

An Evaluation of Water Circulation and Contaminant Transport Models for the Intra-American Seas.

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Abstract

The Intra-American Seas (IAS) consists of a number of small islands with high coastline to area ratios. These coastal areas often support the majority of an islands population, are utilized for various socio-economic activities and provide habitats for unique, fragile ecosystems. The islands and the juxtapose landmasses that make up the Caribbean Region are interconnected by the water bodies that surround them. Interaction with coastal sea processes generated by the surrounding waters can pose a potential threat to sustainability of these systems, by providing a medium for the transport of contaminants introduced by accidental spillage, unregulated dumping and river discharge. This paper has examined water circulation in the IAS to identify the regional processes and characteristics that contribute to the dynamics of water circulation. Seasonal and inter-annual variations in tidal regimes, currents, air and sea surface temperatures in addition to bathymetry all seem to contribute to the observed circulation and dispersion of the waters contents. The identified processes were then used to inform the evaluation of a number of existing circulation models for the IAS. A number of circulation models exist that can in general be adapted for the region with some modifications and limitations, however the POM and NRL/NLOM were identified as being most relevant. The capabilities of these models in terms of their computational methodology to determine the influence of regional characteristics on the transport of contaminants have been evaluated to determine potential limits to their operations as they relate to the Region.

Key words: Water circulation, Contaminant transport, Models, Intra-American Seas.