**MAGIC Data Intro: Leg Date and Time Summaries**

Version 2014-02-04

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 This document provides information on the timing of the MAGIC deployment that will be helpful to anyone using MAGIC data, specifically, it lists the dates and times when the ship was at sea and in port. This information might change as further processing occurs (although any such changes are expected to be very minor and consist of only small differences in the times listed below), and when such changes are made a new version of the document will be made available. Versions of this document will be denoted by date rather than version number, so consult the date above to see if you have the latest version. Please report any questions, concerns, suggestions, or errors to Ernie Lewis at elewis@bnl.gov.

 MAGIC involved deployment of the Second ARM Mobile Facility (AMF2) aboard the Horizon Lines Ltd. cargo container ship *Spirit* as it plied its regular route between Los Angeles, CA and Honolulu, HI, making one round trip every two weeks. The *Spirit* generally left Los Angeles every other Saturday at around 5 am local time and arrived in Honolulu approximately 4.5 days later, at around 9 pm local time the following Wednesday. After approximately 24 hours in port, the *Spirit* returned to Los Angeles, arriving approximately 6.5 days later at around 5 am local time the following Thursday, and remained in port approximately 48 hours. The slower time on the return resulted in lower fuel costs and allowed for a two-week schedule. The *Spirit* sometimes ran a rhumb line (a constant bearing, resulting in a straight line on a Mercator projection) and sometimes a great circle route, to and from Hawaii. The great circle distance is ~4100 km, and is ~20 km shorter than a rhumb line. The distance between the two routes at their midpoints is ~85 km.

 The *Spirit* docked at the Port of Los Angeles generally near 33.730N, 118.257W (the location varied by up to nearly 1 km, or 0.01 degrees) and at the Port of Honolulu at 21.314N, 157.883W. As 0.001° latitude is approximately 100 m, and 0.001° longitude is ~83 m in Los Angeles and ~93 m in Honolulu, it makes little sense to report these locations to greater accuracy.

 Each round trip is called a “leg,” and legs are numbered sequentially as “LegxxA” for the trip from Los Angeles to Honolulu and “LegxxB” for the return leg, where “xx” refers to the two digit leg number (this allows for proper sorting of files). Each portion of a leg is defined to start when the ship left port, so the time in port is part of the previous leg. Arrival and departure times are somewhat ambiguous due to the definition of when the ship actually arrived or departed. However, any reasonable definition would yield values of start and end times that agree with those listed below to within 30 minutes or so. Measurements taken within an hour or two of the beginning and ending times listed below should be assumed to have a strong anthropogenic influence (especially aerosol measurements), and in general, the data taken in port will not be meaningful, as there were typically large metal cranes over the instruments or nearby, and there were numerous aerosol sources such as tug boats, other ships, machinery on the dock, etc. Some of the instruments were turned off near or in port for various reasons: the UHSAS, CPC, and PSAP (aerosol instruments) were turned off in port, the MWACR (W-band radar) measured only moments in both ports, the BSRWP (radar wind profiler) was in standby mode in both ports, the RHP (stable table for the W-band radar) was off in both ports, and the HSRL and MPL (lidars) were off in Hawaii.

 All times in this document are in UTC. Los Angeles is 8 hrs behind UTC, and 7 hrs behind UTC during daylight saving time. Honolulu is always 10 hrs behind UTC, as Hawaii doesn’t observe daylight saving time. Daylight saving time ended November 4, 2012 at 2:00 am local time (which would correspond to 09:00 UTC in California) and began again March 10, 2012 at 2:00 am local time (which in California would correspond to 10:00 UTC). MAGIC was concluded by the time daylight savings time ended on November 3, 2013 at 2:00 am local. Although all times were recorded in UTC, the *Spirit* observed local time for meals, shift watches, etc., except that during daylight saving time it split the two-hour difference between Alaskan Standard Time and Hawaii-Aleutian Standard Time into one-hour changes each for two successive nights, with the consequence that during one of those days local time did not correspond to any actual time zone.

 MAGIC commenced with Leg00 in February, 2012. This was an exploratory leg to investigate meteorology, ship motion, and radiosonde launches. The next voyage with MAGIC personnel was Leg01B, which started on September 15, 2012. The mast meteorological system and ISAR were the only instruments on this leg. The AMF2 and other MAGIC instrumentation were installed when the *Spirit* was in the Port of Los Angeles after Leg01B and before the start of Leg02A on September 22, 2012. All MAGIC instrumentation was uninstalled on January 13, 2013 before the *Spirit* went into dry dock. The AMF2 and MAGIC instrumentation were re-installed on May 9-10, 2013, and MAGIC continued with Leg10A, which started on May 11, 2013. An IOP, during which there were 8 sonde launches per day (instead of the normal 4), occurred on Leg 14, from July 6-18, 2013. MAGIC continued until the end of Leg20B in October, 2013. The AMF2 and all MAGIC instrumentation were removed from the *Spirit* on October 10, 2013.

**MAGIC Leg Start and End Times**

Complied by Ernie Lewis 2014-02-04

**All times are UTC.**

|  |  |  |  |
| --- | --- | --- | --- |
|  | A |  | B |
|  | Depart LA | Arrive HI |  | Depart HI | Arrive LA |
| Leg00 | 2012-02-11, 13:30 | 2012-02-16, 09:00 |  | 2012-02-17, 09:00 | 2012-02-23, 15:00 |
| Leg01 |  |  |  | 2012-09-14, 23:20 | 2012-09-20, 13:40 |
| Leg02 | 2012-09-22, 12:15 | 2012-09-27, 05:50 |  | 2012-09-28, 09:50 | 2012-10-04, 14:20 |
| Leg03 | 2012-10-06, 11:30 | 2012-10-11, 06:30 |  | 2012-10-12, 08:00 | 2012-10-18, 13:30 |
| Leg04 | 2012-10-20, 11:25 | 2012-10-25, 06:15 |  | 2012-10-26, 06:40 | 2012-11-01, 13:20 |
| Leg05 | 2012-11-03, 17:50 | 2012-11-08, 15:00 |  | 2012-11-09, 17:30 | 2012-11-15, 15:00 |
| Leg06 | 2012-11-17, 12:20 | 2012-11-22, 07:30 |  | 2012-11-24, 10:15 | 2012-11-30, 01:20 |
| Leg07 | 2012-12-01, 13:30 | 2012-12-06, 09:00 |  | 2012-12-07, 08:20 | 2012-12-13, 14:45 |
| Leg08 | 2012-12-15, 13:00 | 2012-12-20, 08:30 |  | 2012-12-22, 08:15 | 2012-12-28, 00:00 |
| Leg09 | 2012-12-29, 12:30 | 2013-01-03, 07:00 |  | 2013-01-05, 04:50 | 2013-01-13, 03:35**SEE NOTE 1** |
| Leg10 | 2013-05-11, 11:20 | 2013-05-16, 06:20 |  | 2013-05-17, 16:30 | 2013-05-23, 14:00 |
| Leg11 | 2013-05-25, 11:25 | 2013-05-30, 06:30 |  | 2013-05-31, 11:15 | 2013-06-06, 13:30 |
| Leg12 | 2013-06-08, 11:25 | 2013-06-13, 06:35 |  | 2013-06-14, 16:35 | 2013-06-20, 13:35 |
| Leg13 | 2013-06-22, 11:30 | 2013-06-27, 07:45 |  | 2013-06-28, 17:30 | 2013-07-03, 23:10 |
| Leg14 | 2013-07-07, 17:35 | 2013-07-12, 06:50 |  | 2013-07-13, 11:45 | 2013-07-18, 23:15 |
| Leg15 | 2013-07-20, 12:00 | 2013-07-25, 05:45 |  | 2013-07-26, 13:10 | 2013-08-01, 13:30 |
| Leg16 | 2013-08-03, 13:30 | 2013-08-08, 05:40 |  | 2013-08-09, 10:15 | 2013-08-15, 14:30 |
| Leg17 | 2013-08-17, 18:30 | 2013-08-22, 10:15 |  | 2013-08-23, 17:15 | 2013-08-29, 13:20 |
| Leg18 | 2013-08-31, 11:45 | 2013-09-05, 06:35 |  | 2013-09-06, 12:00 | 2013-09-12, 13:40 |
| Leg19 | 2013-09-14, 12:25 | 2013-09-19, 06:20 |  | 2013-09-20, 11:20 | 2103-09-26, 13:55 |
| Leg20 | 2013-09-28, 11:35 | 2013-10-03, 06:35 |  | 2013-10-04, 10:05 | 2013-10-10, 13:35**SEE NOTE 2** |

**NOTE 1: During Leg09B the *Spirit* had its engines off for approximately 14 hours on 2013-01-06 and 2013-01-07; thus the trajectory will look abnormal for this time as the ship was drifting. Soon thereafter the entire ship, including the AMF2, was without power for approximately one hour, and some instruments might not have resumed operation before the end of the leg. Data acquisition stopped 2013-01-11 for some instruments and on 2013-01-12 for all instruments. After the *Spirit* arrived in port in Los Angeles after Leg09B, the AMF2 was removed from the ship (it was completely off the *Spirit* by 2013-01-13, 21:00 UTC) and placed in storage, where it remained until reinstallation on 2013-05-09.**

**NOTE 2: MAGIC instrumentation was being turned off and packed during Leg20 and all MAGIC instrumentation was removed from the *Spirit* on 2013-10-10 by 22:00.**

**Leg00A**

Depart Los Angeles 2012-02-11, 13:30

Arrive Honolulu 2012-02-16, 09:00

In Port of Honolulu 2012-02-16, 09:00 to 2012-02-17, 09:00

**Leg00B**

Depart Honolulu 2012-02-17, 09:00

Arrive Los Angeles 2012-02-23, 15:00

**Leg01A**

No MAGIC personnel on Leg01A

**Leg01B**

Depart Honolulu 2012-09-14, 23:20

Arrive Los Angeles 2012-09-20, 13:40

In Port of Los Angeles from 2012-09-20, 13:40 to 2012-09-22, 12:15

**Leg02A**

Depart Los Angeles 2012-09-22, 12:15

Arrive Honolulu 2012-09-27, 05:50

In Port of Honolulu from 2012-09-27, 05:50 to 2012-09-28, 09:50

**Leg02B**

Depart Honolulu 2012-09-28, 09:50

Arrive Los Angeles 2012-10-04, 14:20

In Port of Los Angeles from 2012-10-04, 14:20 to 2012-10-06, 11:30

**Leg03A**

Depart Los Angeles 2012-10-06, 11:30

Arrive Honolulu 2012-10-11, 06:30

In Port of Honolulu from 2012-10-11, 06:30 to 2012-10-12, 08:00

**Leg03B**

Depart Honolulu 2012-10-12, 08:00

Arrive Los Angeles 2012-10-18, 13:30

In Port of Los Angeles from 2012-10-18, 13:30 to 2012-10-20, 11:25

**Leg04A**

Depart Los Angeles 2012-10-20, 11:25

Arrive Honolulu 2012-10-25, 06:15

In Port of Honolulu from 2012-10-25, 06:15 to 2012-10-26, 06:40

**Leg04B**

Depart Honolulu 2012-10-26, 06:40

Arrive Los Angeles 2012-11-01, 13:20

In Port of Los Angeles from 2012-11-01, 13:20 to 2012-11-03, 17:50

**Leg05A**

Depart Los Angeles 2012-11-03, 17:50

Arrive Honolulu 2012-11-08, 15:00

In Port of Honolulu from 2012-11-08, 15:00 to 2012-11-09, 17:30

**Leg05B**

Depart Honolulu 2012-11-09, 17:30

Arrive Los Angeles 2012-11-15, 15:00

In Port of Los Angeles from 2012-11-15, 15:00 to 2012-11-17, 12:20

**Leg06A**

Depart Los Angeles 2012-11-17, 12:20

Arrive Honolulu 2012-11-22, 07:30

In Port of Honolulu from 2012-11-22, 07:30 to 2012-11-24, 10:15

**Leg06B**

Depart Honolulu 2012-11-24, 10:15

Arrive Los Angeles 2012-11-30, 01:20

In Port of Los Angeles from 2012-11-30, 01:20 to 2012-12-01, 13:30

**Leg07A**

Depart Los Angeles 2012-12-01, 13:30

Arrive Honolulu 2012-12-06, 09:00

In Port of Honolulu from 2012-12-06, 09:00 to 2012-12-07, 08:20

**Leg07B**

Depart Honolulu 2012-12-07, 08:20

Arrive Los Angeles 2012-12-13, 14:45

In Port of Los Angeles from 2012-12-13, 14:45 to 2012-12-15, 13:00

**Leg08A**

Depart Los Angeles 2012-12-15, 13:00

Arrive Honolulu 2012-12-20, 08:30

In Port of Honolulu from 2012-12-20, 08:30 to 2012-12-22, 08:15

**Leg08B**

Depart Honolulu 2012-12-22, 08:15

Arrive Los Angeles 2012-12-28, 00:00

In Port of Los Angeles from 2012-12-28, 00:00 to 2012-12-29, 12:30

**Leg09A**

Depart Los Angeles 2012-12-29, 12:30

Arrive Honolulu 2013-01-03, 07:00

In Port of Honolulu from 2013-01-03, 07:00 to 2013-01-05, 04:50

**Leg09B**

Depart Honolulu 2013-01-05, 04:50

Arrive Los Angeles 2013-01-13, 03:35

**See NOTE 1 above.**

**Leg10A**

Depart Los Angeles 2013-05-11, 11:20

Arrive Honolulu 2013-05-16, 06:20

In Port of Honolulu from 2013-05-16, 06:20 to 2013-05-17, 16:30

**Leg10B**

Depart Honolulu 2013-05-17, 16:30

Arrive Los Angeles 2013-05-23, 14:00

In Port of Los Angeles from 2013-05-23, 14:00 to 2013-05-25, 11:25

**Leg11A**

Depart Los Angeles 2013-05-25, 11:25

Arrive Honolulu 2013-05-30, 06:30

In Port of Honolulu from 2013-05-30, 06:30 to 2013-05-31, 11:15

**Leg11B**

Depart Honolulu 2013-05-31, 11:15

Arrive Los Angeles 2013-06-06, 13:30

In Port of Los Angeles from 2013-06-06, 13:30 to 2013-06-08, 11:25

**Leg12A**

Depart Los Angeles 2013-06-08, 11:25

Arrive Honolulu 2013-06-13, 06:35

In Port of Honolulu from 2013-06-13, 06:35 to 2013-06-14, 16:35

**Leg12B**

Depart Honolulu 2013-06-14, 16:35

Arrive Los Angeles 2013-06-20, 13:35

In Port of Los Angeles from 2013-06-20, 13:35 to 2013-06-22, 11:30

**Leg13A**

Depart Los Angeles 2013-06-22, 11:30

Arrive Honolulu 2013-06-27, 07:45

In Port of Honolulu from 2013-06-27, 07:45 to 2013-06-28, 17:30

**Leg13B**

Depart Honolulu 2013-06-28, 17:30

Arrive Los Angeles 2013-07-03, 23:10

In Port of Los Angeles from 2013-07-03, 23:10 to 2013-07-07, 17:35

**Leg14A**

Depart Los Angeles 2013-07-07, 17:35

Arrive Honolulu 2013-07-12, 06:50

In Port of Honolulu from 2013-07-12, 06:50 to 2013-07-13, 11:45

**Leg14B**

Depart Honolulu 2013-07-13, 11:45

Arrive Los Angeles 2013-07-18, 23:15

In Port of Los Angeles from 2013-07-18, 23:15 to 2013-07-20, 12:00

**Leg15A**

Depart Los Angeles 2013-07-20, 12:00

Arrive Honolulu 2013-07-25, 05:45

In Port of Honolulu from 2013-07-25, 05:45 to 2013-07-26, 13:10

**Leg15B**

Depart Honolulu 2013-07-26, 13:10

Arrive Los Angeles 2013-08-01, 13:30

In Port of Los Angeles from 2013-08-01, 13:30 to 2013-08-03, 13:30

**Leg16A**

Depart Los Angeles 2013-08-03, 13:30

Arrive Honolulu 2013-08-08, 05:40

In Port of Honolulu from 2013-08-08, 05:40 to 2013-08-09, 10:15

**Leg16B**

Depart Honolulu 2013-08-09, 10:15

Arrive Los Angeles 2013-08-15, 14:30

In Port of Los Angeles from 2013-08-15, 14:30 to 2013-08-17, 18:30

**Leg17A**

Depart Los Angeles 2013-08-17, 18:30

Arrive Honolulu 2013-08-22, 10:15

In Port of Honolulu from 2013-08-22, 10:15 to 2013-08-23, 17:15

**Leg17B**

Depart Honolulu 2013-08-23, 17:15

Arrive Los Angeles 2013-08-29, 13:20

In Port of Los Angeles from 2013-08-29, 13:20 to 2013-08-31, 11:45

**Leg18A**

Depart Los Angeles 2013-08-31, 11:45

Arrive Honolulu 2013-09-05, 06:35

In Port of Honolulu from 2013-09-05, 06:35 to 2013-09-06, 12:00

**Leg18B**

Depart Honolulu 2013-09-06, 12:00

Arrive Los Angeles 2013-09-12, 13:40

In Port of Los Angeles from 2013-09-12, 13:40 to 2013-09-14, 12:25

**Leg 19A**

Depart Los Angeles 2013-09-14, 12:25

Arrive Honolulu 2013-09-19, 06:20

In Port of Honolulu from 2013-09-19, 06:20 to 2013-09-20, 11:20

**Leg19B**

Depart Honolulu 2013-09-20, 11:20

Arrive Los Angeles 2013-09-26, 13:55

In Port of Los Angeles from 2013-09-26, 13:55 to 2013-09-28, 11:35

**Leg20A**

Depart Los Angeles 2013-09-28, 11:35

Arrive Honolulu 2013-10-03, 06:35

In Port of Honolulu from 2013-10-03, 06:35 to 2013-10-04, 10:05

**Leg20B**

Depart Honolulu 2013-10-04, 10:05

Arrive Los Angeles 2013-10-10, 13:35

**See NOTE 2 above.**