



**WESTERN REGION TECHNICAL ATTACHMENT
NO. 98-18
APRIL 28, 1998**

**GOES-10 PROVIDES HIGH TEMPORAL RESOLUTION OF
TREASURE VALLEY OUTFLOW BOUNDARIES**

Gregory A. DeVoir - NWSFO Boise

The National Environmental Satellite, Data, and Information Service (NESDIS) and the National Weather Service (NWS) conducted a GOES-10 Science Test between March 16 and April 12, 1998. The purpose of the test was to determine if, and by how much, the utilization of routine, 5-minute-interval imagery can improve NWS forecasting operations, products and services. Forecasters at NWSFO Boise found this imagery to be very useful on several occasions. An example from April 6, 1998 demonstrates that the utilization of high temporal (~5 minute) imagery can increase the quality of forecast operations and services on even routine weather days.

April 6, 1998

A typical spring day was anticipated over Boise's County Warning Forecast Area (CWFA) on April 6, 1998. Analysis and modification of the 1200 UTC RAOB for Boise (Fig. 1) and interrogation of 1200 UTC NCEP model guidance indicated weak vertical wind shear (≤ 5 kts surface to 7,000 feet) and small CAPE ($250-500 \text{ J Kg}^{-1}$) over the forecast area during the afternoon hours. Given the low-level moisture apparent in the morning sounding (Fig. 2), light winds aloft, convective temperatures in the lower 50s and predicted afternoon highs in the middle to upper 50s, numerous single cell showers were expected to develop from the late-morning through the early-evening hours. Also, with freezing levels running between 5,000-6,000 feet, graupel and/or small (pea-sized) hail was expected with any of the heavier rain showers.

By 1800 UTC, several showers had developed over eastern Oregon and southwest Idaho (Fig. 3). Showers initiated first over the higher, snow-covered terrain in eastern Oregon (Steens Mountain and the Blue Mountains) and southwest Idaho (Owyhee and Boise Mountains). By 1800 UTC, only shallow cumulus was developing over the Snake River Valley. GOES-10 5-minute resolution visible imagery loops (Fig. 4 - longer loop (~780 KB) and Fig. 5 - shorter loop (~470 KB)) (Figs. 4 and 5 animated on homepage) document the evolution of this shower activity during the afternoon hours. Numerous outflow boundaries associated with the collapse of individual cells in the weakly sheared environment can be seen in Figs. 4 and 5 (Figs. 4 and 5 animated on homepage).

As shown in the initial frames, an outflow boundary moved northward through the Treasure Valley from the Owyhee Mountains. To the north, showers over the Boise Front produced another outflow boundary which propagated southward off of the Boise foothills. Eventually, the Boise Front and Owyhee County outflow boundaries collided in northern sections of the Treasure Valley forming a solid line of showers, more intense than their successors, extending from 3 miles north of Boise to Baker City, OR. Subsequent outflow from this line of showers is seen propagating southward during the last several frames of the Fig. 4 and 5 loops (Figs. 4 and 5 animated on homepage).

The boundaries were difficult to detect and monitor using WSR-88D radial velocity products since their movement was perpendicular to the radar beam. The only other indication of shower outflow was a subtle wind shift as the Owyhee County outflow passed over the Boise airport around 2030 UTC. Forecasters monitored the progress of these outflows in real time using GOES-10 5-minute imagery and anticipated the formation of more intense convection in association with the boundary intersection. Storm spotters relayed reports of locally heavy rain and small hail within the line, and one spotter reported thunder in Payette County, about 35 miles northwest of Boise. The following NOWCAST was issued at 2209 UTC.

SHORT TERM FORECAST
NATIONAL WEATHER SERVICE BOISE ID
407 PM MDT (307 PM PDT) MON APR 6 1998

IDZ011>016-0RZ020>022-062340
WEST CENTRAL MOUNTAINS-LOWER TREASURE VALLEY IDAHO-
BOISE MOUNTAINS/CAMAS PRAIRIE-UPPER TREASURE VALLEY-
SOUTHWEST HIGHLANDS-WESTERN MAGIC VALLEY-BAKER COUNTY
OREGON-LOWER TREASURE VALLEY OREGON-SOUTHEAST OREGON-

.NOW...

AT 403 PM MDT SCATTERED RAIN SHOWERS...SOME CONTAINING HEAVY RAIN AND SMALL HAIL...CONTINUED OVER A LARGE PORTION OF EASTERN OREGON AND SOUTHWEST IDAHO. THE HEAVIEST RAIN SHOWERS WERE OCCURRING IN A LINE ALONG THE BOISE FOOTHILLS EXTENDING FROM EAGLE TO PAYETTE AND NORTHWESTWARD TO BAKER CITY. A STORM SPOTTER IN PAYETTE REPORTED THUNDER AT 400 PM MDT AND SMALL HAIL WAS COVERING THE GROUND IN TWIN FALLS. THE SHOWERS WERE MOVING EAST-NORTHEAST AT 10 MPH AND WILL CONTINUE THROUGH THE EARLY EVENING HOURS.

\$\$

Fortunately, several limiting characteristics of the April 6, 1998 convective environment (low freezing level, limited moisture and weak CAPE) prevented the development of more significant rainfall or large hail within the enhanced line of showers. However, given a similar convective environment with rich monsoonal moisture present and higher freezing levels, outflow boundary intersection would be a more serious forecast/warning problem. Recent fire damage to the soil in the Boise foothills has increased the potential for debris flows into north Boise neighborhoods during high-intensity rains. Given the potential for deep moist convection in a weakly sheared environment, forecasters would have utilized

5-minute GOES-10 imagery as a strong supplement to the WSR-88D to evaluate the potential for flash flooding in the vicinity of the boundary intersection.

Summary

The availability of GOES-10 5-minute satellite imagery allows the forecaster to more readily identify and monitor the progress of small-scale features, especially those which may be insufficiently resolved by radar and/or surface observation networks. This example illustrates the value of GOES-10 5-minute imagery in a routine forecast situation, and naturally leads one to conclude how valuable this data would become in more significant or severe weather regimes. Boise NWSFO forecasters appreciated the opportunity to view this imagery during the GOES-10 Science Test and hope this information can soon be made available to NWS forecasters on a regular basis.

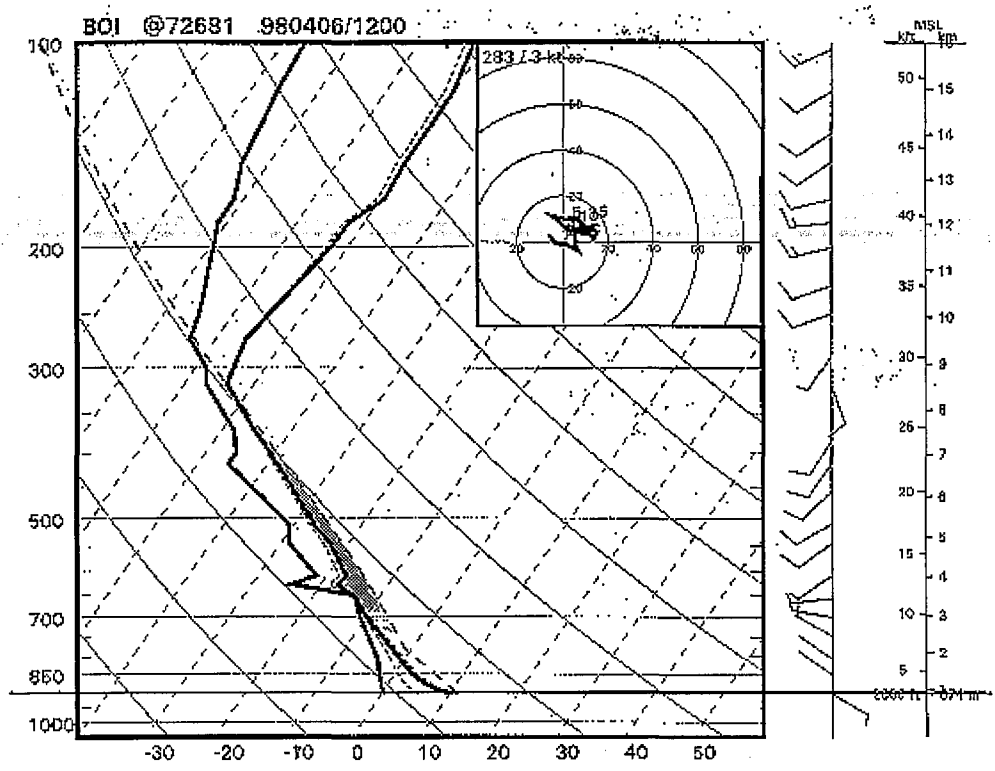


FIG. 1. Boise 1200 UTC sounding on April 6, 1998 (modified).

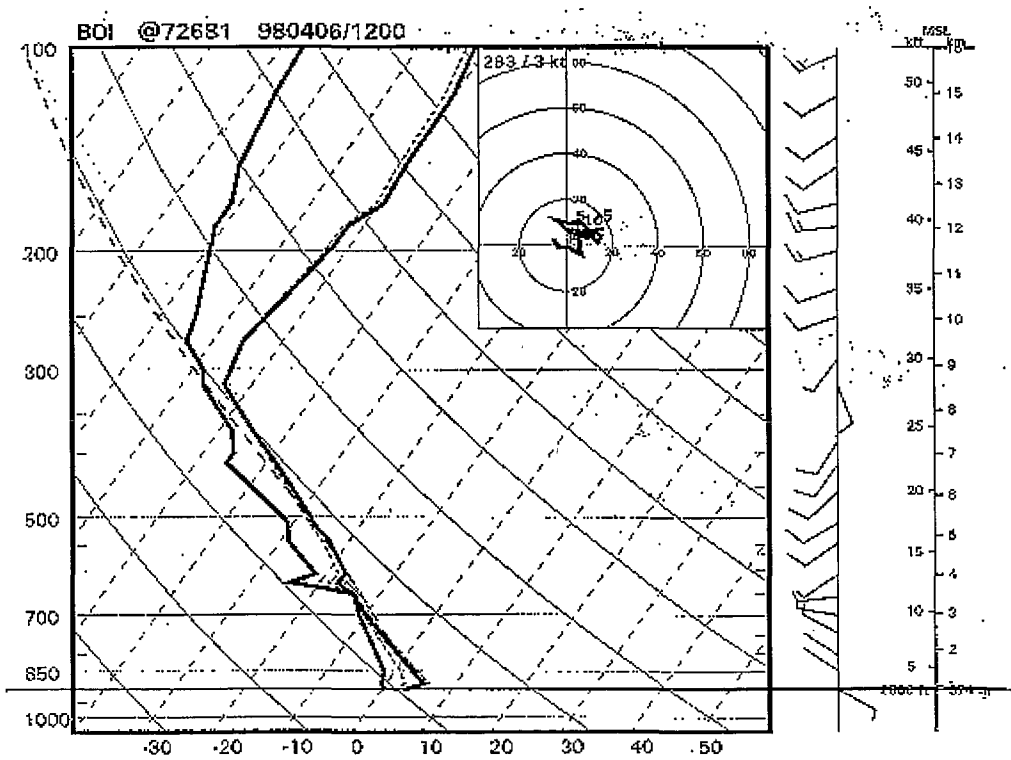


FIG. 2. Boise 1200 UTC sounding on April 6, 1998 (unmodified).

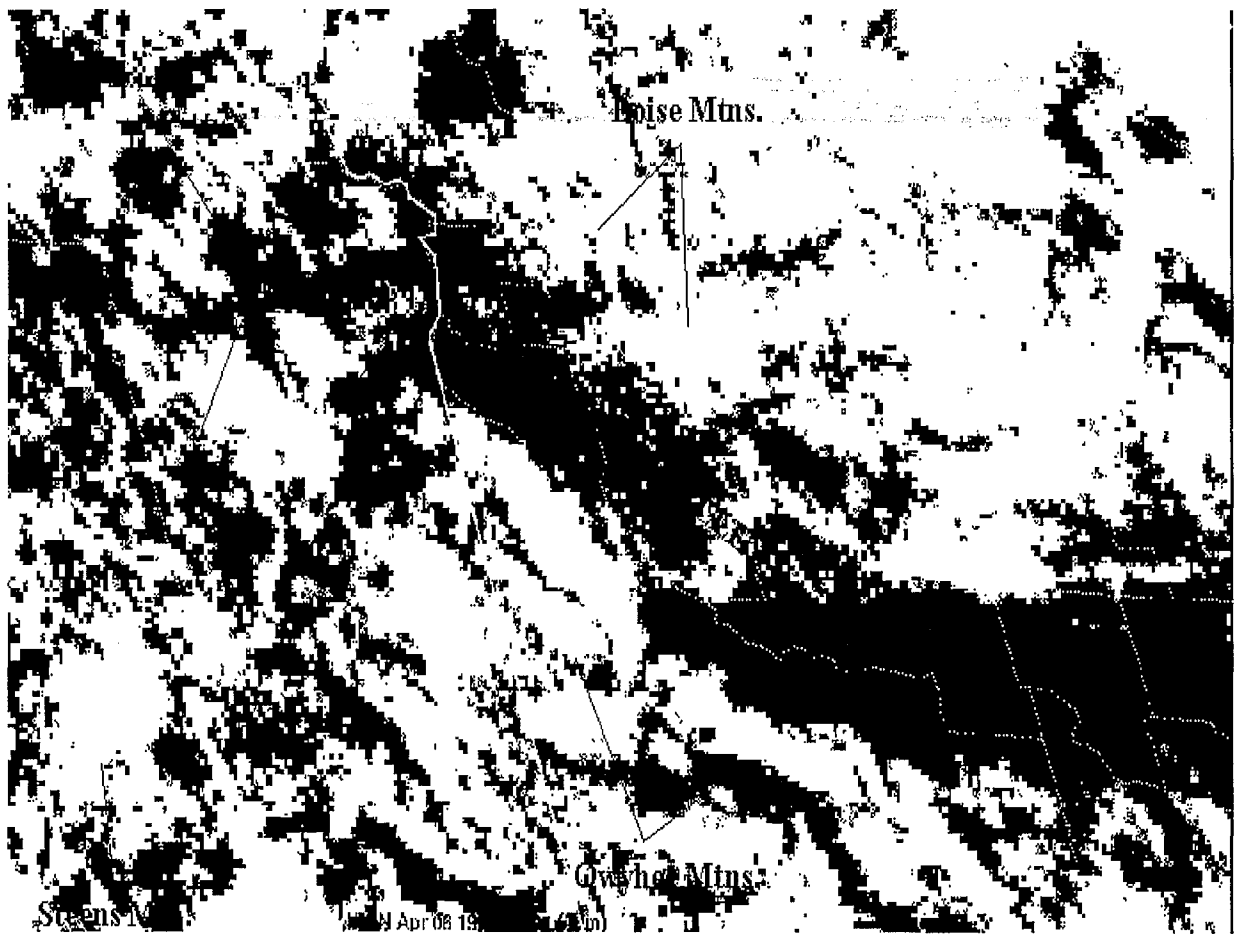


FIG. 3. GOES-10 1KM IR image at 1800 UTC on April 6, 1998. Showers have developed over the higher, snow-covered terrain of eastern Oregon and southwest Idaho.

Andy,

A simple complaint letter. Attached are:

- 1) the original figure from Greg DeVoir's TA
- 2) a copy using our own copier of the original
- 3) the copy that came with the TA from region

As you can see, the copy that came with the TA from region is useless. I know we are trying to save resources by not using color and I agree with that philosophy. I read all the TAs using the WRH web site. However, certainly the copies we do send could look better than this.

rusty

1

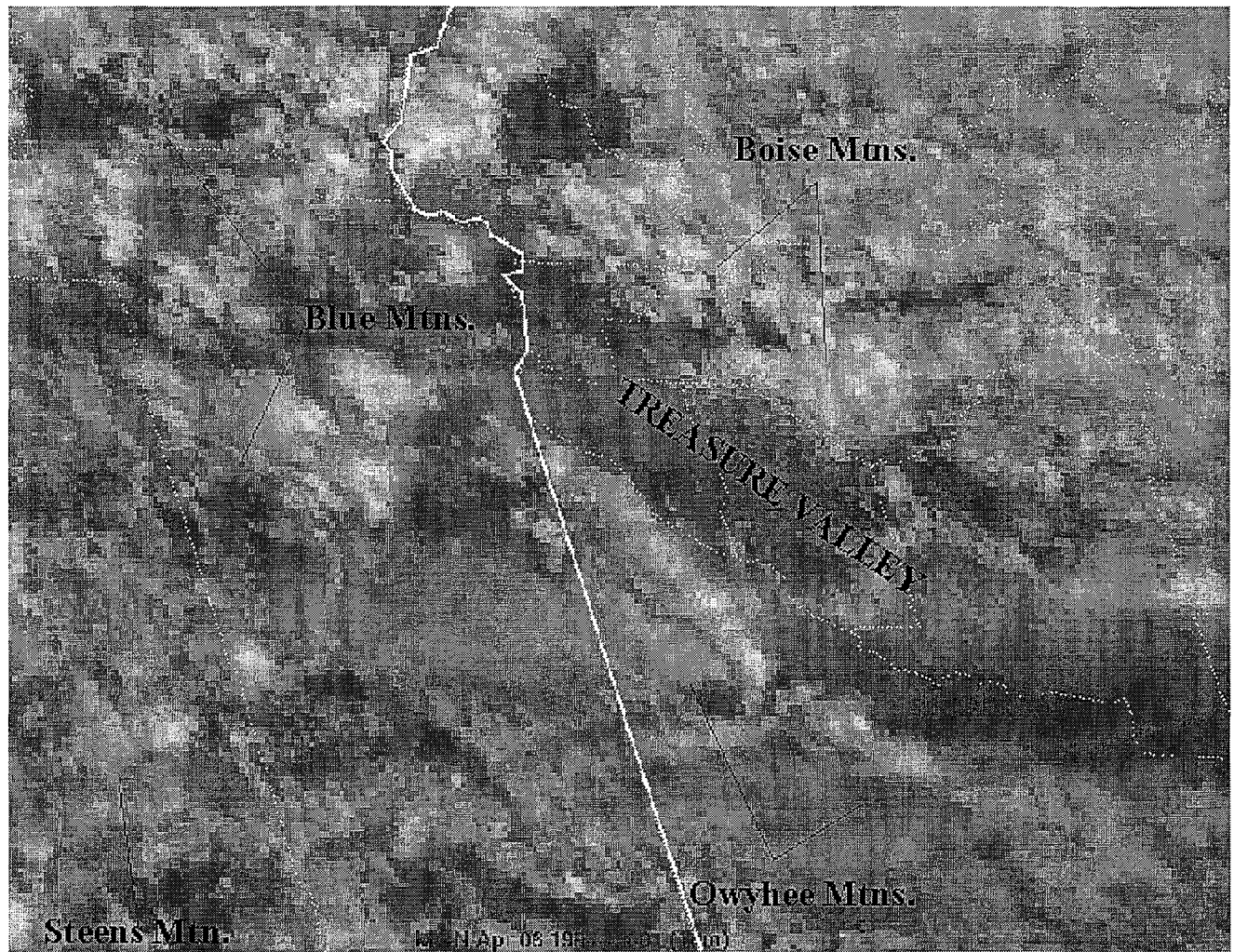


Fig. 3. GOES-10 1KM IR image at 1800 UTC on April 6, 1998. Showers have developed over the higher, snow-covered terrain of eastern Oregon and southwest Idaho.

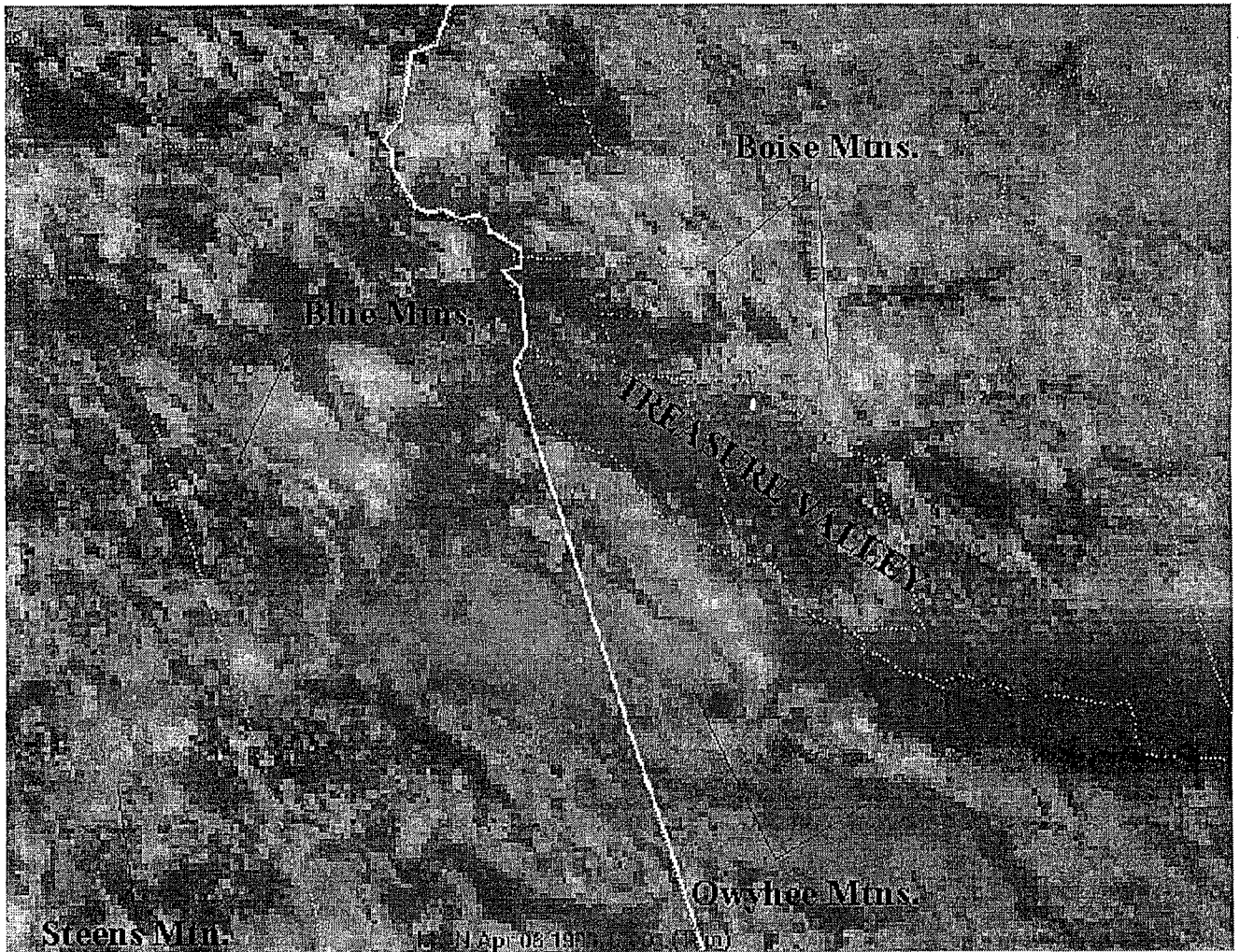


Fig. 3. GOES-10 1KM IR image at 1800 UTC on April 6, 1998. Showers have developed over the higher, snow-covered terrain of eastern Oregon and southwest Idaho.

#3

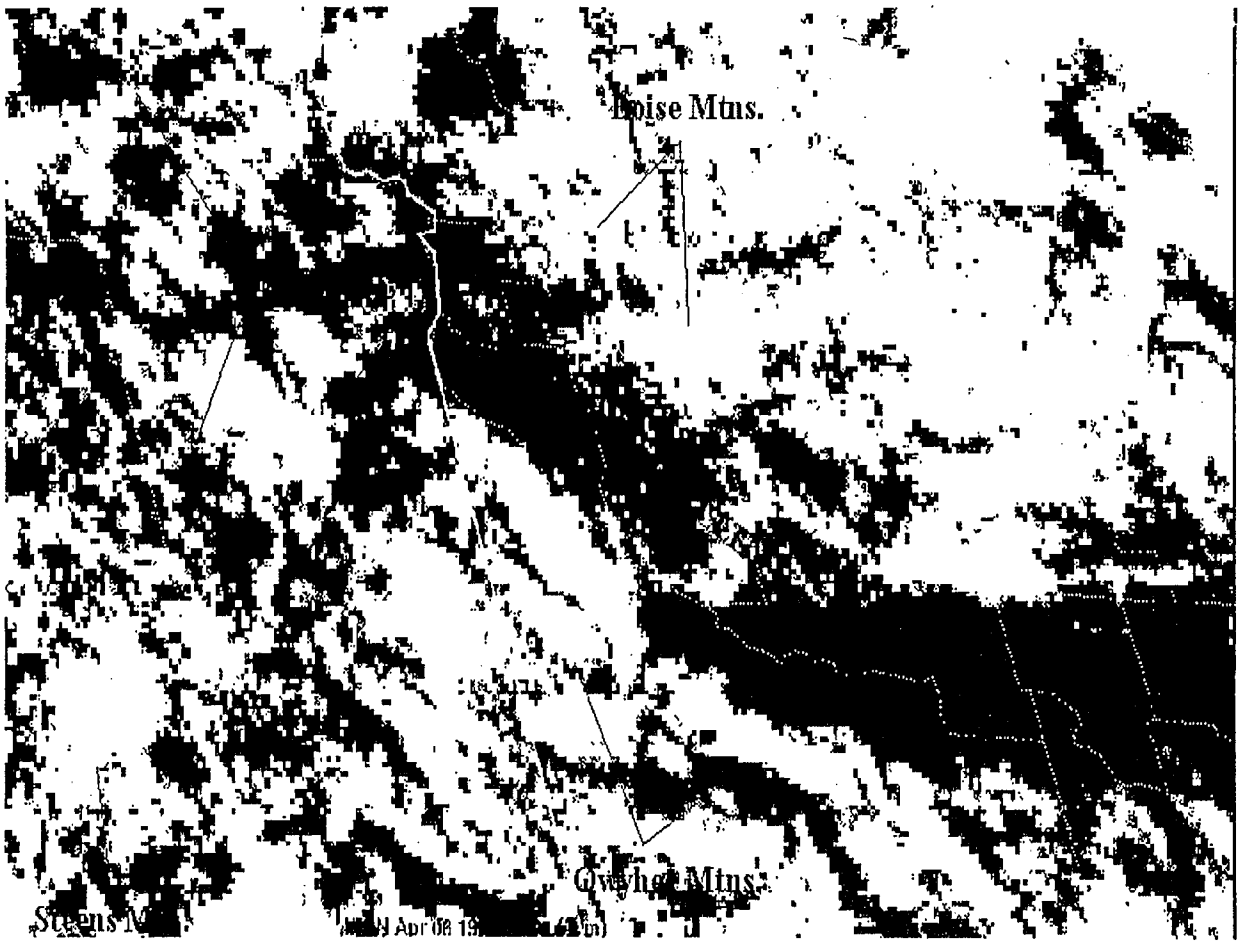


FIG. 3. GOES-10 1KM IR image at 1800 UTC on April 6, 1998. Showers have developed over the higher, snow-covered terrain of eastern Oregon and southwest Idaho.