

Alaska Science Forum

Sun and Weather

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The ultimate source of energy on earth is the sun. Life itself would not exist without its steady radiation, nor coal, nor oil, nor plants, nor wind and rain. Whether the air is hot or cold, windy or calm, wet or dry, clear or cloudy, is directly dependent on the sun. Any changes in weather patterns, then, should be due to changes in the sun and its relationship to earth. Thus, the constancy of the weather with the days and seasons is a result of the sun's unchanging brightness and its steady trek across the sky.

As weather records improve, however, it is tempting to compare them with the small changes in solar output connected with sunspots or disturbances on the sun which were first recorded by Chinese astrologers a thousand years ago. The yearly growth rings of our oldest trees like ancient, wizard chieftains tell of droughts that seem to vary with the numbers of these sunspots. In recent times the spots have appeared and disappeared in an eleven-year cycle. Associated with these cycles are disturbances in the high atmosphere of the earth such as aurora and radio blackouts.

The direct effect of these small variations of solar radiation on the earth's lower atmosphere must be small. If the weather system were a ten-ton truck, then the effect of changes due to sunspots would be the same as hooking it up to a little red wagon. The truck would not notice the wagon until perhaps the wagon bounced high enough due to road corrugations to cut an electric wire or brake line and trigger a change in the action of the truck. Thus, if the aurora changes the amount of heat or light reaching the earth in a critical place like the Gulf of Alaska, the storms forming there could on the average, be more severe or move more northward, producing noticeable effects which could vary roughly with the eleven-year cycle.

Historic records indicate that the eleven-year sunspot cycle disappeared for as long as one hundred years at least twice. Historical references to the aurora, weather and sunspots are now being studied to determine if these longer absences of sunspots will emphasize effects on earth which are not evident in the eleven-year cycle. Thus, the "Little Ice Age" or extended cold period which occurred in Europe during one of the extended absences of sunspots may provide a model to allow prediction of future changes in solar activity and its effect on earth.

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