APPENDIX M

WEATHER EFFECTS ON SPECIAL OPERATIONS FORCES

Special operations forces (SOFs) consist of Special Forces (SF), Rangers, special operations aviation, psychological operations (PSYOP) and Civil Affairs (CA), as well as signal and support. These operations are influenced by many of the same elements and thresholds as their conventional counterparts. However, special tactics and capabilities can make SOF operations more weather sensitive than conventional operations.

SOF optimal use is in deep operations at the strategic or operational level. These operations are significantly affected by both weather and environmental conditions, and make extensive use of climatology. The following are some of the more significant weather effects for SOF operations.

CLOUDS AND SKY COVER. Low clouds improve SOF mobility due to decreased chance of detection. Low clouds may degrade target acquisition. Employment of E-O systems (both) infrared and laser) may be degraded.

HUMIDITY. Moist air degrades sound propagation while dry air improves it. Prolonged exposure of sensitive equipment (C-E and medical) affects maintenance requirements and the useful life of supplies.

ILLUMINATION. Poor light conditions enhance surreptitious operations but hinder visual observation of targets, troop movement, and both land and sea navigation. Special operations aviation generally operates at night.

PRECIPITATION. Rain or snow may improve surreptitious ground mobility if threat patrols seek shelter. Aircraft and watercraft can "hide" in, or be masked by, precipitation to avoid radar detection. Wet weather improves crowd control, but during prolonged precipitation may increase populace restlessness. Heavy rain or snow affect CA operations. Moderate rain dampens sound during loudspeaker operations. Variations from normal precipitation can alter the speed of river stream flow and estuary currents.

REDUCED VISIBILITY. poor visibility complicates target surveillance. Surreptitious movement is enhanced. The ability to navigate and fly at night is degraded. Selected E-O systems are degraded (see Appendix F). Restricted visibility aloft affects flight operations.

SOLAR AND IONOSPHERIC DISTURBANCES. High sun spot activity degrades long-haul communications and PSYOP radio and television broadcasts.

SURFACE WIND. Wind speed and direction forecasts (both surface and aloft) are critical to leaflet dissemination. Wind also cuts down on loudspeaker sound propagation. Moderate winds can degrade or enhance waterborne operations, depending on situation. Winds are a major cause of turbidity in shallow water. Winds affect CA operations according to each particular type mission.

TEMPERATURE. Both high and low temperatures may affect crowd and population control. Extreme cold may improve surreptitious mobility if threat guards and patrols seek shelter. Cold air allows better sound propagation than warm air.

TIDES AND CURRENTS. Infiltration and exfiltration route planners must consider timing and height of tides. Infiltration at low tide results in more exposure while moving up the beach and may require avoiding obstacles in shallow water. In both inland and open waters, currents may vary widely and require careful study.

Table M-1. Weather effects from cloud ceilings.

WEATHER VALUE (FEET)	SEVERE DEGRADATION		MODERATE DEGRADATION	
	SYSTEM/EVENT	REMARKS	SYSTEM/EVENT	REMARKS
LT 200	R&S	Target acquisition		
LT 300	Ground	Target acquisition		
LT 1,000	Airborne, CAS HALO Infiltration Amphibious Aviation Ground	Aircraft fast movers Minimum base of cloud over DZ CAS Target acquisition CAS	Aviation Ground, R&S	See app E Target acquisition
LT 3,000			Airborne Amphibious Aviation Ground	Aircraft CAS Target acquisition CAS
LT 3,500			CAS	Depends on tactics-- fast movers
LT 4,500	HERCULES (AC-130)			
LT 5,000	NBC	Blast effect	MAVERICK	Depends on tactics

Table M-2. Weather effects from reduced visibility.

WEATHER VALUE (METERS)	SEVERE DEGRADATION		MODERATE DEGRADATION	
	SYSTEM/EVENT	REMARKS	SYSTEM/EVENT	REMARKS
LT 1,600	Airborne	Aircraft operations		
	Amphibious	Target acquisition		
	Aviation	Target acquisition		
	R&S	Target acquisition		
	NBC	Target acquisition		
LT 4,800			Airborne	Aircraft operations
			Amphibious	Target acquisition
			Aviation	Target acquisition
			R&S	Target acquisition
			NBC	Target acquisition

Table M-3. Weather effects from surface winds.

WEATHER VALUE (KNOTS)	SEVERE DEGRADATION		MODERATE DEGRADATION	
	SYSTEM/EVENT	REMARKS	SYSTEM/EVENT	REMARKS
SURFACE WINDS				
LT 3			NBC	Agent dispersal
GT 7			Amphibious NBC Balloon launch for leaflet dissemination	Sea state Agent dispersal
GT 10	NBC	Agent dispersal		
GT 13			Static line (infil)	Chute limitation
GT 15			Airborne Loudspeaker broadcasts	Jump release
GT 18	RAP	Chute limitation		
GT 20	Airborne	Jump release		
GT 25			Aviation Signal	Aircraft Antenna stability
GT 30	Aviation	Aircraft		
GT 35	Amphibious	Sea state		
GT 49	Signal	Antenna stability		
GUST SPREAD				
GT 15	Aviation	Aircraft		

Table M-3. Weather effects from surface wind (continued).

WEATHER VALUE (KNOTS)	SEVERE DEGRADATION		MODERATE DEGRADATION	
	SYSTEM/EVENT	REMARKS	SYSTEM/EVENT	REMARKS
UPPER AIR WINDS				
GT 15			Airborne	Jump release
GT 20	Airborne	Jump release		

Table M-4. Weather effects from temperature.

WEATHER VALUE (°F/°C)	SEVERE DEGRADATION		MODERATE DEGRADATION	
	SYSTEM/EVENT	REMARKS	SYSTEM/EVENT	REMARKS
LT -25/-37	Signal	Exposure		
LT 0/-18			Signal	Exposure
LT 25/-4	Amphibious Logistics	Exposure Exposure		
LT 32/0			Amphibious Signal	Exposure Exposure
GT 68/20			NBC	Dispersal persis-tence
GT 95/35	NBC	Dispersal, persis-tence	Signal	Heat stress
GT 105/41	Signal	Heat stress		
GT 122/50	Logistics	Storage		

Table M-5. Weather effects from precipitation.

WEATHER CONDITION	SEVERE DEGRADATION		MODERATE DEGRADATION	
	SYSTEM/EVENT	REMARKS	SYSTEM/EVENT	REMARKS
RAIN (INCHES)				
Any	NBC	Agent persistence		
Light rain (trace - .1/hour)			Airborne Amphibious Ground R&S	Fall rate Beach state Trafficability Trafficability, target acquisition
Moderate rain (.11 to .3/hour)	Airborne Amphibious Ground R&S	Fall rate Beach state Trafficability Trafficability, target acquisition		
LT .5/hour			Signal	Attenuation
GT .5/hour	Signal	Attenuation	Aviation	Target acquisition
Freezing precipitation	Aviation Signal	Aircraft icing Antenna stability		
SNOW DEPTH (INCHES)				
Trace			Ground R&S Logistics	Trafficability Trafficability Trafficability
1			Aviation	Targeting, vertigo
GT 1	Aviation	Targeting, vertigo		
2	Logistics	Trafficability		
GT 24	Ground R&S	Trafficability Trafficability		

Table M-6. Weather effects from miscellaneous causes.

WEATHER CONDITION	SEVERE DEGRADATION		MODERATE DEGRADATION	
	SYSTEM/EVENT	REMARKS	SYSTEM/EVENT	REMARKS
THUNDER-STORMS				
LT 5 km distance	Airborne Aviation R&S Logistics NBC Signal	Aircraft Aircraft Ground Storage Munition storage System safety, ground operations		
GT 5 km distance			Airborne Aviation R&S Logistics NBC Signal	Aircraft Aircraft Ground operations Storage Munition storage System safety, ground operations
EFFECTIVE ILLUMI-NATION (MILLILUX)				
LT 2.5	Airborne Amphibious Aviation R&S Signal	NVG NVG NVG NVG NVG		
RELATIVE HUMIDITY				
GT 70%	Logistics	Storage		

Table M-6. Weather effects from miscellaneous causes (continued).

WEATHER CONDITION	SEVERE DEGRADATION		MODERATE DEGRADATION	
	SYSTEM/EVENT	REMARKS	SYSTEM/EVENT	REMARKS
DENSITY ALTITUDE (FEET)				
4,000			Airborne, Aviation	Aircraft lift
6,900	Airborne, Aviation	Aircraft lift		
SEA STATE (FEET)				
Tide GT 6	Amphibious	Boat safety		
Swell-height GT 3	Amphibious	Boat safety		
Surf height GT 4	Amphibious	Boat safety		
AIRCRAFT ICING				
Trace			Aviation	Aircraft safety
Light or greater	Aviation	Aircraft safety		
AIRCRAFT TURBU-LENCE				
Light			Aviation	Aircraft safety
Moderate	Aviation	Aircraft safety		
LAPSE RATE				
Inversion	Signal	Fading, ducting	NBC	Agent persis-tence

Table M-6. Weather effects from miscellaneous causes (continued).

WEATHER CONDITION	SEVERE DEGRADATION		MODERATE DEGRADATION	
	SYSTEM/EVENT	REMARKS	SYSTEM/EVENT	REMARKS
Stability change	NBC	Agent persistence		
IONOSPHERIC DISTURBANCE				
Any	Signal	Frequency use		