Digital and Map Products Produced using PRISM

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PRISM (Parameter-elevation Regressions on Independent Slopes Model) is an analytical model that uses point data and a digital elevation model (DEM) to generate gridded estimates of monthly and event-based climatic parameters. Originally developed for precipitation estimation, PRISM has been generalized and applied successfully to temperature, among other parameters. PRISM has been used extensively to map precipitation and minimum and maximum temperature over the United States, Canada, and other countries.

A variety of digital and map products have been produced using PRISM. Study regions include the entire United States and many foreign countries. Many of the digital data layers are available via ftp. General categories of map products are as follows:

(1) monthly and annual average climate maps for precipitation, temperature, snowfall, degree days, and other parameters; 1961-90 was generally used as the averaging period.

(2) sequential monthly maps for precipitation and temperature (mean maximum and mean minimum) for the period 1895-1993 (one map per month for each year)

(3) maps of precipitation for individual extreme precipitation events (such as the February, 1996 flood event in the Pacific Northwest)

(4) isopluvial maps (extreme precipitation magnitudes); for example, 25-year 24-hour precipitation intensities

Data are available in several digital formats, including ASCII, GRASS, and Arc/Info, as well as in hard copy.

Below are descriptions of several map projects.

Landslide Potential mapping

Several intense rain storms during 1996 caused widespread flooding in western Oregon and throughout the Pacific Northwest. Moist subtropical air masses brought record-setting rainfall on several occasions. The rain, coupled with significant snow melt and substantial runoff from saturated soil, pushed some stream levels above all-time crests. In addition, numerous landslides and mudslides occurred; these destroyed homes and roads, caused significant property damage, inundated stream channels, and killed several people. Many of the slides were in forest areas which had earlier been harvested, and this has led to demands by some environmental groups for a moratorium on clear-cutting.

The best way to minimize damage from landslides would be by curtailing or modifying certain land use activities in areas prone to slides. Unfortunately, no map or guideline regarding landslide potential currently exists. Oregon State University and the Oregon Department of Forestry were authorized to investigate landslide/mudslide potential, and to produce a series of maps which specify the relative risk throughout western Oregon.

The primary criteria which influence landslide potential are precipitation intensity and slope; vegetation and geology are important as well. A detailed slope data set was constructed using high-resolution topographic

information. This was combined with precipitation intensity coverage developed using the PRISM model. Initially, the latter was for 24-hour totals for a 25-year return period; later, the coverage was expanded to include shorter averaging periods (1-, 3-, and 6-hours) and other return periods (5- and 10-years).

The landslide potential maps were not meant to be site-specific decision-making tools, but rather to provide planners wit h overview information. Areas identified as "high potential for slides" would be scrutinized more thoroughly from the ground than would those with "low potential." Ultimate decisions regarding site land use will continue to be made only after a site inspection. But the slide potential information represents a significant and useful new tool for officials who make those decisions.

Precipitation Mapping for the February, 1996 Flood

A series of intense surges of subtropical moisture inundated western Oregon during the period February 5-9. The combination of record-breaking rain, warm temperatures, and a deep snowpack led to severe flooding throughout northern sections of the state. River flood stages were comparable in magnitude to the December, 1964 flood, the largest in Oregon since flood control reservoirs were built in the 1940's and 1950's.

Several people perished in the flooding, and damage was extreme. A state of emergency was declared for all of northwestern Oregon and southwestern Washington. As damage claims were filed and lawsuits initiated, it became apparent that a map of total precipitation during the flood period was needed.