknowledgement goes to the volunteer crew and land-based support of *SV Infinity* during 2007-2008, especially Mark Van Thillo and Abigail Alling. Sincere thanks also to David McCutchen, inventor of the technology, without whom this project would not have been possible.

For more information on PCRF’s past and current projects, visit www.pcrf.org. For more information about IMC, visit www.immersivemedia.com.