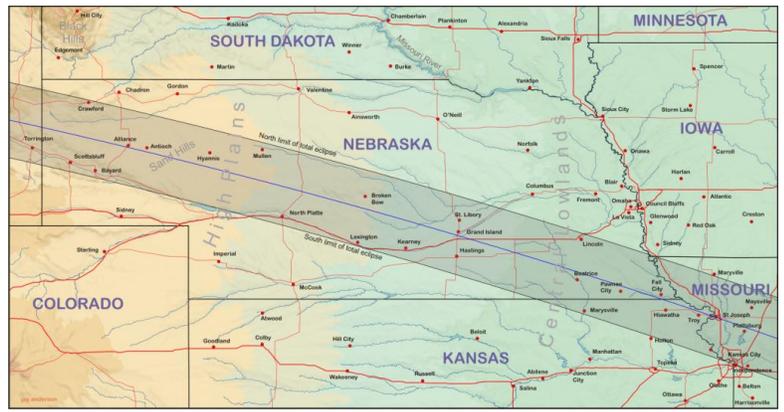


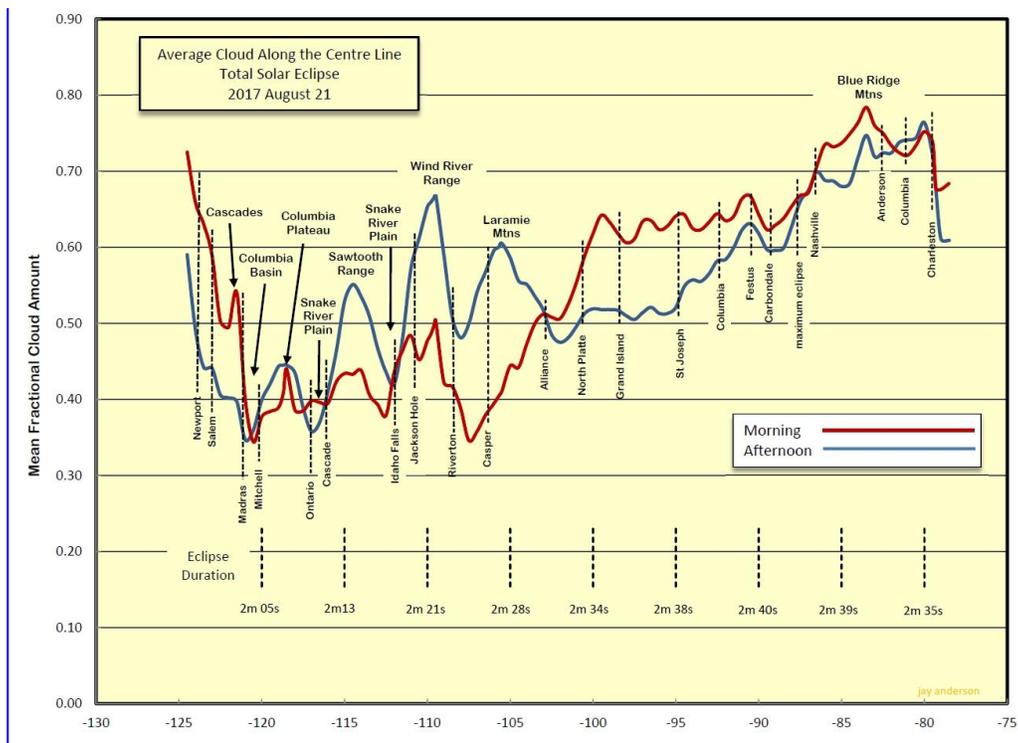
Nebraska 2017 Eclipse Weather Prospects

On leaving Wyoming, the Moon's shadow comes to the flat landscape of Nebraska, descending more than 1200 m from the High Plains in the west to the Central Lowlands along the Missouri River.

Protected from Pacific flows by the Rockies, and from easterly weather by the prevailing winds and the distant Appalachians, the "Great Plains" or "Prairies" become an easy conduit for air masses moving northward from the Gulf of Mexico or southward from Canada. Southerly flows bring high humidities and warm, sultry days. Northerly flows bring cooler and drier weather, usually preceded by a cold front that gives birth to towering thunderstorms as it collides with the entrenched Gulf air. Westerlies bring dry weather, while the uncommon easterlies are usually found in the bad weather behind a departing low-pressure system.



The clash of these air masses gives the Great Plains its reputation for severe convective weather – especially tornadoes – but August is several months later than the peak of the severe-weather season and the climate is more subdued than in May and June. Nebraska has an average of 21 tornadoes in June, but only 2 in August.



The major source of moisture on the west side of the Appalachians is a low-level air stream from the Gulf of Mexico, which tends to flow north and eastward, following the trend of the prevailing winds aloft. As a consequence, there is a steady increase in available moisture along the eclipse track from west to east across Nebraska, and eventually, all the way to the Appalachians in Tennessee as the lunar shadow encroaches on ever-greater amounts of Gulf air.

The route of the eclipse through Nebraska and Kansas is not across a landscape of obdurate flatness, but instead passes over undulating hills, grassy dunes, occasional buttes and escarpments, rugged Badlands, and the rich ecology of intermingled lakes and wetlands. There are no cloud-making mountains or dry valleys, and so the weather is generated by passing large-scale weather systems that slide overtop the Rockies, frontal systems from Canada, and the growth and decay of convective clouds on days with suitable instability. In middle and upper layers, the westerly flows carry cool, dried-out remnants of Pacific air across the mountains and onto the Plains. If these westerlies cross a humid, low-level flow of Gulf air, the combination creates the temperature profile that helps initiate the thunderstorms for which the Prairies are so well known.

August Cloud-Cover Statistics										
Nebraska		Percent Frequency of Sky Condition							Average Cloud Cover (%)	Percent of Possible Sunshine
Airport Observing Site	Nearby communities	Clear	Few	Scattered	Broken	Overcast	Thin Fog	Thick Fog		
Western Nebraska Regional *	Scottsbluff/Minatare	25.8	22.5	11.6	24.6	15.6	0	0	43	
Alliance Muni *	Alliance	32.6	32.8	0	22.5	12.0	0	0	35	
Hooker County Airport *	Mullen	21.9	32.1	0	20.1	25.6	0.2	0.0	47	
North Platte Regional Arpt *	North Platte									75
Broken Bow Muni *	Broken Bow	20.1	32.4	0	27.7	19.3	0.5	0	47	
Kearney Regional Airport *	Kearney/Gibbon	28.0	27.7	0	12.6	31.5	0.2	0	46	
Hastings *	Hastings	20.6	31.9	0	32.3	15.2	0	0	45	
Central Nebraska Regional Arpt *	Grand Island	25.5	14.6	14.0	23.4	22.5	0	0	49	
Lincoln Municipal *	Lincoln	21.9	18.5	7.7	24.2	27.5	0.2	0	53	70
Beatrice Municipal *	Beatrice	16.4	31.1	0	33.0	19.4	0	0	50	
Columbus Muni	Columbus	17.4	33.7	0	32.0	16.1	0.6	0.2	47	
Brenner Field Airport *	Falls City	20.9	27.9	0.0	36.4	14.8	0	0	48	
Sidney Municipal/ Lloyd W. Carr	Sidney	20.3	20.0	22.2	22.6	14.0	0.9	0	45	
Chadron Municipal	Chadron	19.5	41.5	0	25.7	13.2	0	0	40	
Kansas										
Forbes Field	Topeka	18.5	32.7	0	29.6	19.2	0	0	47	70
Johnson County Executive Airport	Olathe	15.7	34.7	0	31.4	17.1	0.8	0.2	48	

* = within total eclipse track

Satellite measurements of cloud cover (Figure 2) show that cloudiness tends to decrease during the afternoon across the Great Plains rather than increase, as it does in the mountains. This pattern is caused when morning clouds are broken up by solar heating, leading to a sunnier afternoon in spite of the increase in convective clouds as the day warms. Across Nebraska and Kansas cloudiness falls by about 10 percent between 7 a.m. and 2 p.m. The Moon’s shadow passes across the Plains just before 1 p.m. CDT, well timed to take advantage of the diurnal trend.

In southeastern Nebraska and northeast Kansas, where the eclipse reaches the Missouri River, the terrain is wide open to sub-tropical moisture reaching northward from the Gulf of Mexico, In addition, the air is also humidified by extensive evapotranspiration of soil moisture from fields of grain, sorghum, and corn planted on the Prairies. A consequence of the gradual increase in moisture from west to east is reflected in the average August precipitation along the track, which ranges from a low of about 7 mm in central Wyoming to 100 mm along the Kansas-Missouri border.

The increase in humidity along the track is also reflected in the slow increase in average cloud amount (Table 1) across Nebraska, from around 35 to 45 percent in the west near Alliance, to 50 to 55 percent in the east around Lincoln and Beatrice. Satellite measurements of average cloudiness along the centreline across the state (Figure 1, afternoon graph) show a similar trend, rising sharply from a low of 48 percent near Alliance to nearly 65 percent at North Platte . Measurements of sunshine (Table 1) along the track are a little less pessimistic, showing that North Platte, in central Nebraska, receives 75 percent of the maximum possible sunshine, while Lincoln and Topeka are content with an average of 70 percent.

Nebraska favors the well-prepared expedition, as highways in the state permit rapid movement to clearer skies, which are often not too distant when thunderstorms are responsible. Good weather information will be essential – satellite images work particularly well in the short range, but a forecast from the day before will probably prove more convenient.

A good home base for eclipse expeditions is Alliance, NE, or nearby Antioch, both located in the best weather zone on the plains. Highway 2 from Alliance offers 320 km of in-the-track travel toward the east if cloud avoidance is necessary and a westerly escape can go all the way to Casper and still stay in the umbral region. In central and eastern Nebraska, Interstate 80 allows rapid relocation, cutting diagonally across the track, from Lincoln to Lexington, a distance of 240 km. Nebraska and northeast Kansas don’t offer any cloud-eating terrain, so flight is the best option if a new viewing location is wanted.