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ON THE INFLOW OF STRATUS
INTO THE SOUTHERN GEORGIA STRAIT

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INTRODUCTION

In the summer season, marine stratus is frequently present along the outer coasts of Vancouver Island and Washington state. Under certain conditions, this stratus is advected into the southern Georgia strait through the Puget sound via the Chehalis river valley and through the strait of Juan de Fuca.

EFFECT OF A STRATUS LAYER OVER VANCOUVER

Various industries and the public are inconvenienced and some activities are made more hazardous by a layer of marine stratus over Vancouver and the southern Georgia strait.

More specifically

1. The arrival of cooler marine air preceeding the stratus will lower the surface temperatures over Vancouver from the preceeding days.
2. The presence of a layer of marine stratus may
   (a) significantly reduce the hours of sunshine.
   (b) may cause precipitation in the form of drizzle.
   This results in a marked change from the preceeding stretch of fine weather.
3. The resultant low ceilings and sometimes low visibilities pose a hazard to routine operations of the aviation industry.
4. The accompanying strong gusty surface winds and low visibilities pose a hazard to the marine industries.

Fore the above reasons, the arrival of marine stratus over the southern Georgia strait is a serious forecast problem during the summer months.

BACKGROUND NOTES

The same author did a limited study on marine stratus. The following generalized conclusions were reached.

1. Marine stratus forms
   (a) over the eastern Pacific due to turbulent mixing under the subsidence inversion of the semi permanent subtropical high, and
   (b) over the cool upwelled waters next to the outer coasts.

2. After the stratus has formed under the subsidence inversion, the area of stratus moves with the fluctuations in the position of the low level subtropical high. The high moves from an offshore position to an onshore position with the passage of an upper trough. Rising pressures along the outer coasts ahead of the ridge line coupled with falling pressures due to thermal heating over the inner coasts gives rise to a low level wind field which causes advection of stratus into the southern Georgia Strait.

3. Dissipation of the stratus occurs by mixing with the warmer air at the fringes of the cloud shield.

The upper trough which initiates the stratus inflow probably will not be "seen" in the surface data. It is mostly likely seen on the 500 mb analysis (This depends on the quality of the analysis.). However, it is probably best seen as a line of cloud on the satellite pictures. This cloud system is usually in the dissipating stages as it passes over the south coast.

RESULT OF INTERACTION-MIGRATING UPPER TROUGH AND QUASI STATIONARY UPPER HIGH.

The interaction between the approaching upper trough and the previously stationary upper high predicably results in an entire spectrum of flow patterns. This spectrum will discriptively be classified into three very general categories.

CATEGORY A A relatively minor upper trough moves through the long wave ridge position without causing the upper ridge to move or lose its amplitude. The onshore movement of the low level high will occur quickly. This onshore movement will end when the coastal thermal trough re-establishes itself. This sequence of events results in one stratus day only.

CATEGORY B A significant upper trough causes the slow motion eastward of the upper ridge. The onshore movement of the low level ridge will be slow and it may continue for two, three and even more days. The stratus will move into the southern Georgia strait each morning (not necessarily reaching the Vancouver area). The stratus inflow (but not the marine air inflow) will end when solar induced vertical and horizontal mixing dissipates the stratus and causes the cloud shield to "retreat" to the outer coasts again. The stratus advance begins again when mixing weakens.

CATEGORY C A strong upper trough results in the rapid decay or the rapid motion eastward of the upper ridge. The surface high moves quickly onshore, however, the subsidence inversion over the coasts is rapidly destroyed. A strong marine air inflow will occur, but the stratus is dissipated or becomes stratocumulus as a result of the more unstable air flow aloft.

EXAMPLES

Examples of the above interactions and the motion of the marine stratus layer will be given in future notes.