Pacific Northwest
NATIONAL LABORATORY
Proudly Operated by Battelle Since 1965

Evaluation of using dual-IRTs to measure Sea Surface Skin Temperature

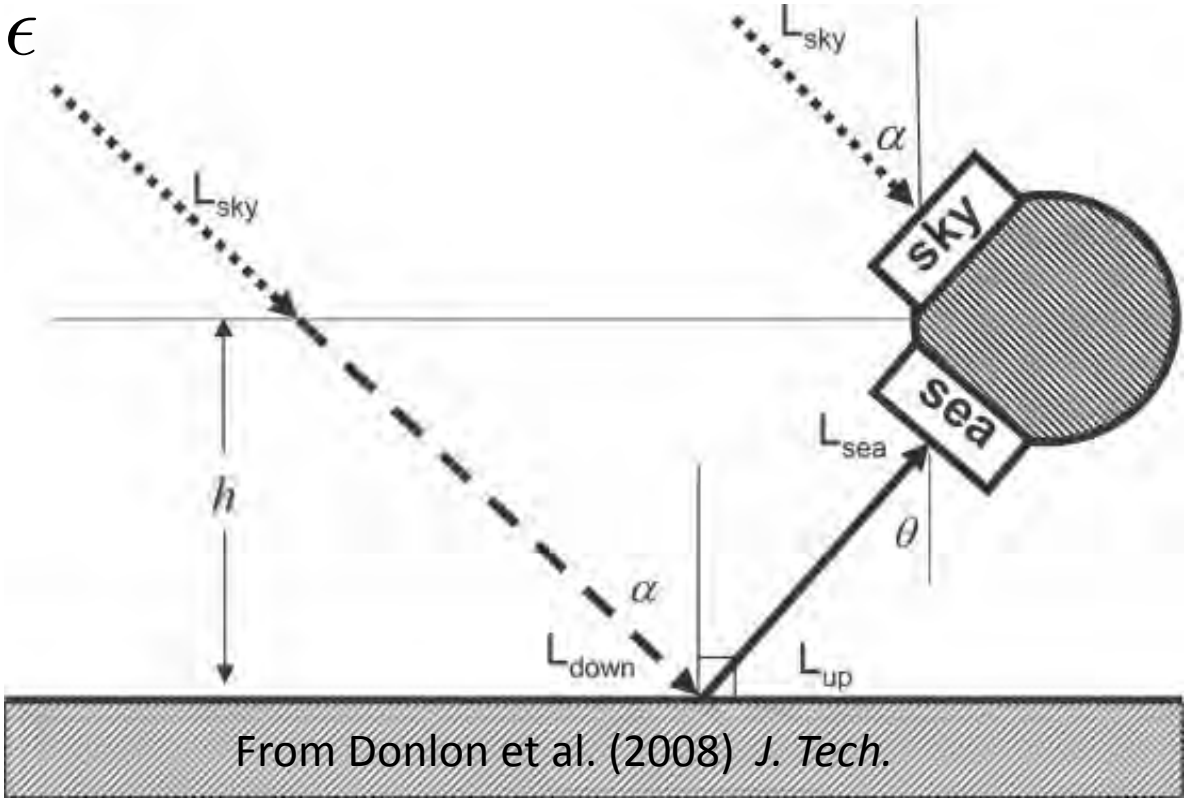
LAURA RIIHIMAKI (LAURA.RIIHIMAKI@PNNL.GOV)

KEN KEHOE, VICTOR MORRIS, MIKE REYNOLDS, MIKE RITSCHE

Sea Surface Skin Temperature can be derived from IR radiances

Because seawater is not a perfect blackbody, radiances must be corrected for reflected atmospheric radiances

$$L_{SST} = \frac{L_{sea} - (1-\epsilon)L_{sky}}{\epsilon}$$



From Donlon et al. (2008) *J. Tech.*

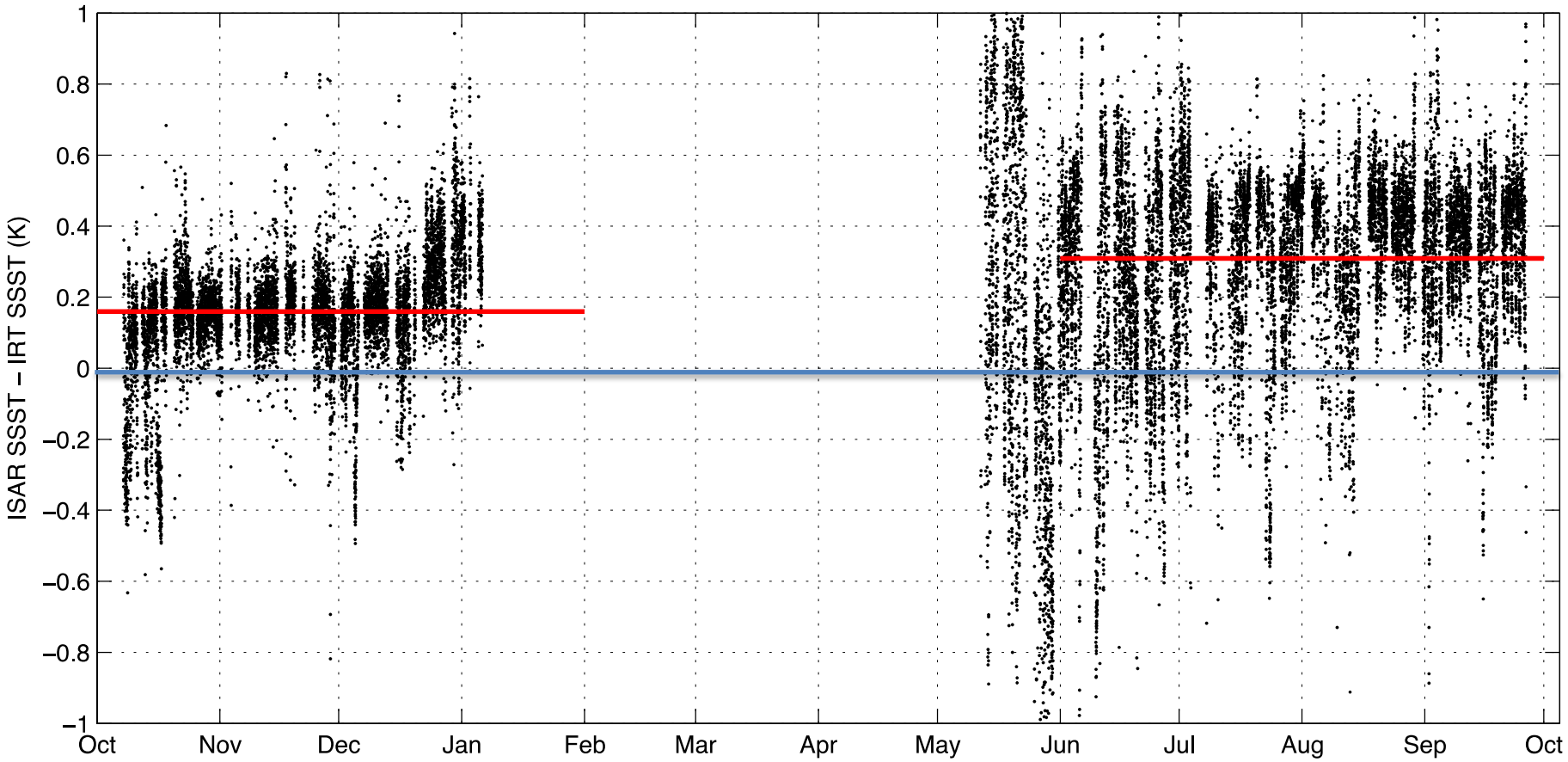
What instrumentation to use? Testing the dual IRTs against the ISAR during MAGIC

- IRT pro: we already have the instruments
- IRT con: exposure to sea salt and precip and additional bias caused by two instruments

IRTs have overall 0.2 K bias, within IRT instrument specs of 0.5 K.

First half of MAGIC
0.16 K bias, 0.17 K st. dev.

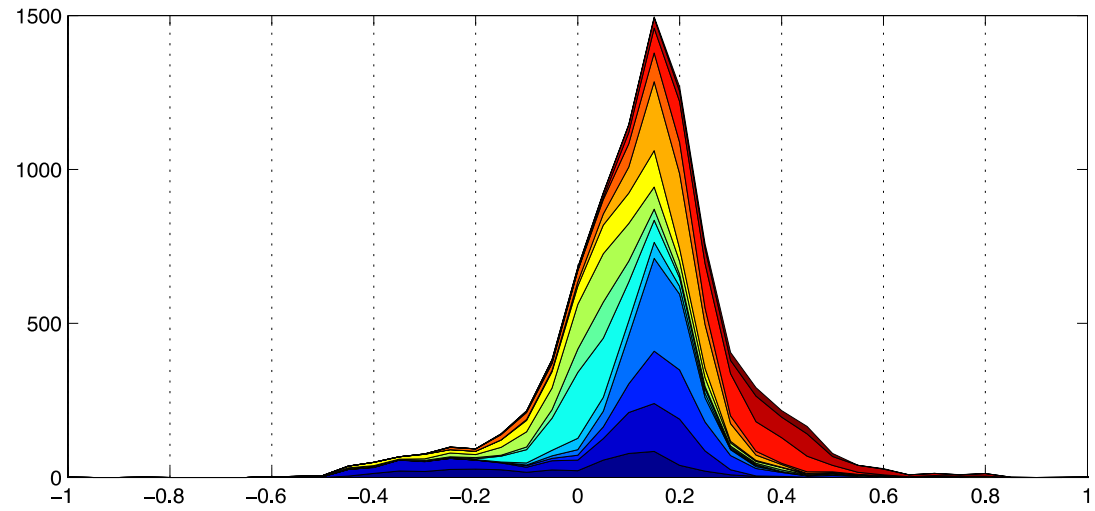
Second half of MAGIC
0.31 K bias, 0.26 K st. dev.

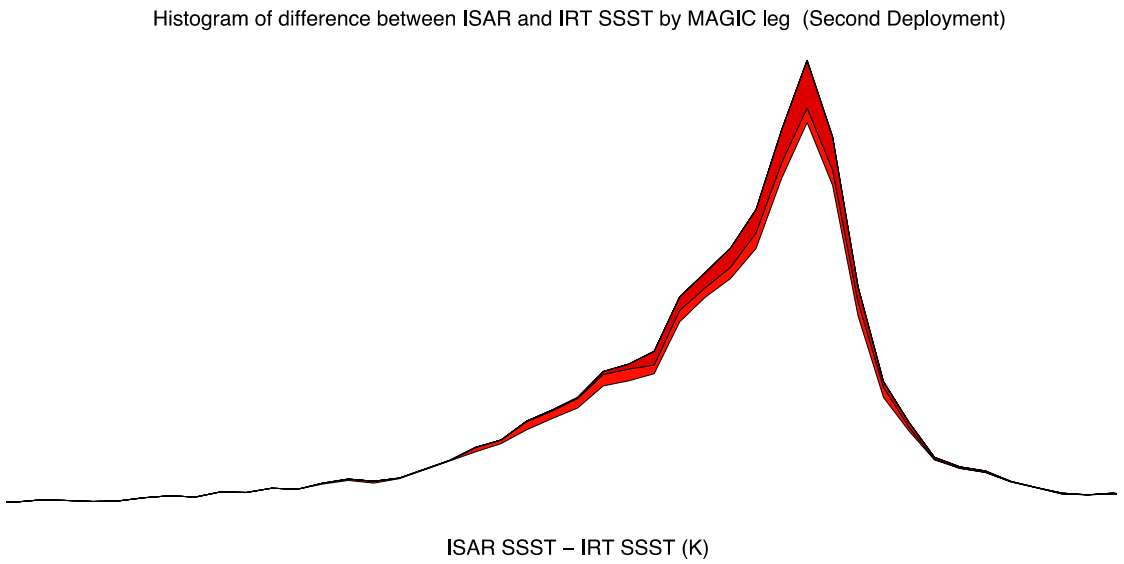


The ISAR – IRT bias increases with time

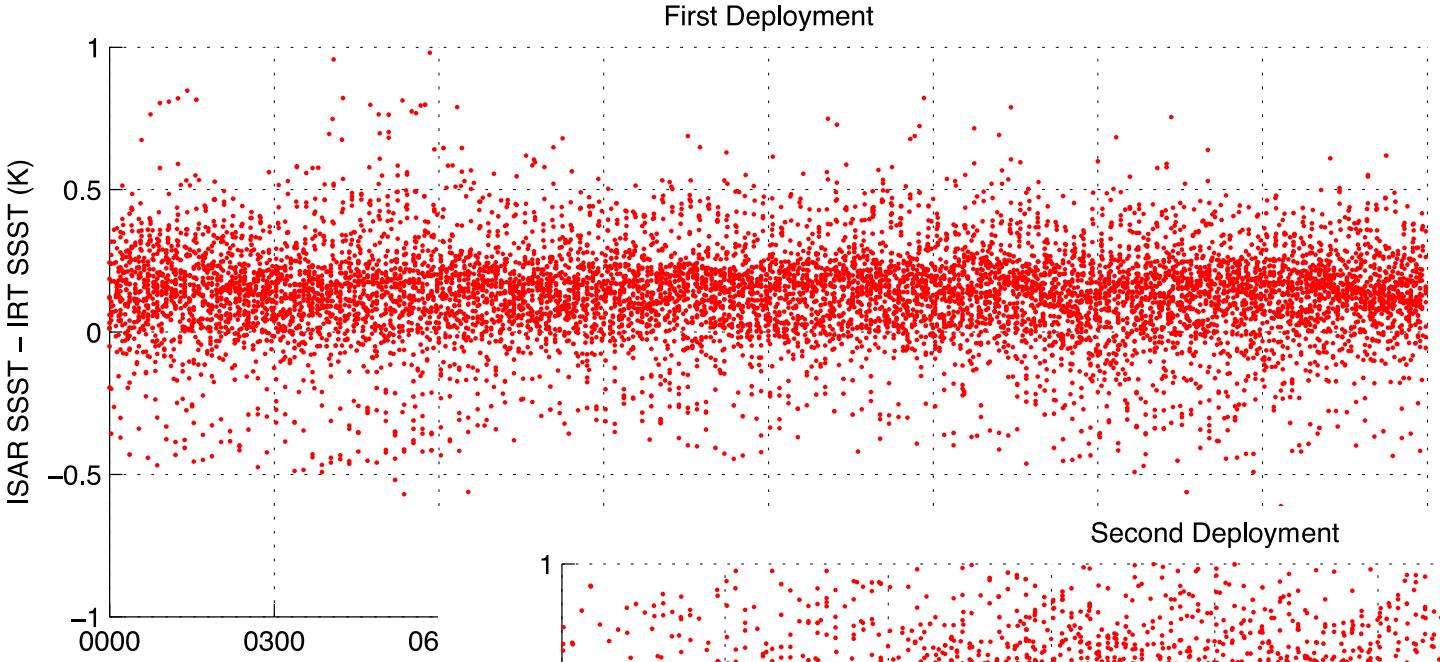
Histograms of biases by leg of the MAGIC deployments

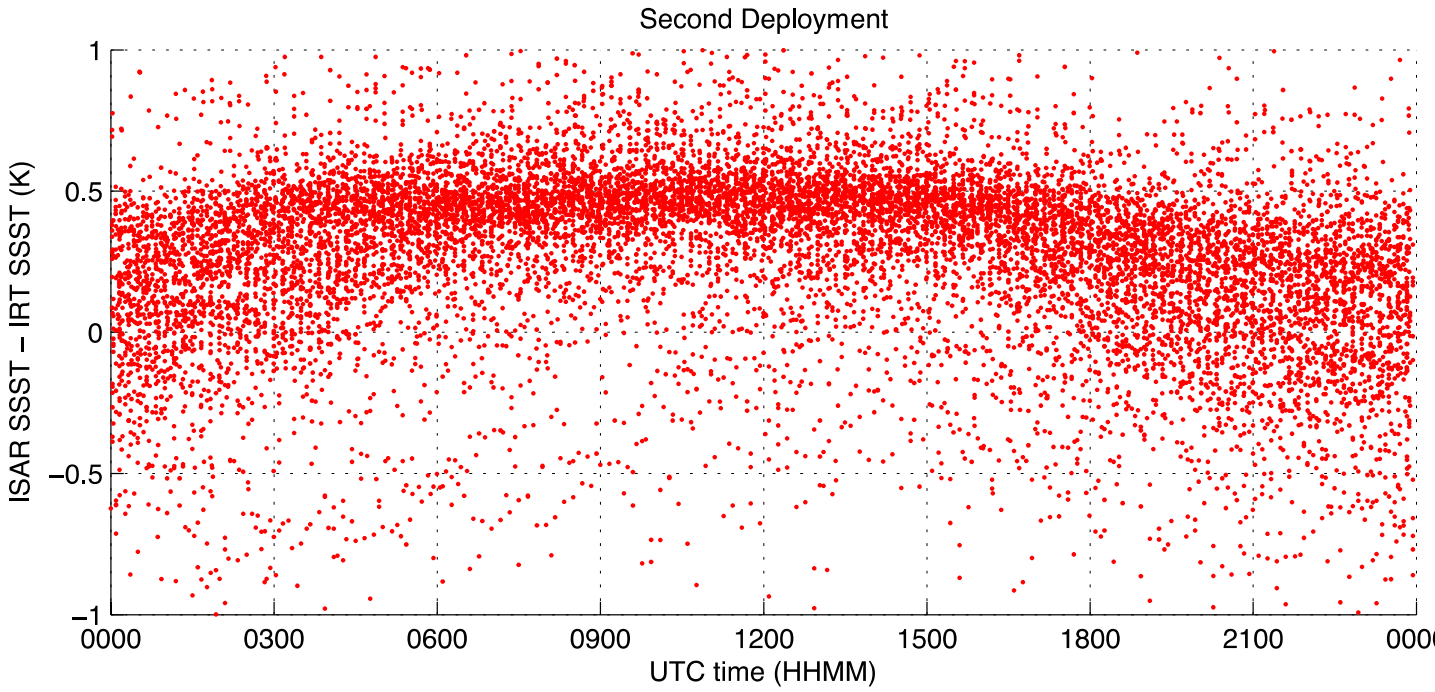
Each color represents one leg of the MAGIC deployment, with blue at the beginning and red towards the end of the deployment





Diurnal component to bias in second deployment but not first



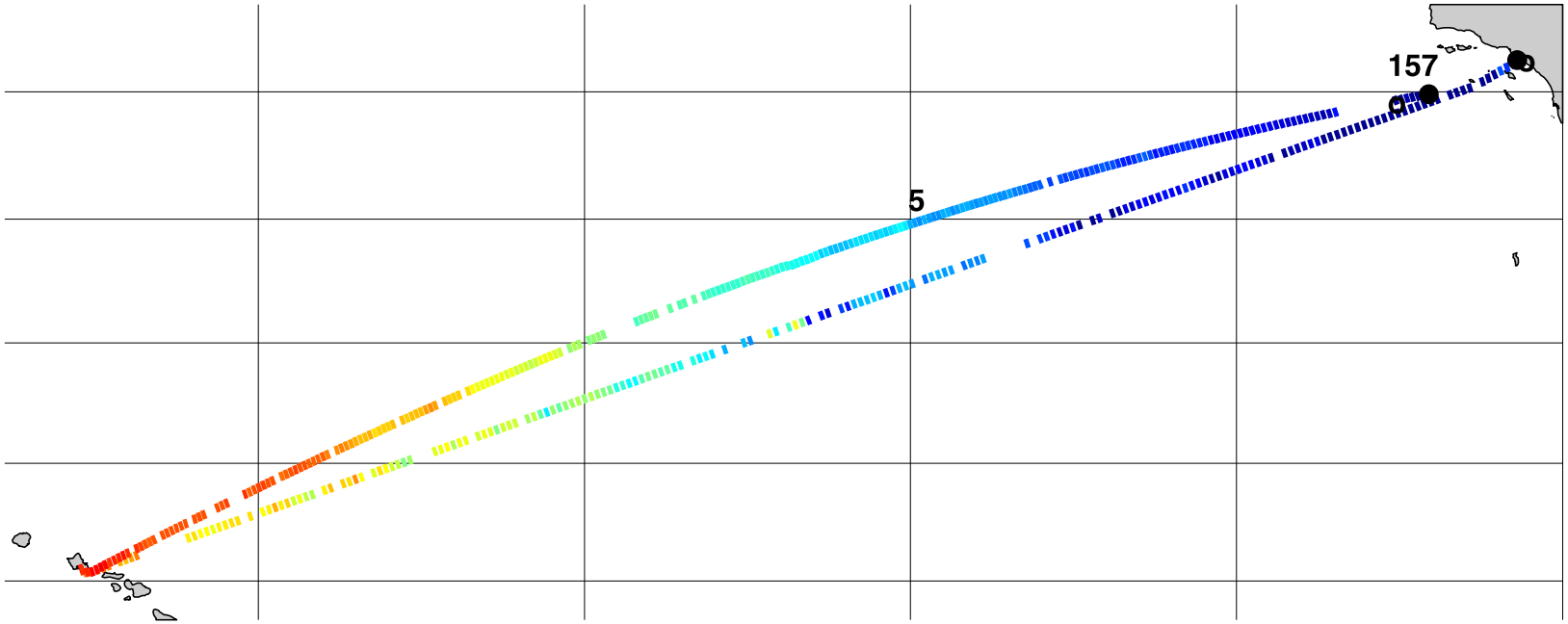


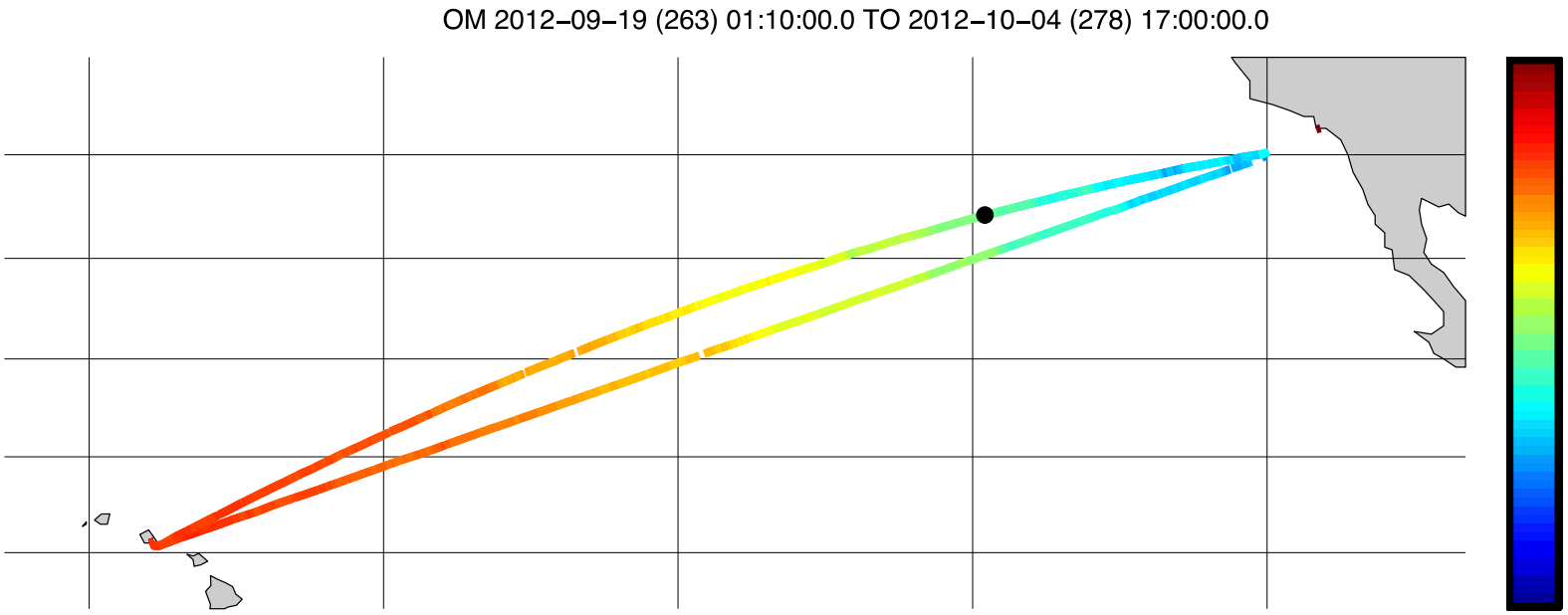
Conclusions & Future Work

- Over the full time period IRT method has a bias of 0.2 K with a standard deviation of 0.3 K compared to ISAR, which is within the accuracy of the IRT manufacturer specs of 0.5 K.

- Three interesting differences seen:
  - Increased bias over time in a deployment
  - Different bias between two deployments
  - Diurnal variation to bias in second deployment

- It is possible that additional improvement can be made if the specific difference are explained:
  - Sensors decline in sensitivity with
  - Different orientation
  - NAV best estimate might give more accurate emissivity values
  - ISAR differences between two deployments?


157
5


OM 2012–09–19 (263) 01:10:00.0 TO 2012–10–04 (278) 17:00:00.0