



WRF Sensitivity to Coupling

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02:00 ~

How WRF 'sees' the sea surface

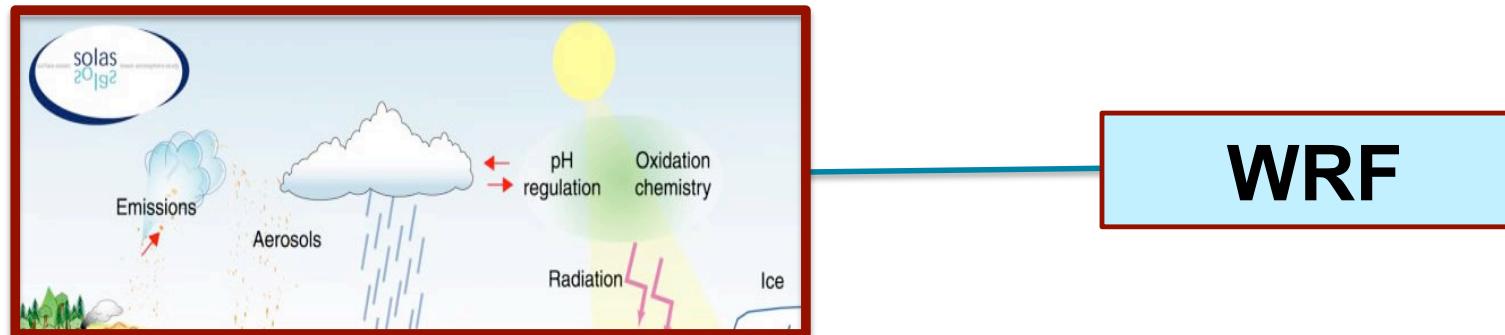


Image from: http://www.bodc.ac.uk/solas_integration/



How WRF 'sees' the sea surface

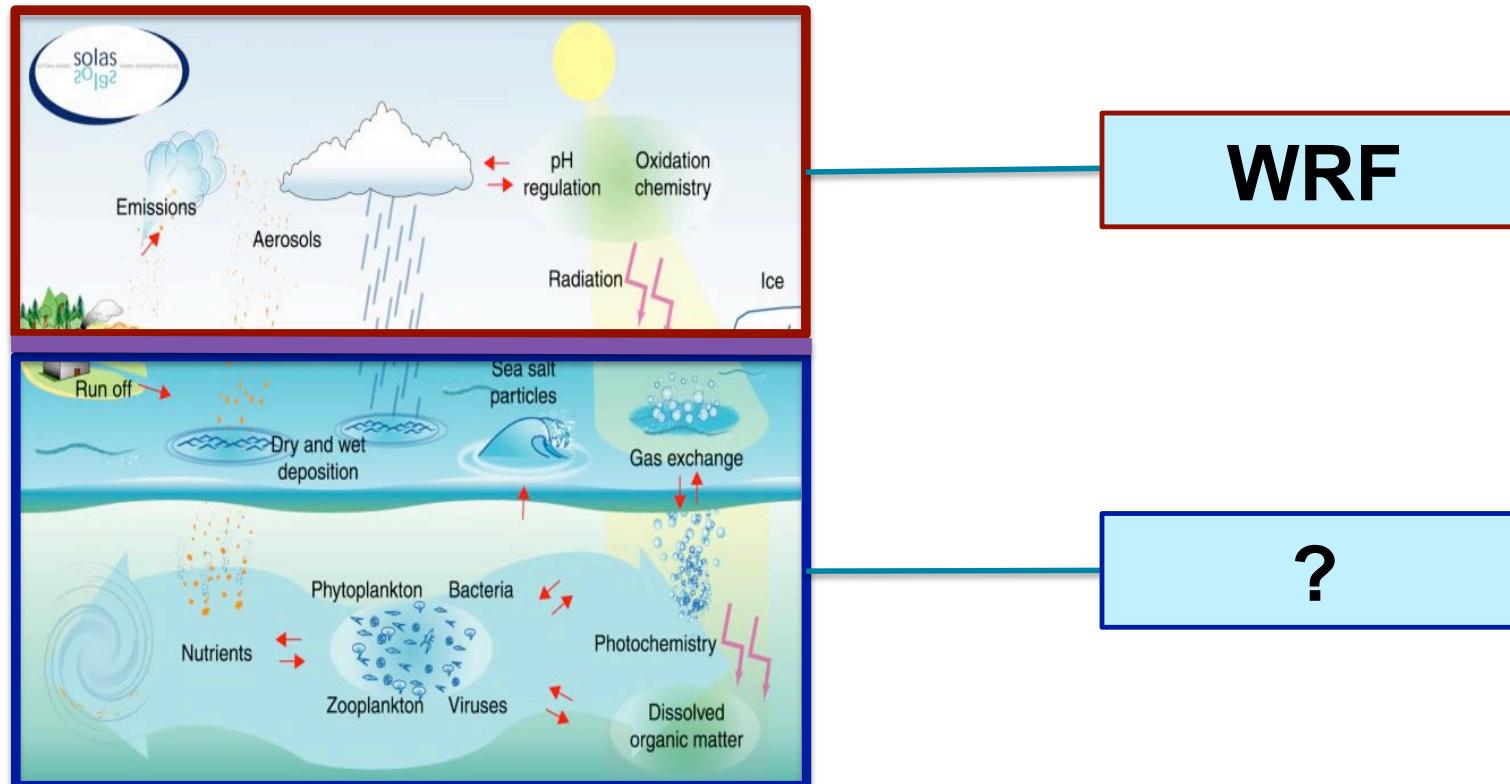


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How WRF 'sees' the sea surface

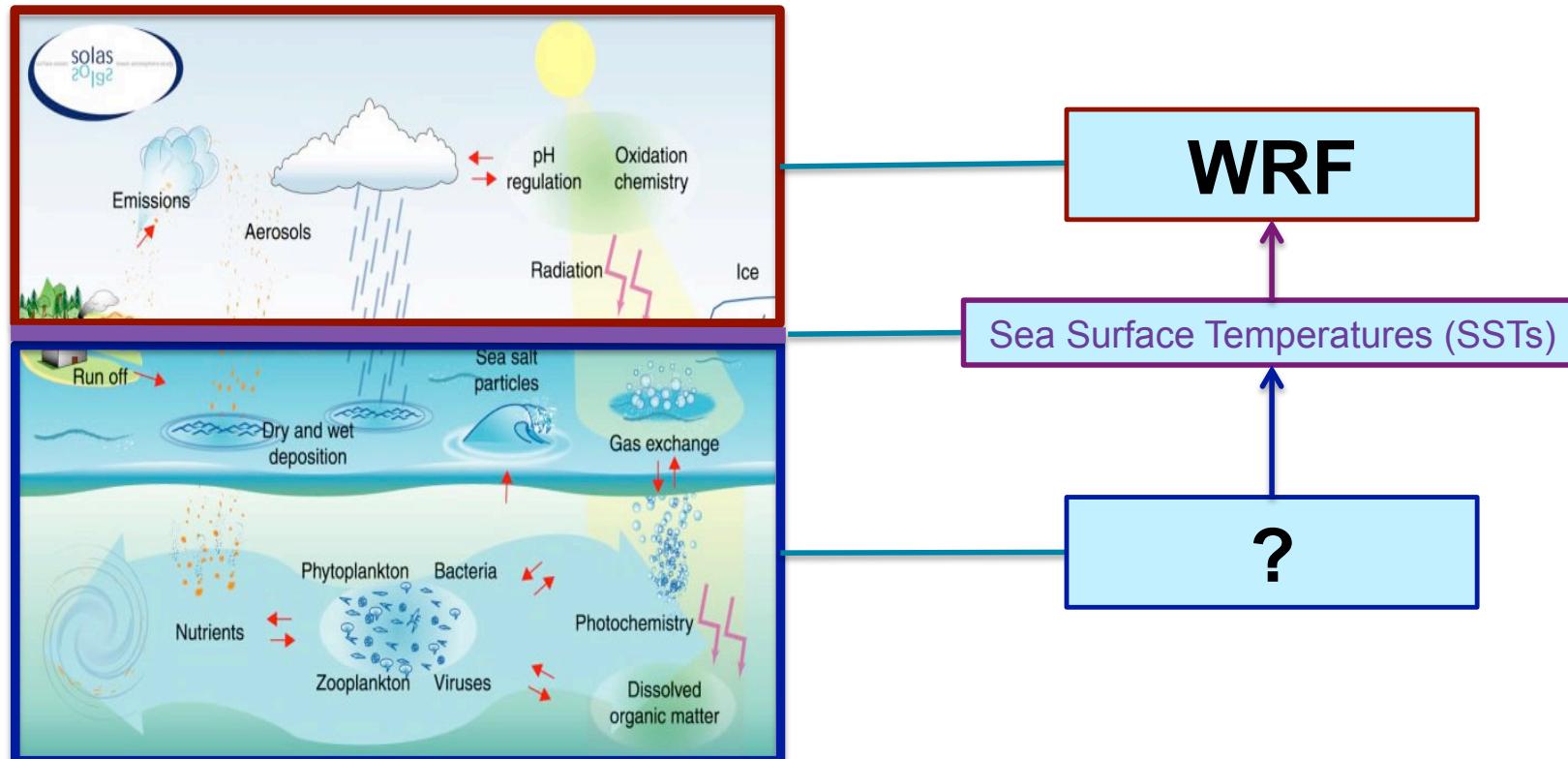


Image from: http://www.bodc.ac.uk/solas_integration/



SSTs in WRF

1. Providing SSTs from observations at initial time and/or at set intervals through out the run.

In the WRF namelist.input file set

sst_update = 1 *設定した値を読み込む*

WRF can also modify these SSTs in response to surface winds and changes in radiative fluxes using the scheme described in Zeng and Beljaars (2005).

In the WRF namelist.input file set

sst_skin = 1



How WRF 'sees' the sea surface

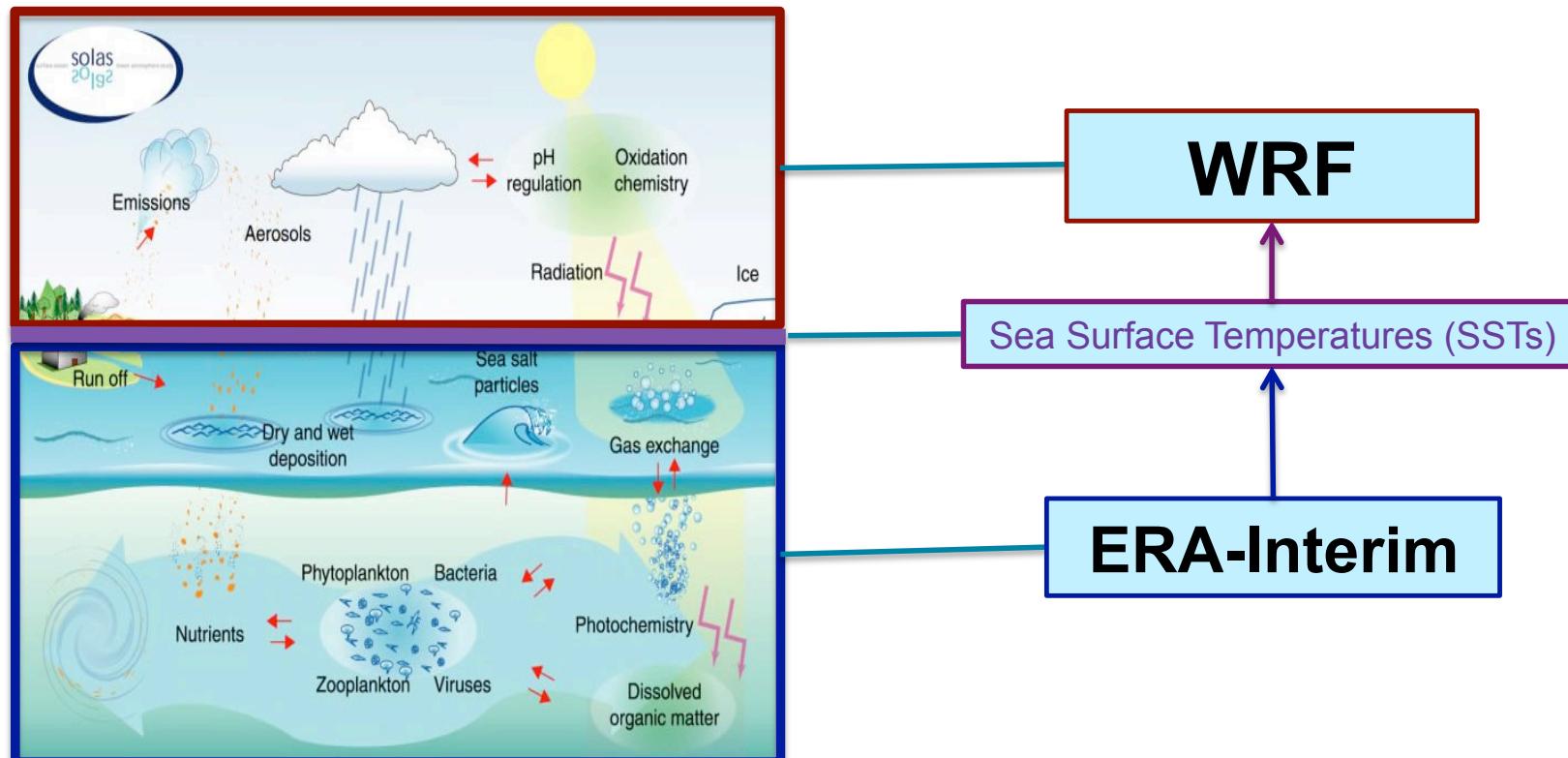
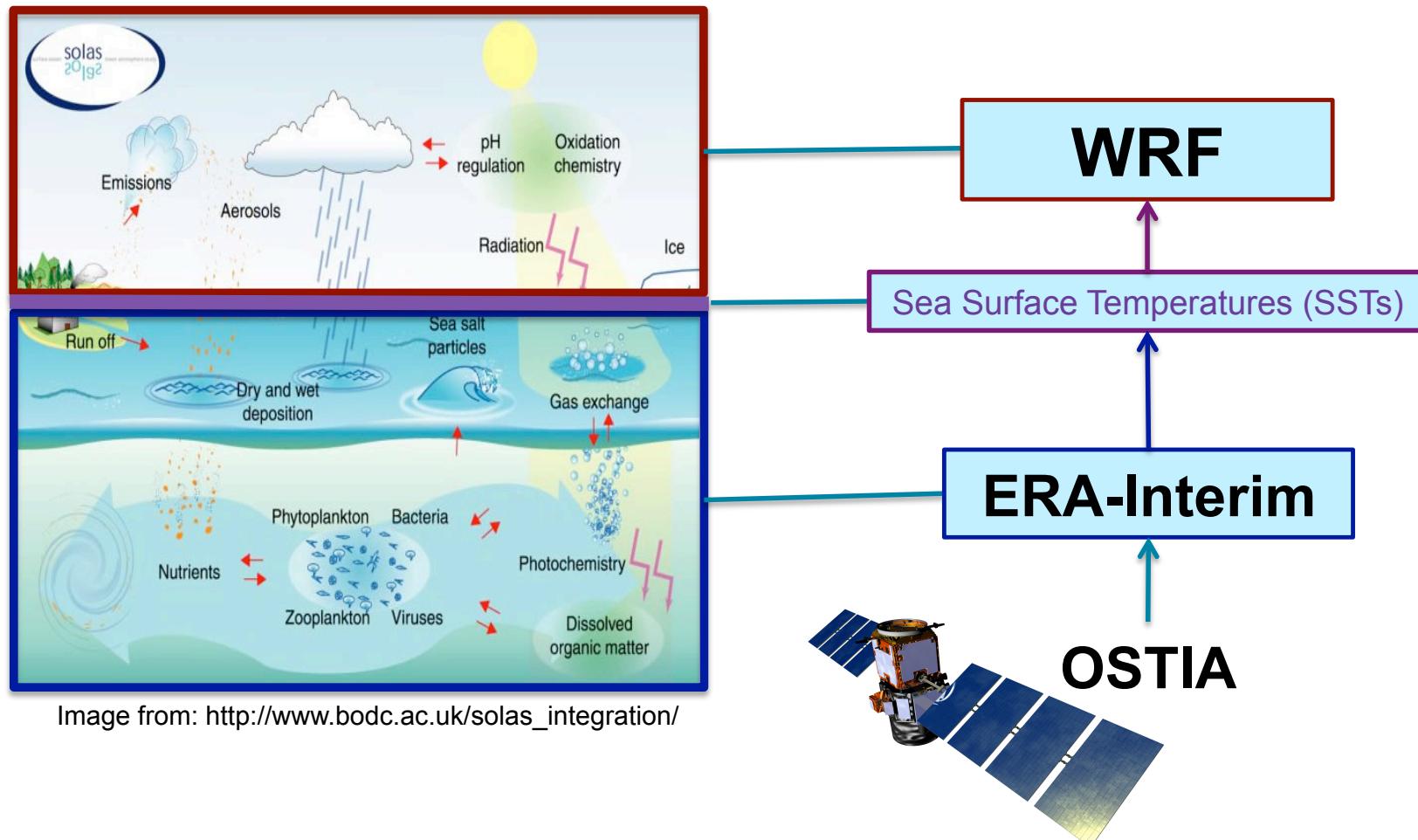


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How WRF 'sees' the sea surface





SSTs in WRF

2. Ocean Mixed Layer model e.g. Davis *et al.* (2008)
based on Pollard *et al.* (1972).



How WRF 'sees' the sea surface

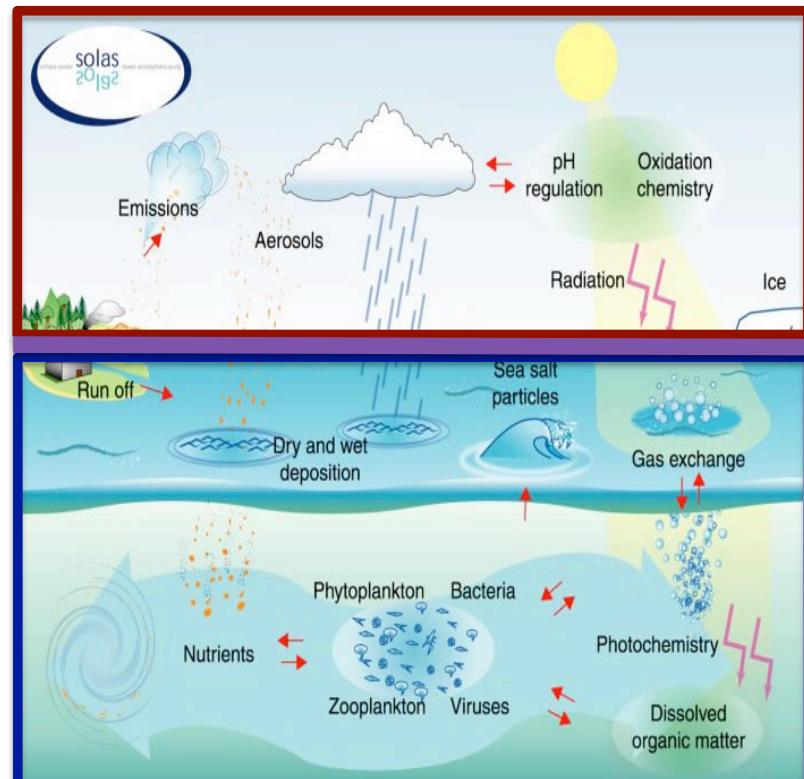
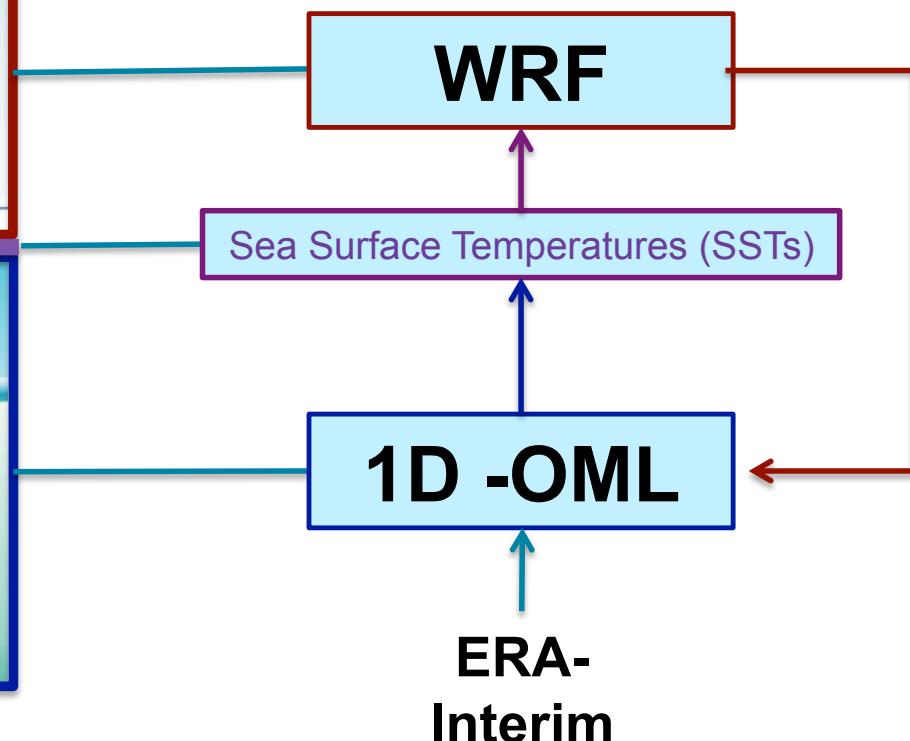


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SSTs in WRF

2. Ocean Mixed Layer model e.g. Davis *et al.* (2008)
based on Pollard *et al.* (1972).

Basically,

Determine depth of mixing (h_{new}).

If $h_{\text{new}} > h_{\text{old}}$,

Then:

$$\delta h = h_{\text{new}} - h_{\text{old}}$$

$$\delta T = \delta h \times \Gamma$$

Else: No vertical mixing and no cooling

In the WRF namelist.input file set

`sf_ocean_physics = 1`

`oml_hml0 =`

`oml_gamma =`



SSTs in WRF

カクセイノリニシテガラシ

3. Coupled ocean model e.g. COAWST (Warner *et al.*, 2010)



How WRF 'sees' the sea surface

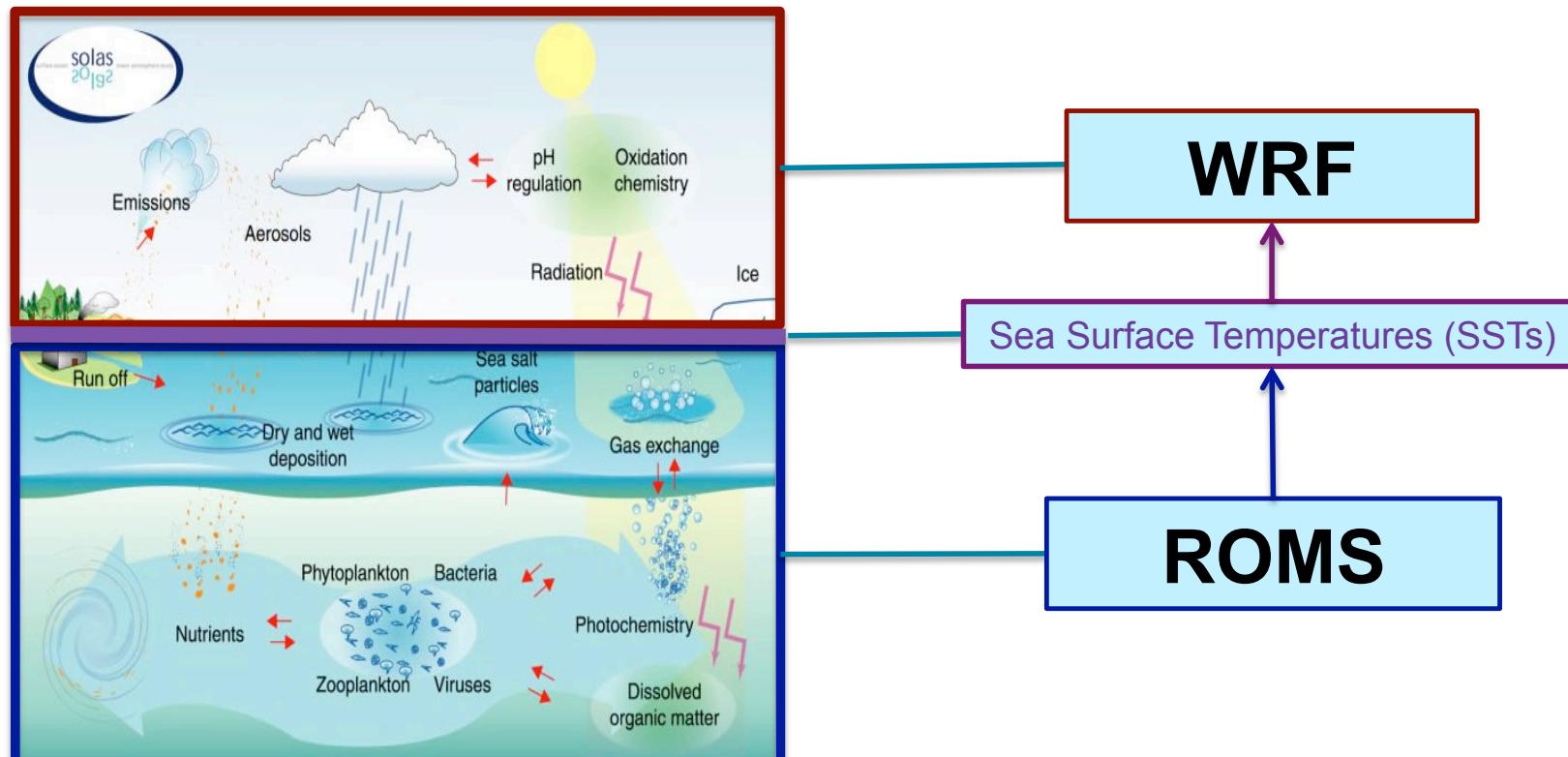


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How WRF 'sees' the sea surface

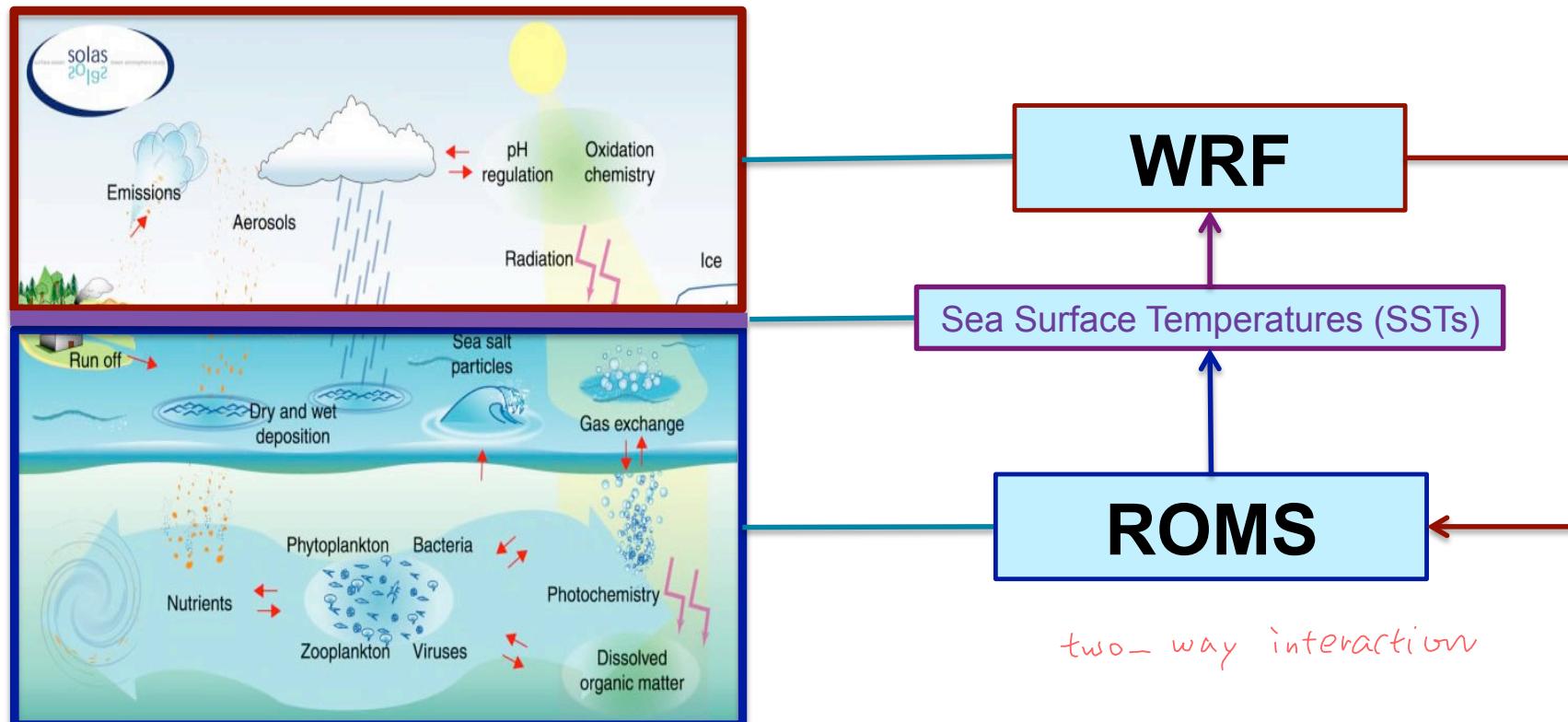
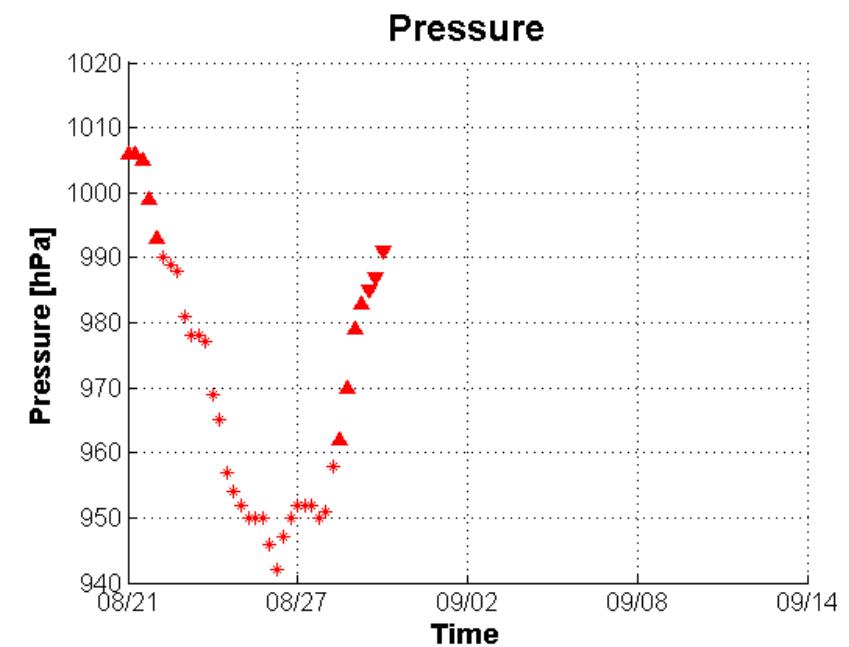
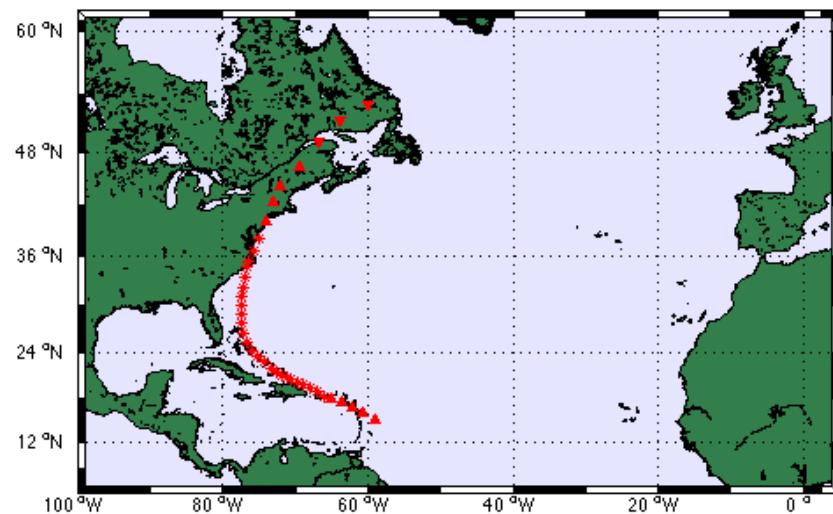


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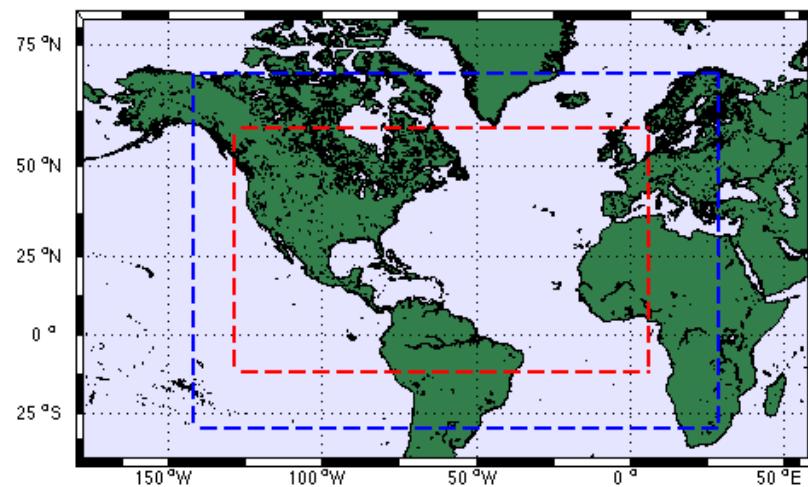


Case Study: Hurricane Irene (2011)





Case Study: Hurricane Irene (2011)



WRF V3.6.1

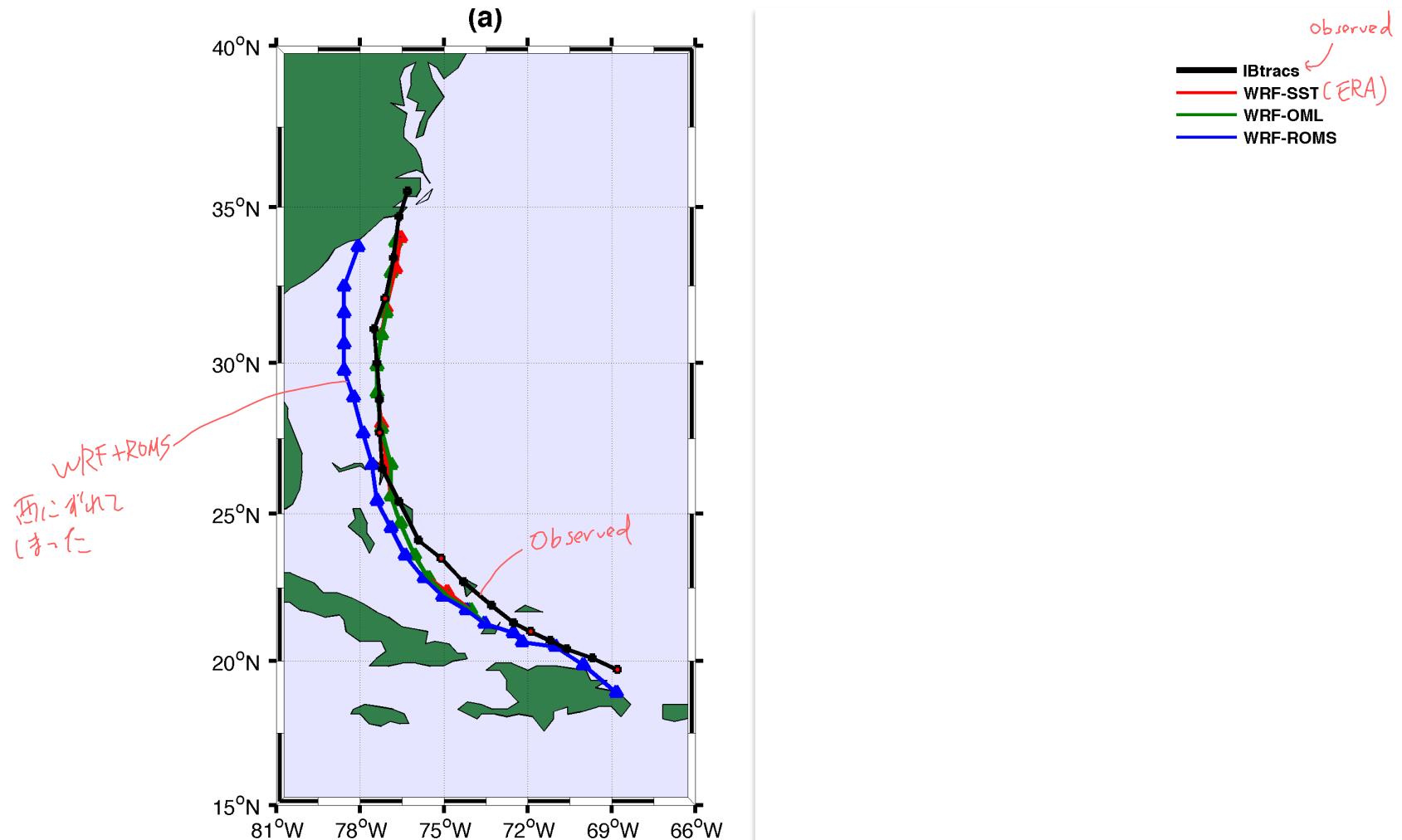
Initial and boundary data: ***ERA Interim***
Resolution: **36km, 12km**
Start Date: **23rd August 2011**

ROMS V3.7

Initial and boundary data: ***HYCOM***
Resolution: **12km**
Start Date: **23rd August 2011**

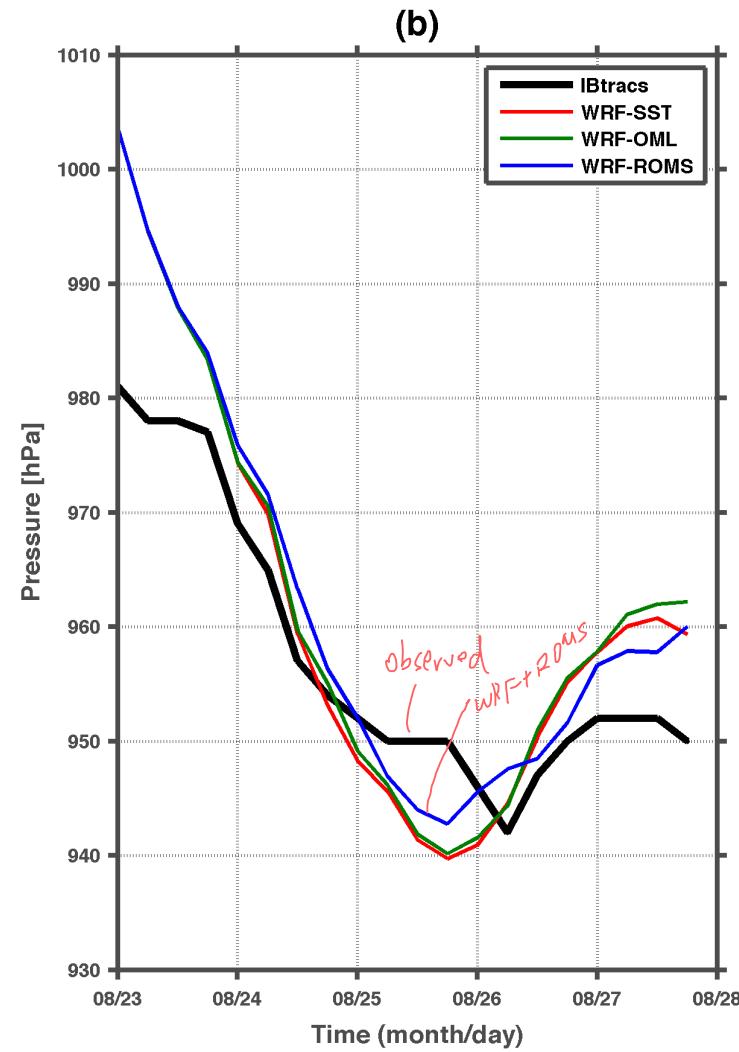
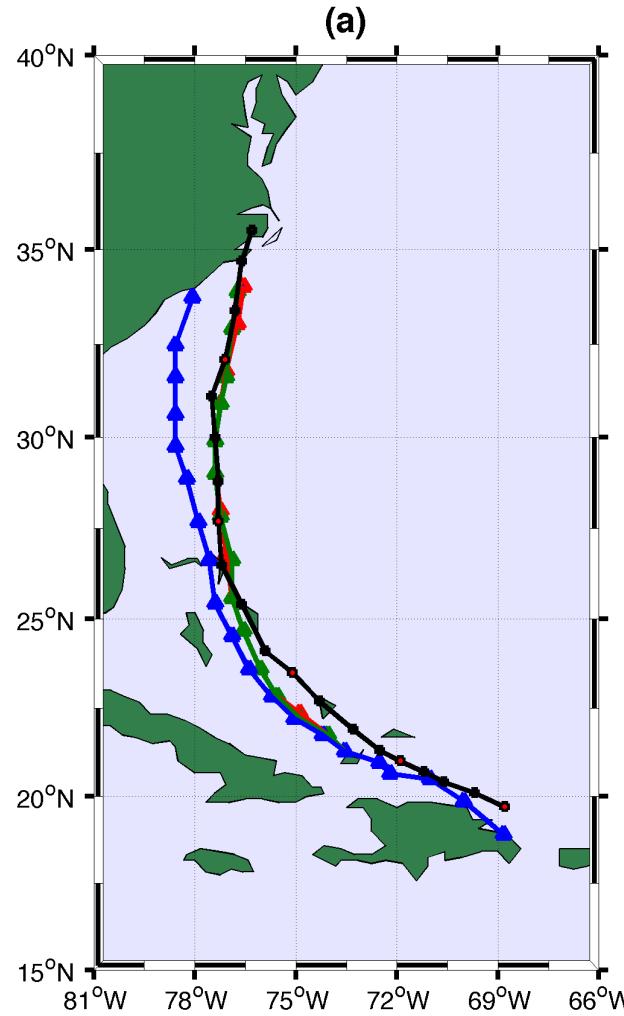


Case Study: Hurricane Irene (2011)



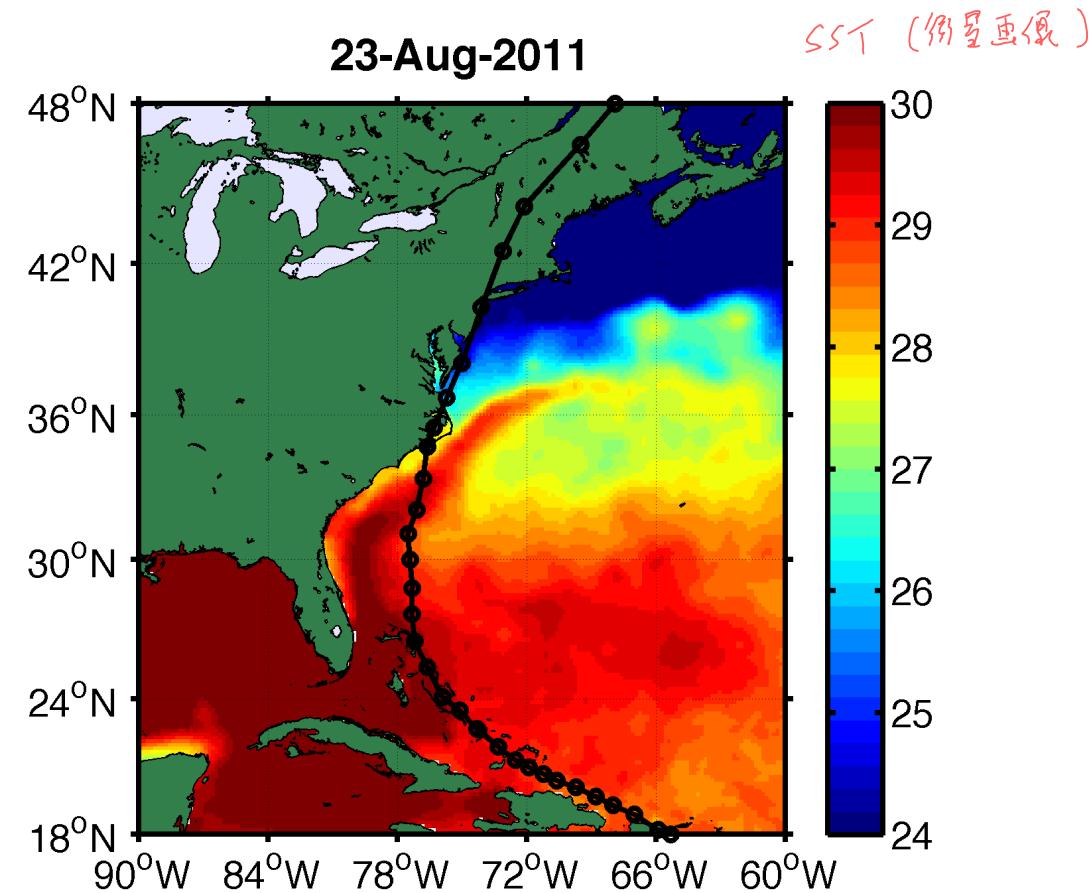
ERA を使った方が
最も精度が高い。
(ただし、位置観測が少ない
この組合せでは優秀)
(手書き予測等)
↓
WRF-ROMS の必要性

Case Study: Hurricane Irene (2011)



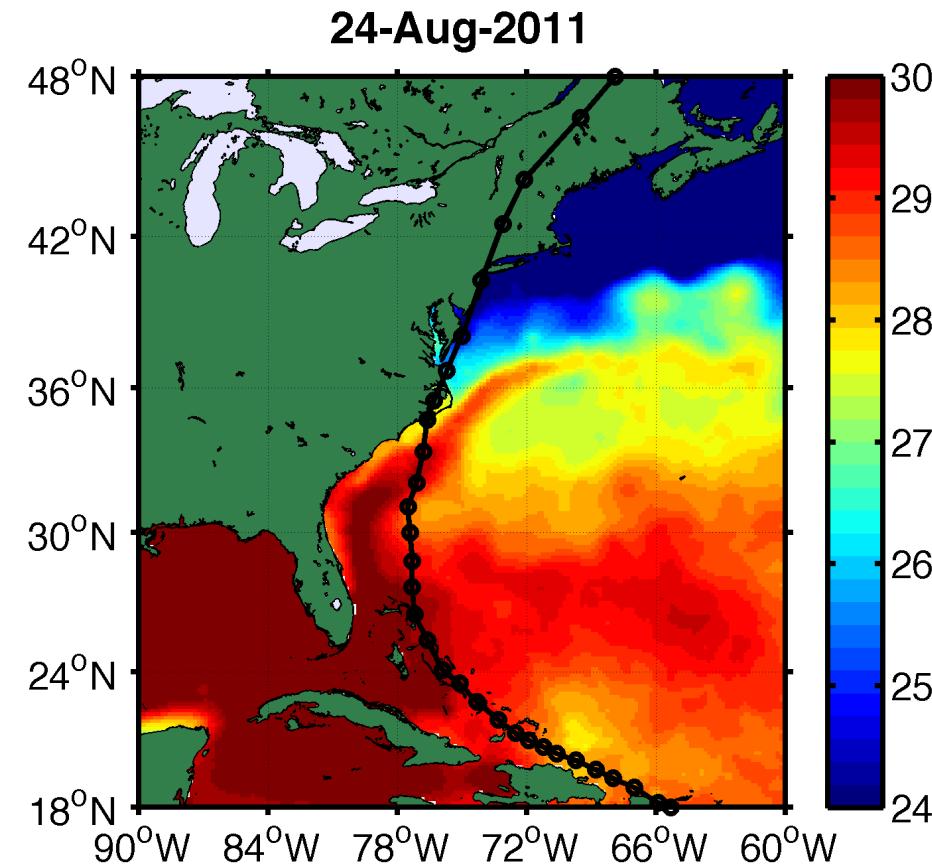


Case Study: Hurricane Irene (2011)



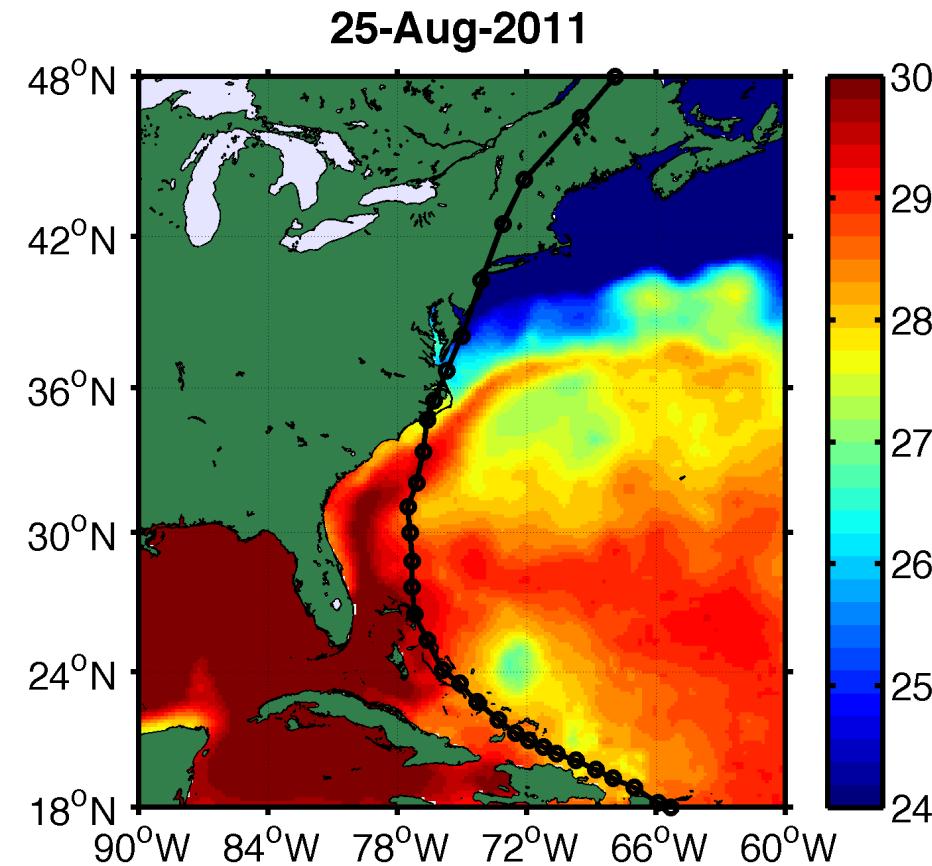
[Mooney et al., 2016]

Case Study: Hurricane Irene (2011)



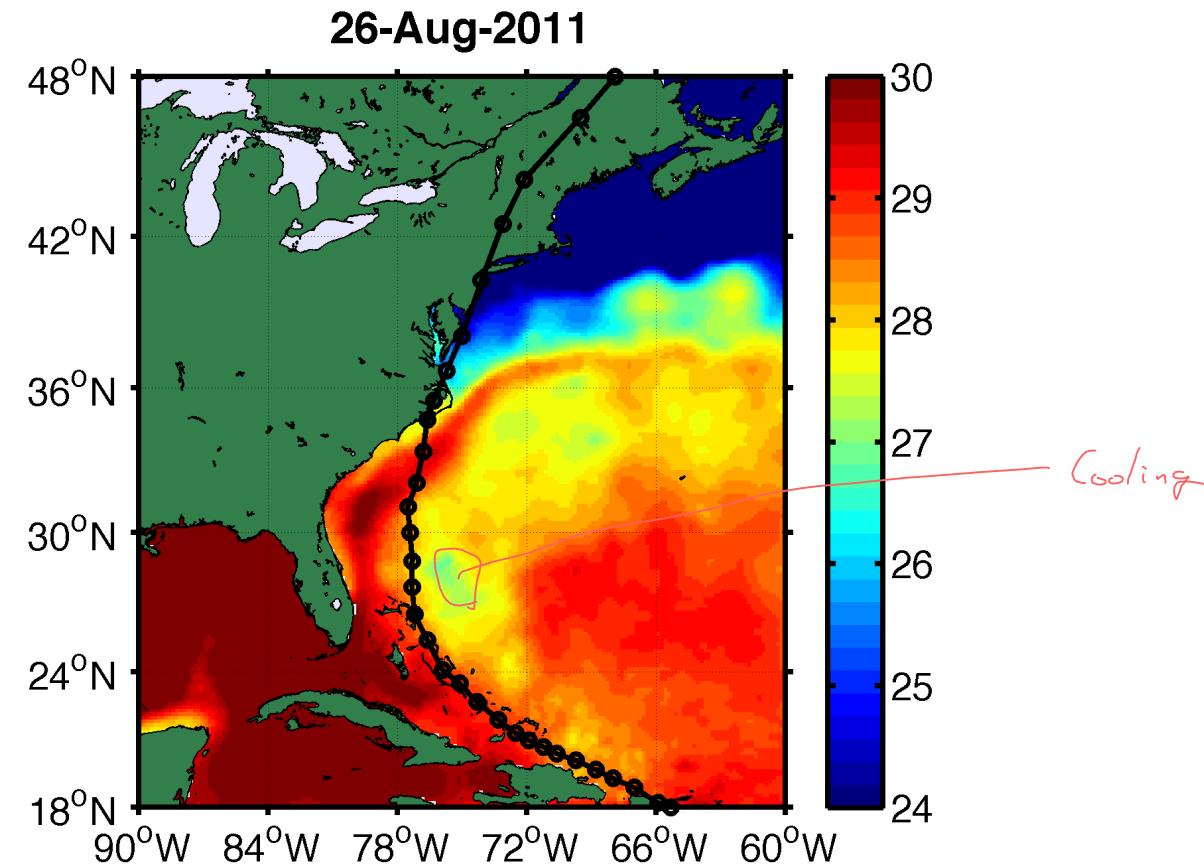
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Case Study: Hurricane Irene (2011)



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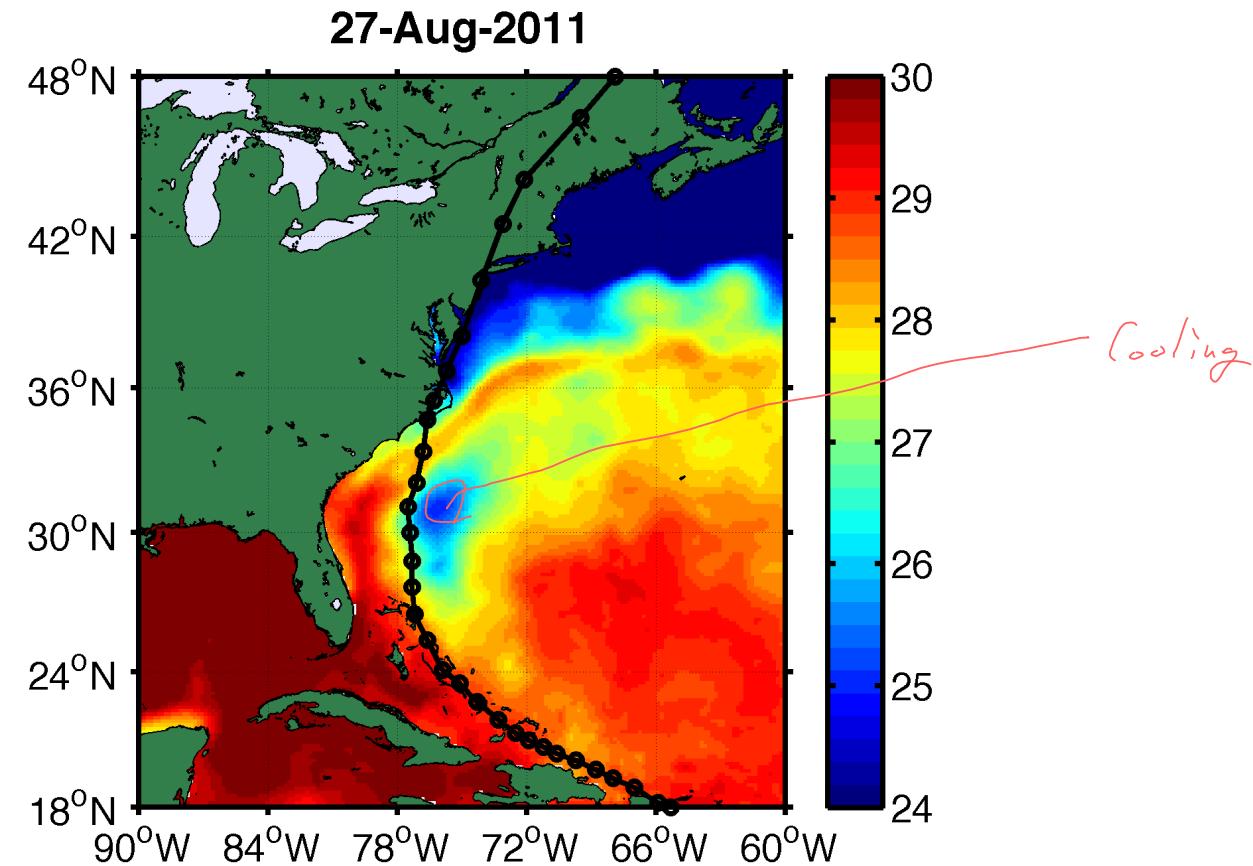
Case Study: Hurricane Irene (2011)



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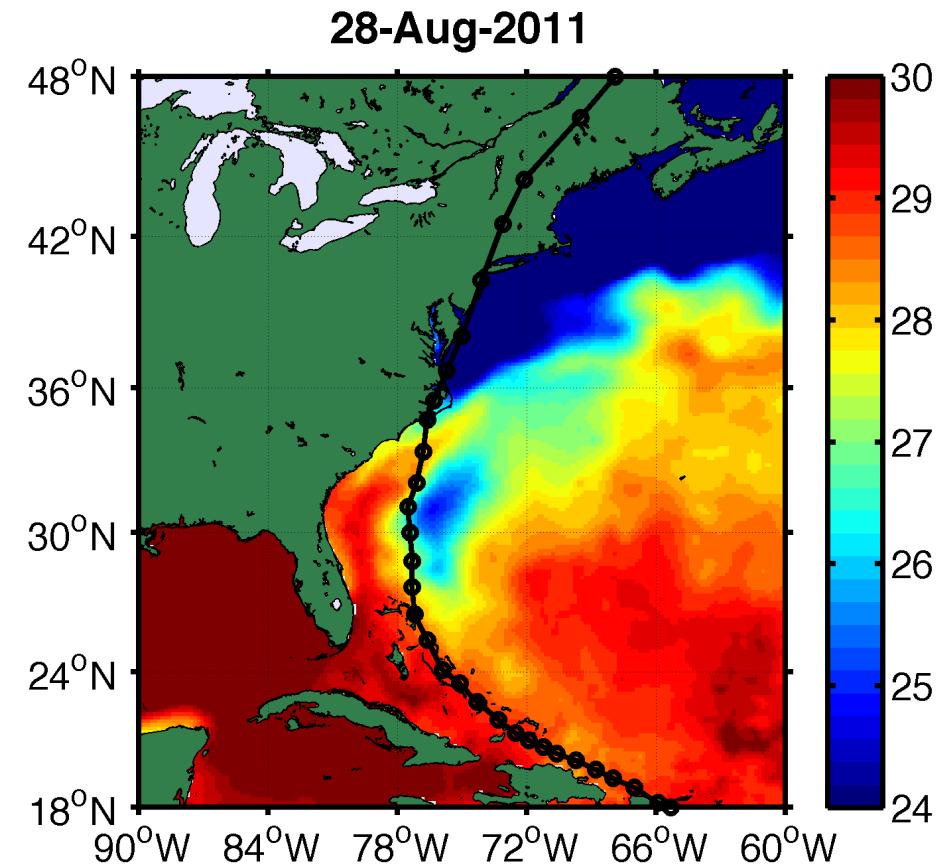


Case Study: Hurricane Irene (2011)



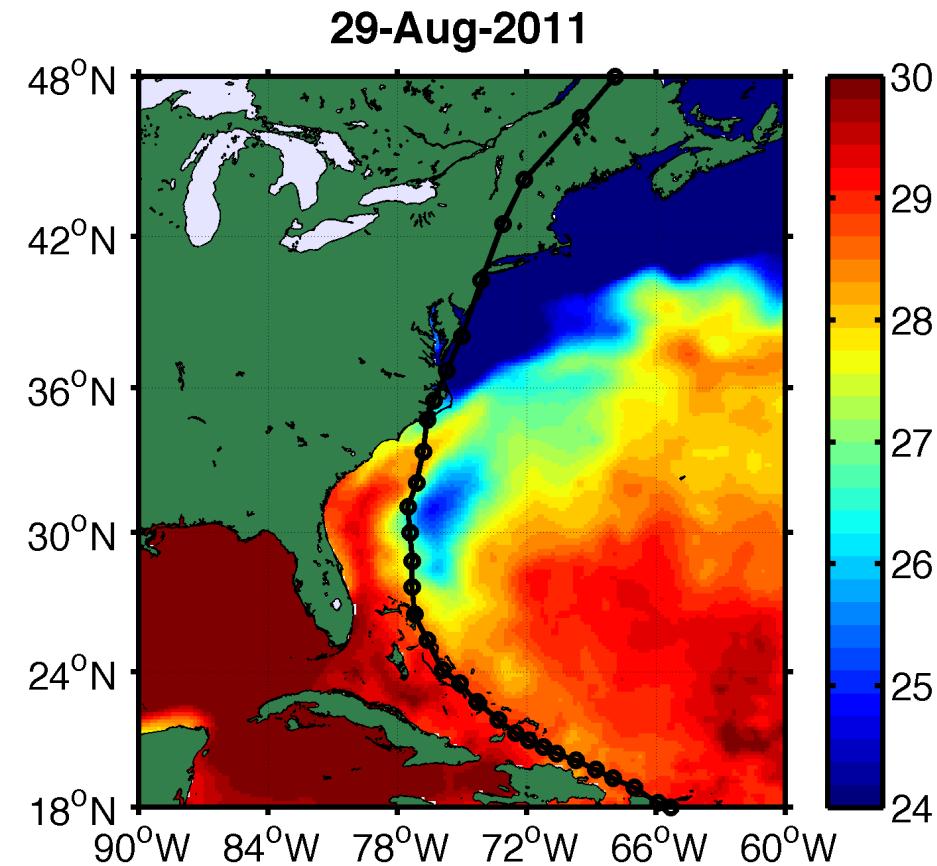
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Case Study: Hurricane Irene (2011)



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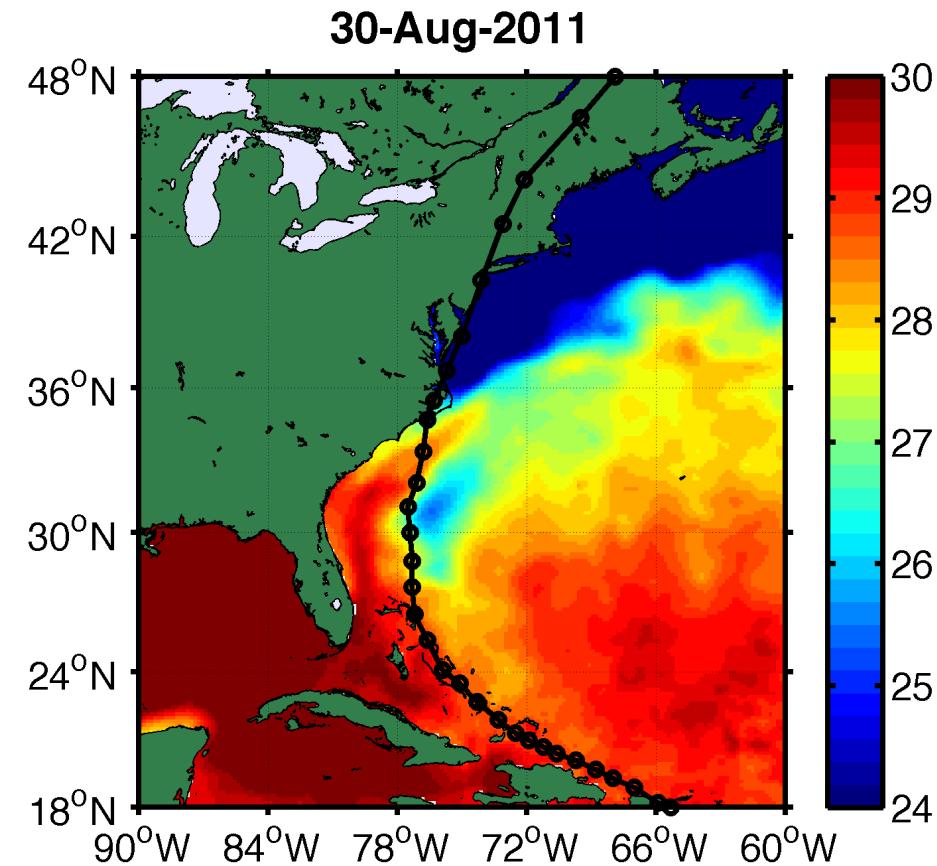
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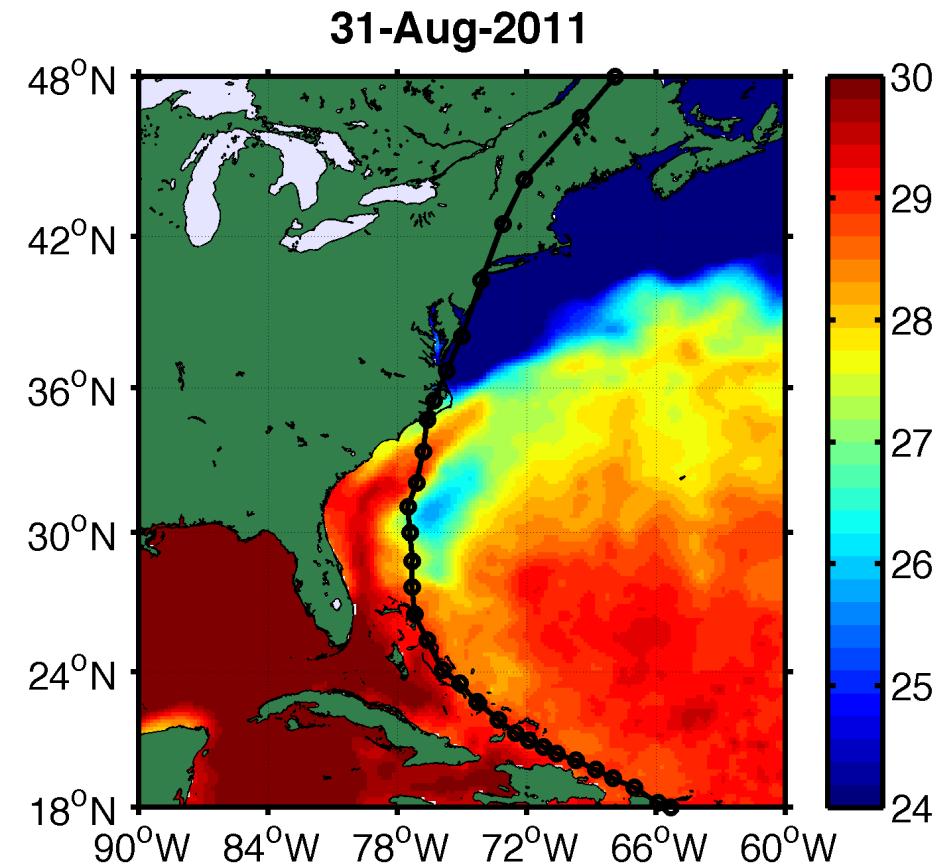
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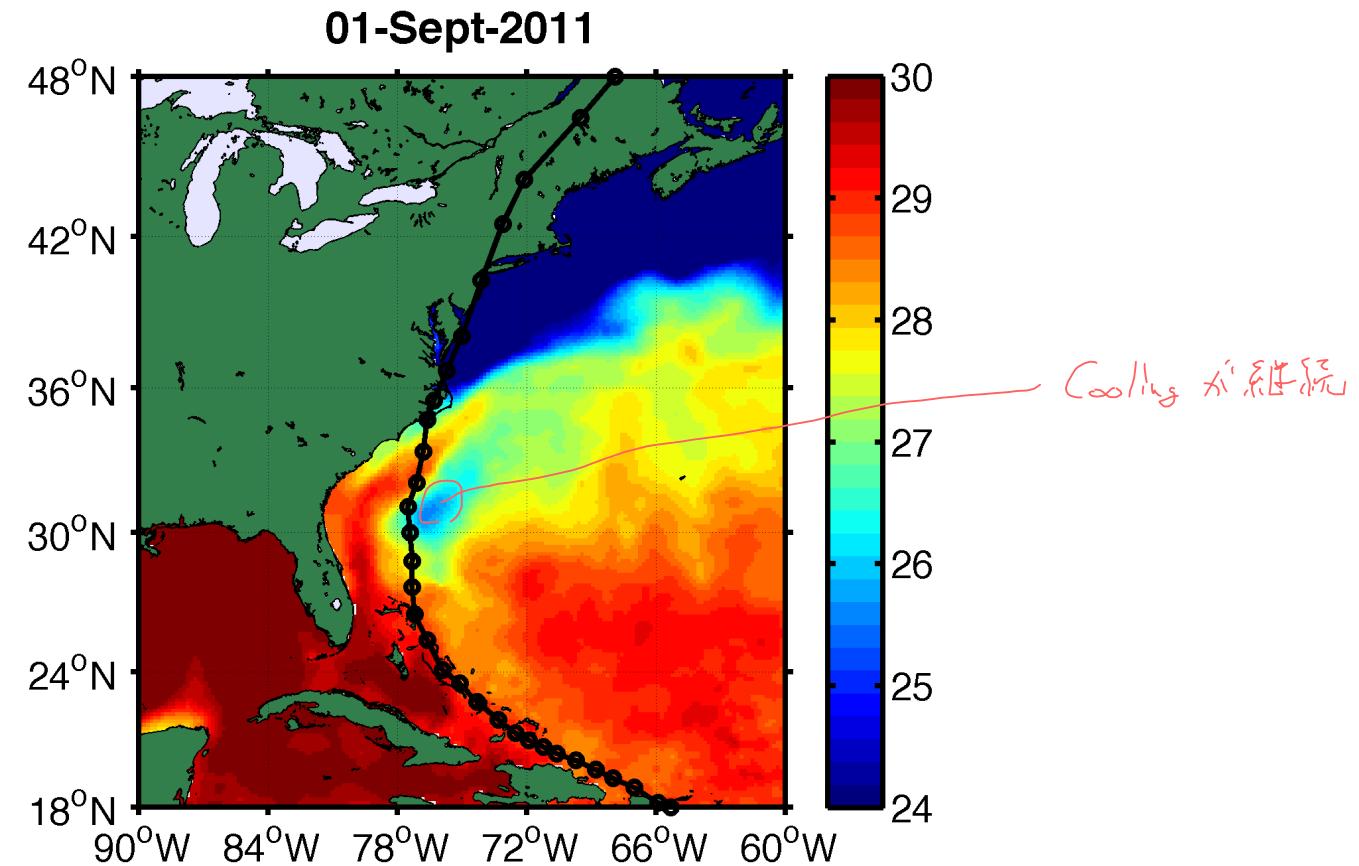


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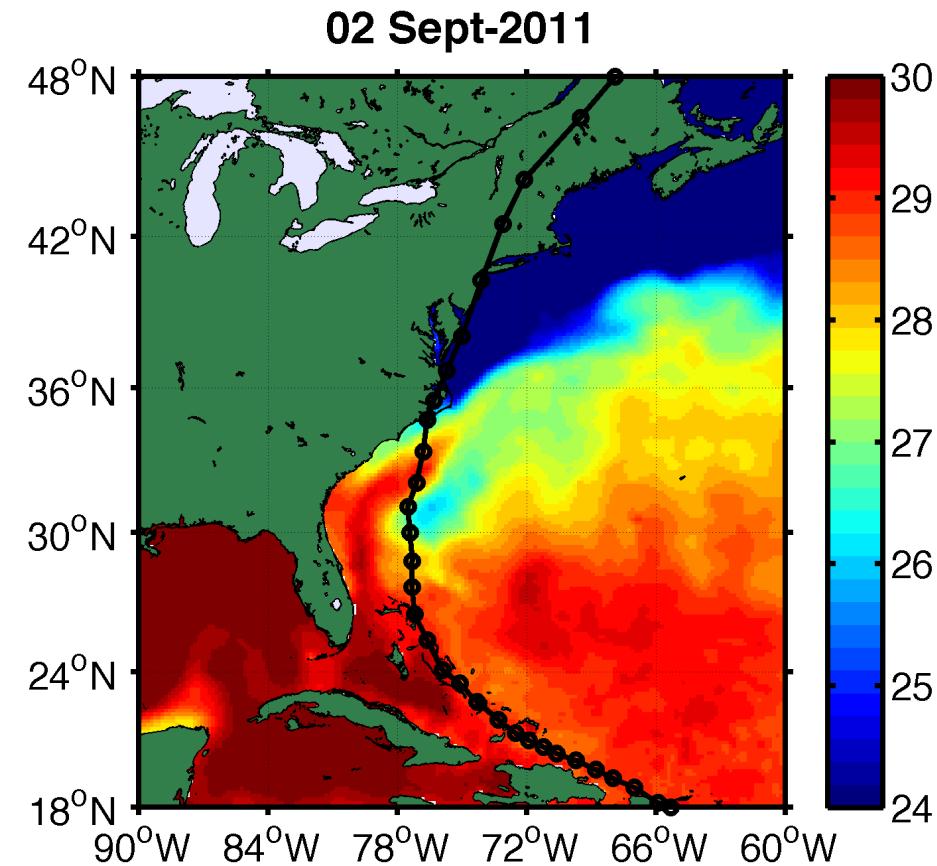
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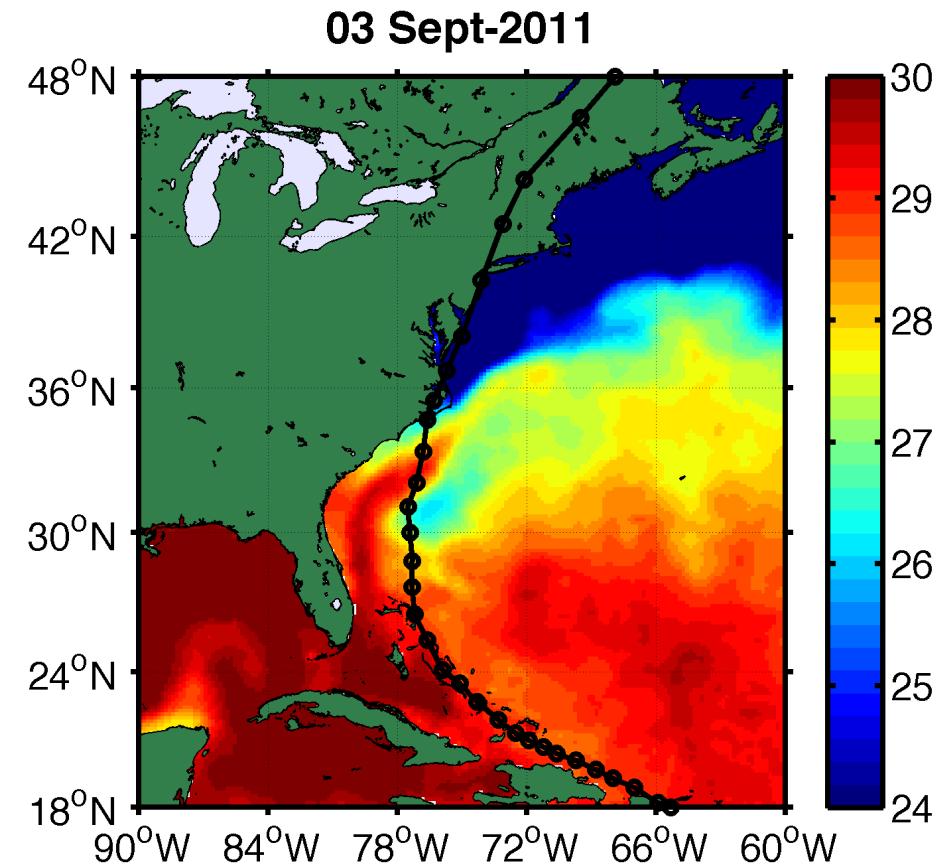
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Case Study: Hurricane Irene (2011)



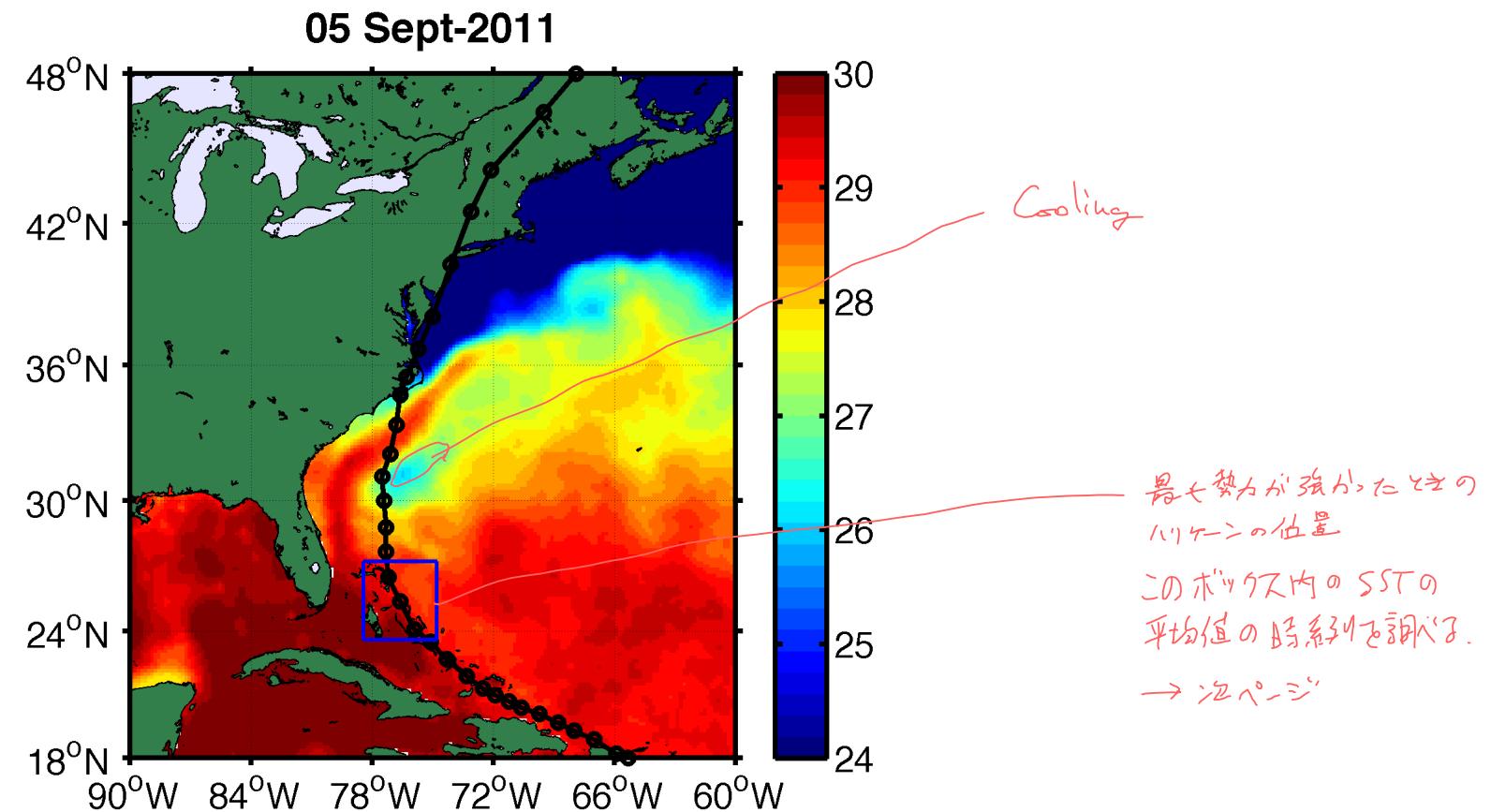
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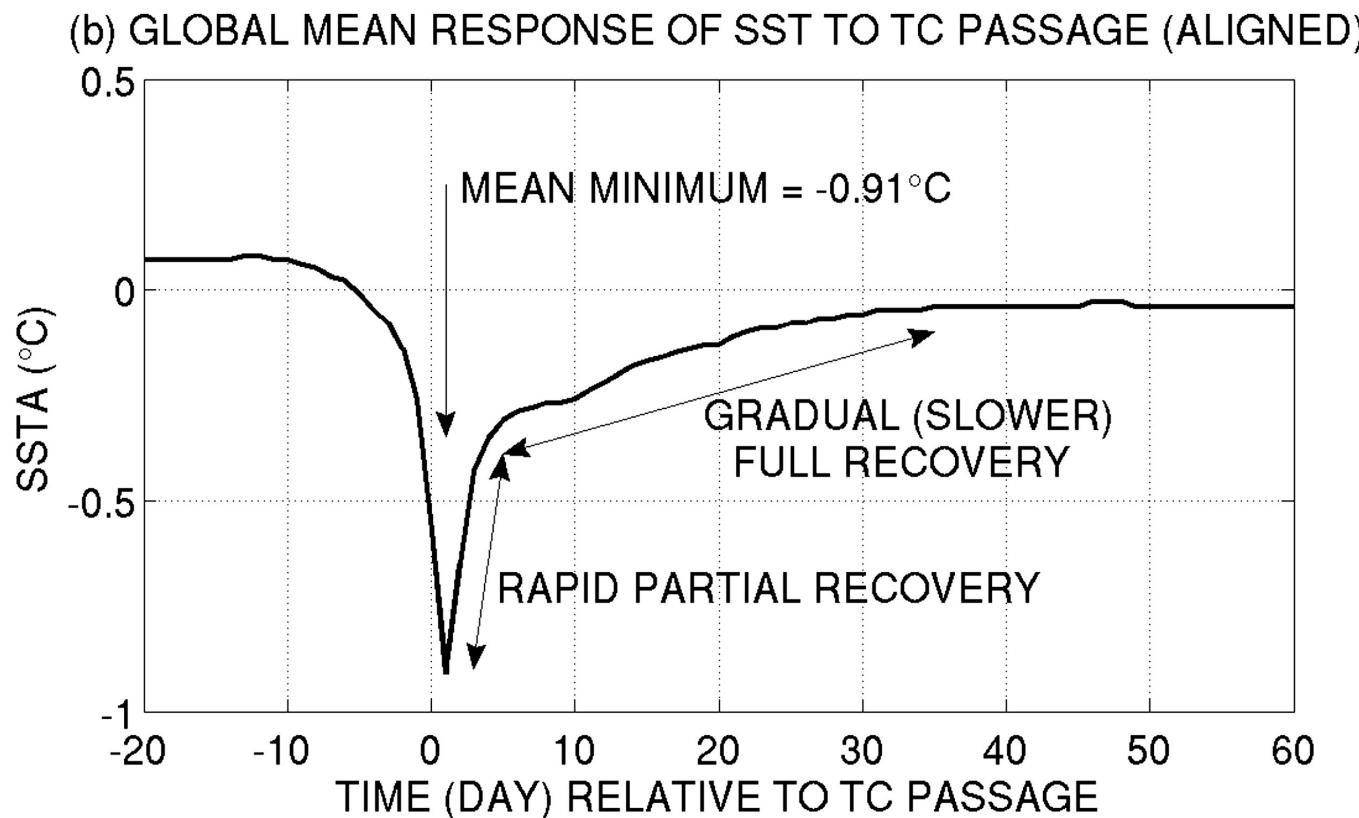
[Mooney et al., 2016]

Case Study: Hurricane Irene (2011)



[Mooney et al., 2016]

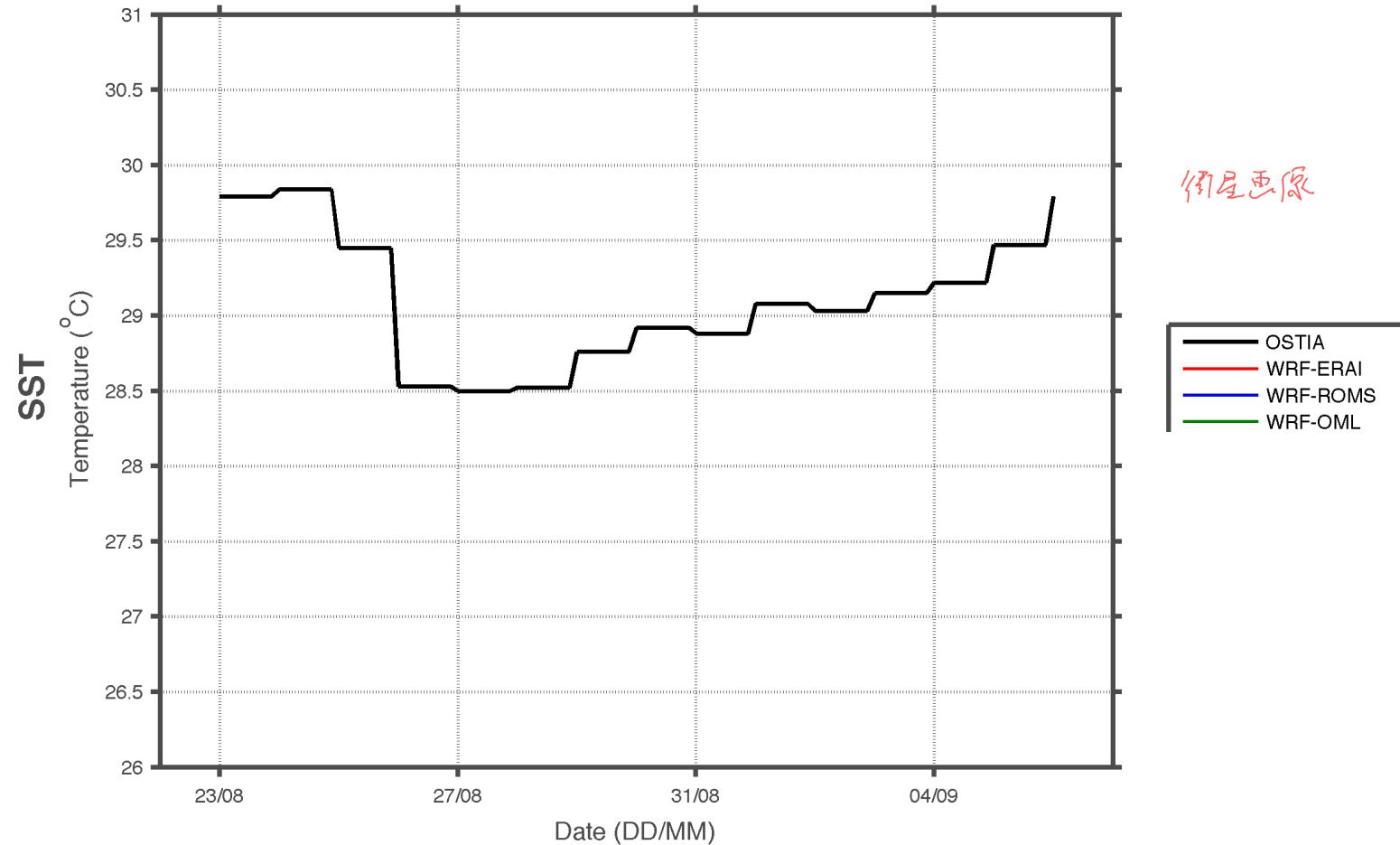
Case Study: Hurricane Irene (2011)



[Dare and McBride, 2011]

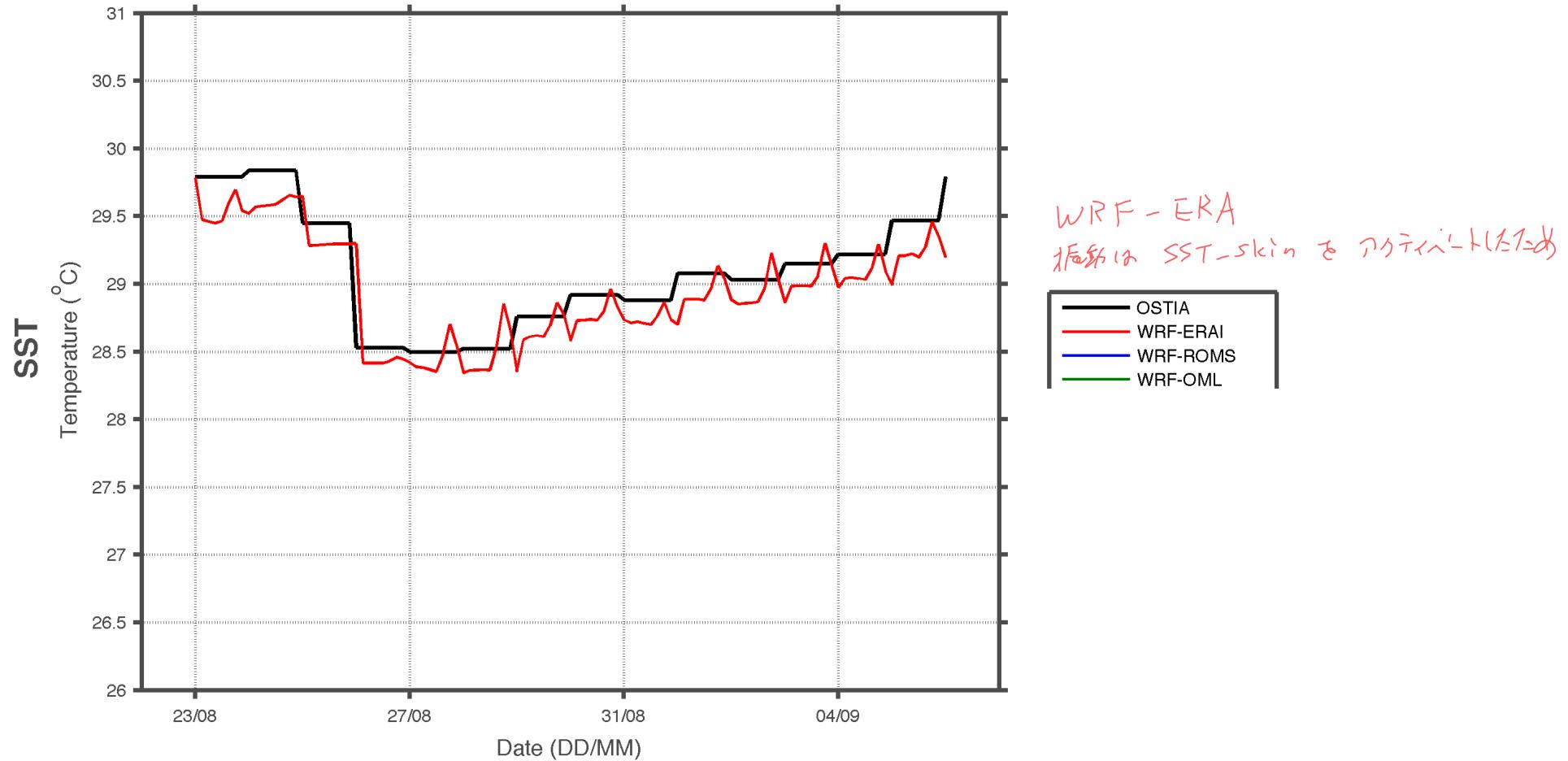


Case Study: Hurricane Irene (2011)



[Mooney et al., 2016]

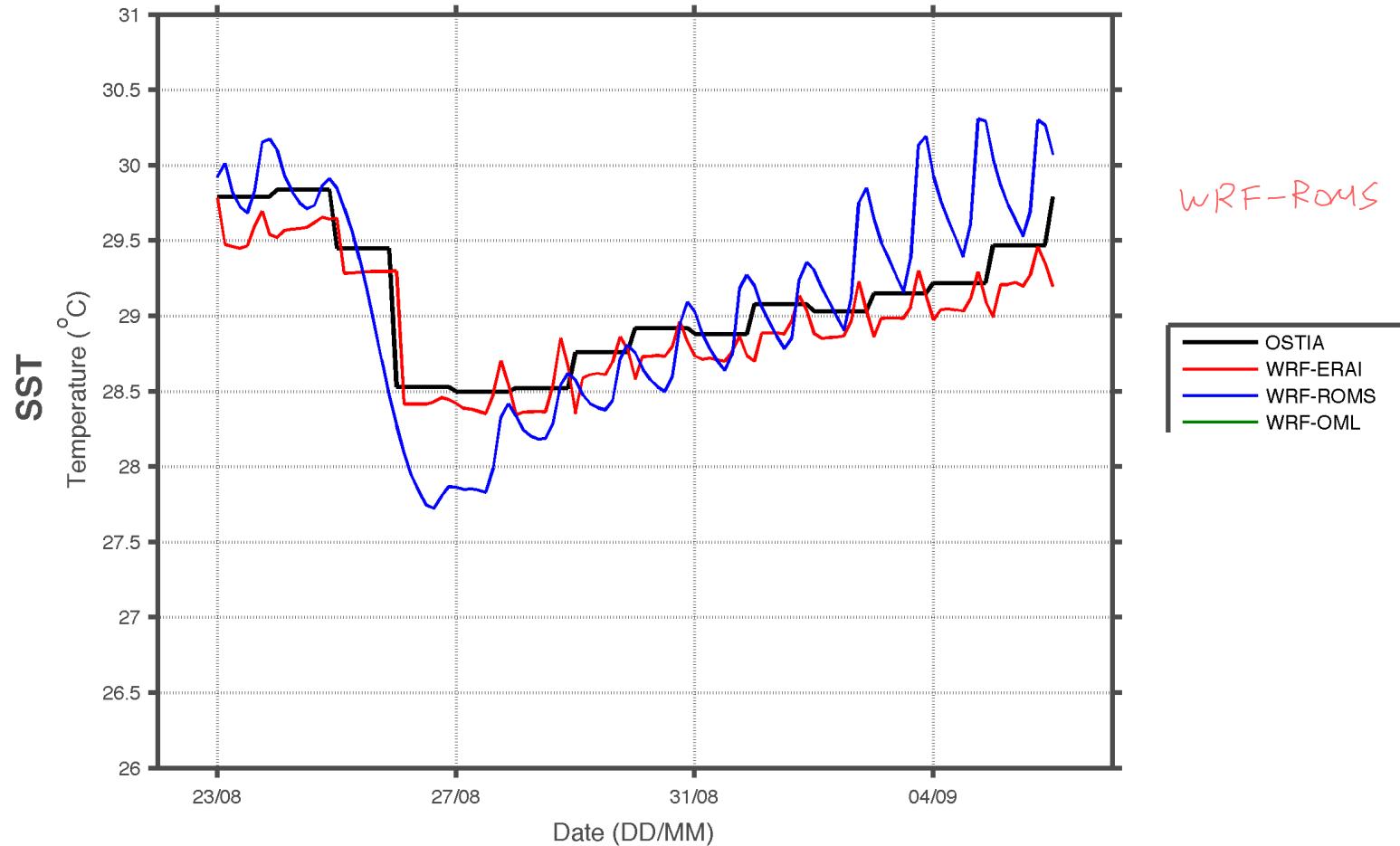
Case Study: Hurricane Irene (2011)



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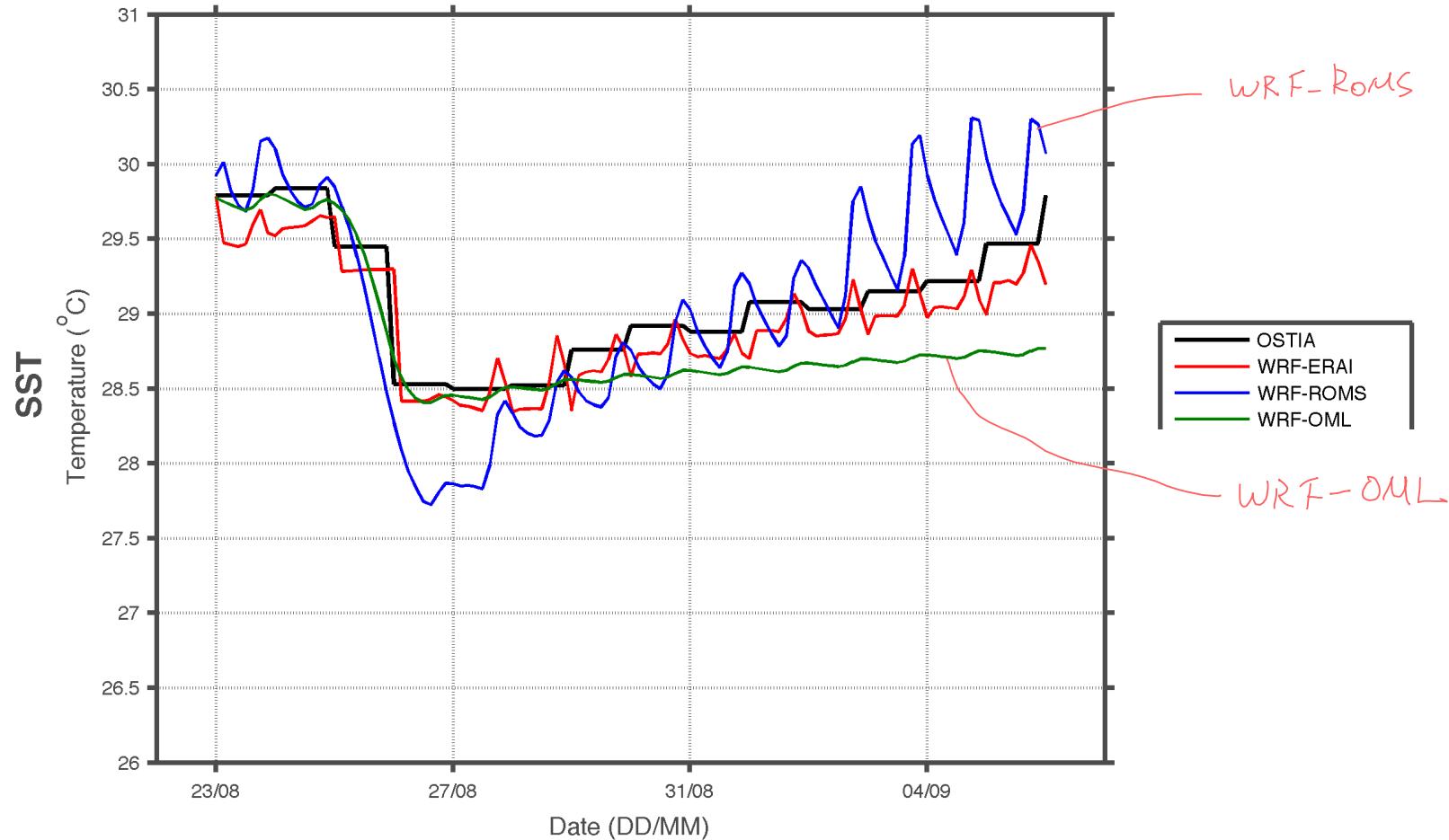


[Mooney et al., 2016]



Case Study: Hurricane Irene (2011)

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[Mooney et al., 2016]