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## Some notes on the climate of the British Solomon Islands

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The Solomons are among the wettest regions of the globe. Among twenty-four stations having 7 years or more of complete years' records to 1963, only four had a mean annual rainfall below 100 in. Pending full analysis of records from a scattered, but growing, network of climatological stations taking upper-air observations in the south-west Pacific, it seems that there is a basic easterly flow of air, with wave-type perturbations, and surface vortical circulations having a generally westerly movement. South of the equatorial perturbation belt, and dominating weather over the Solomons during the larger part of the year, are the south-easterly variables, or 'trades', themselves marked by zones of convergence that may be related to passage of meridional fronts along the root-zone of the south-easterlies, far south of the Solomons. These may be responsible for the spells of wet weather that occur during the south-easterly months, during some of which quite exceptional conditions of cloudiness and precipitation occur. The Royal Society Expedition encountered one such in 1965; more than 120 in. of rain were recorded in 2 weeks at a gauge on the southern side of Guadalcanal; severe landslip and flood damage occurred quite widely in the Solomons and adjacent areas.

During the 'summer' months dominated by the perturbation zone, there are occasionally small tropical cyclones originating in the area around the Solomons and passing across the group; these also can bring exceptional cloud, rain and wind.

One of the major problems in discussing the climate of the Solomons is that we must proceed largely from inference. Rainfall records were taken at government stations and on a number of plantations before the war, but there was a virtually complete break after 1941, and when gauges were re-established they were rarely in the same place as their predecessors. Until very recently indeed, no inland recording gauges were maintained, and all usable data refer only to coastal locations, almost all within a few feet of sea level. In a region as accidented as the Solomons, where a number of islands rise 3000 to 5000 ft., and Guadalcanal to over 7600 ft., this is especially unfortunate. During the 1960s the number of recording posts has been increased substantially, and by the early 1970s useful means may be derived from these new data, yielding a much denser network. For the time being, however, we find ourselves in the position of seeking to interpret the presence of grassland by means of low or seasonal rainfall, and conversely of low or seasonal rainfall by the presence of grassland.

Given the general meteorological conditions, particular interest attaches to the effects of topography on climate, for it is evident that very great variations occur from this cause. Islands of the size composing the Solomons develop complete heat-exchange systems of their own, with locally induced circulation which has a great effect on the distribution of rainfall and temperature. By causing lifting and divergence or convergence of airflow, islands also alter the balance of processes in wind system, and accelerate changes in the

stratification of the airstream. Shallow vortices are of insufficient depth to override the higher mountains, so that in the perturbation season especially it is likely that locally induced circulations will completely dominate local climatic variations. During the south-easterly season, air banks up on the windward or weather coasts, becomes very unstable, is lifted and yields heavy rain; passing across the islands the air descends and diverges. There is on many mountainous islands a very sharp contrast between windward and leeward régimes, probably occurring within only 1 to 3 miles. During the south-easterly season, windward-leeward contrasts develop on every island more than a few square miles in area.

Coastal temperatures vary very little through the protectorate, with mean maxima in the 80s (F) and mean minima in the 70s (F) throughout the year. Inland, however, simple observation shows that much greater contrasts occur, and even at low altitudes temperatures on clear nights during the south-easterly months can fall into the 50s (F), while maxima rise into the 90s (F). Temperatures at high altitudes are almost unknown, but it is improbable that air frosts would ever occur except under the most unusual meteorological conditions. There is major need for a string of semi-automatic recording stations across the island of Guadalcanal, where the greatest contrasts certainly arise.

The accompanying maps of annual rainfall distribution (figures 9 to 12) are derived from all available records to 1963, however inadequate and fragmentary, interpreted with the aid of much inference and no small degree of imagination. Perhaps it is a tolerable approximation for the general area Guadalcanal–Nggela–Malaita; it is certainly much less tolerable for the New Georgia group, and for the remainder of the archipelago it is based on so few records as to be largely guesswork. There is a steep decline in mean rainfall across Guadalcanal from south to north, accompanied by an increase in seasonal contrasts, a reversal in the incidence of ‘wet’ and ‘dry’ seasons, and an increase in the incidence and length of spells of rainless weather. A similar, but less marked, gradient seems to occur across Malaita from south-east towards north-west, and there are perhaps similar contrasts between the northern and southern sides of Santa Isabel, the southern and northern sides of San Cristobal, and the south-western and north-eastern ends of the New Georgia group. It must be emphasized, however, that detailed contrasts may occur on each island, of a nature which the record is insufficient to reveal. Thus there is a string of grassland patches along the northern fringe of Nggela which may reflect greater incidence of dry spells; it is probable that there is strong contrast between the south-eastern and north-western sides of Kolombangara, Vella Lavella, Vangunu, and almost every other high island. Broadly it seems that the coastlands of ‘The Slot’ are less wet and more seasonal than the outer coasts of the group as a whole.

There are also some other differences. A tendency to double maximum—a habitual attribute of tropical régimes—occurs in the southern side of the New Georgia group and the Shortlands, but is absent from the record elsewhere. Thus seasonal differences in rainfall are much less marked in New Georgia than in Guadalcanal.

Cyclones are generated in the sea areas around the Solomons, and though violent are of small size. They are of more frequent occurrence in the south-east of the group than in the north-west.

Year-to-year variation of rainfall is everywhere marked, but the coefficient of variation,

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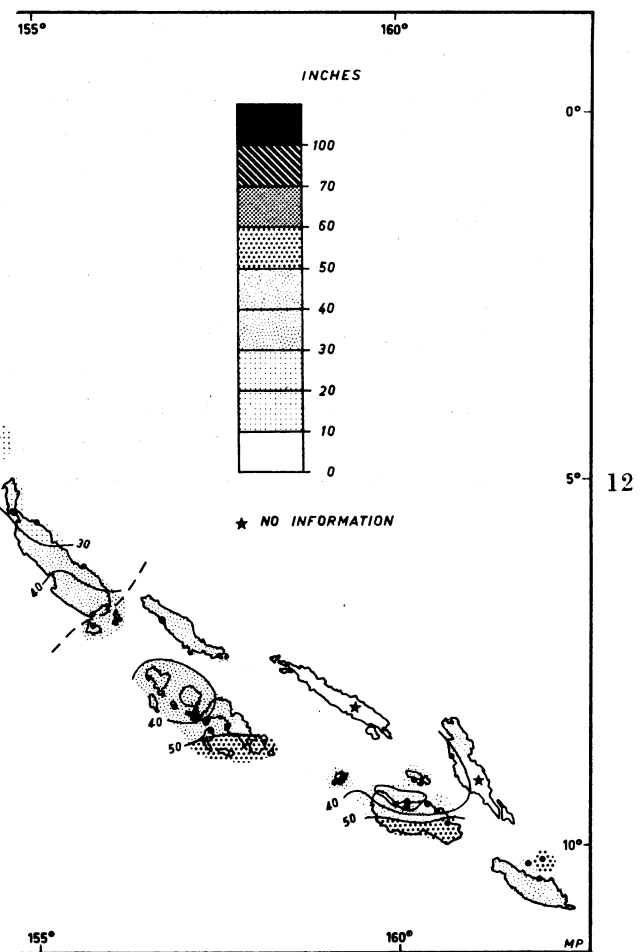
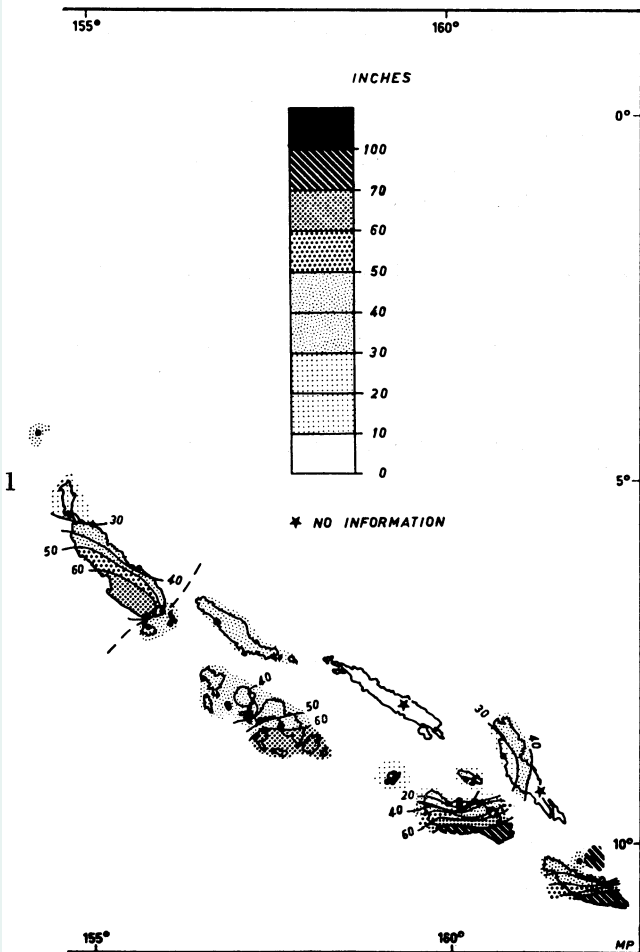
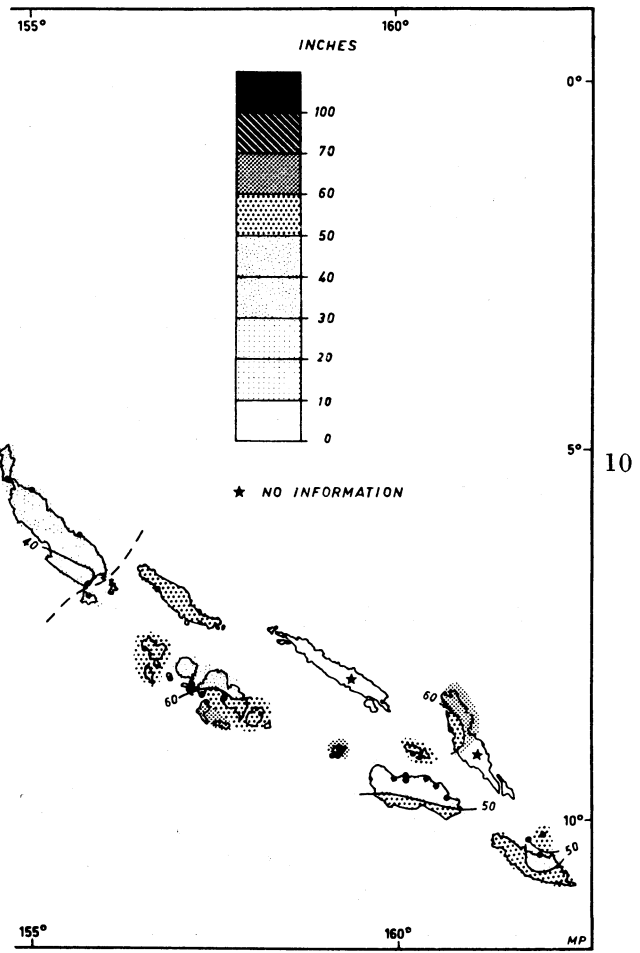
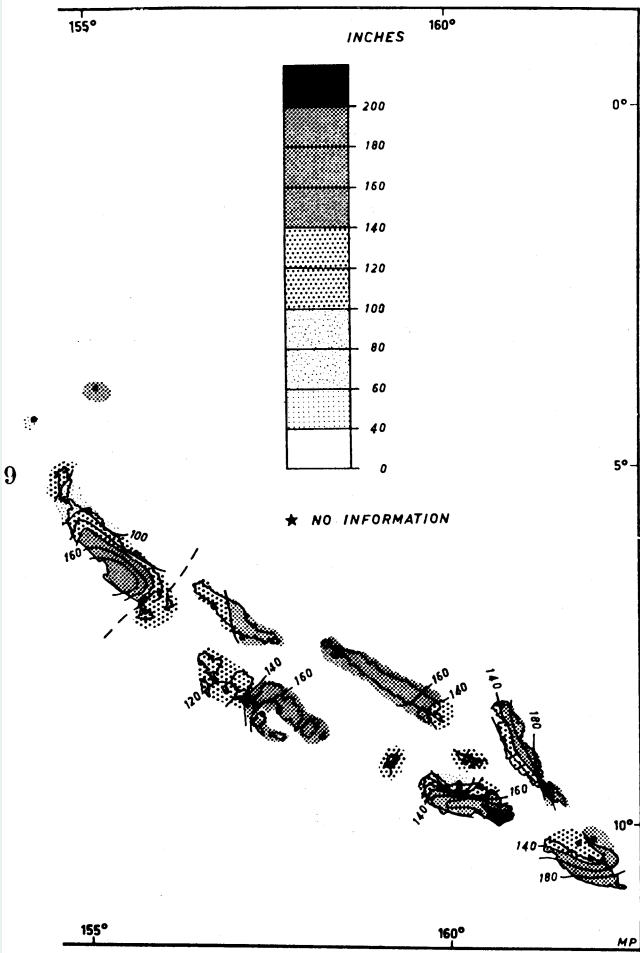


FIGURE 9. Solomon Islands. Mean annual rainfall.  
FIGURE 10. Solomon Islands. Rainfall January to April.  
FIGURE 11. Solomon Islands. Rainfall May to August.  
FIGURE 12. Solomon Islands. Rainfall September to December.

being calculable only on data of different periods at different stations, shows too much range between closely adjacent stations in the north Guadalcanal–west Malaita area for any firm conclusions to be drawn.

This account will certainly appear unsatisfactory. It will be insufficient and far too tentative to satisfy the needs of the ecologist; it is grossly tendentious and extrapolative by the standards of the climatologist. The data and discussion on which it is drawn were derived from a much wider study of rainfall distribution and seasonality in the tropical south-west Pacific as a whole, including areas with a much closer network of recording posts than is found in the Solomons. At most, it might serve as a check against inference derived from differentiation of present plant cover; this ecological differentiation will point up areas on which more climatological data are required. Perhaps a programme for the collection of such data over the coming decade, pinpointed in terms of critical sites or transects within this immensely varied and interesting corner of the humid tropics, might be one continuing product of the present Symposium.

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