6GHz RFI from space

[1]Makoto Yoshikawa, [1]Yasuhiro Fujimoto,
[2]Keiji Imaoka, and [2]Akira Shibata

1. Mitsubishi Space Software Co., Ltd.
2. Japan Aerospace Exploration Agency, EORC

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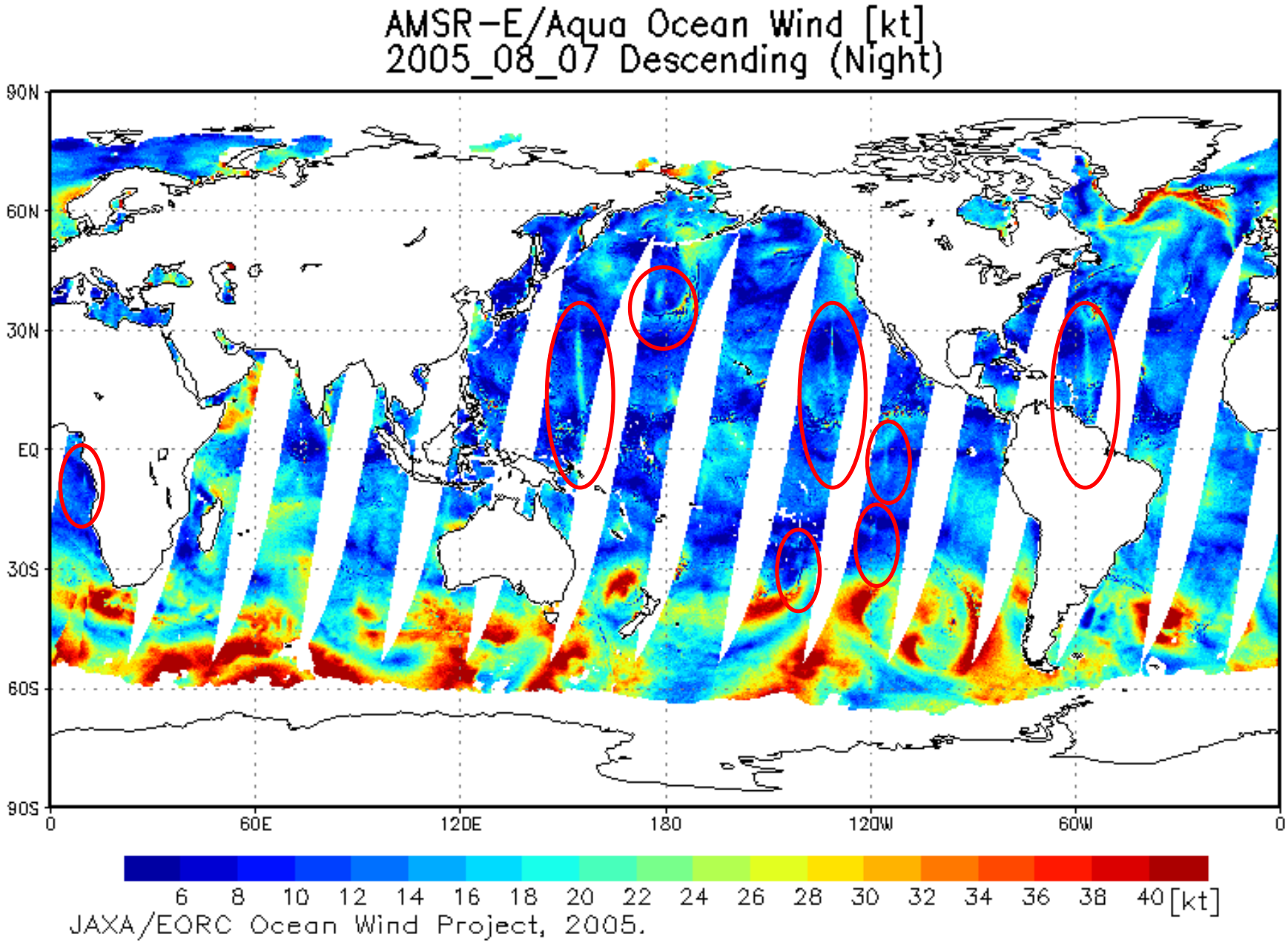
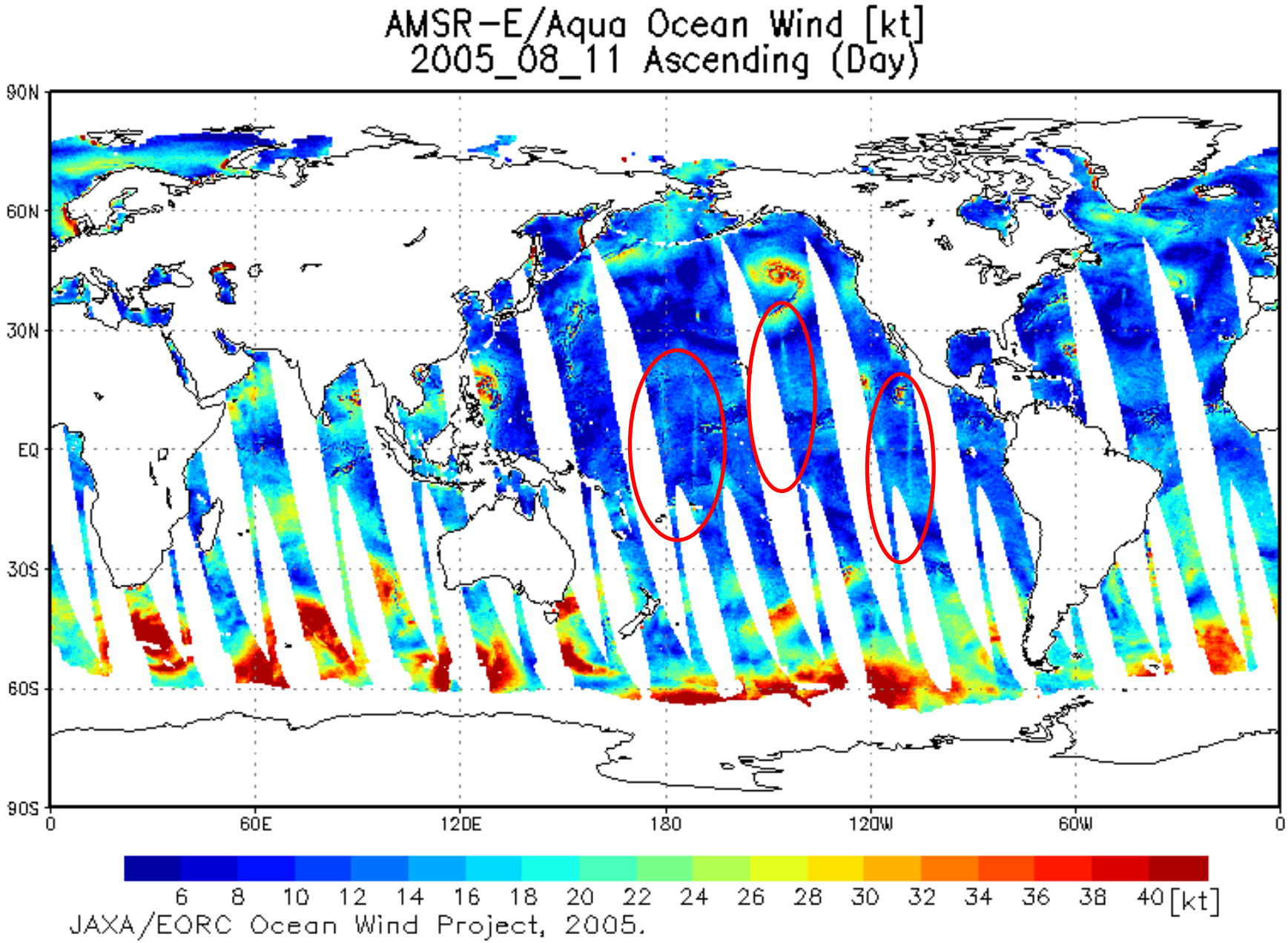
Overview of RFI in ocean area (AMSR-E/Night)



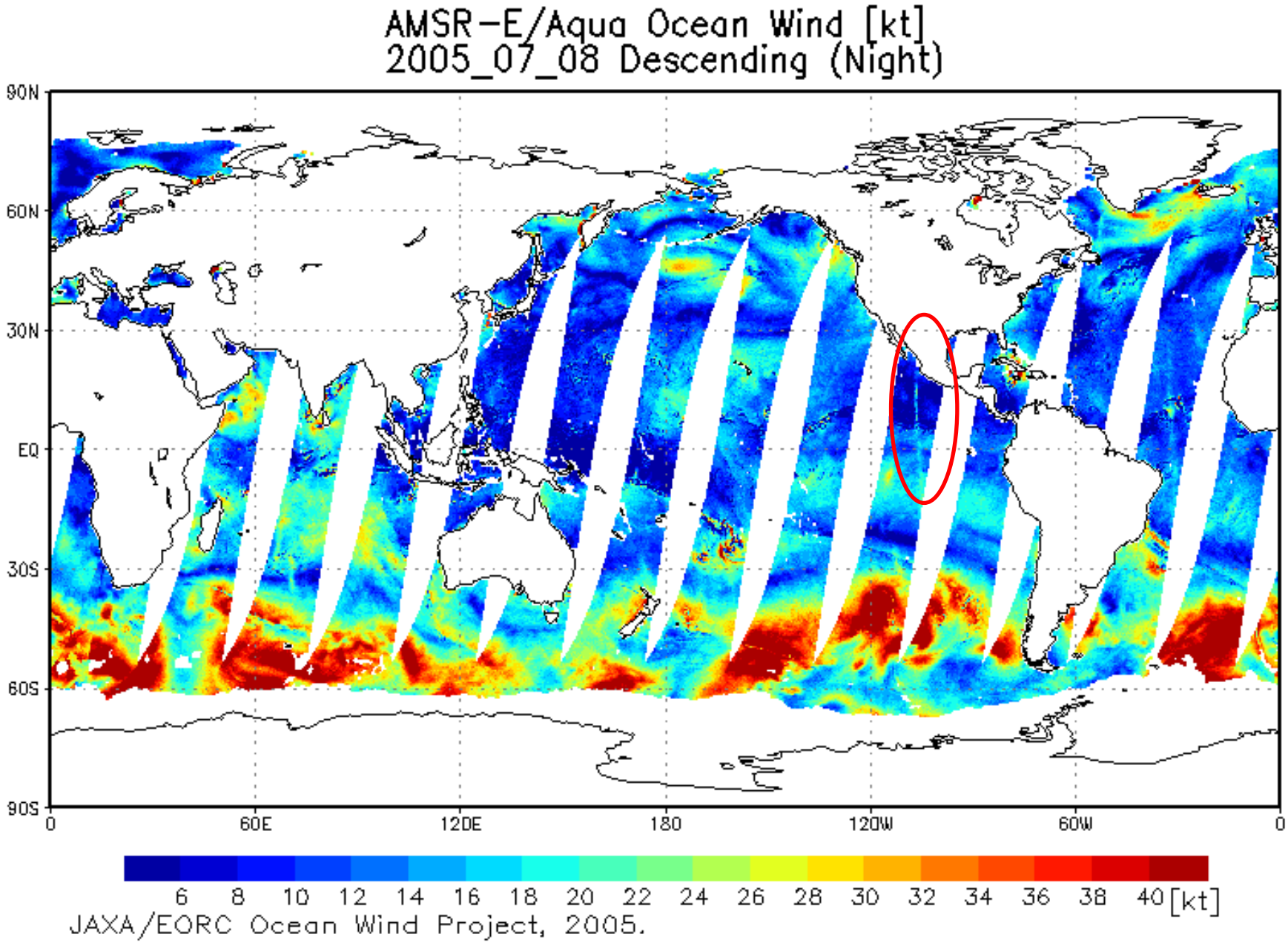
Overview of RFI in ocean area (AMSR-E/Day)



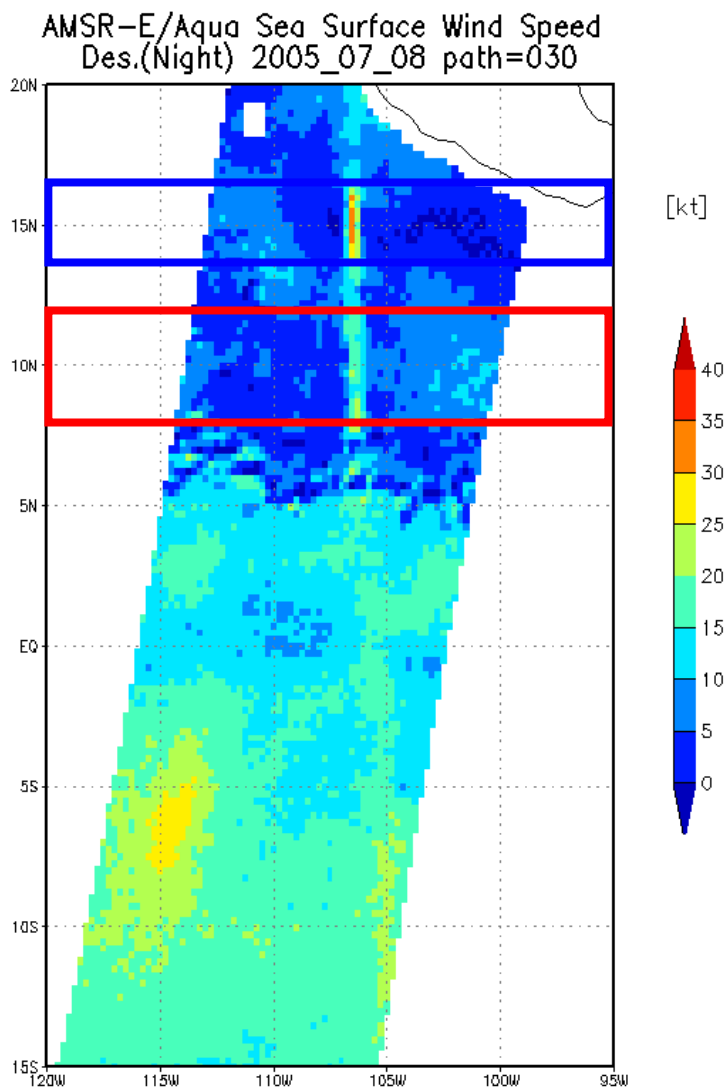
The feature of RFI patterns in ocean wind retrieved from 6.925GHz

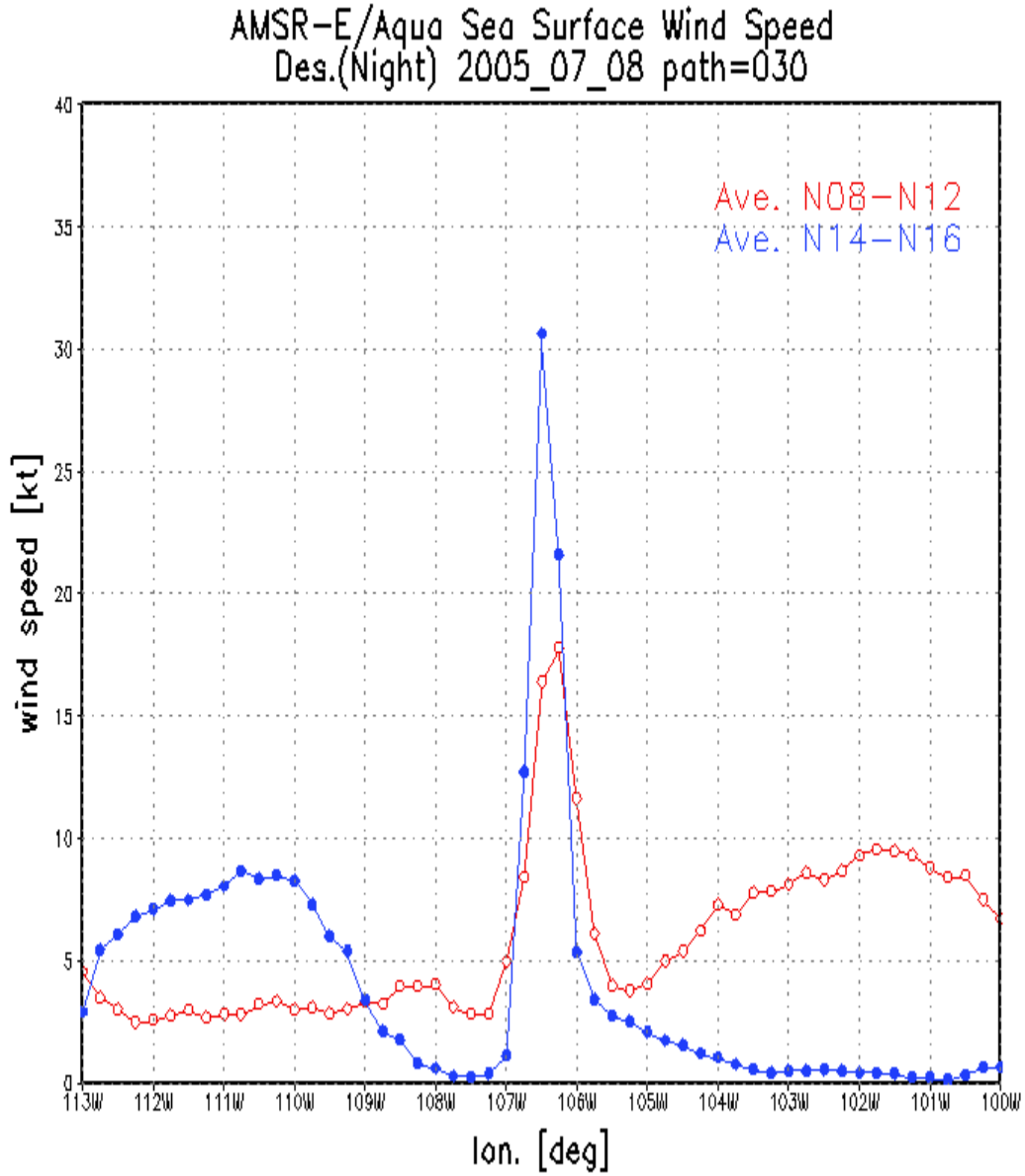
- These non-natural patterns are detected in AMSR and AMSR-E 6.925GHz data all over the ocean.
- These patterns were detected a few in 2002 and 2003, but its level and frequency seem to be increasing since 2004.
- The intensity and area of the RFI seem to depend on the ocean wind condition, such as low- or high-wind, surface condition and RFI source condition.
- The position of the RFI appearance indicates that the source is moving, compared with the pattern of sun glitter, and the sources are existing all over the ocean.

Effect of RFI under low-wind condition

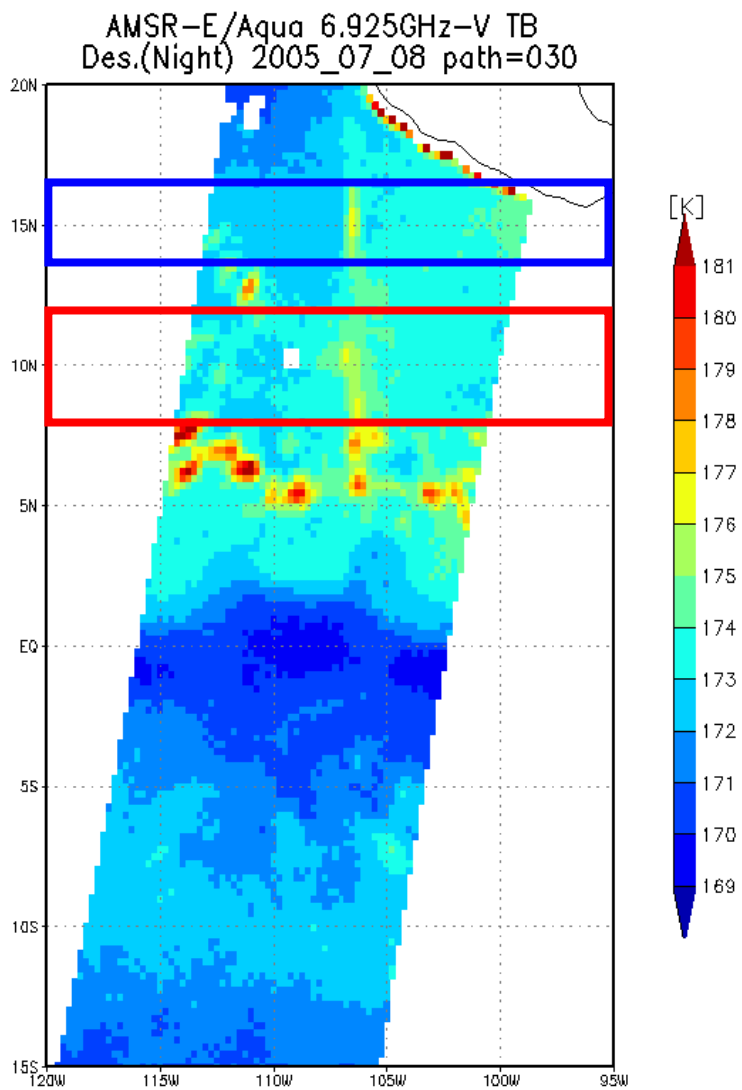


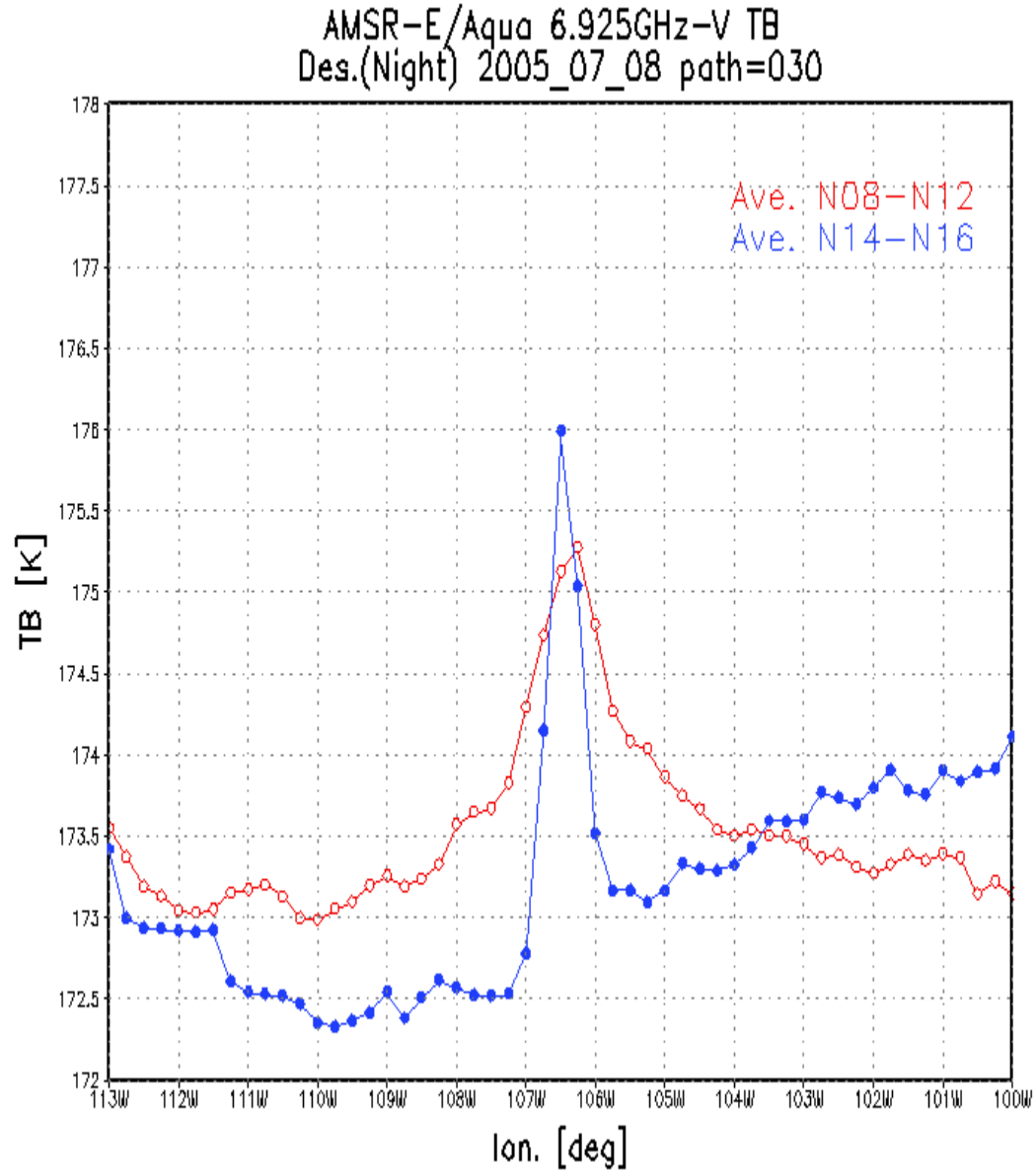
RFI effect for ocean wind (retrieved from 6GHz) algorism



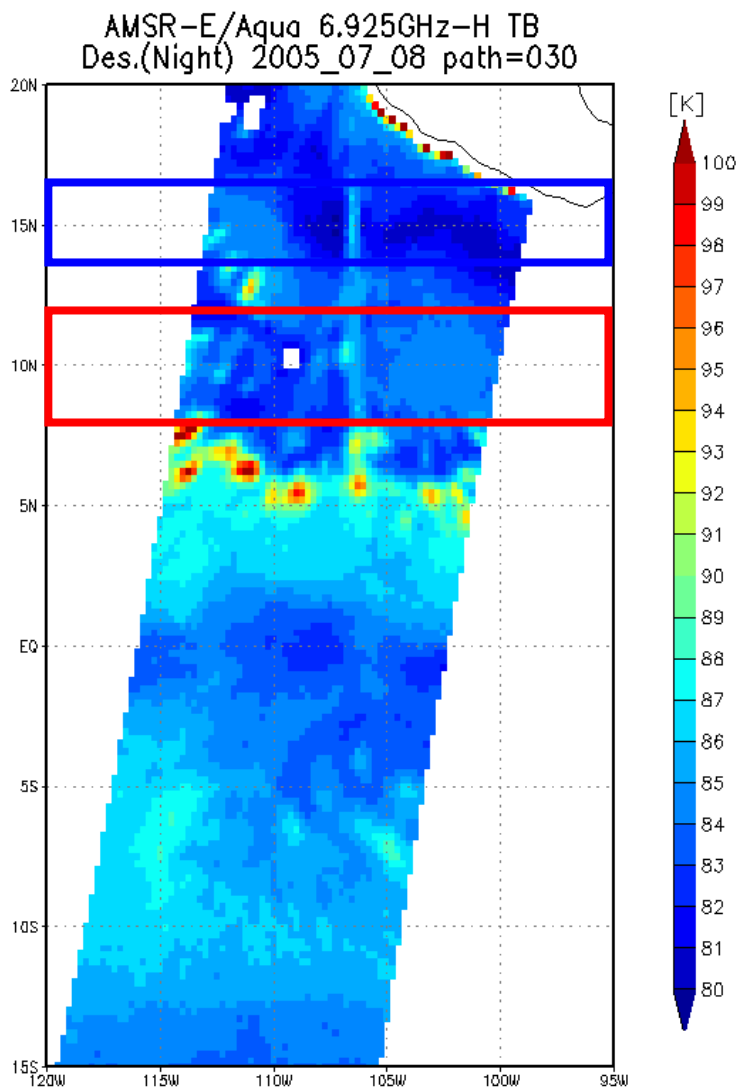


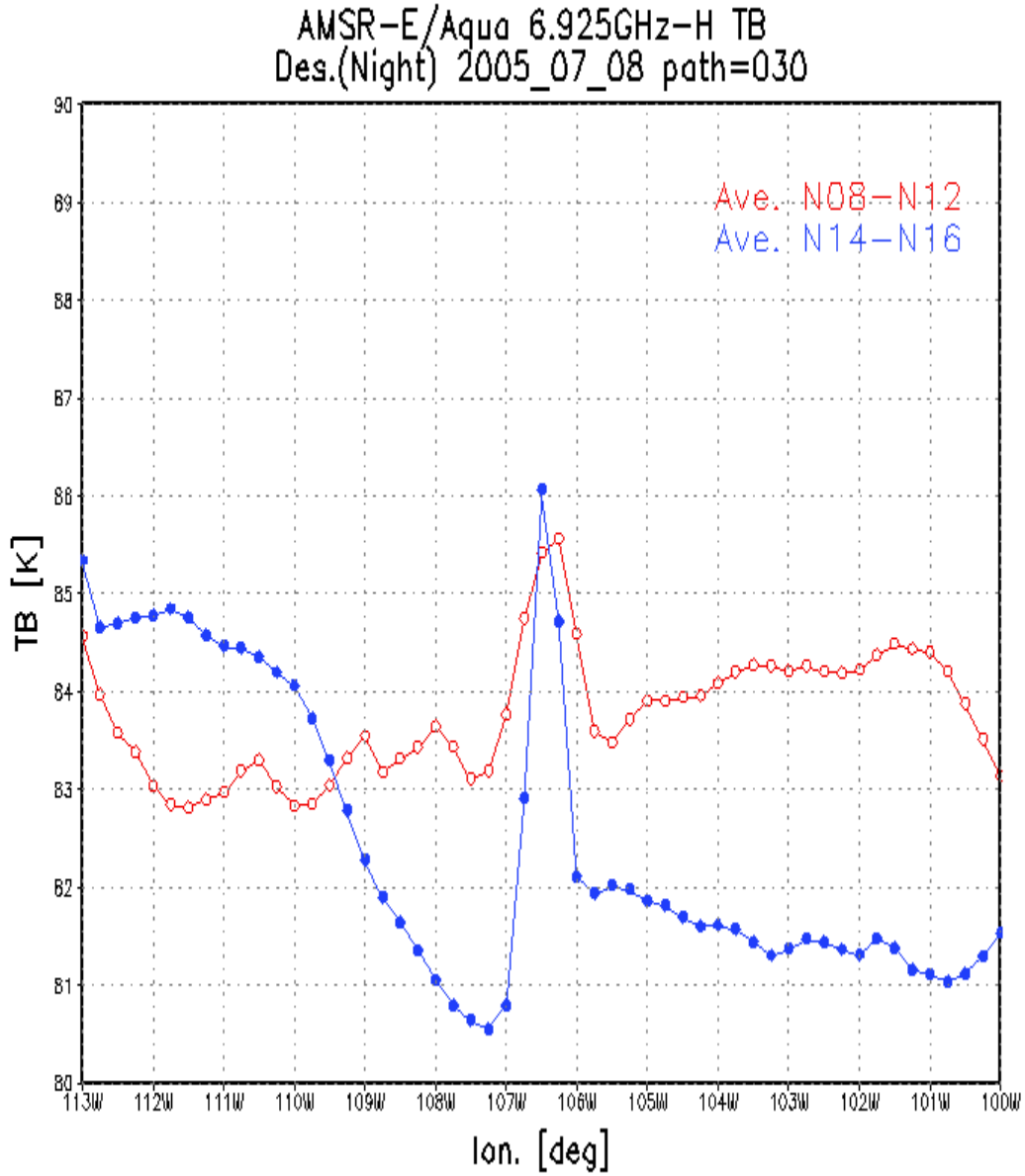
RFI level for 6.925GHz-V Tb



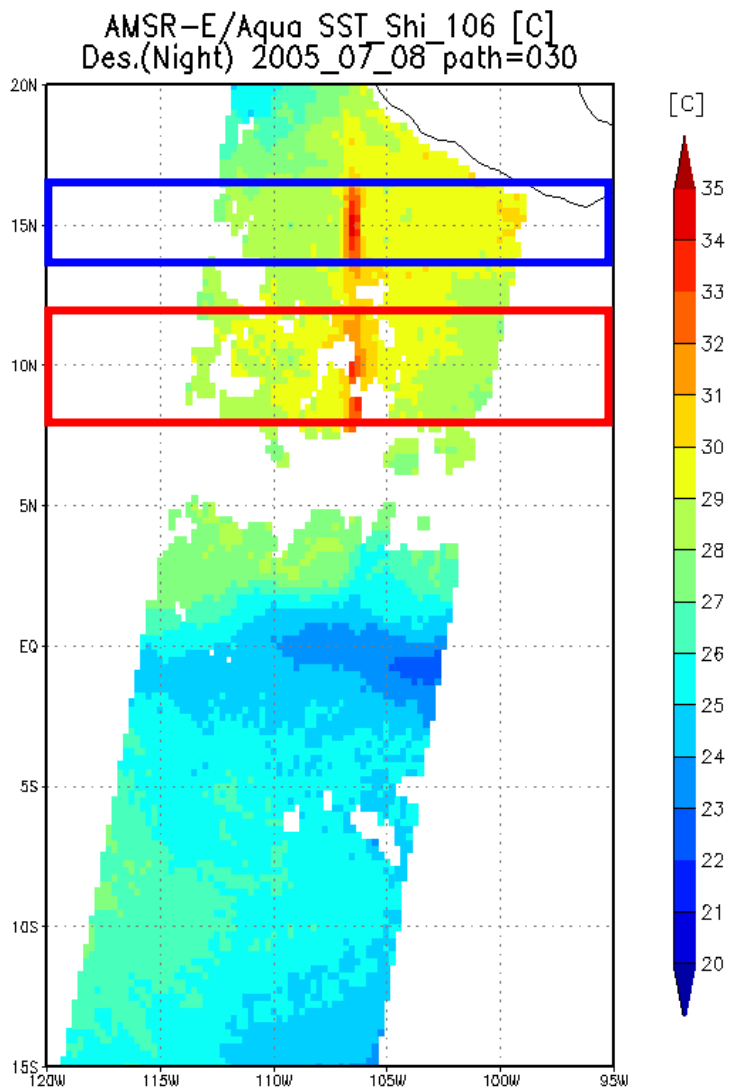


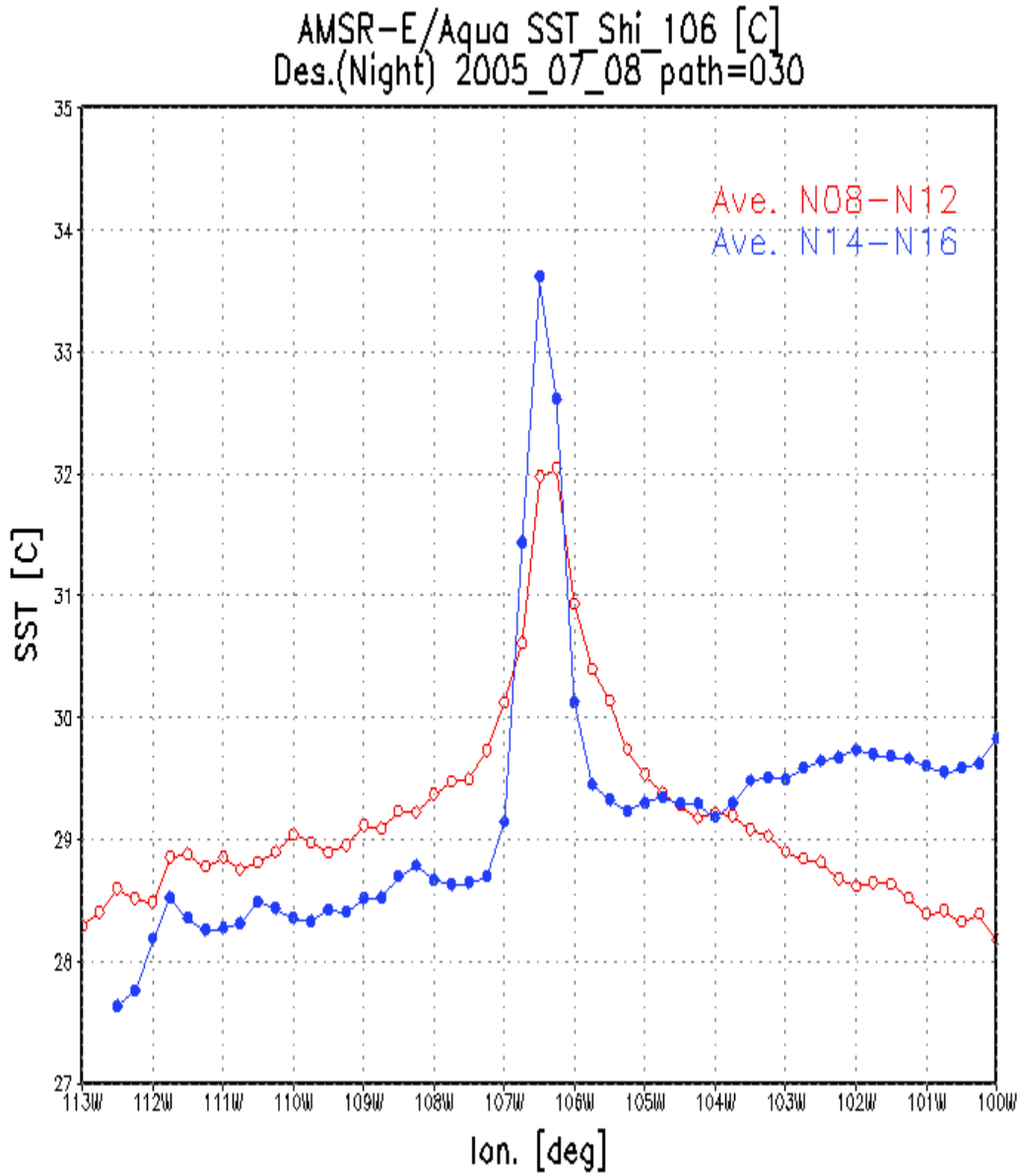
RFI level for 6.925GHz-H Tb





RFI effect for SST algorism





RFI effect under low-wind condition

- Due to RFI, 6.925GHz Tb of V-pol. and H-pol. are higher with 2-3.5[K] and 2.5-5.5[K] respectively at peak point under the low-wind condition.
- The effect to the SST retrieval using 6.925GHz is 3.0-5.0[C] higher, and to the SSW, 15-30[kt] higher under low-wind.
- The effect of RFI depends on the condition of ocean wind and surface condition.

RFI source

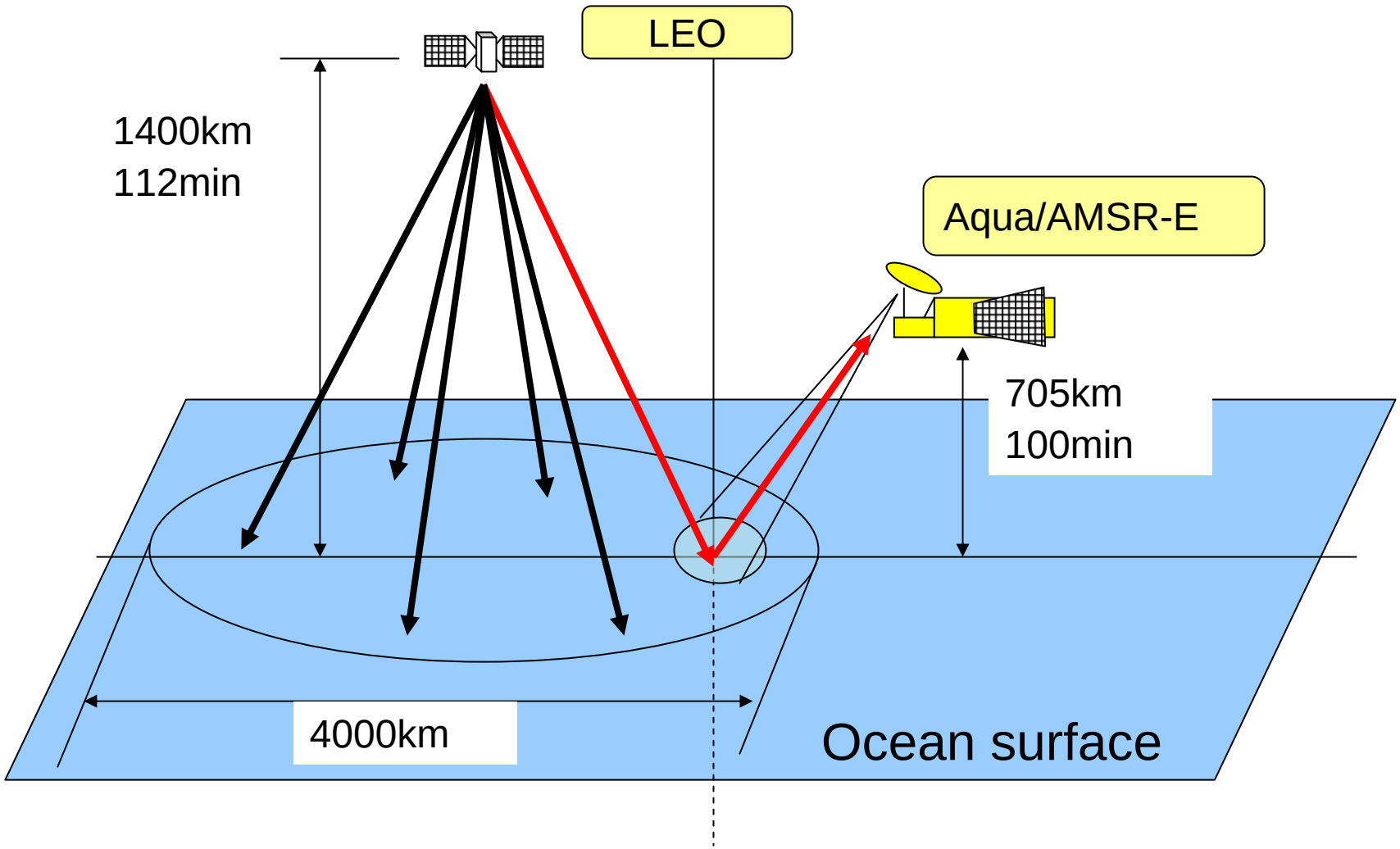
Table 1. Telecommunication satellite system using C-band.

System name	Globalstar(LEO)	ICO(MEO)
Altitude	1400km	10355km
Inclination angle	52deg	45deg
Satellite number	52	10
Orbit plane	8	2
Downlink	6.825GHz-7.075GHz	6.875GHz-7.055GHz
Operation	2001-	1999-
Life	7.5yr	10yr

- C-band is assigned for LEO's downlink, therefore, microwave radiometer of C-band can be interfered from these system.

6GHz RFI from space

➢The position of the RFI appearance indicates that the source is moving, compared with the pattern of sun glitter, and the sources are existing all over the ocean. So, the most probable source are LEO's.



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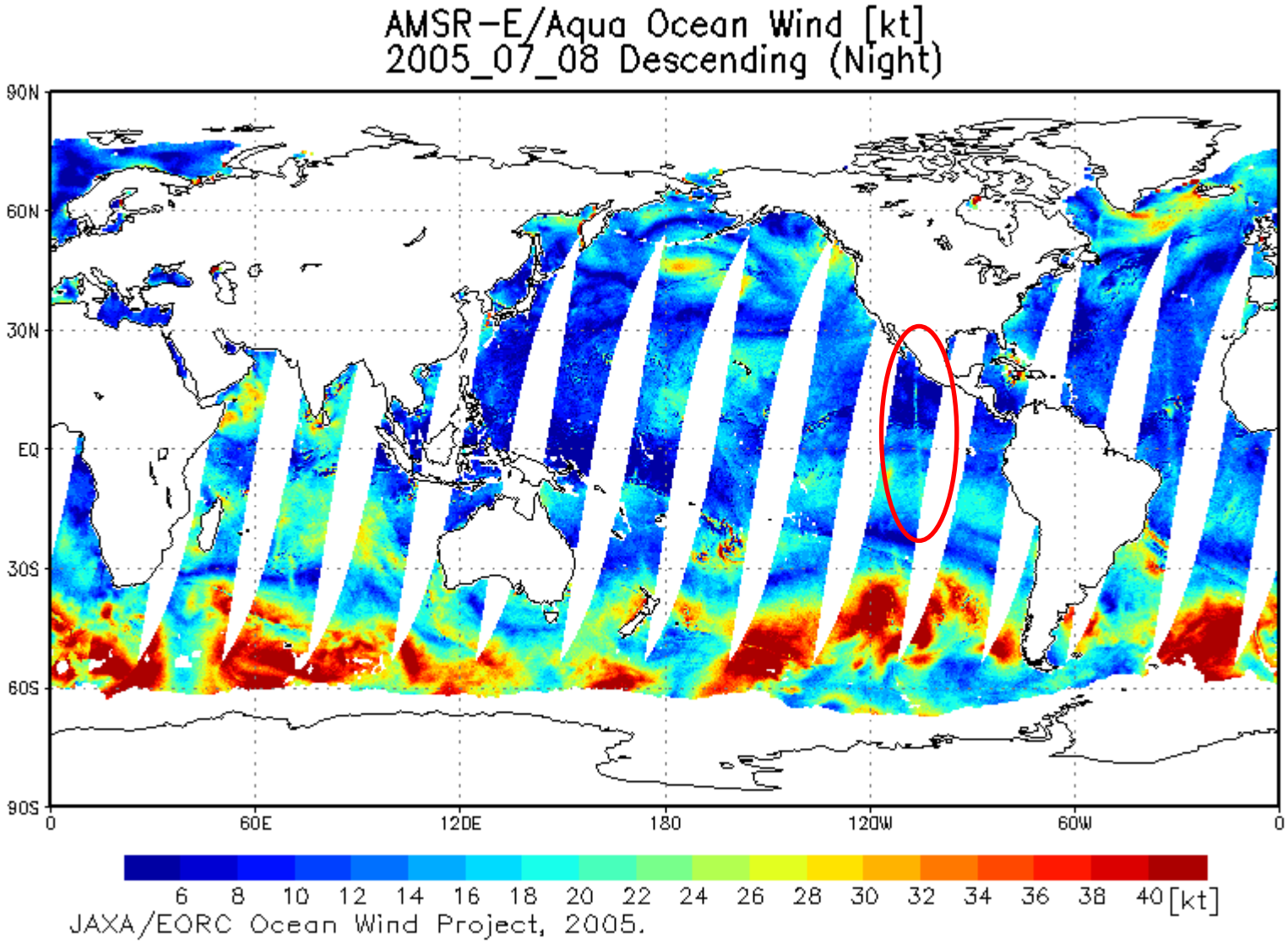

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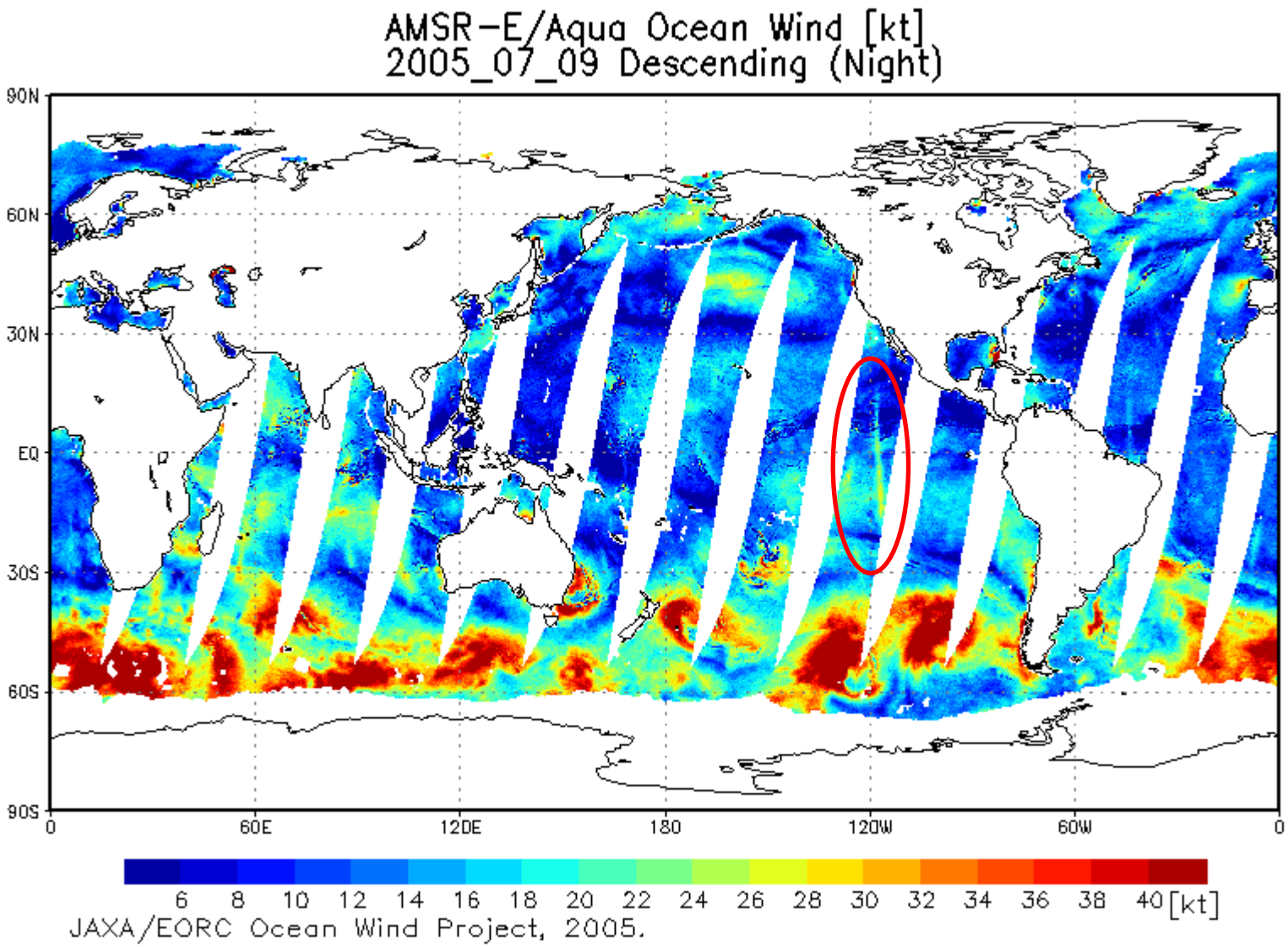

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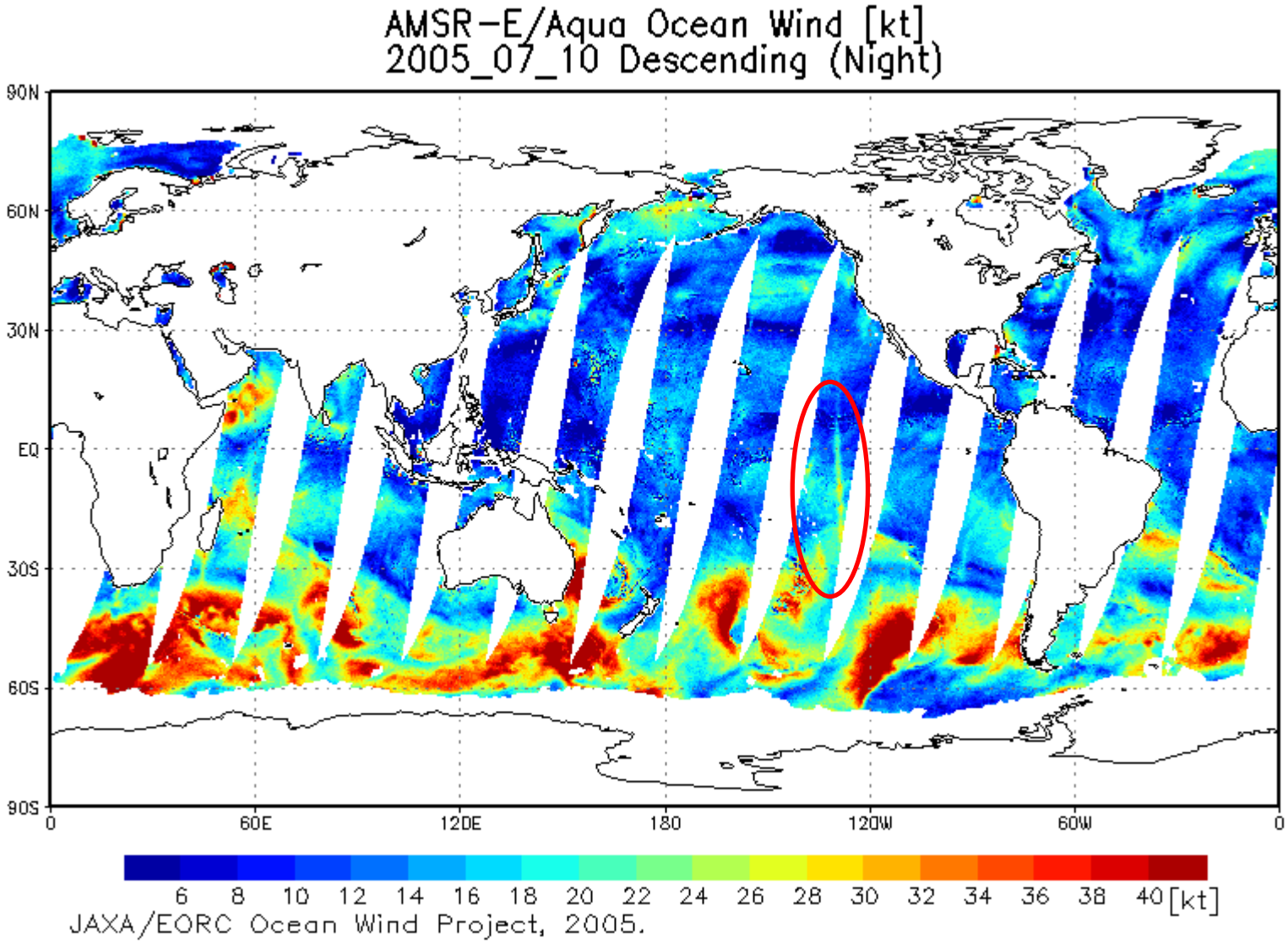

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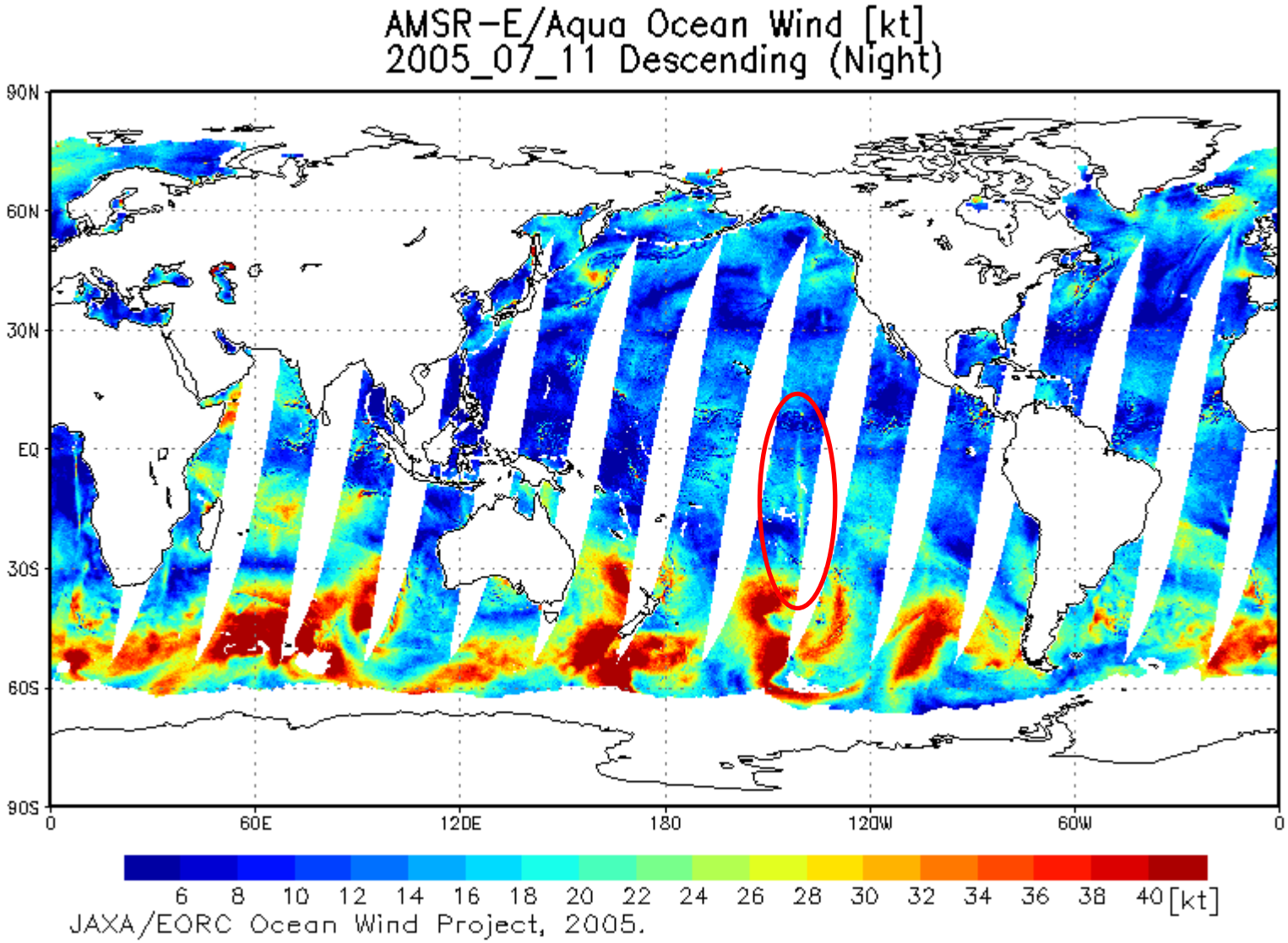

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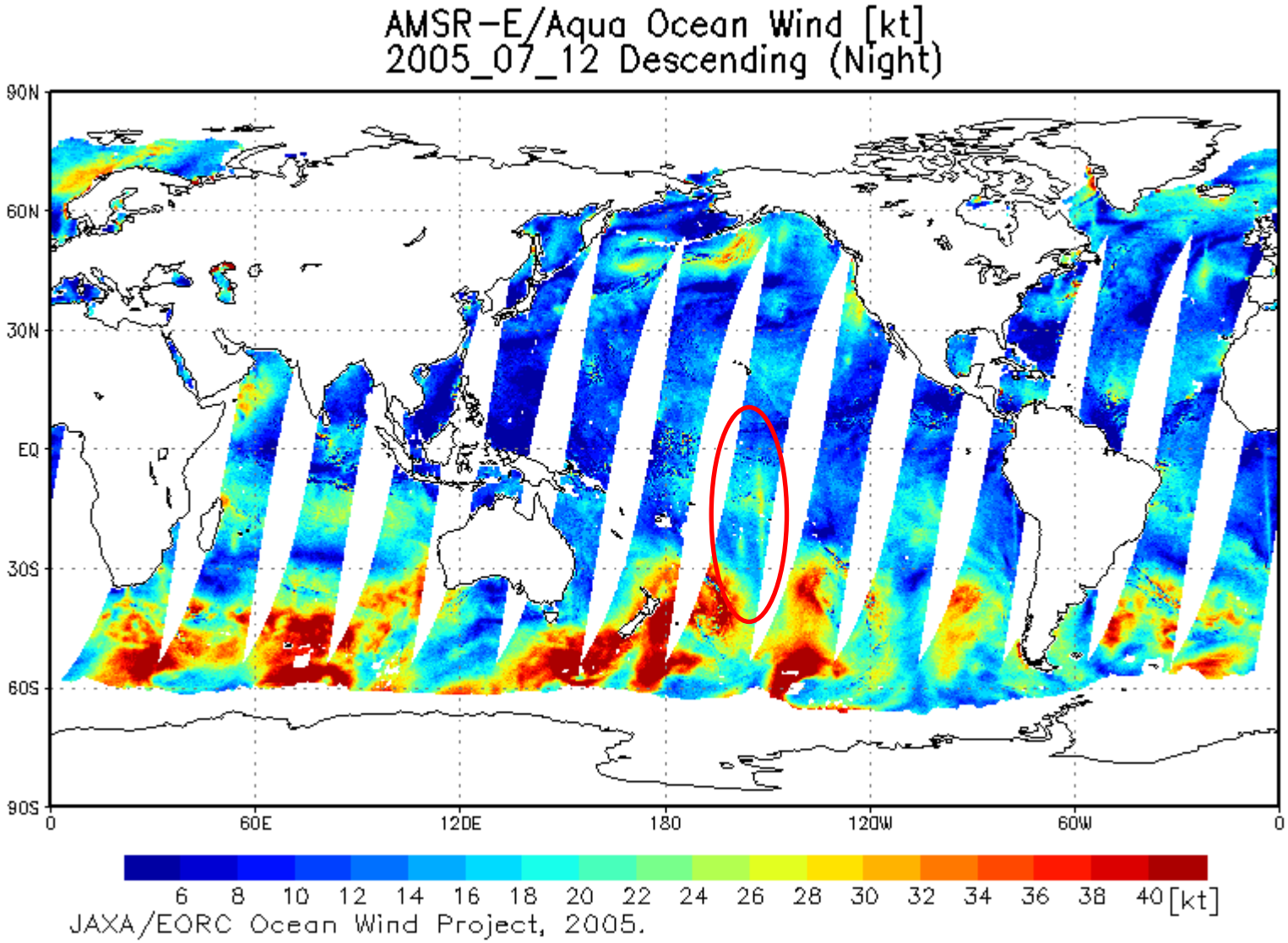

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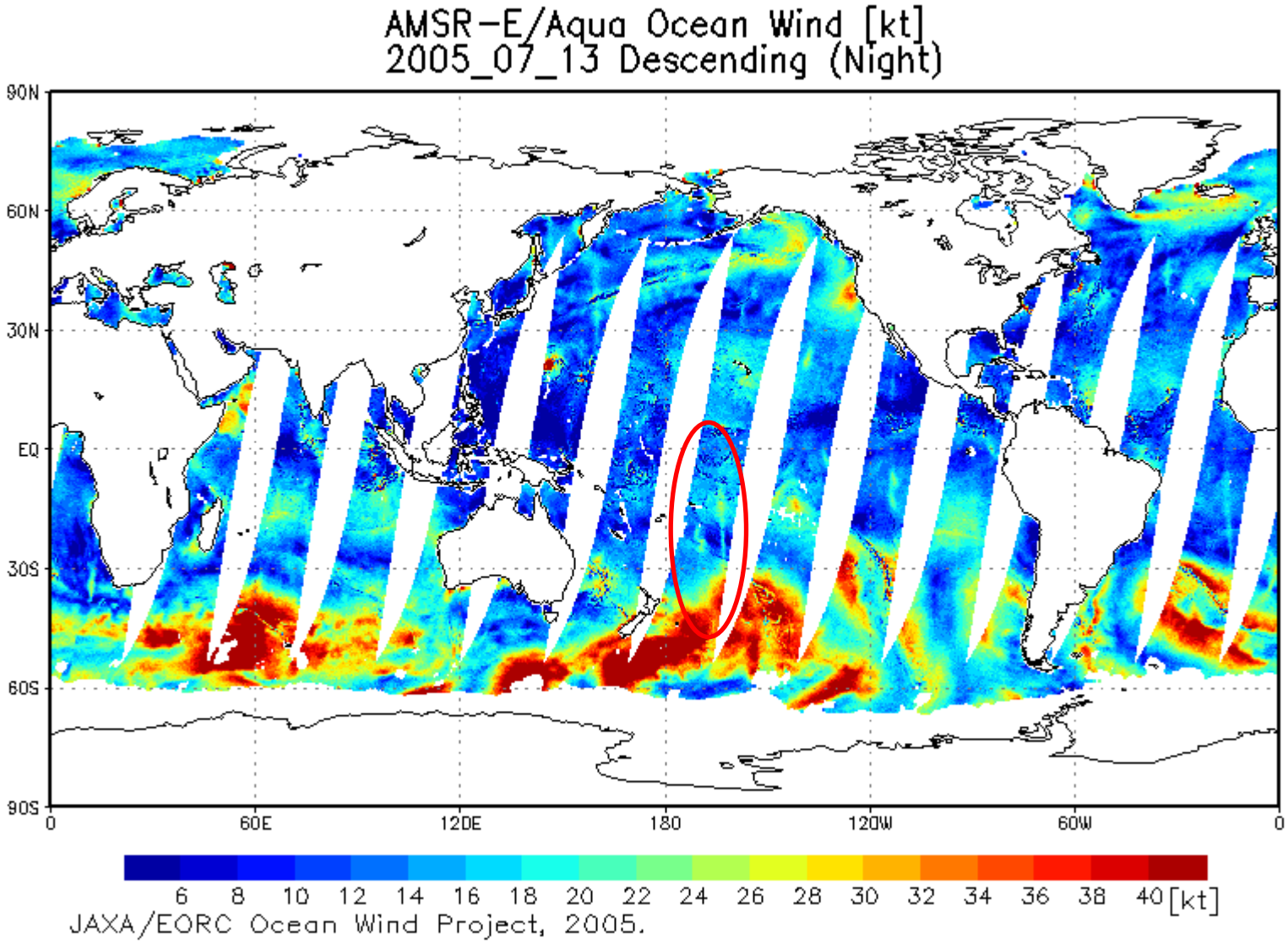

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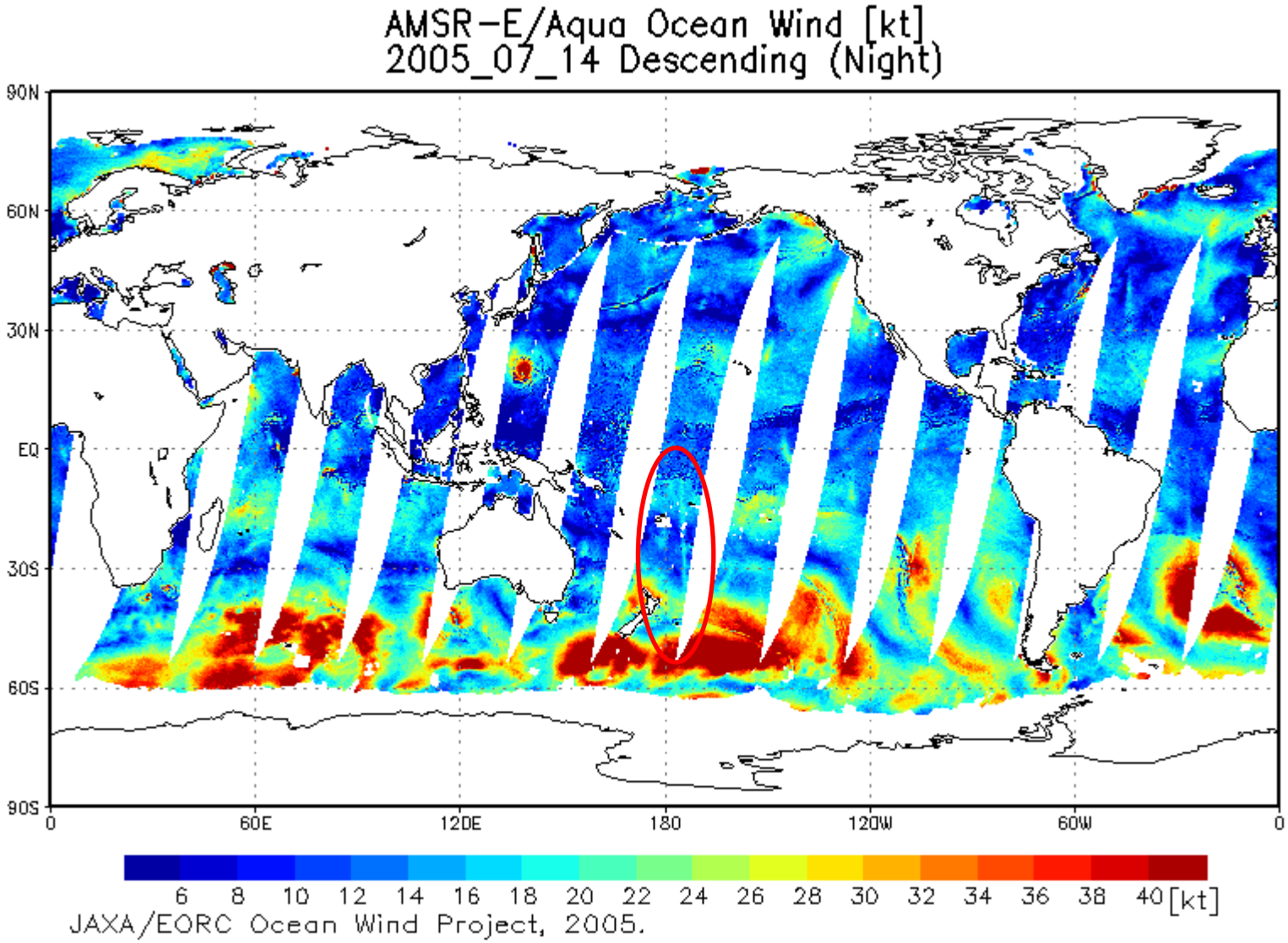

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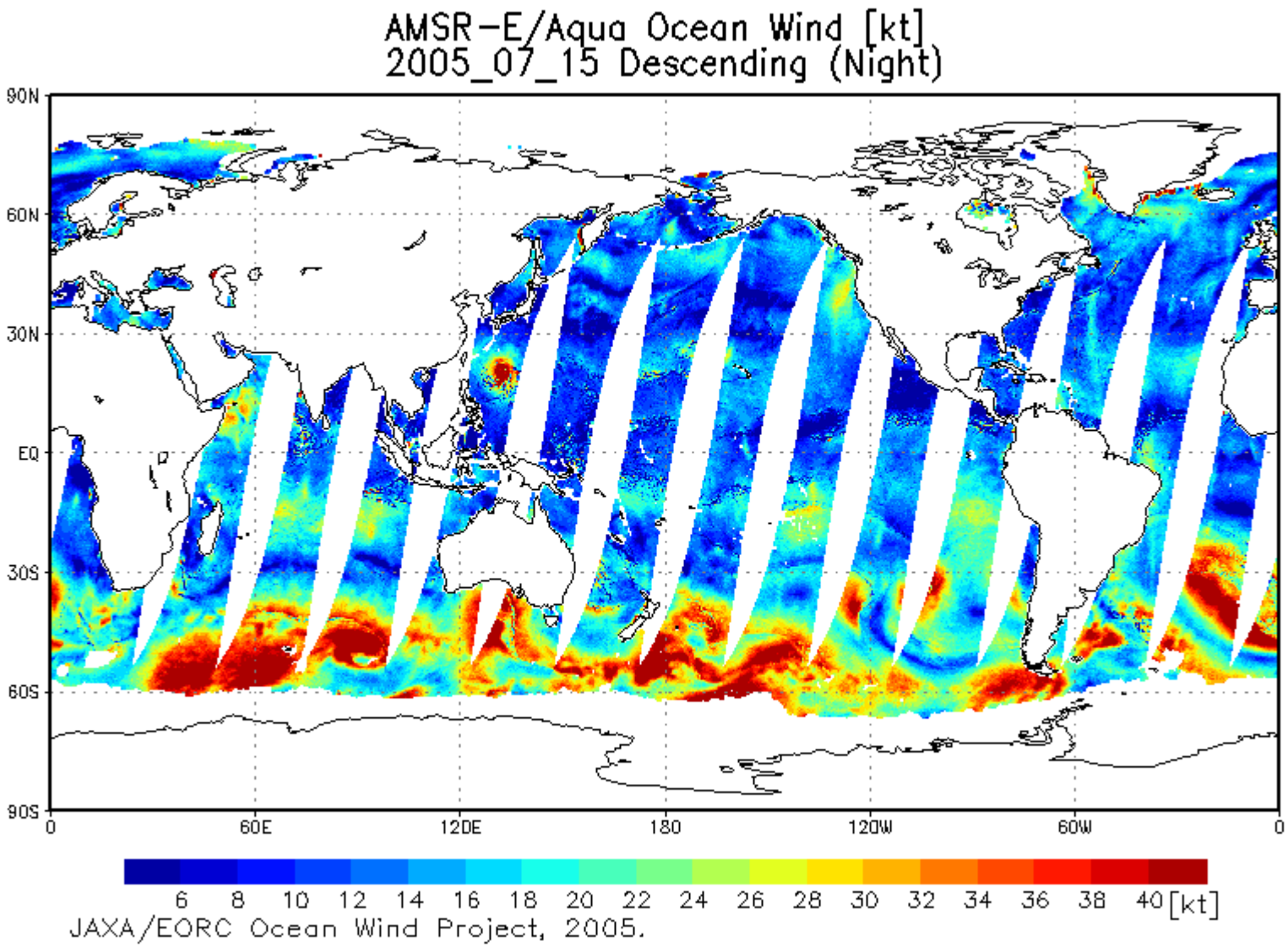

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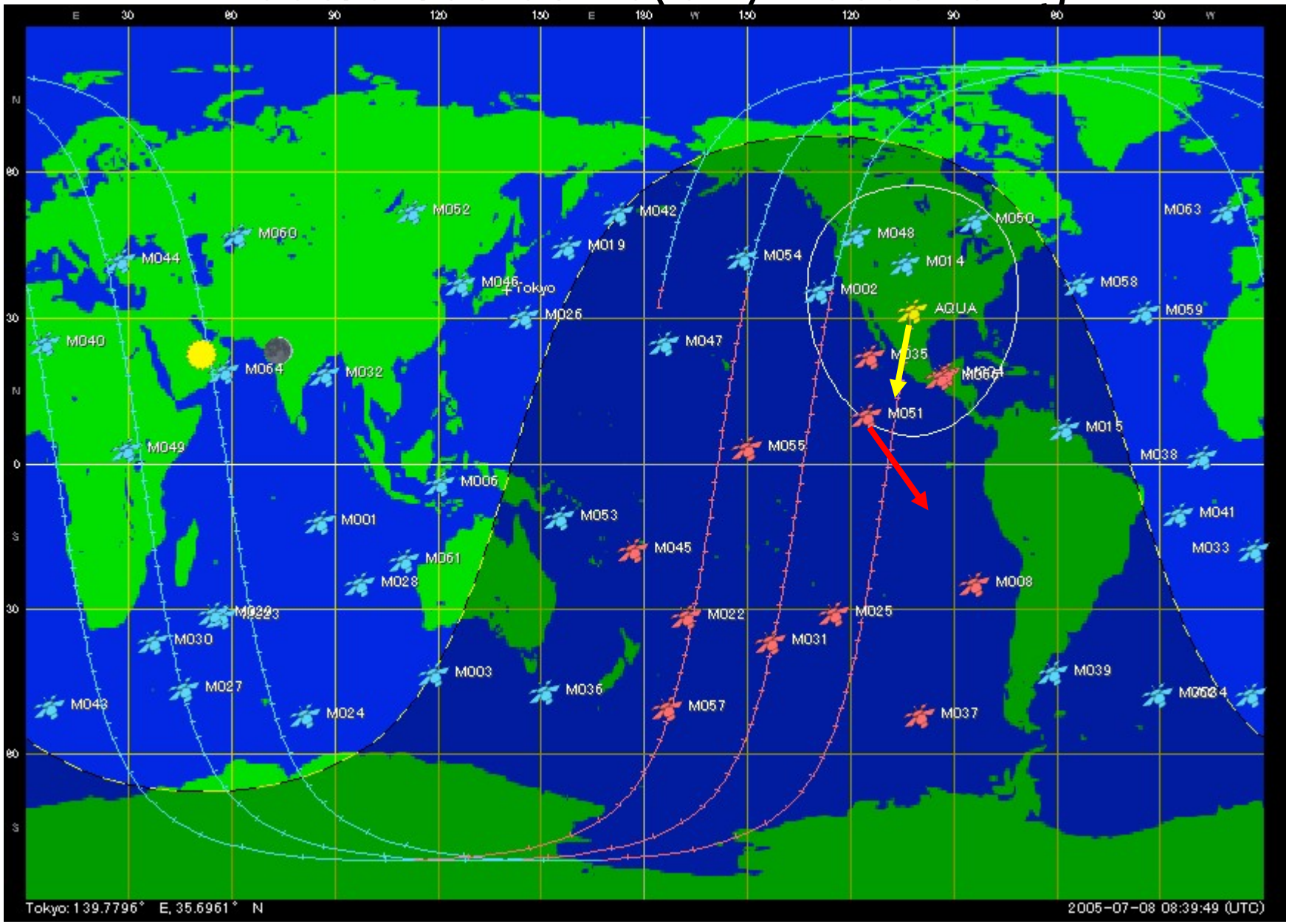

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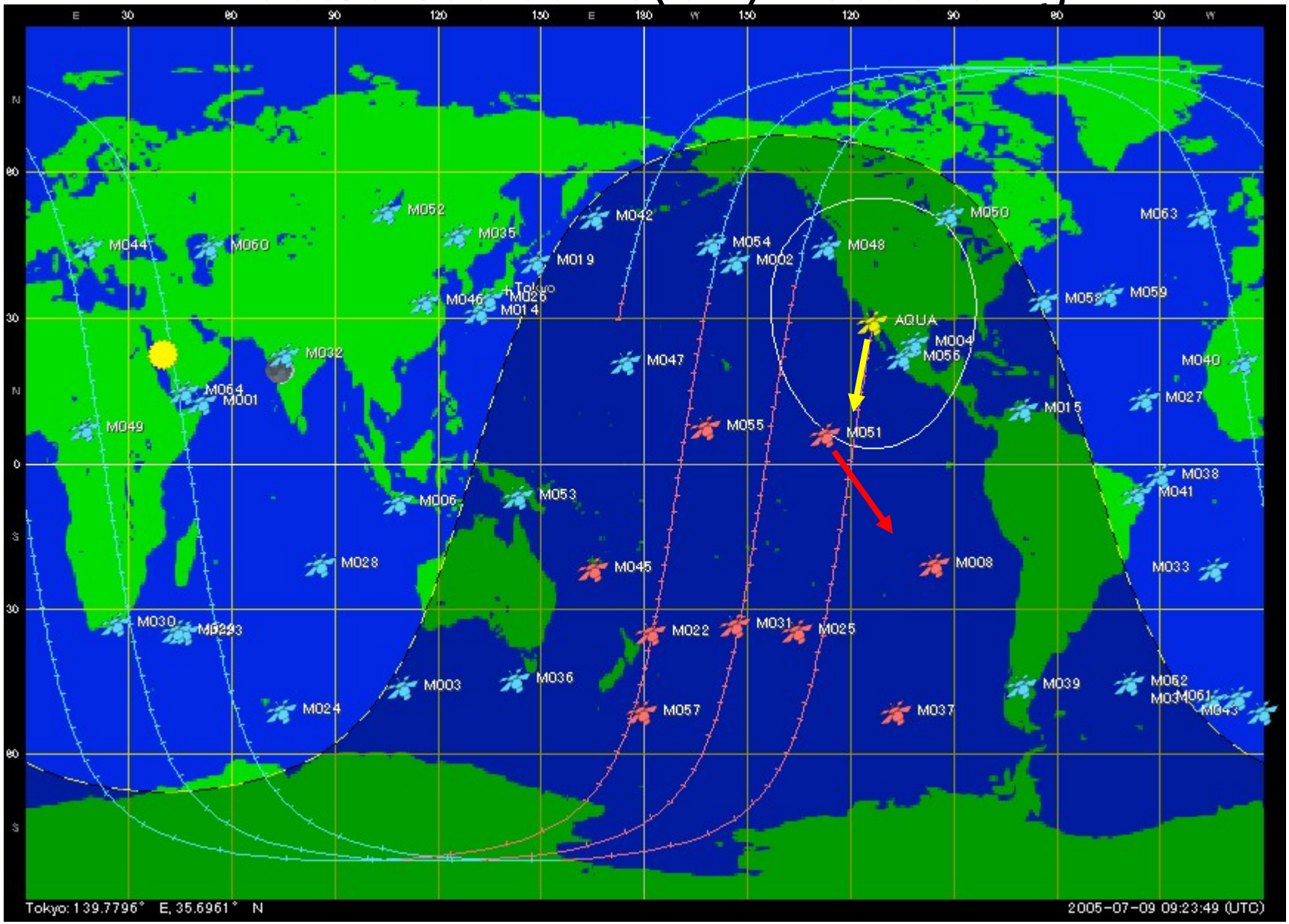

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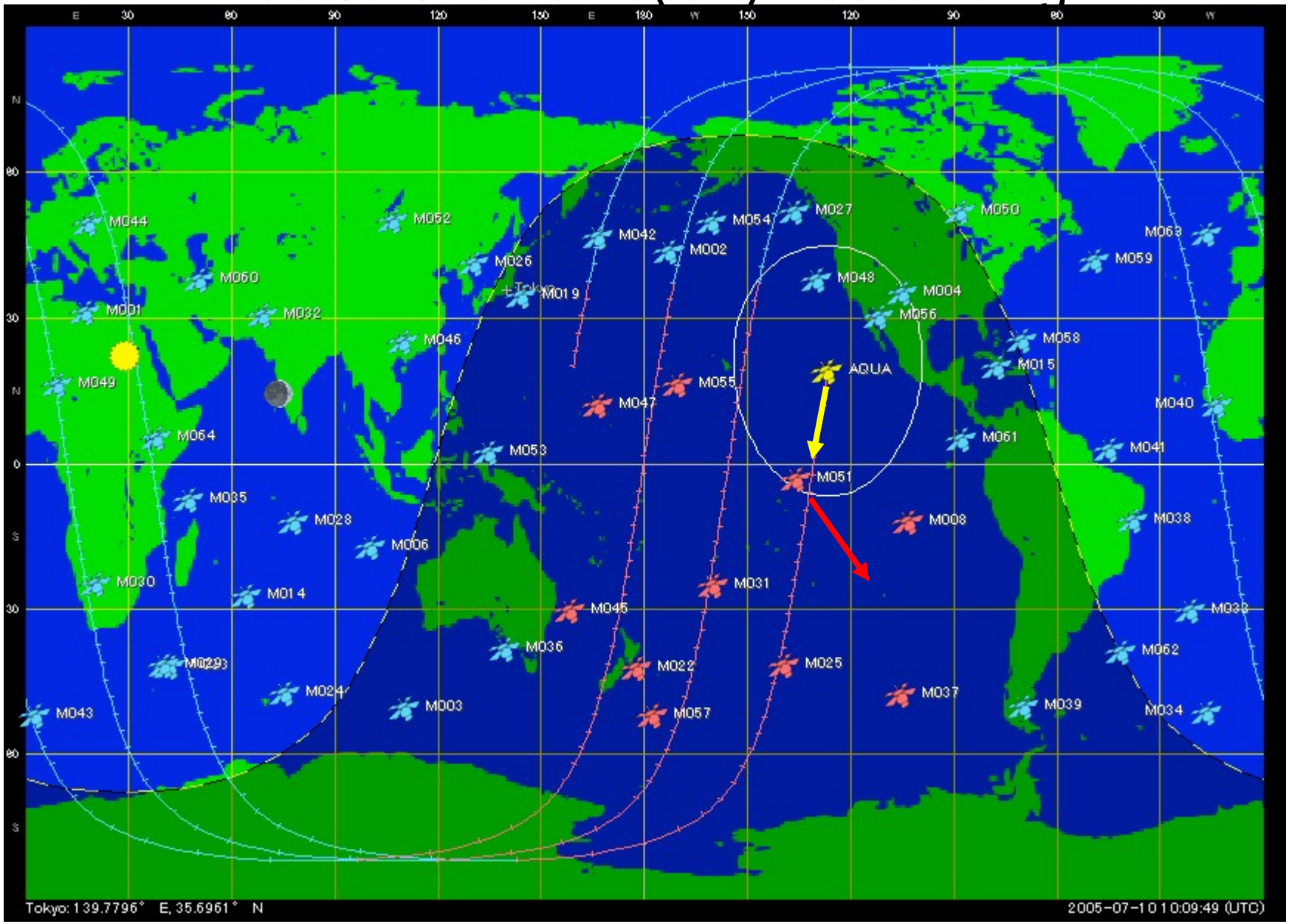

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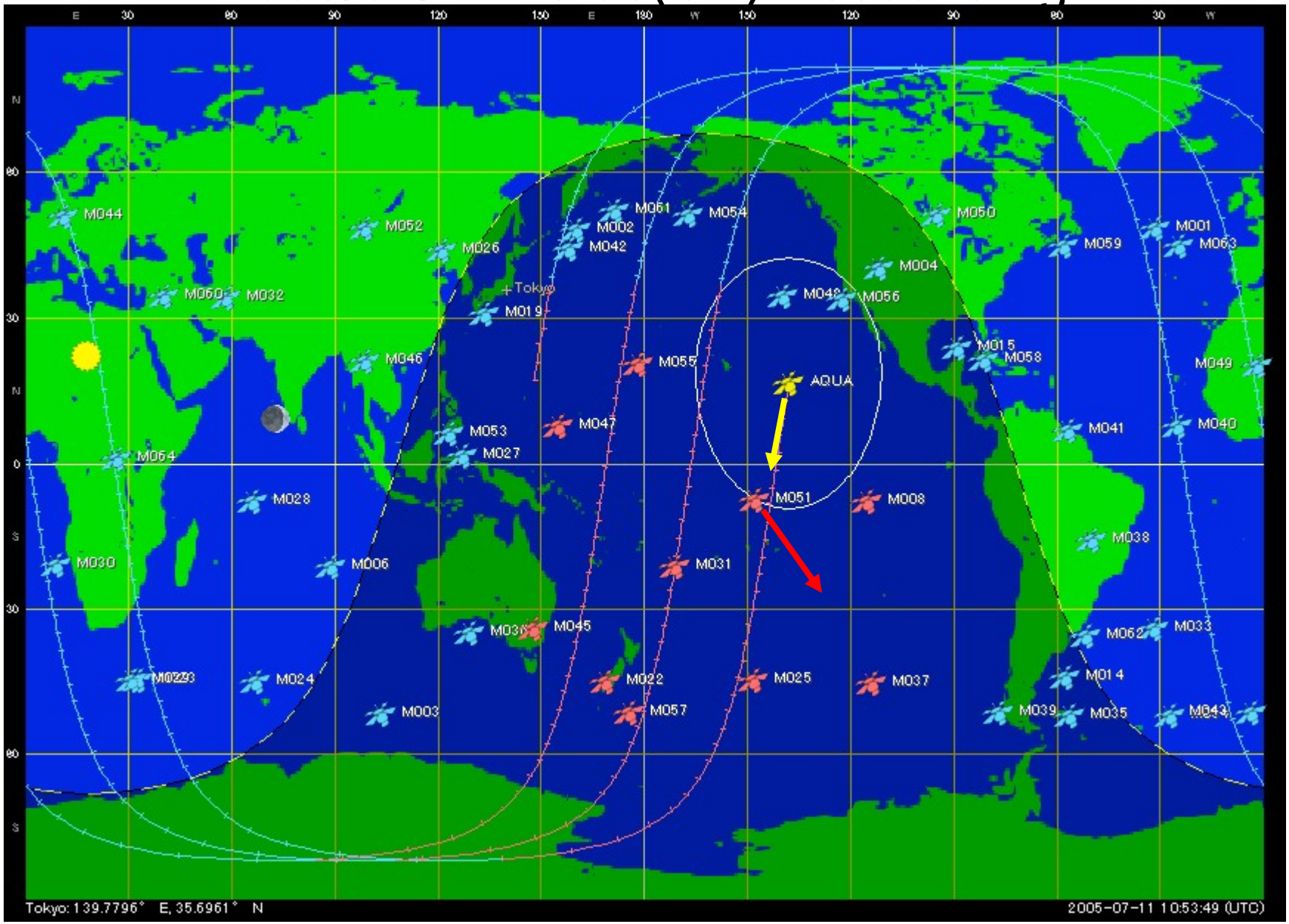

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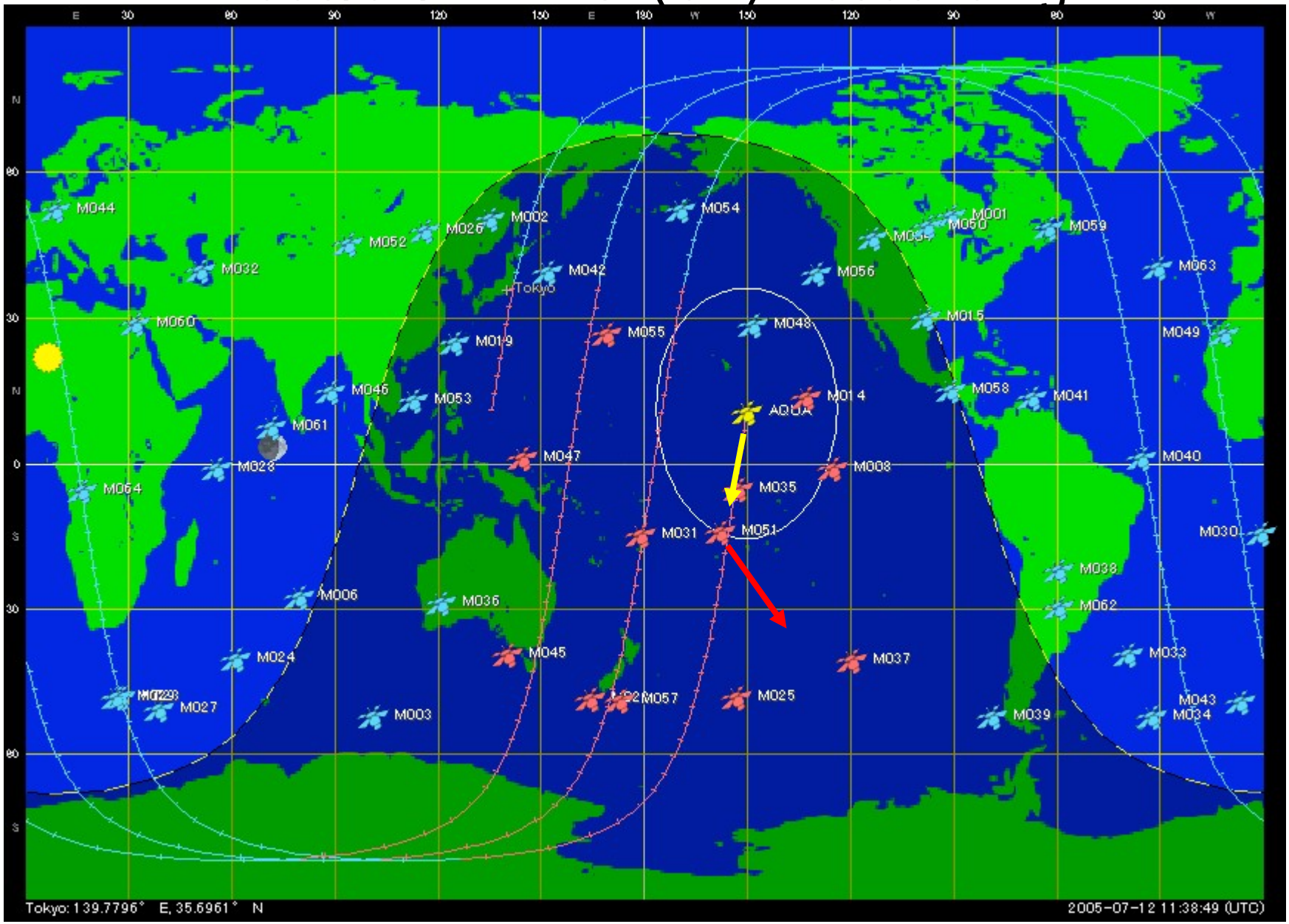

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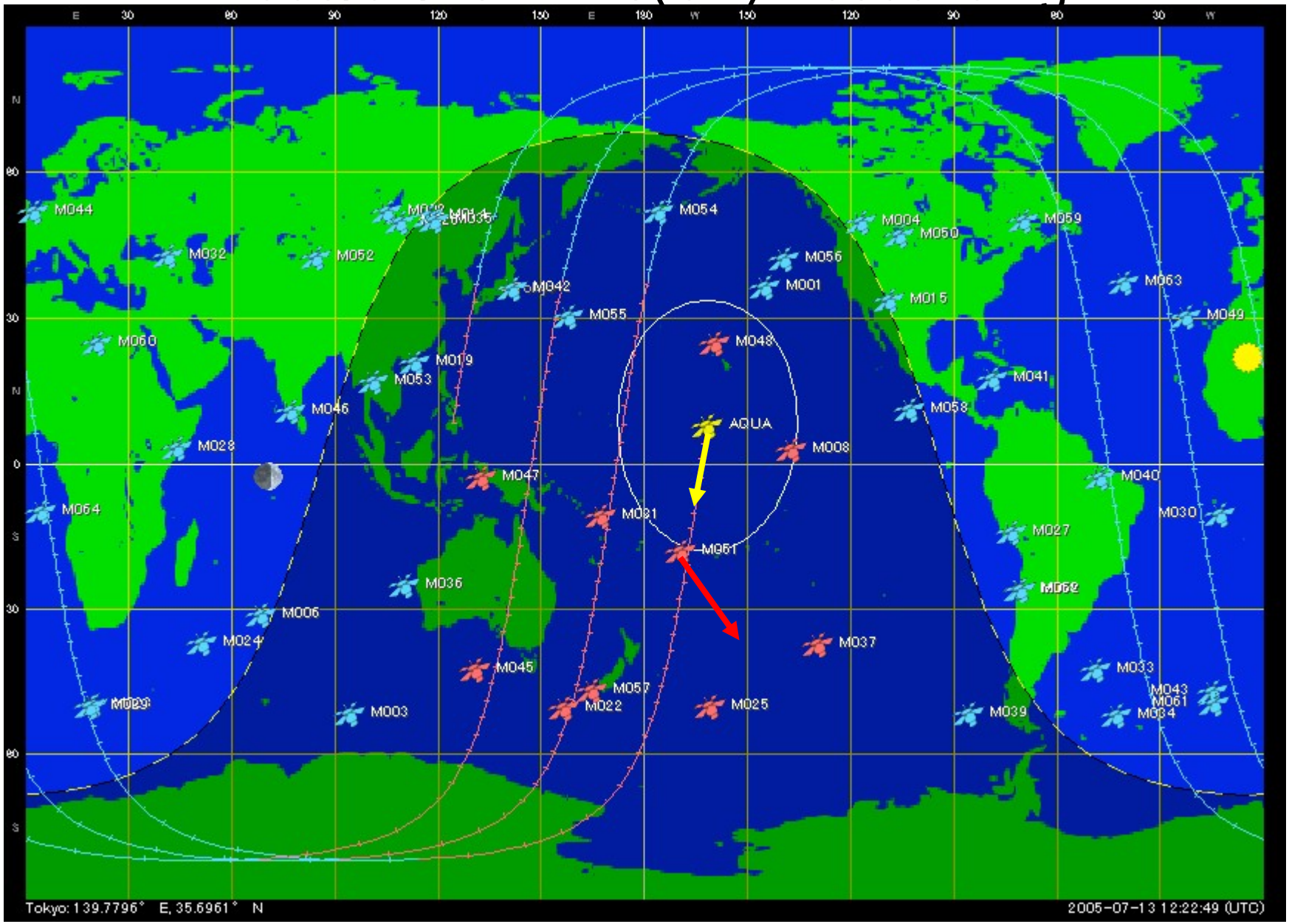

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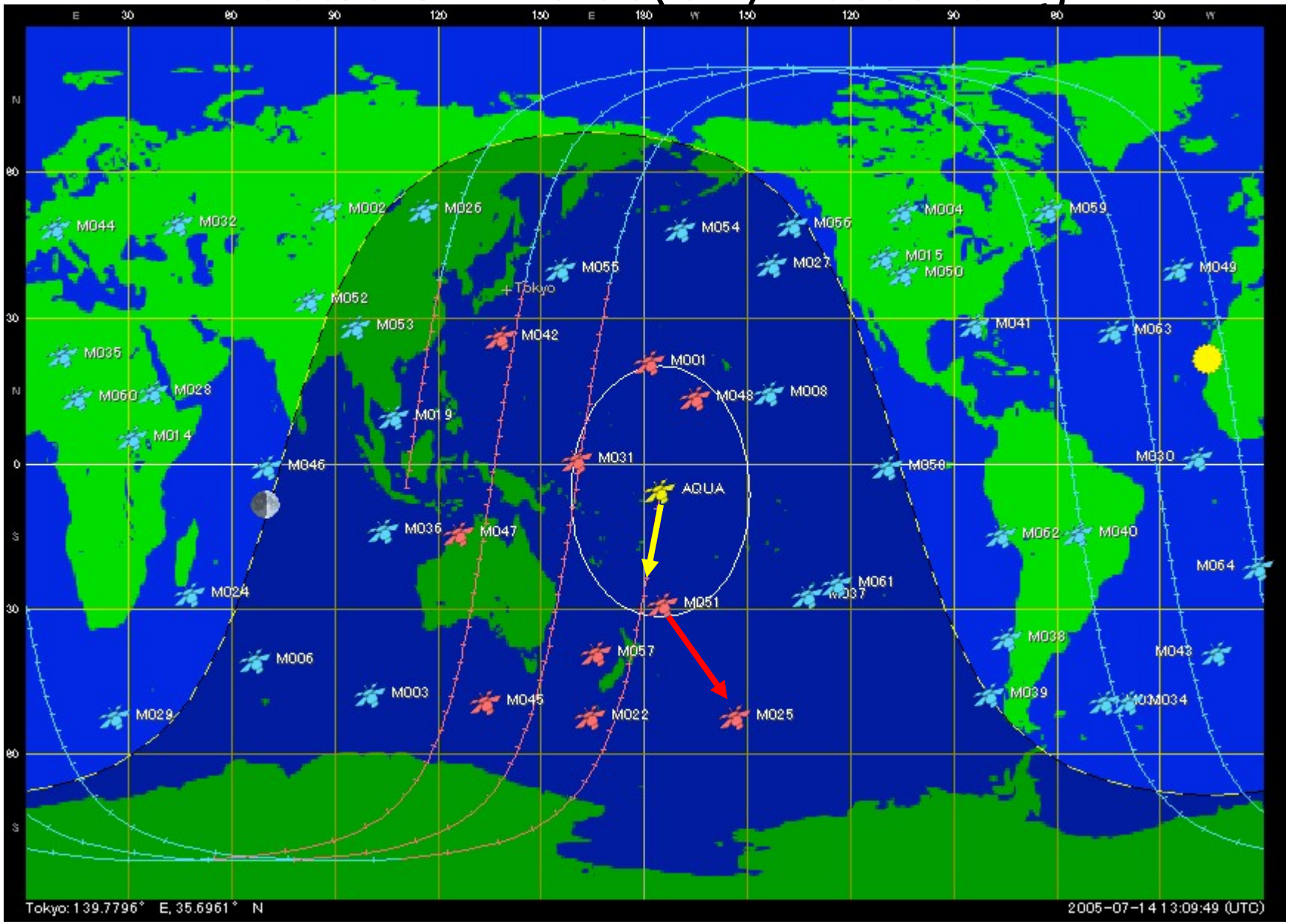

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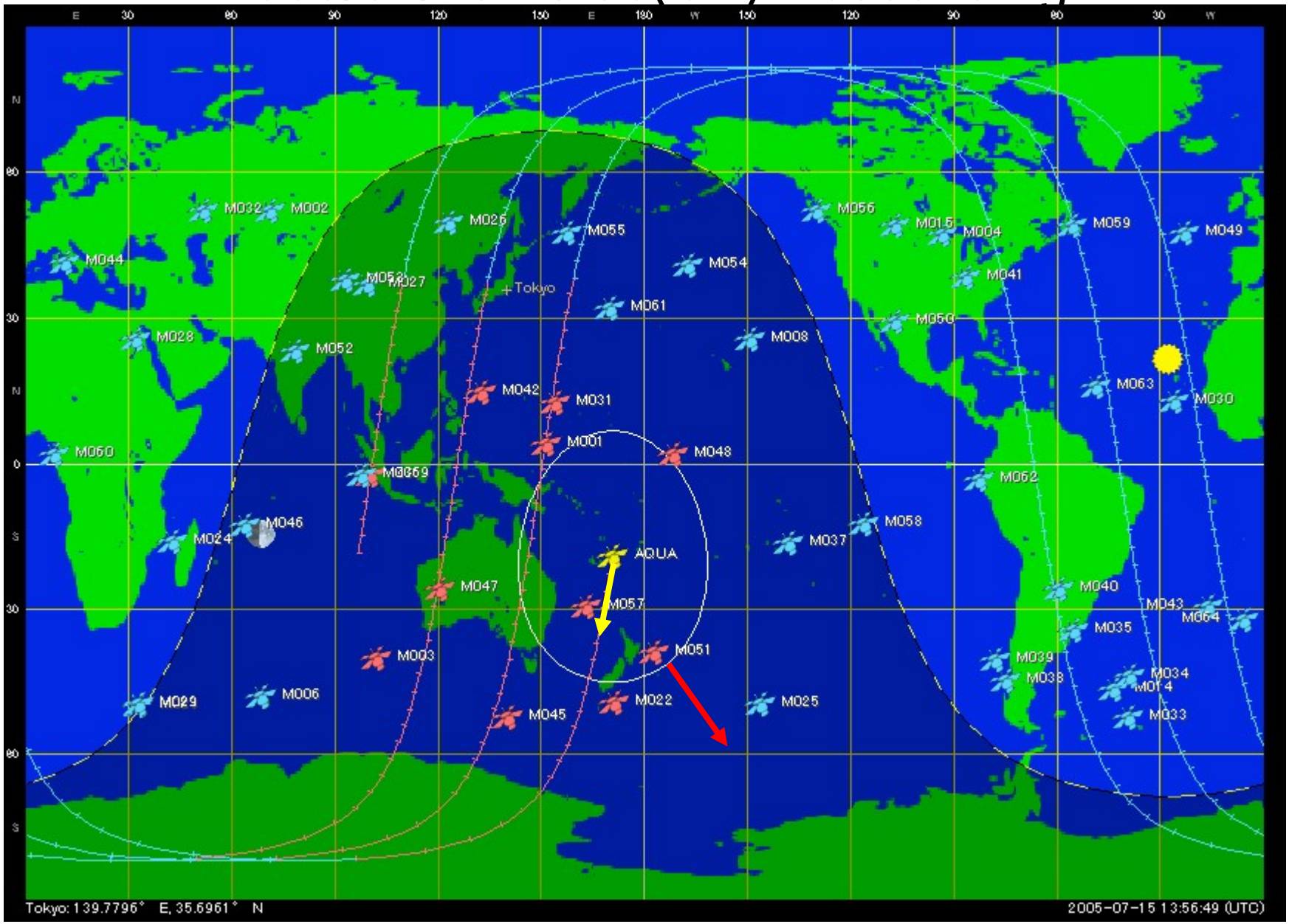
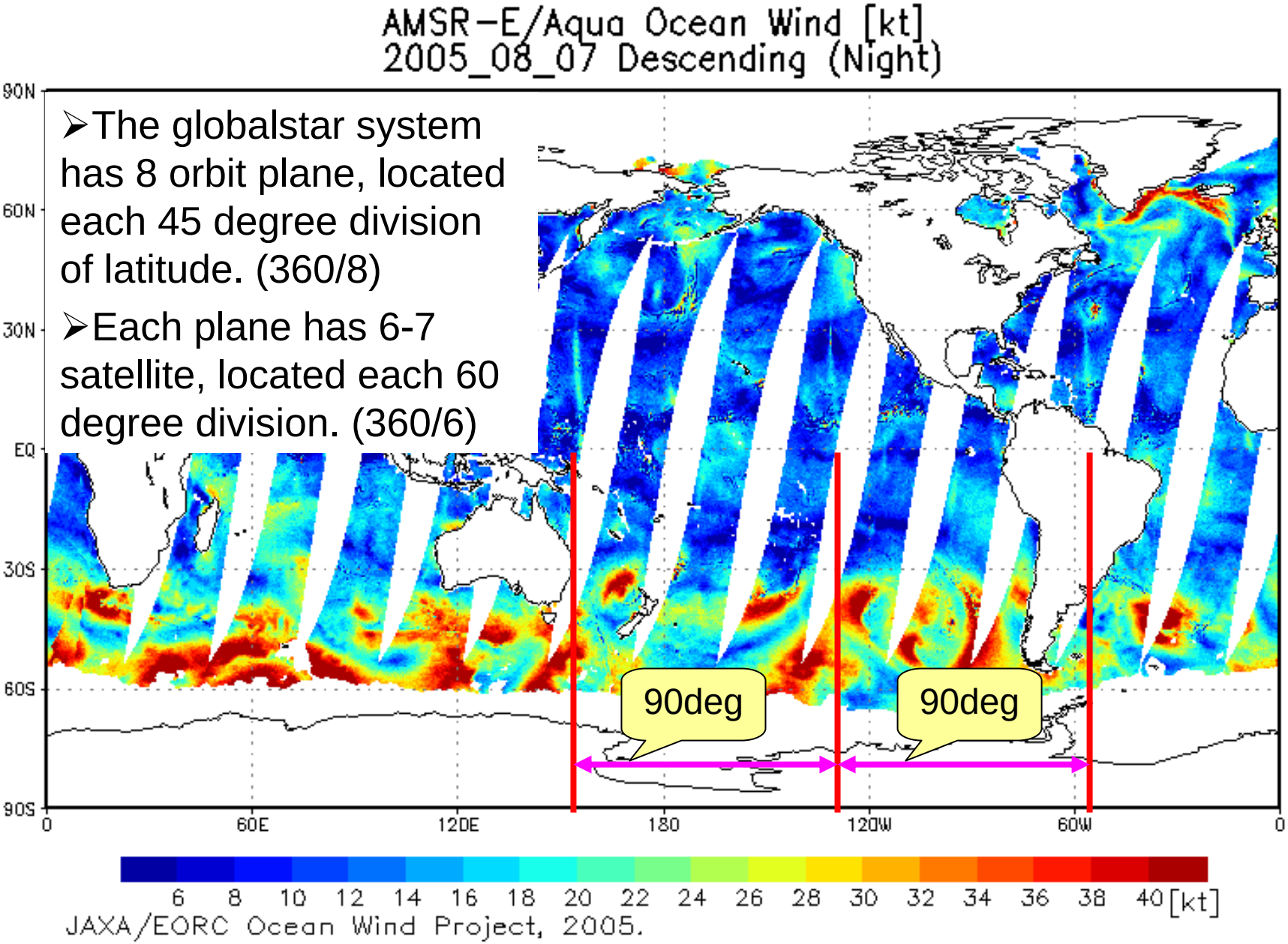


Summary

- RFI in ocean area were detected a few in 2002 and 2003, but its level and frequency seems to be increasing since 2004.
- Ocean products retrieved from 6.925GHz, such as SST and SSW, are damaged seriously because of the RFI.
- Preliminary result of the orbit tracking indicates that one of the 6.925GHz RFI source can be the reflectance of the globalstar downlink beam.
- RFI at 6-7GHz, assigned for LEO’s downlink, must be considered in a specification of sensors to retrieve better quality of the ocean product.

Backup slides

RFI in ocean area



- The globalstar system has 8 orbit plane, located each 45 degree division of latitude. (360/8)
- Each plane has 6-7 satellite, located each 60 degree division. (360/6)