Corrosion Behavior of Low-Carbon Steel and Weathering Steel in a Coastal Zone of the Spratly Islands: A Tropical Marine Atmosphere

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For the first time, the initial atmospheric corrosion behavior of low-carbon steel and weathering steel, exposed in a tropical marine zone of the Spratly Islands, has been examined over one year. The results indicated that the corrosion products were mainly composed of β -FeOOH, α -FeOOH, γ -FeOOH, and Fe₃O₄. The transformation between each phase and the cracking, linearly arrayed voids distributed in the rust layer together promoted the corrosion process. The kinetics of both steels exhibited an accelerating process following the exponential function $D = At^n$. In terms of the corrosion rate, r_{corr} , for the first year of exposure to different corrosivity categories defined in ISO 9223, that of the low-carbon steel Q235 exposed in the Spratly Islands was 237.5 $\mu\text{m/a}$; therefore, the corrosivity category of this marine atmosphere was CX.

Keywords: Low-carbon steel Q235; Weathering steel Q450NQR1; Corrosion depth; Spratly Islands; Atmospheric corrosion

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