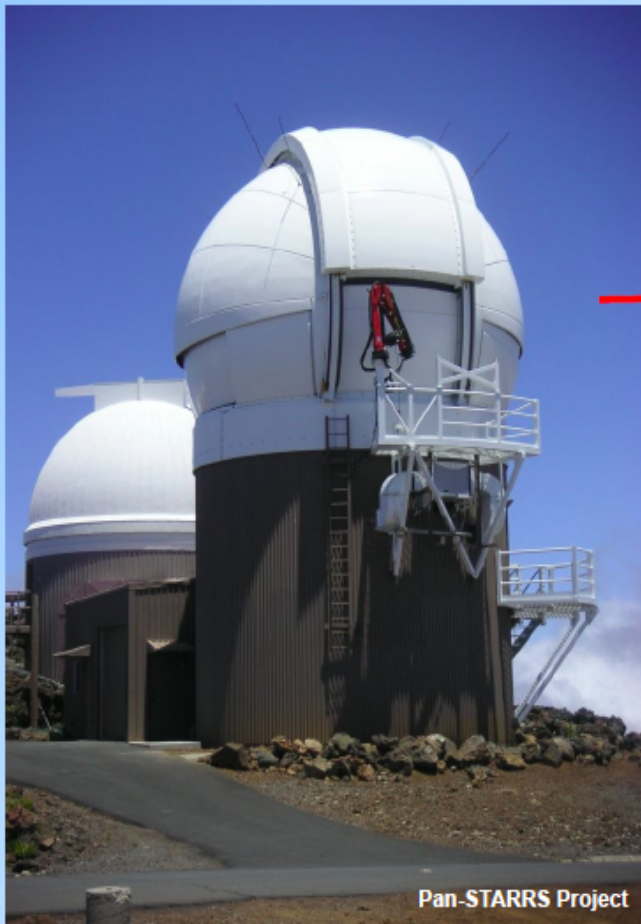
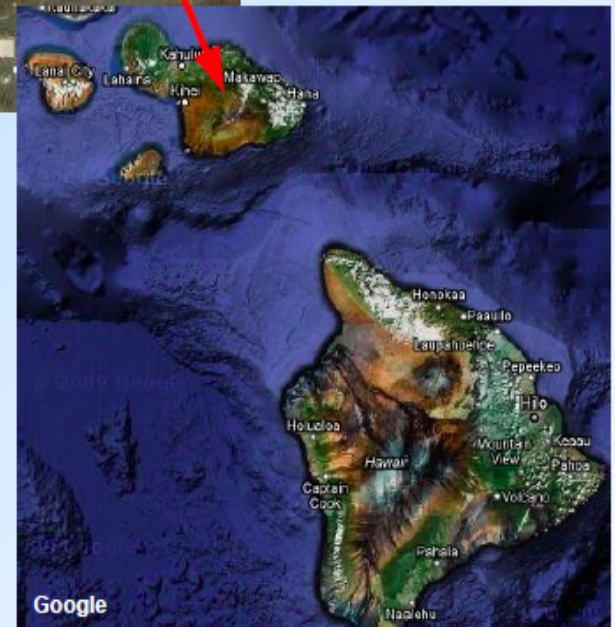


# Pan-STARRS 1: a 1.8m survey telescope (1.4Gpix & 7deg<sup>2</sup> F.O.V.)



Nightly data rate:  
~1.5 TB raw  
~15 TB processed



## PS-1 on Haleakala

### PS1 consortium members



University of Hawaii



University of Arizona

Max Planck Institute for  
Extraterrestrial Physics



Max Planck Institute for Astronomy



JOHNS HOPKINS  
UNIVERSITY

Department of Physics and Astronomy



Harvard-Smithsonian Center for Astrophysics



Queen's University

Queen's University Belfast



University of Edinburgh



Durham University

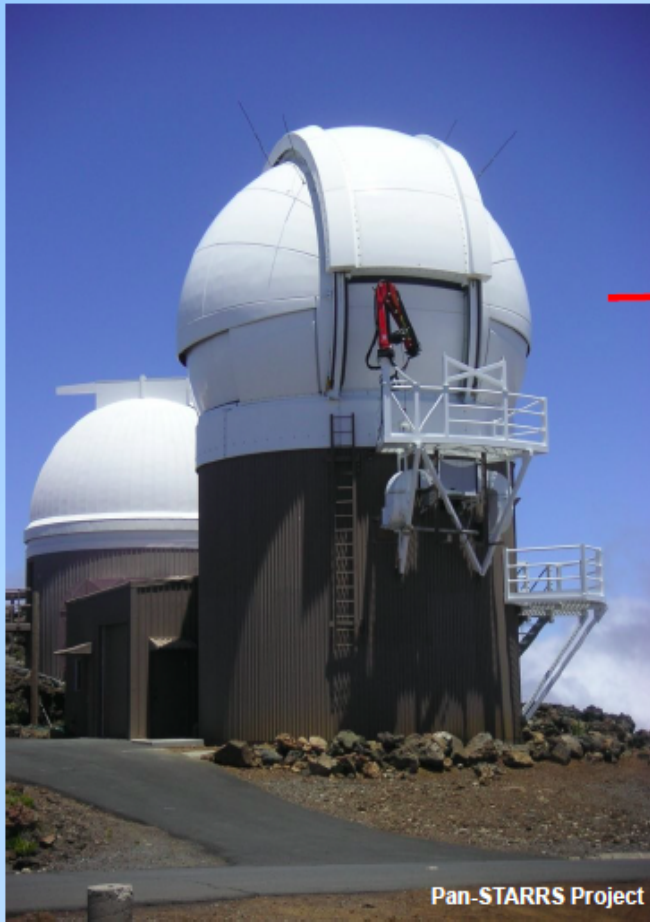


National Central University, Taiwan



Las Cumbres Observatory  
Global Telescope Network

# Pan-STARRS 2 is being commissioned



PS-1 on Haleakala



Nightly data will more than double

PS-2 and PS-1



## PS1 consortium members



Max Planck Institute for Astronomy



JOHNS HOPKINS UNIVERSITY



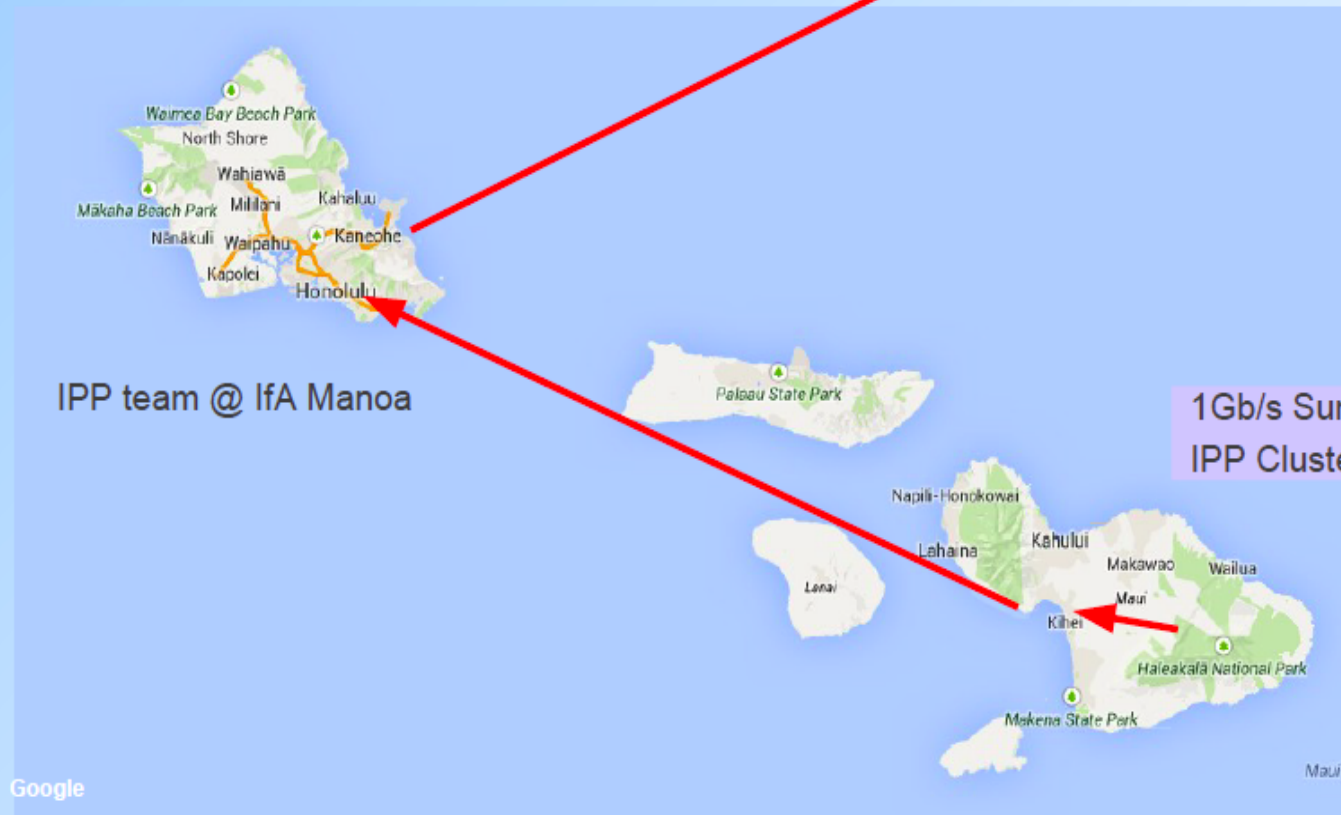
Durham University



# Data Transfer : Telescope to Cluster to the World

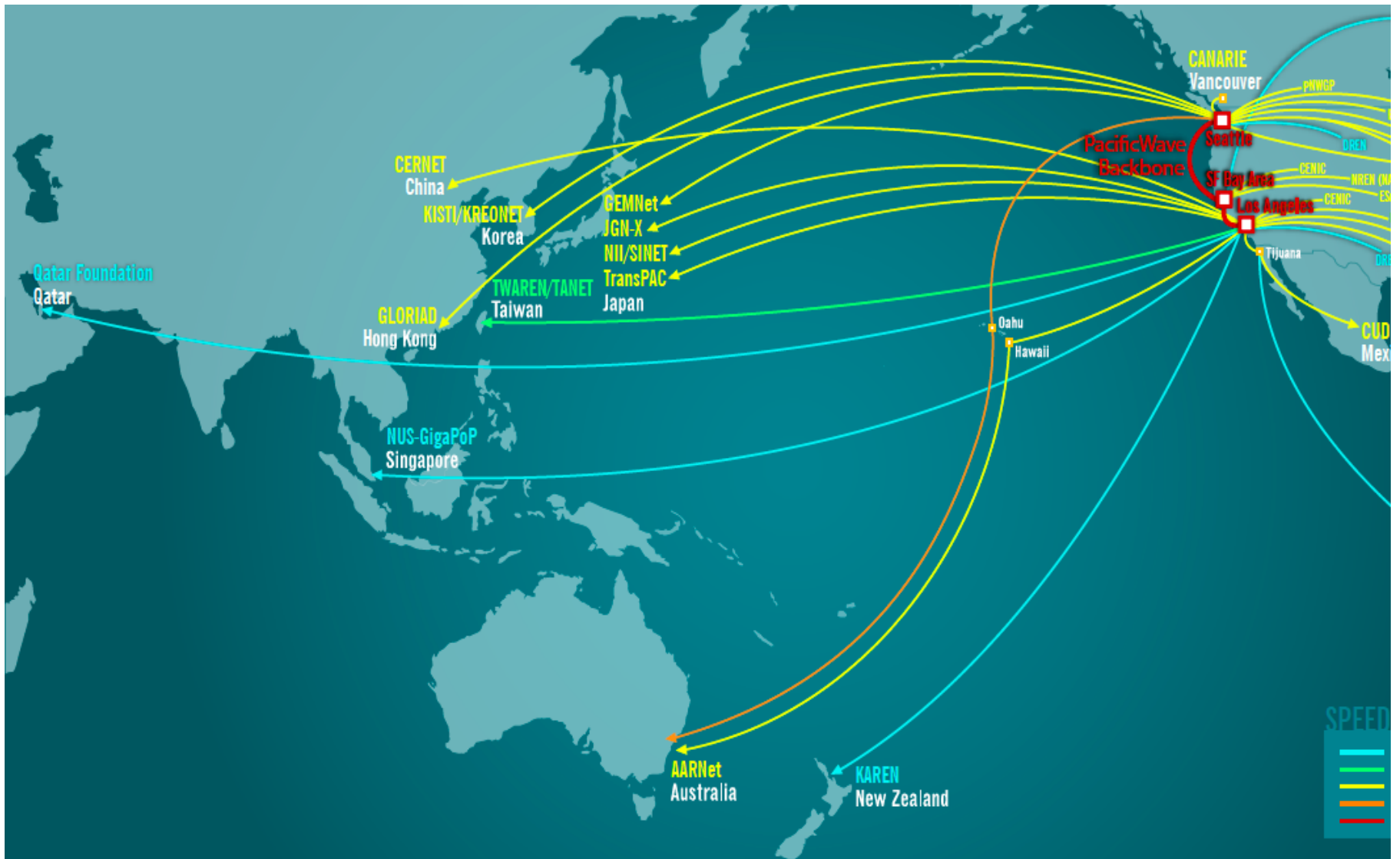
- Data Processing Cluster is at Kihei, Maui
- Data Processing Team is at Manoa, Oahu

Data to Mainland,  
Europe, Taiwan



IPP team @ IfA Manoa

1Gb/s Summit to Kihei  
IPP Cluster @ MHPCC



# TRANS LIGHT PACIFIC WAVE: NETWORK CONNECTIONS

JULY 2013

## Data Volumes and Transfer Rates

- PS1 Data Volume Totals (single copy, compressed) :
  - Raw Data : 700 TB
  - Static Sky : 300 TB
  - Single Epoch Images : 1400 TB
- Data Transfer Experience
  - typical user experience : ~100 Mb/s, limited by:
    - remote user TCP/IP settings
    - data localization on PS1 cluster
    - inefficient threads
    - ???
  - tests with U. Maryland : 6 Gb/s sustained
    - i.e., full PS1 raw data transfer : ~11 days
    - but, full PS1 processed data : > 150 days!
    - full PS1 + PS2 process data (2016) : > 1 year!

## Importance of Future 100Gb/s Links

- PS1 + PS2 will start a new survey mid-2014
- Full partners and future survey parameters are TBD
- Remote partners want data access
- 100Gb/s enables timely downloads, repeat downloads
- 100Gb/s might enable some partners to join
  - e.g., Euclid in Europe

## Data Transfer Test Case

- Max-Planck-Institut Fuer Extraterrestrische Physik
  - Garching, Germany
  - Stellar Transit Survey dataset
  - 16,000 exposures
  - ~50 TB processed
  - current speeds of 150 Mb/s : 30 days to transfer
  - multiple re-processing runs planned
- Needed support:
  - help to clear bottlenecks
  - guidance on routing choices