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## Spatial and temporal variabilities in underwater acoustic transmission: an analytical review.

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**Corporate Author :** SACLANT ASW RESEARCH CENTRE LA SPEZIA (ITALY)

**Personal Author(s) :** Ali, Hassan B

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**Abstract :** An overview of temporal and spatial variability in underwater acoustic transmission is provided, based on a literature survey of previous experimental studies. Following comments on the use of the term fluctuations, the medium-induced degradations of a transmitted signal are described and general approaches to medium (channel)

characterization are discussed. The use of the scattering-function technique and the alternative, but equivalent, wide-sense stationary uncorrelated scattering channel approach are considered, using experimental results to demonstrate the utility and the limitations of these methods. Following brief remarks on the effect of acoustic fluctuations on sonar performance, examples of environmental and acoustic fluctuations are provided. In conformity with current practice, the temporal and spatial scales of ocean variability are analyzed in terms of: (1) a mean vertical profile representing local climatology; (2) a mesoscale component that is deterministic on the acoustic time scale; and (3) a statistical component representing smaller scale, random fluctuations due to internal waves and fine structure. Each component is discussed, using experimental results from several sources. Tidally induced fluctuations are discussed separately, followed by some comments on the significant effects due to source/receiver motions.

**Descriptors :** \*SOUND TRANSMISSION , \*UNDERWATER ACOUSTICS , \*ACOUSTIC CHANNELS , SPATIAL DISTRIBUTION , TIME DEPENDENCE , LITERATURE SURVEYS , RANGE(DISTANCE) , SEA WATER , TRANSMISSION LOSS , ACOUSTIC REFLECTION , SONAR EQUIPMENT , MULTIPATH TRANSMISSION , NORTH ATLANTIC OCEAN , AMBIENT NOISE , ACOUSTIC SCATTERING , MOTION , DEPTH , VARIATIONS

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