



Great observatories of the world

by **Serge Brunier & Anne-Marie Lagrange**

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This is an exciting book describing nearly 60 observatories worldwide and some off-world too. Optical observatories dominate, but the whole spectrum from gamma to radio wavelengths is covered. Collectively the book provides a convenient reference to a mass of information that even the dedicated Internet user would be hard pressed to match.

The book, translated from French, has a few typos and minor factual errors of no great consequence. The period from Galileo's first telescopic observations [1609] to Palomar's 5m Hale is condensed into the first nine pages. The great refractors like Lick and Yerkes and historic observatories like Greenwich or Meudon get scant mention. The book's emphasis is on cutting-edge astronomy and the observatories that support these goals.

French observatories, despite their modest instrumentation, get initial billing. Coverage then spirals outwards through Europe including the Canaries to north and south America – the former includes Hawaii's Mauna Kea whilst Australia's Siding Spring concludes the optical section. Both optical and radio observatories are covered equally in each continent. The final third of the book describes space telescopes from gamma and X-ray through to infrared, and concludes with telescope plans for the future, both space and ground-based. For the latter ESO's 100m aperture OWL (Overwhelmingly Large) optical telescope is destined for Chile – looking like a radio dish but presumably with a surface precision orders of magnitude better to work at optical wavelengths.

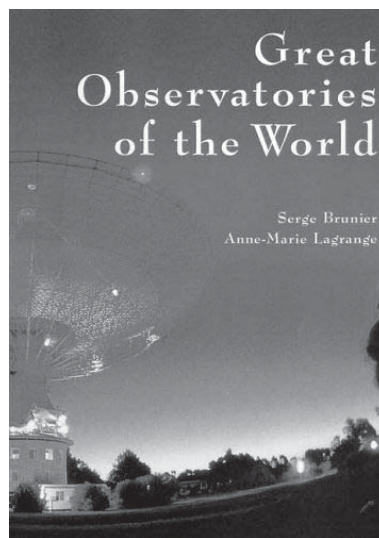
At regular intervals throughout the book, sections describe how telescopes operate and collect data. These are brief but lucid and cover many topics like atmospheric turbulence, adaptive optics and detectors, astrometry, interferometry and spectroscopy, data reduction and analysis. Classic hemispherical domes are no longer in vogue – their modern counterparts are shed-like and often completely open at night to allow the free flow of air to minimise the effects of atmospheric turbulence. Each telescope description includes the working parameters of resolution against designed waveband and limiting magnitudes for a given exposure via quantum efficient CCD detectors.

Many of these great observatories will be familiar to the reader from popular journals, but some less so. It is interesting to read of the former secret US Air Force Starfire base in New Mexico that pioneered laser ranging

and adaptive optics in the 1980s as part of the 'Star Wars' initiative – this technology has now migrated to major astronomical observatories. An unusual design is the 10m Hobby-Eberly at Mt Locke in Texas and its counterpart at Sutherland in South Africa. Both huge telescopes point to a fixed elevation but can rotate in azimuth to cover 70% of the sky throughout the seasons. The telescopes are exclusively used for spectroscopy, reaching mag 23 in two hours' exposure – the

limit for moving the gantry across the static telescope's field of view. However, this compromise reduces the project cost to about 15% of that of a fully-tracked giant like Keck.

The appendices are comprehensive with a map showing observatories worldwide and the URL for the 100 largest. A page shows graphically the 50 largest optical mirrors from 10m Keck to 2.4m Hubble – the UK's 4.2m William Herschel on La Palma trails in 20th place. The largest optical mirrors are mosaiced from smaller hexagonal sections to form huge collecting surfaces, much like a radio dish.



Keck's 10m is the current limit whilst this reduces to 8m for monolithic mirrors – they assume a paraboloidal shape whilst spuncast in a furnace prior to cooling and final figuring. In October 2005 the consortium for the Giant Magellan Telescope announced a 25m aperture multi-mirror telescope of seven mirrors brought to a common focus with the outer six mirrors spuncast as off-axis parabolas.

In summary this is a stunning book profusely illustrated in full colour on quality paper. The double page Sagittarius starfield alone, showing thousands of pinpricks of light, is jaw dropping even for non-astronomical friends. If your forthcoming seasonal presents don't set you alight then buy this volume for yourself – you will not be disappointed.

Maurice Gavin

Maurice Gavin is a BAA past president and retired architect with a passion for observation and spectroscopy, often under his homebuilt dome.

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