
Case Study 16.1: Lake Tekapo – Aoraki – Mount Cook Starlight Reserve, New Zealand

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Presentation and analysis of the site

Geographical position: Central South Island of New Zealand in an area bounded by the main range of the Southern Alps in the west and the Two Thumb Range in the east, including a large part of the Mackenzie Basin and also Mount Cook National Park in the province of Canterbury. Villages include Tekapo, Mount Cook and Twizel.

Location: Latitude 44° 00.5' S, longitude 170° 28.7' E (Tekapo Village). Elevation from 710m above mean sea level (Lake Tekapo) to 3750m above mean sea level (Mount Cook).

General description: The core area is Mount John University Observatory (elevation 1032m) on the south-western shore of Lake Tekapo. Tekapo Village (population about 400) is 3 km from the summit of Mount John in a direct line. Twizel and Mount Cook Village are 40 km and 50 km from the summit respectively, neither being visible from Mount John.

Inventory of the remains: The Mount John University Observatory houses four research telescopes of apertures 1.8, 1.0, 0.6 and 0.6m respectively.

History of the site: The Mount John site was surveyed in the early 1960s using NSF funds from the University of Pennsylvania. The observatory was founded in 1965 as a joint astronomical research station of the Universities of Canterbury and Pennsylvania. The partnership continued for a decade.

Cultural and symbolic dimension: The Mount John site is the principal astronomical observatory in New Zealand and the world's southernmost observatory (other than instruments in the Antarctic). It is an excellent site for observing the Magellanic Clouds and the centre of the Galaxy.

The Tekapo and Aoraki/Mount Cook regions have outstanding landscapes of exceptional scenic beauty, including mountains, glaciers, lakes and rivers. The flora and fauna are also exceptional, a number being protected or endangered.

Light pollution is very low and atmospheric transparency is excellent. For a thousand years Maori visited the area to gather food and to observe the regular 'night visitors' in the sky.

Documentation and archives: Information on Mount John can be obtained from the website http://www.phys.canterbury.ac.nz/research/mt_john/index.shtml.

Present site management

Present use: The main astronomical research activities undertaken at the Mt John observatory are high-resolution spectroscopy and studies of variable stars, microlensing and near-Earth asteroids. The site is also used for geophysical and atmospheric research. A 45cm telescope on Mt John and a 40cm telescope at Cowan's Hill near Tekapo are used for public outreach.



Fig. 16.1.1. Top: Mount John University Observatory from the air. **Bottom:** The 'AstroCafe' and its environment. Photographs © Fraser Gunn, courtesy of Mt John Earth and Sky Telescope, New Zealand

Tourist access to Mount John and other dark sky sites in the region is excellent and encouraged, both for recreation and ‘astro-tourism’. The area attracts some 30,000 day-time tourists and 10,000 night-time skywatching tourists annually.

Protection: Light pollution is controlled through a lighting ordinance covering a large region of up to 50 km around Mount John (Section 11 of the Mackenzie District Plan—see link below). This lighting ordinance includes the village but not the Aoraki/Mount Cook National Park, where the New Zealand National Parks Act 1980 (see link below) provides the only existing protection. An extension of the zone protected by the lighting ordinance is currently being mooted, which would include the National Park.

State of conservation: The scientific buildings on Mount John are maintained by the University of Canterbury to the highest standards commensurate with those of a world-class scientific establishment. Three university staff members are permanently resident on site or in the nearby Tekapo Village. Further maintenance personnel make regular visits to Mount John to ensure building maintenance and health and safety issues are addressed.

As major tourist attractions since 2005, the ‘AstroCafe’ and 45cm telescope on Mount John are required to be maintained to the high standards suitable for an important tourist destination.

Context and environment: The environment in the Mackenzie Basin is mainly highland tussock (crown lease land), the remainder being used for sheep runs or recreation. Aoraki/Mount Cook National Park adjoins the basin and comprises steep mountain valleys, high peaks, glaciers and some native forests. Three large lakes formed in the last ice age dominate the region: Tekapo, Pukaki and Ohau.

The Mount John site itself is one of the driest and sunniest locations in New Zealand, with over 2200 hours of sunshine and only 575mm of rainfall annually.

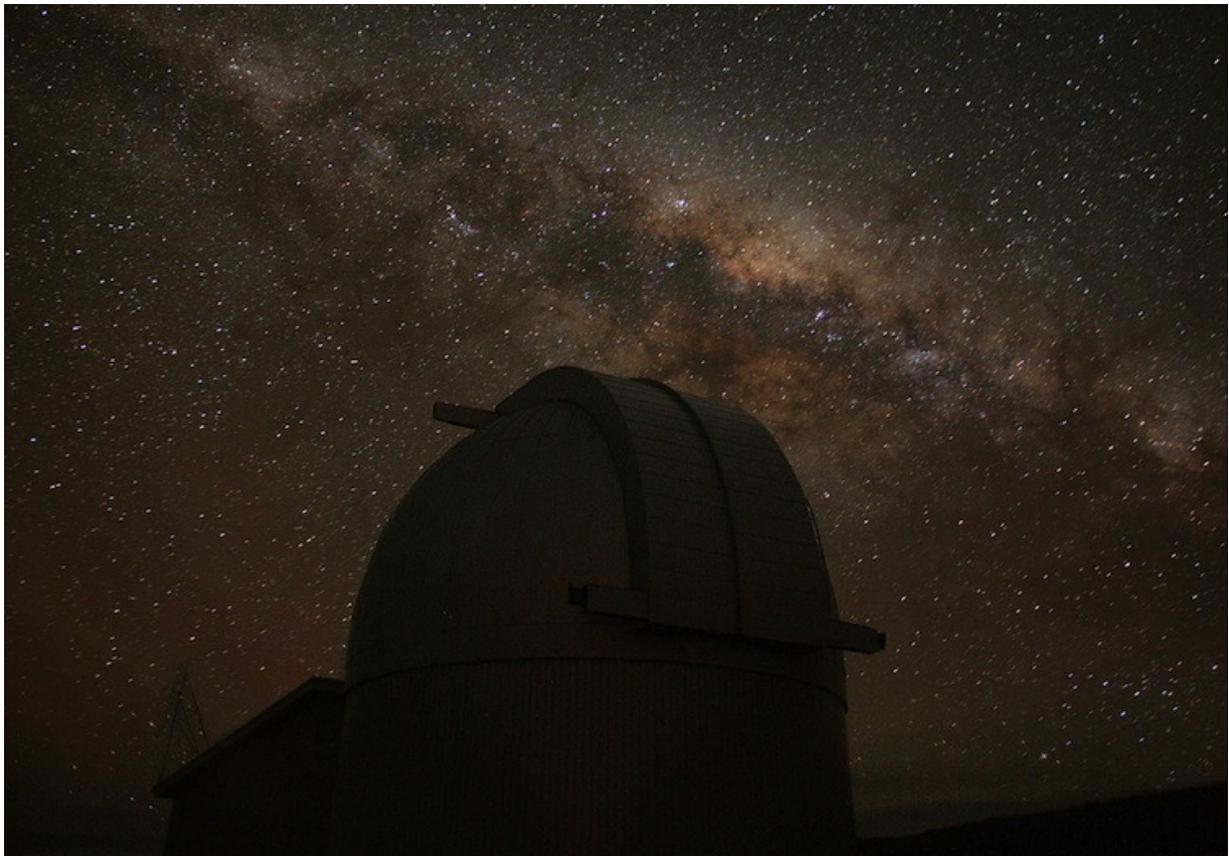


Fig. 16.1.2. The MOA telescope at Mount John and the Milky Way. Photograph © Fraser Gunn, courtesy of Mount John Earth and Sky Telescope, New Zealand

Main threats or potential threats to the site: The enforcement of the lighting ordinance needs to be maintained with vigilance. Over one million tourists annually pass through Tekapo en route to other destinations, and many stay overnight. As tourism develops, the careful protection of the environment in the village is essential. Fortunately, the Mackenzie District Council is committed to sustainable development that protects the environment, including the night sky.

The Mount John site is a mixed site for scientific research, educational tourism and recreation. So far this has been a successful venture, but it needs to be carefully controlled and monitored.

Management: The environment in the Mackenzie Basin is mainly crown lease land, the remainder being privately owned.

The Mackenzie District Council is the branch of local government with jurisdiction over the Mackenzie Basin and Aoraki/Mount Cook. The Council's District Plan is part of the Resource Management Act 1991 and includes a lighting ordinance, first enacted in 1981—see <http://www.mackenzie.govt.nz/Site/Internal/Environmental/Districtplan.aspx>.

The Aoraki/Mount Cook National Park (<http://www.doc.govt.nz/parks-and-recreation/national-parks/aoraki-mount-cook/>) is controlled and managed by the New Zealand Department of Conservation under the authority of the National Parks Act 1980 (<http://www.legislation.govt.nz/act/public/1980/0066/latest/DLM36963.html>).

The University of Canterbury leases the 3 ha. summit of Mount John from the crown (New Zealand government). Earth and Sky Ltd (<http://www.newzealandsky.com/>) have an agreement with the University of Canterbury to run educational astro-tourism at Mount John. This activity is a required condition of the Mount John lease.

Case Study 16.2: Eastern Alpine Starlight Reserve and Großmugl Starlight Oasis, Austria

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Presentation and analysis of the site

Geographical position: East Alpine Starlight Reserve: numerous communities, provinces of Lower Austria, Upper Austria, Styria and Carinthia, Austria. Großmugl Starlight Oasis: community of Großmugl, province of Lower Austria, Austria.

Location: East Alpine Starlight Reserve: Latitude 46° 52' to 47° 58' N, longitude 13° 35' to 14° 55' E. Elevation generally between c. 1000m and 1500m above mean sea level. Großmugl Starlight Oasis (core zone): Latitude 48° 29' 20" N, longitude 16° 13' 20" E. Elevation 250m above mean sea level.

General description: Within the Eastern Alps WSW of Vienna is an elliptical area, about 200 × 100km in size, where the high surrounding mountains provide sufficient shielding from light pollution that the dark night skies are of near perfect natural quality. A separate, much smaller area to the north of Vienna provides a dark-sky 'oasis' that is easily accessible of millions of city dwellers.