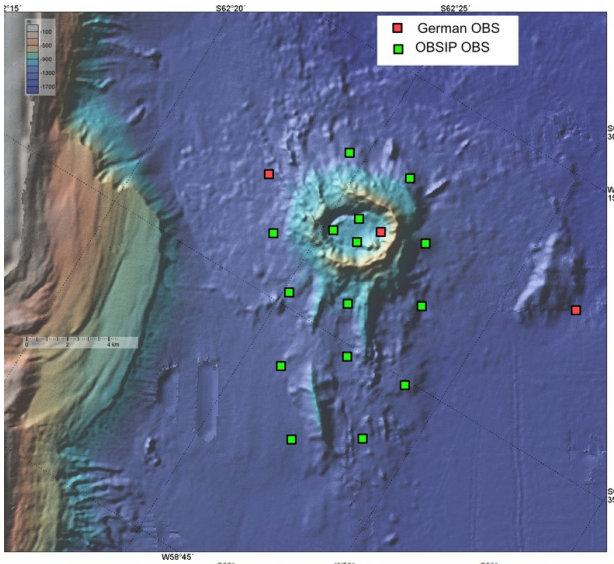
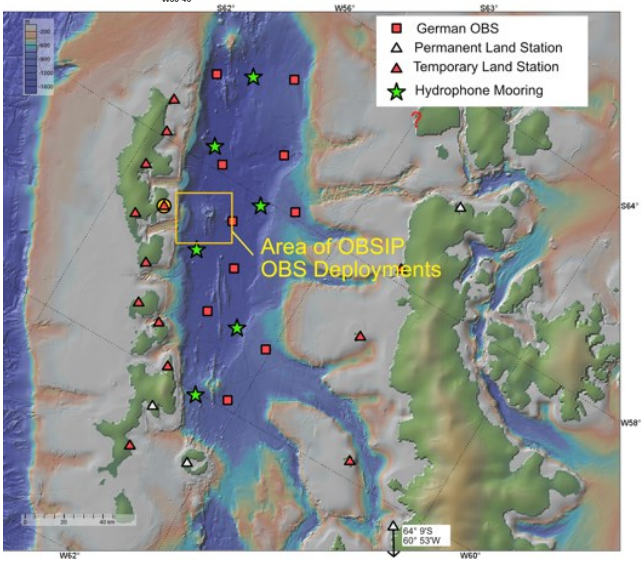
OBSIP Experiment Archive

Year:	2019
Experiment Name:	Bransfield Strait
Principal Investigator(s):	William Wilcock

Experiment Summary: (Taken from the NSF Abstract Award #1744651): One of the fundamental processes in plate tectonics is the rifting or separating of continental crust creating new seafloors which can widen and ultimately form new ocean basins, the latter is a process known as seafloor spreading. The Bransfield Strait, separating the West Antarctic Peninsula from the South Shetland Islands, formed and is presently widening as a result of the separation of continental crust. What is unique is that the system appears to be approaching the transition to seafloor spreading making this an ideal site to study the transitional process. Previous seafloor mapping and field surveys provide the regional structure of the basin; however, there exists a paucity of regional seismic studies documenting the tectonic and volcanic activity in the basin as a result of the rifting. This would be the first local-scale study of the seismicity and structure of the volcanoes in the center of the basin where crustal separation is most active. The new seismic data will enable scientists to compare current patterns of crustal separation and volcanism at the Bransfield Strait to other well-studied seafloor spreading centers. This collaborative international project, led by the Spanish and involving scientists from the U.S., Germany and other European countries, will monitor seismicity for one year on land and on the seafloor. An active seismic study conducted by the Spanish will image fault and volcanic structures that can be related to the distribution of earthquakes. This study supports eight undergraduates from Queens College, CUNY, an ethnically-diverse institution, to conduct field work as members of the scientific party on board the R/V Hesperides and will contribute to the analysis of the data.





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Experiment Summary: ... Back-arc basins are found in subduction settings and form in two stages, an initial interval of continental rifting that transitions to a later stage of seafloor spreading. Studying the transitional process is important for understanding the dynamics and evolution of subduction zones, and in locations where back-arc rifting breaks continental crust, it is relevant to understanding the formation of passive continental margins. The Central Bransfield Basin is unusual in that the South Shetland Islands have lacked recent arc volcanism and it appears subduction is ceasing, but this system has broad significant because it appears to be nearing the transition from rifting to seafloor spreading. This award will support the U.S. component of an international initiative led by the Spanish Polar Committee to conduct a study of the seismicity and volcanic structure of the Central Bransfield Basin. The objective is to characterize the distribution of active extension across the basin and determine whether the volcanic structure and deformation of the rift are consistent with a back-arc basin that is transitioning from rifting to seafloor spreading. The U.S. component of the experiment will contribute a network of six hydroacoustic moorings to monitor regional seismicity and 15 short-period seismometers to study the distribution of tectonic and volcanic seismicity on Orca volcano, one of the most active volcanoes in the basin. An active seismic study across closely spaced multichannel seismic lines across the rift will provide the data necessary to link earthquakes with fault structures enabling a tomography study of Orca volcano and provide insight into how the volcano's structure relates to rifting. This research will constrain the distribution of active rifting across the Central Bransfield Basin and determine whether the patterns of faulting and the structure of volcanic portion of the rift are consistent with a diffuse zone of rifting or a single spreading center that is transitioning to the production of oceanic crust. The Bransfield Basin is an ideal site for a comparative study of seismic and hydroacoustic earthquake locations that will improve the understanding of the generation and propagation of T-wave signals and contribute to efforts to compare the result of T-wave studies with data from traditional solid-earth seismic studies.

Cruises:
1/3/2019-2/10/2019:
15 short period WHOI OBS will be deployed in the Bransfield Strait on board the Spanish vessel Sarmiento de Gamboa.
TBD 2020:
15 short period WHOI OBS will be recovered.

Data:
Data from all OBSIP instruments deployed will be archived under assembled data set ID #18-017 at the IRIS DMC.

Downloads/Links:

None