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Notes

1. The weather-modification capabilities described in this paper are consistent with the operating environments and missions relevant for aerospace forces in 2025 as defined by AF/LR, a long-range planning office reporting to the CSAF [based on AF/LR PowerPoint briefing "Air and Space Power Framework for Strategy Development (jda-2lr.ppt)]."
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14. Concern about the unintended consequences of attempting to "control" the weather is well justified. Weather is a classic example of a chaotic system (i.e., a system that never exactly repeats itself). A chaotic system is also extremely sensitive: minuscule differences in conditions greatly affect outcomes. According to Dr. Glenn James, a widely published chaos expert, technical advances may provide a means to predict *when* weather transitions will occur and the magnitude of the inputs required to cause those transitions; however, it will never be possible to precisely predict changes that occur as a result of our inputs. The chaotic nature of weather also limits our ability to make accurate long-range forecasts. The renowned physicist Edward Teller recently presented calculations he performed to determine the long-range weather forecasting improvement that would result from a satellite constellation providing continuous atmospheric measurements over a 1 km² grid worldwide. Such a system, which is currently cost-prohibitive, would only improve long-range forecasts from the current five days to approximately 14 days. Clearly, there are definite physical limits to mankind's ability to control nature, but the extent of those physical limits remains an open question. Sources: G. E. James, "Chaos Theory: The Essentials for Military Applications," in *ACSC Theater Air Campaign Studies Coursebook*, AY96, 8 (Maxwell AFB, Ala: Air University Press, 1995), 1-64. The Teller calculations are cited in Reference 49 of this source.
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19. A pilot program known as Project Popeye conducted in 1966 attempted to extend the monsoon season in order to increase the amount of mud on the Ho Chi Minh trail thereby reducing enemy movements. A silver iodide nuclei agent was dispersed from WC-130, F4 and A-1E aircraft into the clouds over portions of the trail winding from North Vietnam through Laos and Cambodia into South Vietnam. Positive results during this initial program led to continued operations from 1967 to 1972. While the effects of this program remain disputed, some scientists believe it resulted in a significant reduction in the enemy's ability to bring supplies into South Vietnam along the trail. E. M. Frisby, "Weather-modification in Southeast Asia, 1966-1972," *The Journal of Weather-modification* 14, no. 1 (April 1982): 1-3.
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23. Ibid., 367.
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50. *Ibid.*, 17A-10.

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