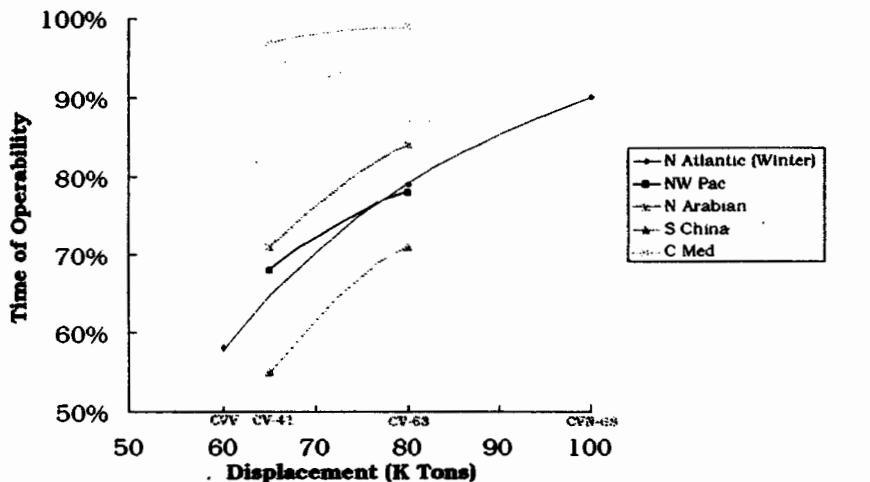


Effect of Sea State on Carrier Flight Operations



Naval Research Advisory Committee

The effect of sea state on the ability to conduct flight operations is an essential determinant of carrier size. Whether in the North Arabian Sea, South China Sea, North Pacific, or North Atlantic, adverse weather and sea state conditions can restrict ship and flight operations. Ship motions degrade operability and, the smaller the ship, the more frequent the loss of operational capability. This chart graphically shows the loss of operability with decreasing carrier size while operating in the North Atlantic Ocean in winter, the North Arabian Sea during the Southwest Monsoon, and in the subtropical Atlantic and Pacific Oceans during hurricane and typhoon seasons.

Pitch, heave, and roll are the ship motion components having the greatest effect on operability. CTOL carriers normally launch and recover aircraft in head seas where pitch and heave are prevalent. The coupled effects of pitch and heave result in vertical motions of the flight deck. When these motions exceed prescribed (NATOPS) guidelines, aircraft launch and recovery, as well as aircraft movement on deck, is limited or ceased. Roll motion also restricts aircraft movement on the flight and hangar decks, much more so on small carriers than on large carriers. Stabilizers can be used to reduce roll motion, but add cost and maintenance burdens. Unfortunately, pitch and heave are the motion components that are the hardest to reduce by stabilization techniques as they are governed primarily by ship size.

Another important aspect of aircraft carrier seakeeping capability relates to wetting of deck-edge aircraft elevators when they are lowered to the hangar deck level. Deck-edge elevators are preferred over inboard elevators because they interfere less with aircraft movement and have less shipboard volumetric impact. Small CVs tend to have less freeboard and greater roll motions. Thus, deck edge elevators more

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