

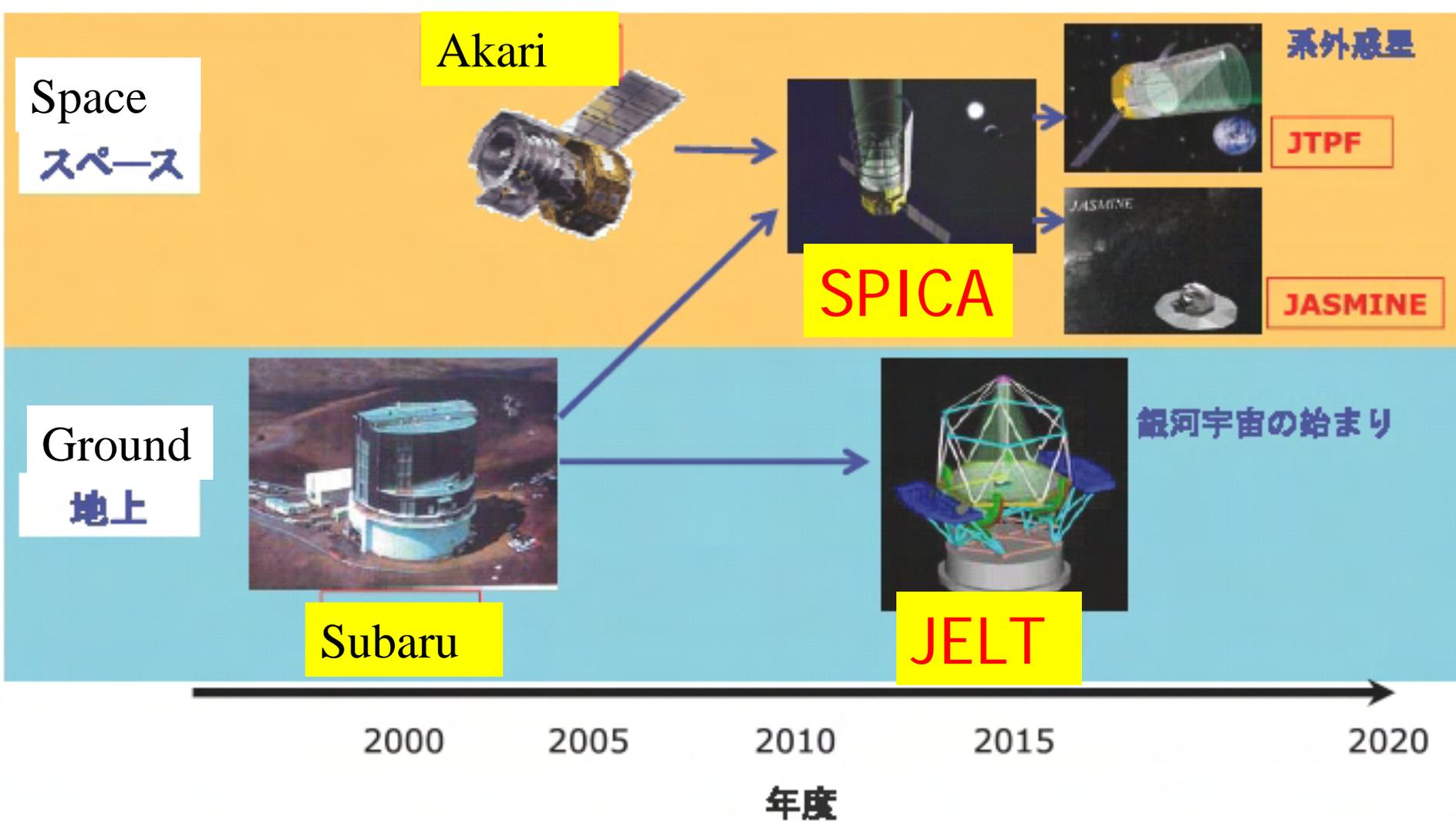
世界のELT情勢

家(国立天文台)

- 42m E-ELT構想
- 30m TMT構想
- 24m GMT構想

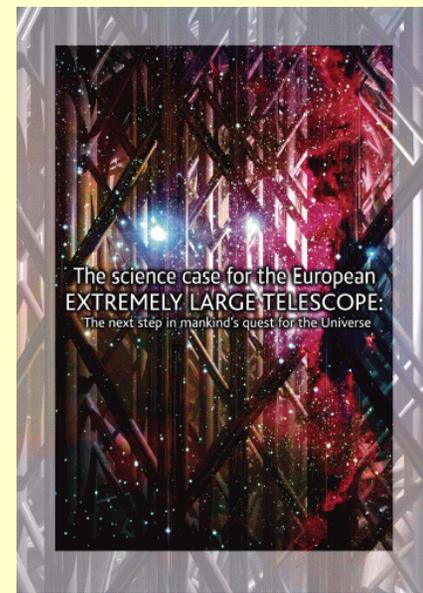
日本の方針

光赤天連ロードマップ



ELTサイエンス

- 暗黒時代／銀河形成
- 初代天体/宇宙再電離
 - 活動銀河中心核(w. AO)
- 近傍銀河恒星種族進化(w. AO)
- 系外惑星(w. AO)
 - 新しい宇宙物理
(ダークエネルギー、宇宙定数、
宇宙膨張直接検証、ガンマ線天体、・・・)



米国より遅れとしても世界一を目指す欧州

- 100mOWL構想見直し宣言(2006/Jan) => 1年で新構想
 - European-Extremely Large Telescope 構想フェーズB検討を承認
 - 口径42m、三非球面系
 - AO, TTを望遠鏡に仕込む
 - 建設予算750ME, 運用10%/年
 - 2009/Feb CDR, 2010年建設開始、2016年部分FL
 - 視野10分角、回折限界、
 - 1050枚セグメント
 - チリ
-
- Cesarsky >
Tim de Zeeuw

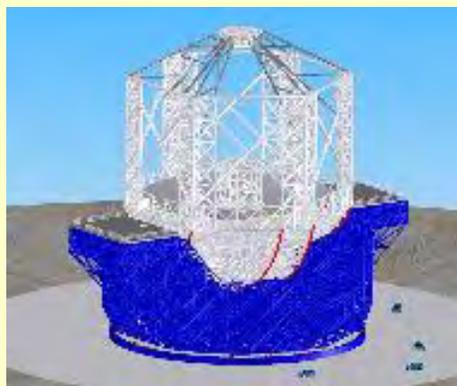


42m E-ELT

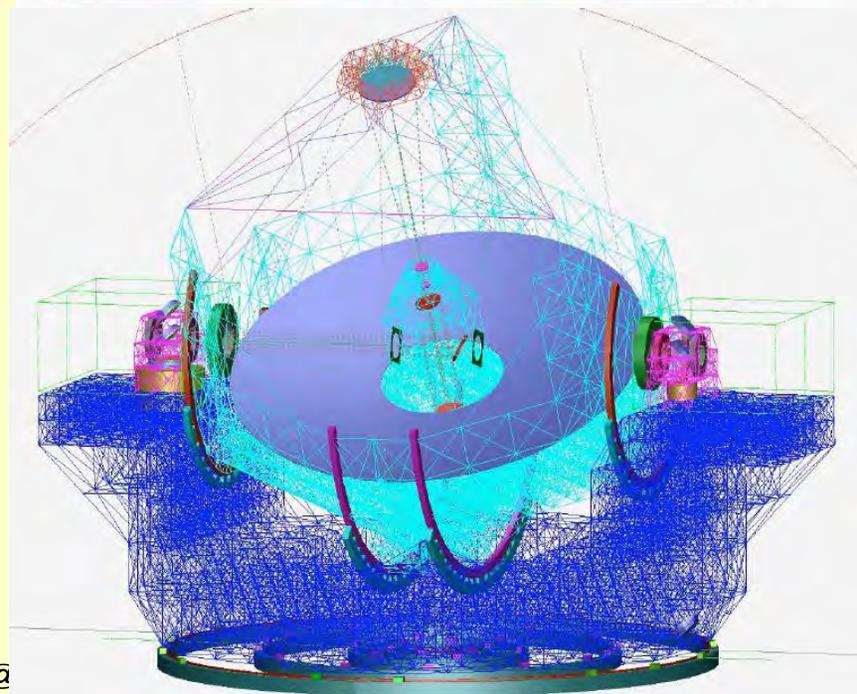
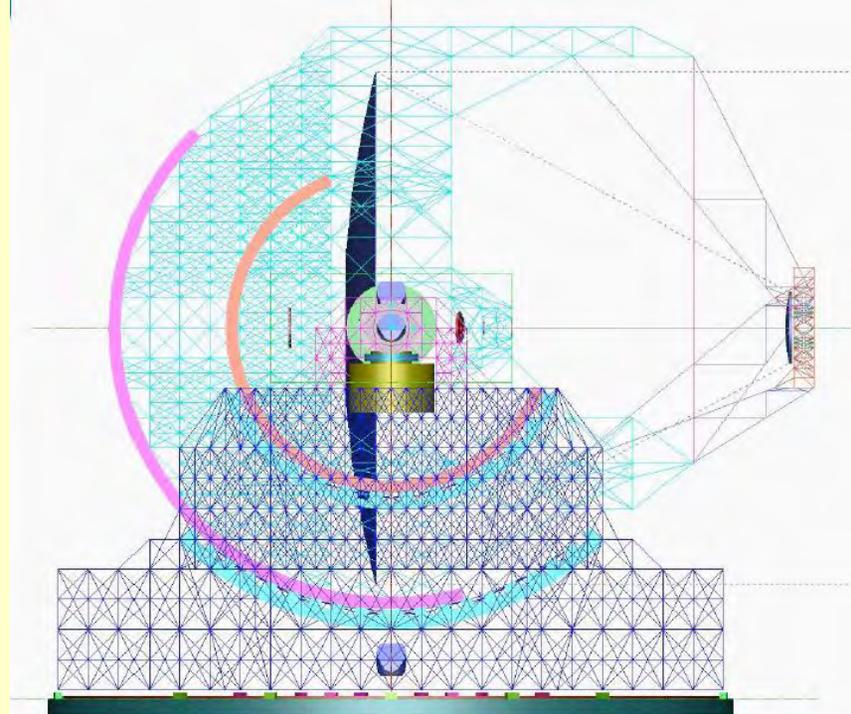
2006年11月のマルセイユ
WSで承認

2006年12月ESO Council
がフェーズB検討開始を
承認

2009年2月フルレビュー



*すばる次期
装置計画への
参画打診





Last modified: 19.09.2006

見直してHPも未充実

ESO

PROJECTS

VLT

ALMA

E-ELT

STATUS

SCIENCE CASE

DESIGN

GALLERY

PUBLICATIONS

LINKS

ELT DESIGN STUDY

AVO

INSTRUMENTATION

OPTICAL DETECTORS

IR DETECTORS

SAMPO

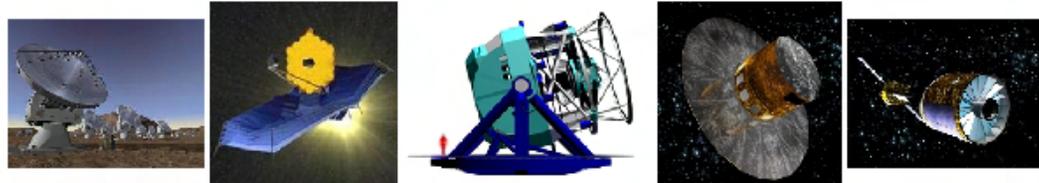
VLT SOFTWARE

TECHNOLOGY TRANSFER

THE EUROPEAN EXTREMELY LARGE TELESCOPE ("E-ELT") PROJECT

BACKGROUND: Observational Astrophysics, 2nd Decade, 3rd Millennium AD

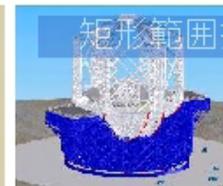
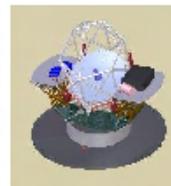
Modern Astrophysics is tackling fundamental questions like: What is the origin and fate of our Universe? How were its basic blocks assembled? Are we alone? For that endeavour, it relies on the combined power of both space and ground-based Observatories covering the whole electromagnetic spectrum from gamma-rays to very low radio frequencies, with in addition the emergence of non-photonic means like neutrinos and gravitational waves. Some of the main new capabilities expected to be deployed before 2020 are shown in the vignettes below.



An essential component in this world-wide strategy is to deploy extremely large optical-IR collectors with exquisite image quality. They will in particular allow to identify and scrutinise promising targets selected along up to hundreds of millions of candidates - the proverbial needle in a haystack - through observations at more exotic wavelengths or large-field surveys. A number of such projects are emerging in North-America (the Giant Magellan Telescope GMT and the Thirty Meter Telescope TMT). Europe is equally present with the European Extremely Large Telescope project or E-ELT in short, conducted by ESO with its community. These pages will strive to keep you current on this exciting development, aiming at more than a factor ten improvement in collected light and image sharpness over the presently running and highly competitive European [VLT Observatory](#).



E-ELT



矩形範囲指定(R)

六角形より同心扇形を米欧にも提案

TMT

2 非球面

F/1.0

六角形

738 segments

120cm 対角,

123 種類

JELT

3 非球面

F/1.5

扇形

798 segments

100x100cm,

14 種類

扇形の利点・欠点

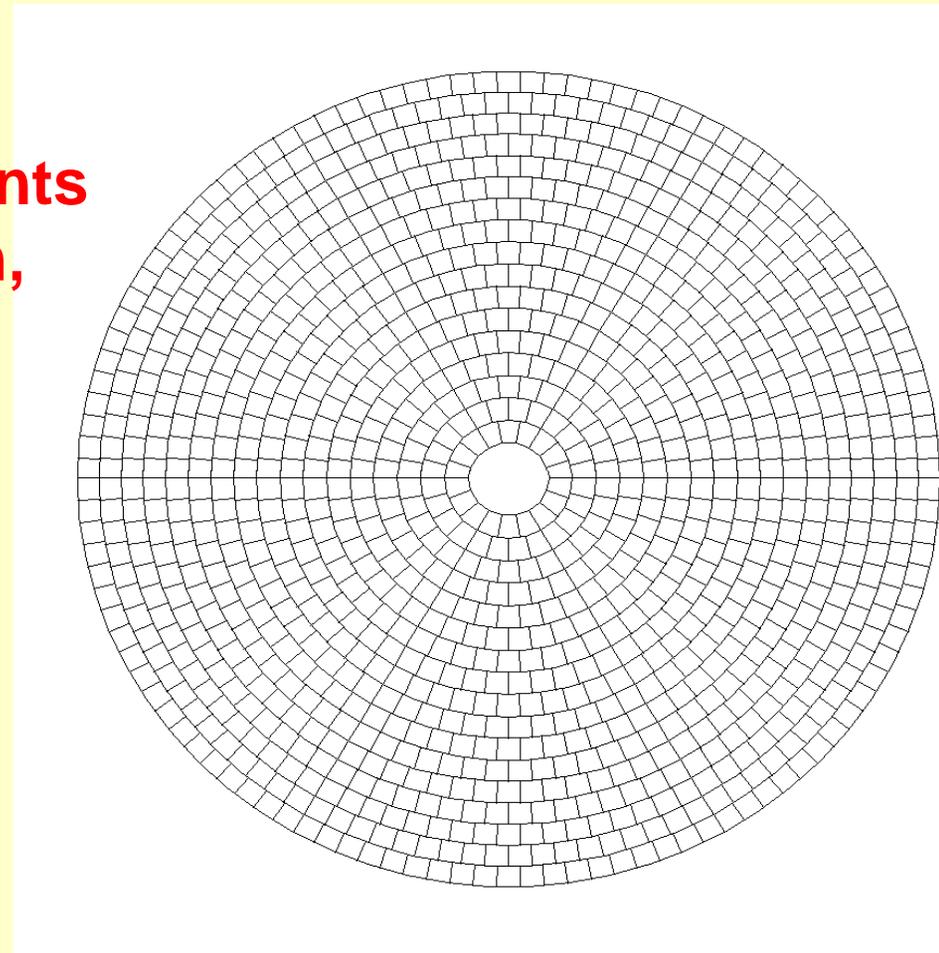
++ 種類が少なく量産効果

++ 経費減

+ PSFが良い

-? エッジ効果は少し大

-? 鏡支持形状幾何学



E-ELTへの参加のメリット

- 1) 基本構想への参画が可能：技術貢献、開発の時間がある。
バームクーヘン型セラミック要素鏡、**LGSAO**、**観測装置**
- 2) 予算化時期が共に**ALMA**後となる

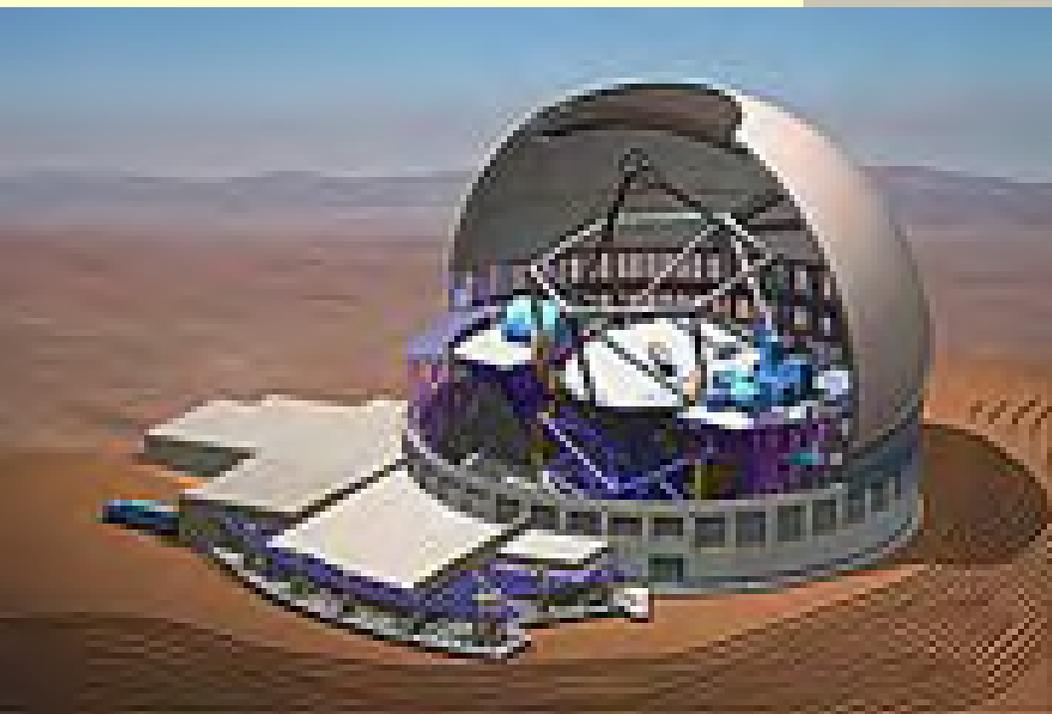
デメリット

- 1) **サイトは南天となろう**。北の**ELT**が無い時代となり、すばるの意義も低下
- 2) すばるはいつまで稼働させる？

TMT

- NSF撤退であせり
- Mauna Kea誘致

TMT Conceptual Design Review	April 2006
TMT Construction Cost Review	September 2006
Construction/Preconstruction Phase Proposal	September 2006
Site Selection Review	July 2007
Preliminary Design Review	October 2007
Earliest Start of Preconstruction/Construction	January 2008
TMT First Light	April 2014
First science	February 2015



**ELT時代のすばるを
活かすためにもハワイ
設置が必定**

**すばるサーベイ+
ELTフォローで日本
の地位確立**



Summit ridge site

Mauna Kea

13 North Site

2

Chilean Sites

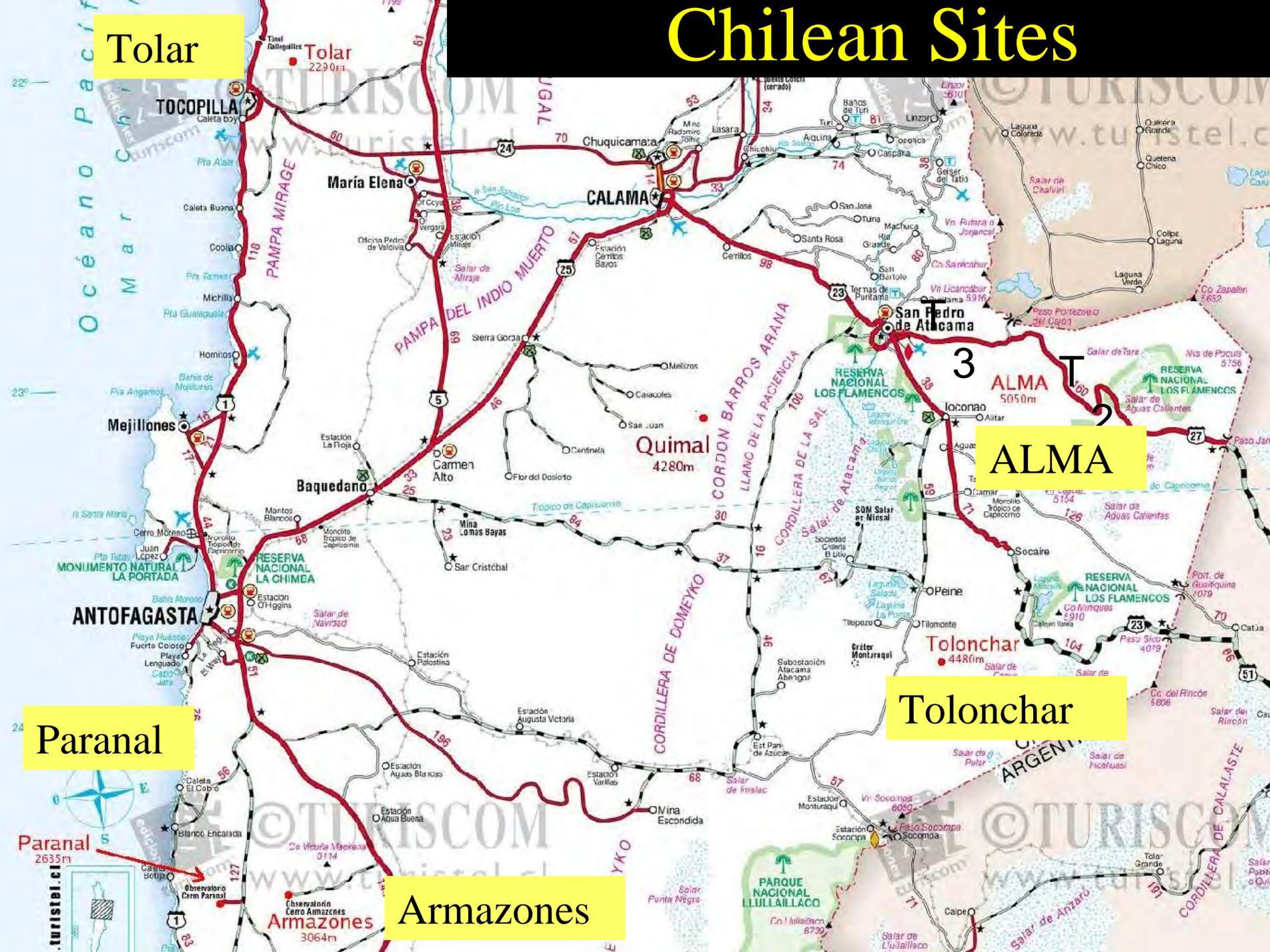
Tolar

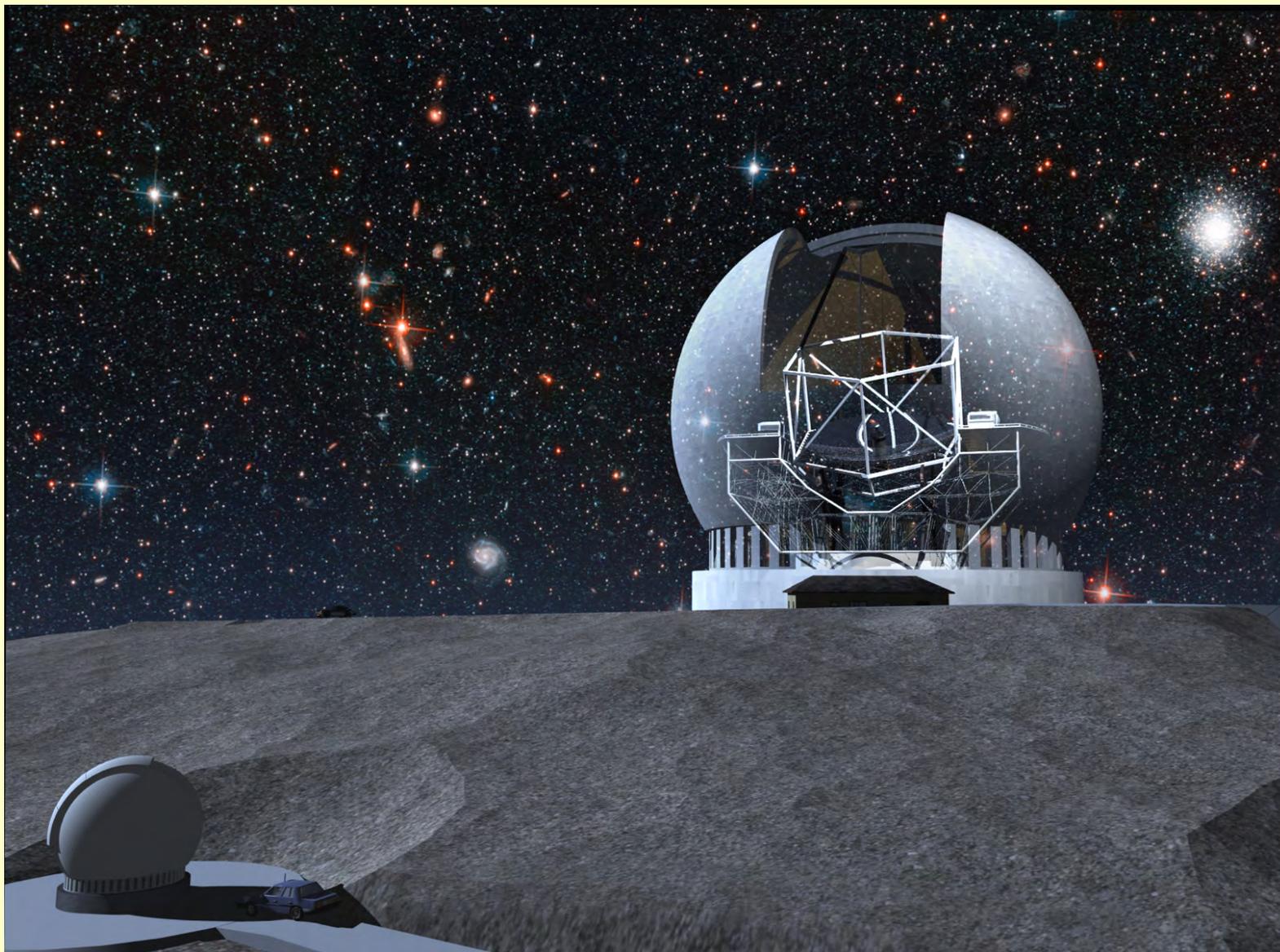
ALMA

Tolonchar

Paranal

Armazones





NSFの苦渋の決断 (Senior Report)

Optical-Infrared Astronomy Transition Program. Gemini operations will continue through 2012. Decisions on new Gemini instrumentation and negotiations for operation beyond 2012 should be guided by a comparison with the cost, performance, and plans of other large optical telescopes. The National Optical Astronomy Observatory should plan to reduce its major instrumentation, data products, administrative and science research staff over the next five years and concentrate on executing its base program more efficiently. Growth in support of a Giant Segmented Mirror Telescope and a Large Survey Telescope should be paced by Federal project choices and the schedule for Major Research Equipment and Facilities Construction account funding as well as progress by the partners in these projects.

Rolf-Peter Kudritzki
Director, Institute for Astronomy
University of Hawaii

December 1, 2006

A report on the long-term future development of observatory sites on the Summit of Mauna Kea is given. A conceptual plan is presented that proposes a much smaller number of future projects than foreseen in the University of Hawaii Master Plan of 2000. The long-range goal is to have eventually fewer observatories than now, but still the very best in the world in this way securing continued world leadership in astronomical research and education in Hawaii for the next decades.

マウナケア誘致へのキャンペーン

The authors recognize and acknowledge the very significant cultural role and reverence that the summit of Mauna Kea has always had within the indigenous Hawaiian community. We are most fortunate to have the opportunity to conduct observations from this mountain.

- Kudritzki's report
- Hawaii Islands Economic Development Board
- NEPA (Federal Environmental Impact Study)
- Department of Land and Natural Resources
- Office of Mauna Kea Management

TMTとの協力課題候補(2006/10協議)

- 望遠鏡本体:
 - 主鏡セグメント, - セグメント支持法, センサー, アクチュエータ
 - 副鏡、第3鏡の駆動、鏡面コート
 - 補償光学:
 - Subaru LGSAO, - NFIRAOSへの応用.
 - 高速実時間制御, 大型可変副鏡
 - 観測装置:
 - 装置製作でのTMT/NAOJ 協力、あるいは日本での製作
 - 研究者・技術者の短期長期派遣
 - 施設:
 - すばる資産の活用、山頂施設と山麓施設建設への協力
 - 運用協力:
- 科学面での提言:
- TMT Science Advisory Committee.
 - Emails, videocon, TMT AO team visit

TMT 構想の動き

4者合意(2004) : Caltech, UC, Canada, (NSF)

(2005年末から) HQ : パサデナ、25FTE

TMTボードから観山台長への手紙(2006/4月) :

概念設計レビュー(5月) : 家、臼田、岩室が参加
すばる/TMT協議(6月) : 観山、林ほか

JELT/TMT TV会議(10/24)

サイトレビュー(11月) : 臼田、高遠

NSF撤退表明(12月)

TMT SWG (12月上旬) : 山田

Moore 財団訪問(1/19)

TMTボード(1/23) : 2009年から3者で建設開始方針を確認

今後

JELT/TMT TV会議(2/26)

UH/TMT/JELT 会議(2/27)

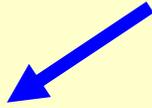
観山台長からの返事(2月中)

Moore財団への正式申請(今夏)

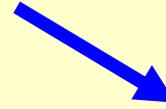
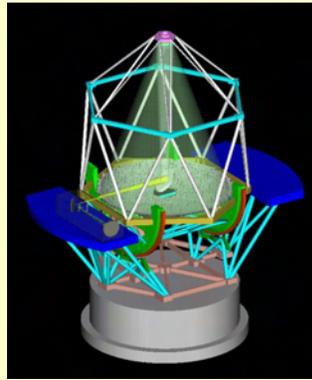
GMT

- カーネギー天文台、アリゾナ大、オーストラリアほか
 - 8.4mx7台 500M\$, 2009~
 - 2006Feb CoDR、チリ設置(土地確保済み)
- President Meserve 6月来訪
 - 黒川学術会議会長、観山、家
 - 望遠鏡に関する技術的貢献の余地は低い
 - 観測装置等

JELT



E-ELT
42m

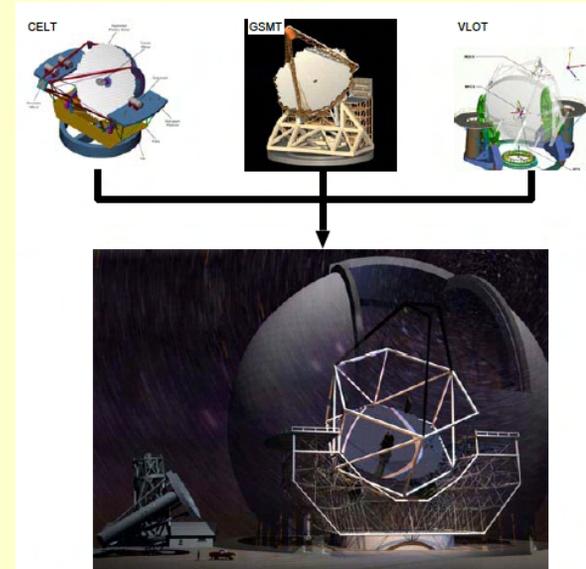


ELT外交・
営業の一年

TMT
30m

ELT情勢の変化
・NSF台所事情
・ESOの決断
・マウナケア誘致

Science,
Cost,
Schedule,
Technology,
Sociology



どちらと駆け落ちするか。 両面外交継続。

光赤外専門委員会からのチェックポイント

- ・JELT推進について
 - ・（スペースは別として）
 - ・ 国立天文台の進める事業として、
 - ・ 光赤外線地上観測分野での日本の本流プロジェクトとしてふさわしいか？
 - ・ 世界の情勢は？
 - ・ 進めるべきか？
 - ・ 進めるとしたらどうやって？
 - ・ (いつまで、大口径拡大路線？
いずれ破綻 どう転換？ ELTは手が届く)

2010's Timeline

