Geology of Victoria

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Cover photograph
Eugene von Guerard (1815-1901)
Cathedral Ranges, Vic. New South Wales 1865 (detail)
Oil on canvas
Photograph courtesy of National Australia

The painting is one of Eugene von Guerard’s vast landscape scenes. The artist is highly regarded for his accurate depiction of Victoria’s landscapes with strong geological themes, particularly in the western volcanic areas and in the highlights of the cathedral Ranges near Bacchus Marsh, the subject investigated geologically by Wilhelm E. A. Max, who noted that the geology of the region is a mixture of sandstone, shale, and limestone, with the former forming a series of terraces parallel to the coast. The artist’s use of light and shadow is evident in the painting, and the scene is complemented by the inclusion of ancient volcanic formations, the youngest of which occur in the Melbourne Zone.
Chapter 20
Geological hazards
hidden dangers for construction

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20.1 Geological hazards in Victoria

20.1.1 Introduction

The severe geotechnical failures and landslides along the coast of Victoria are caused by deep-seated landslides, which are triggered by rainfall and sometimes also by earthquake shaking. Engineering geologists are finding that the landslides along the coast are often caused by the interaction of geologic factors, such as the regional tectonic setting, and the local geologic environment. These landslides are often associated with poorly drained coastal plains and storm drainage, which can lead to the formation of shallow landslides.

Fig. 20.1 (reproduced by permission of the Melbourne Port Authority) shows the extent of the coastal plain along the eastern seaboard of Victoria. The coastal plain is characterized by a series of coastal plains and valley floors, which are often prone to landslides. The landslides along the coast are often triggered by rainfall and sometimes also by earthquake shaking.

20.1.2 Engineering implications of deep weathering

Significant areas of Victoria are underlain by weathered or eroded rocks that have been exposed to the surface for millions of years. The weathering of these rocks has resulted in the formation of deep weathering profiles, which can be seen in Fig. 20.2. The weathering profiles can be classified as shallow weathering, moderate weathering, and deep weathering.

The shallow weathering profiles are characterized by the presence of a thin layer of weathered rock that is overlying unweathered rock. The moderate weathering profiles are characterized by the presence of a thicker layer of weathered rock that is overlying unweathered rock. The deep weathering profiles are characterized by the presence of a thick layer of weathered rock that is overlying unweathered rock.

In Victoria, the deep weathering profiles are often associated with landslides and other geotechnical hazards. The deep weathering profiles can also be used to identify areas that are prone to landslides and other geotechnical hazards. The deep weathering profiles can also be used to identify areas that are prone to landslides and other geotechnical hazards.

Fig. 20.2 (reproduced by permission of the Melbourne Port Authority) shows the extent of the deep weathering profiles along the eastern seaboard of Victoria. The deep weathering profiles are characterized by the presence of a thick layer of weathered rock that is overlying unweathered rock.

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20.2 Slope instability in Victoria

20.2.1 Introduction

Definitions and principles

Slope instability refers to failure by both erosion and mass wasting. The mass failure occurs in the presence of certain types of rock, which are particularly prone to landsliding or "slope collapse." Kaolin soils, for example, are very susceptible to landsliding due to their high porosity and low shear strength.

Slopes are classified based on the type of failure that occurs, such as slides, falls, and flows. These failures can occur either rapidly or slowly, and they can affect different types of slopes, including steep and gentle slopes.

The steepest slopes are more likely to fail due to the natural inclination of the slope to slide. However, even gentle slopes can fail if they are underlain by weak or unstable layers of bedrock.

The steepest slope is considered a failure, regardless of its angle. The slope failure can occur due to a combination of factors, including rainfall, temperature changes, or human activities.

Landslide characteristics

Several major landslides in the Victorian region have caused property damage and infrastructure interruptions. The one that occurred along the Great Ocean Road in 2000 caused extensive local landslide damage. This section describes the types of landslides and their characteristics, including their triggering factors, such as rainfall, temperature changes, and human activities.

The risk of landslide occurrence in a specific area can be evaluated based on the geological and topographical characteristics of the location. For example, areas with high porosity or low shear strength are more susceptible to landsliding.

Geology and geomorphology

The Otago Region is characterized by the Otago Fault and the North Otago Fault, which are the major geological features of the region. The Otago Fault is a right-lateral strike-slip fault, while the North Otago Fault is a normal fault.

The Otago Region is located in the south-eastern part of the South Island, New Zealand. It is characterized by a rugged landscape with steep hills and valleys, which are the result of tectonic activity.

The Otago Region is rich in geological features, including volcanoes, mountains, and valleys. The landscape is characterized by a combination of landscape features, including mountains, valleys, and cliffs.

The Otago Region is a region of active tectonics, with many earthquakes occurring in the area. The region is also characterized by a rugged landscape with steep hills and valleys, which are the result of tectonic activity.
20.2.3 Landslides in the Hayden region

Introduction

The Hayden region is located southwest of Calypso and northwest of the Murray River. It is the north-eastern part of the study area, roughly bounded by the Murray and the Indigo Rivers to the west, the Murray River to the east, and the Great Dividing Range to the north. The region is characterised by a rugged and undulating landscape with a variety of relief and structural features.

Landslide characteristics

The study area is characterised by a series of fault-bounded blocks that have experienced significant movement, resulting in the formation of landslides in the area. These landslides are typically associated with the widespread occurrence of fault scarps, which form a significant part of the region's topography.

Landslide mechanisms

Fault scarp formation is a key mechanism in the development of landslides within the study area. Faulting and slip along fault zones can lead to the development of landslides, particularly those associated with the boundaries of fault-bounded blocks. These landslides are often characterised by rapid movement and can result in significant downslope displacement of materials.

Geology

The study area is characterised by the presence of a series of fault-bounded blocks, which are distinguished by their different geological compositions. These blocks are composed of a variety of rock types, including sedimentary, igneous, and metamorphic rocks, which have formed through a combination of tectonic and geological processes.

20.2.4 Landslides in the Parana Valley

Introduction

The Parana Valley, located in the southern part of the state of São Paulo, in Brazil, is a region characterised by a series of faults and geological structures that have resulted in the formation of landslides in the area. These landslides are typically associated with the movement of fault blocks and are characterised by rapid movement and significant downslope displacement of materials.

Landslide characteristics

The Parana Valley is characterised by a series of fault scarps, which form a significant part of the region's topography. These fault scarps are associated with the movement of fault blocks, which have resulted in the formation of landslides in the area. These landslides are typically characterised by rapid movement and significant downslope displacement of materials.

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20.2 Slope instability between Framlingham and

Introduction

The slopes of Framlingham are two of the most spectacular in the world. They are formed by a combination of two factors: the gentle slope of the land and the steepness of the cliff. The slope is formed by the erosion of the cliff and the steepness of the cliff is formed by the movement of the land.

Stonework and landforms

The stonework of Framlingham is formed by the erosion of the land and the steepness of the cliff. The stonework is formed by the movement of the land and the steepness of the cliff. The stonework is formed by the movement of the land and the steepness of the cliff.

20.2.2.3 Landforms of the South Gaspé Peninsula Highlands

Introduction

The South Gaspé Peninsula Highlands are a series of steep slopes and ridges that are formed by the movement of the land. These landforms are formed by the movement of the land and the steepness of the cliff. The stonework is formed by the movement of the land and the steepness of the cliff.

Fig 20.1 The stonework of Framlingham

Landslide characteristics

The landforms in the South Gaspé Peninsula Highlands are formed by the movement of the land and the steepness of the cliff. The stonework is formed by the movement of the land and the steepness of the cliff.

20.2.2.4 Landforms of the South Gaspé Peninsula Highlands

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