

From: [NRC Announcement](#)
To: [NRC Announcement](#)
Subject: Daily: 9 New Items from Friday, March 18, 2011
Date: Friday, March 18, 2011 10:01:50 PM

NRC Daily Announcements

Highlighted Information and Messages



Friday March 18, 2011 -- Headquarters Edition

[Event: RES Seminar: 25th Anniversary of Chernobyl - April 26, 2011](#)

[Event: RES Seminar on Seismic Research Postponed](#)

[General Interest: Latest Edition of FSME Quarterly Newsletter is Now Online](#)

[Event: NRC Viewing of the Commission Meeting on the Japan Event](#)

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[Employee News: 2011 International Conference for Law Enforcement Agencies at the North Bethesda Marriott](#)

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[Event: Earth Day Celebration. Wednesday, April 20, 2011.](#)

[Employee News: Retirements and Farewells](#)

Event: RES Seminar: 25th Anniversary of Chernobyl - April 26, 2011

A RES Seminar on the 25th Anniversary of Chernobyl will be held in the TWFN auditorium on Tuesday, April 26, 2011, from 9:30 to 11:30 a.m. A summary of the RBMK reactor type, the accident, radiological impacts, and sarcophagus will be given by Brian Sheron, Director of the Office of Nuclear Regulatory Research, and Frank Congel (retired NRC employee), Former Director, Division of Incident Response Operations, NSIR and Former Director, OE.

This agenda gives the order of presentations and speakers:

Introduction – Mike Weber, Deputy Executive Director for Materials, Waste, Research, State, Tribal and Compliance Programs

RBMK Reactor Type – Brian Sheron

Summary of Chernobyl Accident – Brian Sheron

Radiological Impact – Frank Congel

Sarcophagus – Frank Congel

Details about VTCs will be provided when available.



(2011-03-18 00:00:00.0)

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0175

Event: RES Seminar on Seismic Research Postponed

The upcoming RES Seminar scheduled for March 22, 2011, on Seismic Research at Lawrence Berkley National Laboratory is postponed. Key NRC staff involved with the seminar are currently heavily involved with the activities at the Incident Response Center. The RES intranet page will be updated and an announcement sent when the seminar is re-scheduled.



(2011-03-18 00:00:00.0)

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General Interest: Latest Edition of FSME Quarterly Newsletter is Now Online

The latest edition of the Office of Federal and State Materials and Environmental Management Programs (FSME) [Quarterly Newsletter](#) is now available. The Newsletter covers a variety of FSME activities and is one of the tools the Office uses to communicate with its stakeholders. For more information, or if you have comments about the content of the Newsletter, please contact Vanessa Cox, 301-415-8342.



(2011-03-18 00:00:00.0)

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Event: NRC Viewing of the Commission Meeting on the Japan Event

On Monday, March 21, 2011, the NRC will hold a Commission Meeting to address the ongoing nuclear events at the Fukushima Nuclear Reactor site in Japan. The meeting is scheduled to convene at 9 a.m. in the One White Flint North (OWFN) Commission Hearing Room. Interested staff is encouraged to view the proceedings at one of the following locations:

- Two White Flint North (TWFN) auditorium
- TWFN exhibit area
- Cable Channel 46 and 47 throughout the White Flint North Complex
- TWFN Building O-2 B5
- OWFN Building - O-3 B4
- Executive Boulevard Building - 1B15
- Twinbrook Building - 5E01
- Church Street Building - 2C19
- Gateway Building - 04B2
- Region I*
- Region II*
- Region III*
- Region IV*
- Technical Training Center*

*Regional and TTC staff will be notified of the VTC viewing location by their VTC coordinator.

For more information about event viewing locations, contact Jason Wright at 415-

5446 or Christine Kundrat at 415-6130.



(2011-03-18 00:00:00.0)

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General Interest: Security/Safety Reminder - Personal Evacuation Kits

Yellow Announcement No. 035, "Security/Safety Reminder - Personal Evacuation Kits," is now available on the [internal Web site](#) under Yellow Announcements.

This announcement can also be found in the ADAMS 2011 Yellow Announcements folder in the Main Library of the ADAMS Document Manager. In the folder, Yellow Announcements are arranged in report number order.

If you have difficulty accessing a Web link in this announcement, contact the [NRC Announcement Coordinator](#), Beverly Martin, ADM/DAS, 301-492-3674.



(2011-03-18 00:00:00.0)

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Employee News: 2011 International Conference for Law Enforcement Agencies at the North Bethesda Marriott

The Commission on Accreditation for Law Enforcement Agencies will hold its 2011 International Conference at the North Bethesda Marriott from Tuesday, March 22, 2011, through Saturday, March 26, 2011. More than 1,000 law enforcement officers from around the world are expected to attend. Employees are advised that due to the nature of this conference, the surrounding area will experience a significant increase in law enforcement presence.

Please contact [Gary Simpler](#), Office of Administration, at (301) 415-7402 if you have any questions.



(2011-03-18 00:00:00.0)

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Staff Changes: Reorganization in the Office of Administration

Yellow Announcement No. 034, "Reorganization in the Office of Administration," is now available on the [internal Web site](#) under Yellow Announcements.

This announcement can also be found in the ADAMS 2011 Yellow Announcements folder in the Main Library of the ADAMS Document Manager. In the folder, Yellow Announcements are arranged in report number order.

If you have difficulty accessing a Web link in this announcement, contact the [NRC](#)

[Announcement Coordinator](#), Beverly Martin, ADM/DAS, 301-492-3674.



(2011-03-18 00:00:00.0)

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Event: Earth Day Celebration, Wednesday, April 20, 2011.

The NRC will observe Earth Day on Wednesday, April 20, 2011. The environmental community of individuals, corporations, and governments will join together to mark the 1st Anniversary Earth Day Celebration. Earth Day 2011 will call attention to the progress that has been made as well as the work yet to be completed.

The first Earth Day celebration took place in 1970 as a spectacular grassroots movement of citizen leadership. Earth Day inspires us to save the land we love, to realize that global problems do have local solutions, and to make the preservation of the earth a personal commitment. Come celebrate Earth Day by participating in activities and learning more about the actions we can take to recycle, reduce waste, save energy, and protect our environment.

Earth Day will be held in the Two White Flint North exhibit area from 11:30 a.m. to 1:00 p.m. The planned activities are listed below.

Welcome to the Earth Day Resource Center. View special sculptures by the Georgetown Hill Schoolchildren illustrating how everyday products can be used more than once to reduce waste.

Composting Demonstration. Montgomery County composting experts will be on hand to demonstrate how to setup and compost at home. Learn about this fascinating process that reduces landfill waste while producing soil conditioner that helps plants flourish. The county does not sell compost bins or purchase them for county businesses but will have a few on hand to give away.

Geranium Sale. The Employee Welfare and Recreation Association (EWRA) Website will have plants for sale. You can find more details and [an order form](#) on the [EWRA Home Page](#).

Flower and Gardening Tips. Representatives from the Maryland Master Gardeners will provide information on flowers and gardening. Get information on soil testing services, learn what plants flourish with minimal watering, and get answers to your personal gardening questions.

Commuting Services. Visit with transportation representatives from NRC and the North Bethesda Transportation Center to better understand commuting options in the local area.

Recycling and Waste Prevention. See NRC's recycling program exhibit and talk to Montgomery County representatives about recycling at home. View samples of the types of batteries that can be recycled at NRC.

Energy Saving. Visit a special display to learn how to save energy. NRC facilities staff and representatives from Montgomery County will provide information on how

you can save energy at work and at home. Also, learn more about how to report energy and water waste at NRC by using the "Fixit" system.



(2011-03-18 00:00:00.0)

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Employee News: Retirements and Farewells

Headquarters and Regional employees who are leaving the agency:

Retirements:

Brenda Ross, OIS (retiring on March 31, event on March 30)
Michael D. Tschiltz, NMSS (retiring on April 2, event on March 29)
Marie T. Miller, Region I (retiring on April 3, event on March 29)
Ted Quay, NRR (retiring in April, event on March 31)
Rex Wescott, NMSS (retiring on March 31, event on March 24)

For details, access the [Retirements and Farewells Web page](#).



(2011-03-18 00:00:00.0)

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The latest Announcements are always on the [NRC@WORK Home Page](#).

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[Frequently Asked Questions About the NRC Daily Announcements Email](#)

MR

From: [Wilson, George](#)
To: [Howe, Allen](#); [Giitter, Joseph](#)
Cc: [Mathew, Roy](#); [Hiland, Patrick](#); [Skeen, David](#)
Subject: SBO
Date: Friday, March 18, 2011 8:25:11 AM

Station Blackout Rule

Also, in the 1980s--specifically in 1988-- the NRC concluded that additional regulatory requirements were justified in order to provide further assurance that a loss of both offsite and onsite emergency ac power systems—a station blackout condition--would not adversely affect public health and safety. Studies conducted by the NRC have shown that the hardware and procedures that have been implemented to meet the station blackout requirements have resulted in significant risk reduction and have further enhanced defense in depth. However, we plan to carefully evaluate the lessons learned from the events in Japan to determine if enhancements to the station blackout rule are warranted.

The NRC staff reviewed the responses from every nuclear power plant and issued a SER accepting the proposed coping methods. Each light-water-cooled nuclear power plant licensed to operate must be able to withstand for a specified duration and recover from a station blackout as defined in Sec. 50.2. As a result of the SBO rule all plants have (1) established SBO coping and recovery procedures; (2) completed training for these procedures; (3) implemented modifications as necessary to cope with an SBO; and (4) ensured a 4- 16 hour coping capability. The coping capability was based on the reliability and redundancy of the on-site electrical system, the frequency of a loss of off-site power and the time needed to restore off-site power. The staff also performed pilot inspections at 8 sites to verify proper implementation of the SBO rule. Based on the outcomes of those inspections the Staff concluded that the industry was properly implementing the rule.

There are 44 Units that rely on Battery power to cope with a SBO (4 hour coping)

There are 60 Units that have opted to use an alternate AC source (4-16 hours coping)

George Wilson
USNRC
EICB Branch Chief, Division of Engineering
Mail Stop O12H2
301-415-1711

C/176

MR
From: [Wilson, George](#)
To: [Mahoney, Michael](#); [Boska, John](#); [Gratton, Christopher](#)
Cc: [Giitter, Joseph](#); [Howe, Allen](#); [Khanna, Meena](#); [Hiland, Patrick](#); [Skeen, David](#)
Subject: FW: QA and Messages Regarding tsunami.docx
Date: Friday, March 18, 2011 12:38:57 PM
Attachments: [QA and Messages Regarding tsunami.docx](#)
Importance: High

See attached

clm

Tsunami

Review Guidance and Guidelines Related to Tsunami:

1. General Design Criterion 2 (GDC 2), 10CFR50, requires, in part, that structures, systems, and components important to safety be designed to withstand the effects of natural phenomena such as floods, tsunami, and seiches without loss of capability to perform their safety functions. Design bases for these SSCs are also required to reflect:
 - a.
2. 10 CFR 100.23, requires, in part, that the size of seismically induced floods and water waves that could affect a site from either locally or distantly generated seismic activity must be determined.
 - a.
3. RG 1.102 – Flood Protection for Nuclear Power Plants, describes types of flood protection acceptable to the NRC staff
 - a. Exterior Barriers (e.g.)
 - i. Levee – embankment to protect land from inundation
 - ii. Seawall or floodwall - a structure separating land and water areas, primarily to prevent erosion and other damages due to wave action
 - iii. Bulkhead – similar to seawall, purpose is to restrain the land area
 - b. Incorporated Barriers
 - i. Protection provided by specially designed walls and penetration closures. Walls are usually reinforced concrete designed to resist static and dynamic forces of a Design Basis Flood Level of a Probable Maximum Flood.
4. RG 1.59 – Design Basis Floods for Nuclear Power Plants
 - a. The most severe seismically induced floods reasonably possible should be considered for each site.
 - b. Tsunami requires consideration of seismic events of the severity of the Safe Shutdown Earthquake occurring at the location that would produce the worst such flood at the nuclear power plant site.
5. US NRC, Standard Review Plan, “Probable Maximum Tsunami Flooding,” Section 2.4.6, Rev. 2
 - a. Areas of Review
 - i. Probable maximum tsunami postulated for a site should include wave runup and drawdown
 - ii. Hydrologic characteristics of maximum locally and distantly generated tsunami (e.g., volcanoes, landslides)
 - iii. Geological and seismic characteristics of potential tsunami faults (e.g., magnitude, focal depth, source dimensions, fault orientation, and vertical displacement)

Questions and Answers for Tsunami Issues

1. Why do we have confidence that US nuclear power plants are adequately designed for earthquakes and tsunamis?

Answer: Nuclear plants in both the US and Japan are designed for earthquake shaking. In addition to the design of the plants, significant effort goes into emergency response planning and accident mitigation. This approach is called defense-in-depth.

2. Are nuclear power plants designed for tsunamis?

Answer: Yes. Plants are built to withstand a variety of environmental hazards and those plants that might face a threat from tsunami are required to withstand large waves and the maximum wave height at the intake structure (which varies by plant.)

3. What level of tsunami are we designed for?

Answer: Like seismic hazard, the level of tsunami that each plant is designed for is site-specific and is appropriate for what may occur at each location.

4. Can this happen here (i.e., an earthquake that significantly damages a nuclear power plant)? Are the Japanese plants similar to US plants?

Answer: All US nuclear power plants are built to withstand environmental hazards, including earthquakes and tsunamis. Even those plants that are located within areas with low and moderate seismic activity are designed for safety in the event of such a natural disaster. The NRC requires that safety-significant structures, systems, and components be designed to take into account even rare and extreme seismic and tsunami events. The Japanese facilities are similar in design to several US facilities

5. How many reactors are along coastal areas that could be affected by a tsunami (and which ones)?

Answer: Many plants are located in coastal areas that could potentially be affected by tsunami.

Two plants, Diablo Canyon and San Onofre, are on the Pacific Coast, which is known to have tsunami hazard. There are also two plants on the Gulf Coast, South Texas and Crystal River. There are many plants on the Atlantic Coast or on rivers that may be affected by a tidal bore resulting from a tsunami. These include St. Lucie, Turkey Point, Brunswick, Oyster Creek, Millstone, Pilgrim, Seabrook, Calvert Cliffs, Salem/Hope Creek, and Surry. Tsunami on the Gulf and Atlantic Coasts occur, but are very rare. Generally the flooding anticipated from hurricane storm surge exceeds the flooding expected from a tsunami for plants on the Atlantic and Gulf Coast.

From: [Khanna, Meena](#) *MRK*
To: [Hiland, Patrick](#); [Skeen, David](#)
Cc: [Scales, Kerby](#); [Howe, Allen](#); [Giitter, Joseph](#); [Gratton, Christopher](#); [Boska, John](#); [Mahoney, Michael](#); [Wilson, George](#)
Subject: FW: URLs for articles addressed at meeting...
Date: Friday, March 18, 2011 5:25:27 PM

Pat and Dave, I'm sure you've seen these two articles on seismic/earthquake risks, but just wanted to share the url's for them in case you haven't seen them...they were addressed in our pre-meeting for the Commr. Briefing in support of addressing any questions that the agency may receive from the public on Monday. Thanks,

meena

From: Khanna, Meena *MRK*
Sent: Friday, March 18, 2011 4:50 PM
To: Wilson, George; Chokshi, Nilesh; Stutzke, Martin; Farzam, Farhad; Mathew, Roy; Matharu, Gurcharan; Kammerer, Annie; Munson, Clifford; Jones, Henry; See, Kenneth; Wescott, Rex; Hiser, Allen; Pelton, David; Terao, David; Cook, Christopher; Graves, Herman; Pires, Jose; Beasley, Benjamin; Murphy, Andrew; Uribe, Juan; Markley, Michael; Hiser, Allen
Subject: URLs for articles addressed at meeting...

As requested, here are the url's for the two articles that we addressed at today's meeting..thanks again to all of you for all of the tremendous support!

http://www.msnbc.msn.com/id/42103936/ns/world_news-asiapacific/

http://www.huffingtonpost.com/2011/03/18/nuclear-plants-regulators-risk_n_837504.html

c/178

From: Grobe, Jack *inr*
To: [Sheron, Brian](#); [Uhle, Jennifer](#); [Wiggins, Jim](#); [Evans, Michele](#); [Miller, Charles](#); [Haney, Catherine](#); [Dorman, Dan](#); [Moore, Scott](#); [Johnson, Michael](#); [Holahan, Gary](#); [Leeds, Eric](#); [Boger, Bruce](#); [Brenner, Eliot](#); [Hayden, Elizabeth](#); [Schmidt, Rebecca](#); [Doane, Margaret](#); [Mamish, Nader](#); [Dyer, Jim](#); [Brown, Milton](#); [Hackett, Edwin](#); [Piccone, Josephine](#); [Wilson, George](#); [Harrison, Donnie](#); [Kammerer, Annie](#); [Collins, Timothy](#); [Milligan, Patricia](#); [Salley, MarkHenry](#); [Bowman, Eric](#)
Cc: [Borchardt, Bill](#); [Weber, Michael](#); [Virgilio, Martin](#); [Ash, Darren](#); [Burns, Stephen](#); [Vietti-Cook, Annette](#); [Andersen, James](#); [Giitter, Joseph](#); [Howe, Allen](#); [Nelson, Robert](#); [McGinty, Tim](#); [Blount, Tom](#); [Holian, Brian](#); [Gallagher, Johanna](#); [Cheok, Michael](#); [Lee, Samson](#); [Hiland, Patrick](#); [Skeen, David](#); [Ruland, William](#); [Lubinski, John](#)
Subject: Re: Support and Logistics for the Japan Commission Meeting
Date: Friday, March 18, 2011 6:17:34 PM

Oops - I made a mistake. Cathy Haney will be in France so Trish Milligan should also be expected to cover Radiological Consequence Assessment as well as Emergency Preparedness. Thanks.
Jack Grobe, Deputy Director, NRR

From: Grobe, Jack *inr*
To: [Sheron, Brian](#); [Uhle, Jennifer](#); [Wiggins, Jim](#); [Evans, Michele](#); [Miller, Charles](#); [Haney, Catherine](#); [Dorman, Dan](#); [Moore, Scott](#); [Johnson, Michael](#); [Holahan, Gary](#); [Leeds, Eric](#); [Grobe, Jack](#); [Boger, Bruce](#); [Brenner, Eliot](#); [Hayden, Elizabeth](#); [Schmidt, Rebecca](#); [Doane, Margaret](#); [Mamish, Nader](#); [Dyer, Jim](#); [Brown, Milton](#); [Hackett, Edwin](#); [Piccone, Josephine](#); [Wilson, George](#); [Harrison, Donnie](#); [Kammerer, Annie](#); [Collins, Timothy](#); [Milligan, Patricia](#); [Salley, MarkHenry](#); [Bowman, Eric](#)
Cc: [Borchardt, Bill](#); [Weber, Michael](#); [Virgilio, Martin](#); [Ash, Darren](#); [Burns, Stephen](#); [Vietti-Cook, Annette](#); [Andersen, James](#); [Giitter, Joseph](#); [Howe, Allen](#); [Nelson, Robert](#); [McGinty, Tim](#); [Blount, Tom](#); [Holian, Brian](#); [Gallagher, Johanna](#); [Brown, Milton](#); [Cheok, Michael](#); [Lee, Samson](#); [Hiland, Patrick](#); [Skeen, David](#); [Ruland, William](#); [Sheron, Brian](#); [Lubinski, John](#)
Sent: Fri Mar 18 18:06:05 2011
Subject: Support and Logistics for the Japan Commission Meeting

Ladies and Gents,

We want to ask your support for several aspects of the Commission meeting on Monday morning regarding the situation in Japan.

First, the only staff at the Commission table will be Bill Borchardt.

In the well, we anticipate having the two available DEDOs (I understand that Mike Weber will be on shift) and one representative from the front office of each of the following offices (either the office director or deputy)

NRR, NRO, NSIR, RES, NMSS, FSME, OPA, OCA, OIP, CFO, ACRS

Annette Vietti-Cook has indicated that she will reserve the "quadrant" of seats nearest the microphone (on the left side of the room as the Commissioners would see it) for NRC staff. As I understand it, the right side will be for reporters and the central area will be open for general public.

In the area for NRC staff, there will be 39 seats.

From a staff perspective, we would like the highest priority available for the following individuals whom Bill will call upon to answer (on camera) any more detailed questions on the indicated subjects. Bill will have the list and ask for this person to respond to any question where he wants more detailed support. Some of these folks will likely already be in the well. The microphone has been moved to allow television camera access to any

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individual answering questions.

Protection Against Natural Disasters – Gary Holahan
Station Blackout – George Wilson
Severe Accident and Spent Fuel Pool Accident Progression – Jennifer Uhle
Radiological Consequence Analysis – Cathy Haney
Hydrogen Fires and Explosions – MarkHenry Salley
Public Stakeholder Outreach – Eliot Brenner
State Outreach – Josie Piccone
International Interactions – Margie Doane
10CFR50.54(hh)(2)/B.5.b – Eric Bowman
Seismic Issues, Tsunami Issues, GI-199 – Annie Kammerer
Mark I containment issues – Tim Collins
Emergency Preparedness – Trish Milligan
Emergency Operating procedures/SAMGs – Donnie Harrison

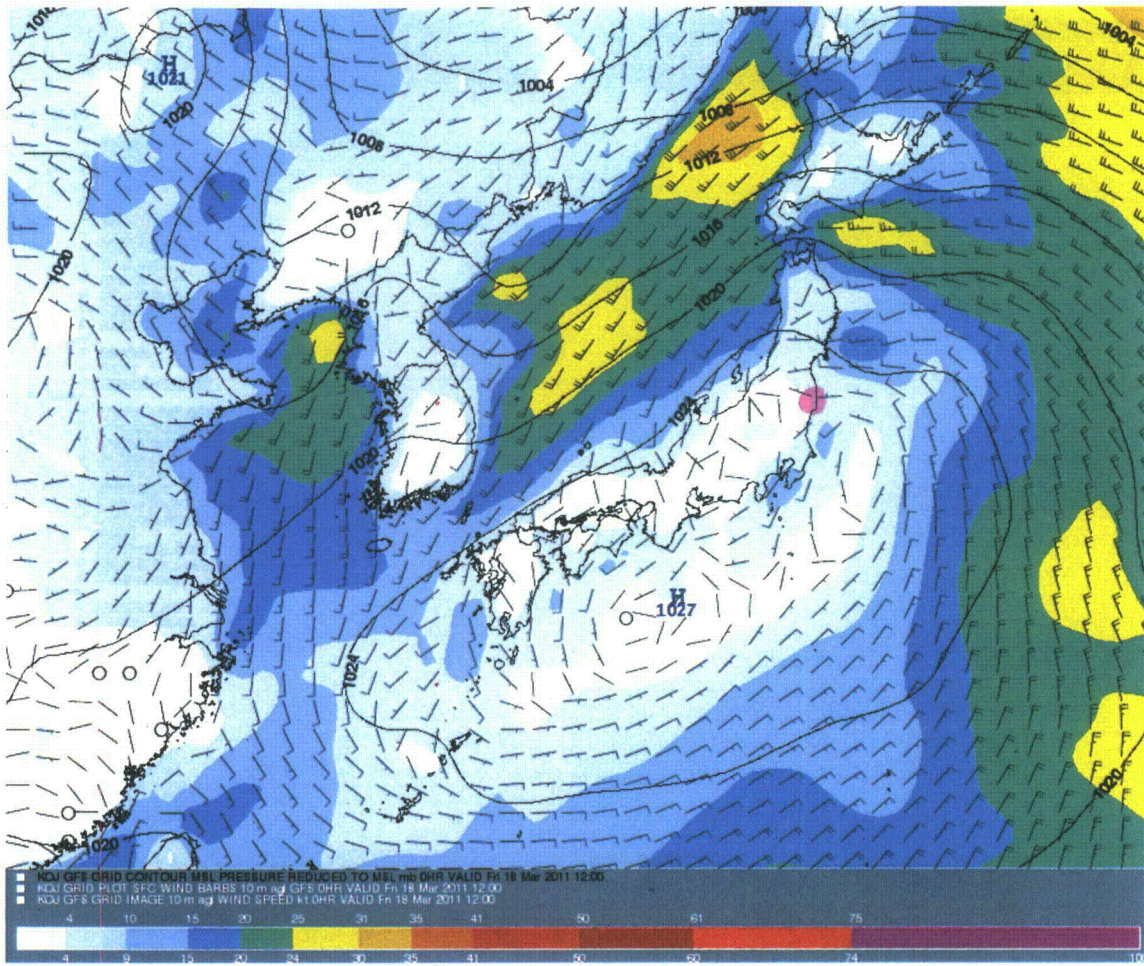
We understand that these people are available for the meeting. If not, please coordinate with Allen Howe to provide an equivalently capable individual.

That leaves 26 seats in the staff section for TAs and other Division Directors and above who should attend the meeting.

SECY is arranging for an e-mail to be sent out to the staff to indicate where televisions are available for other interested staff to observe the Commission meeting.

Thanks for your support.

Jack Grobe, Deputy Director
for Engineering and Corporate Support
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission



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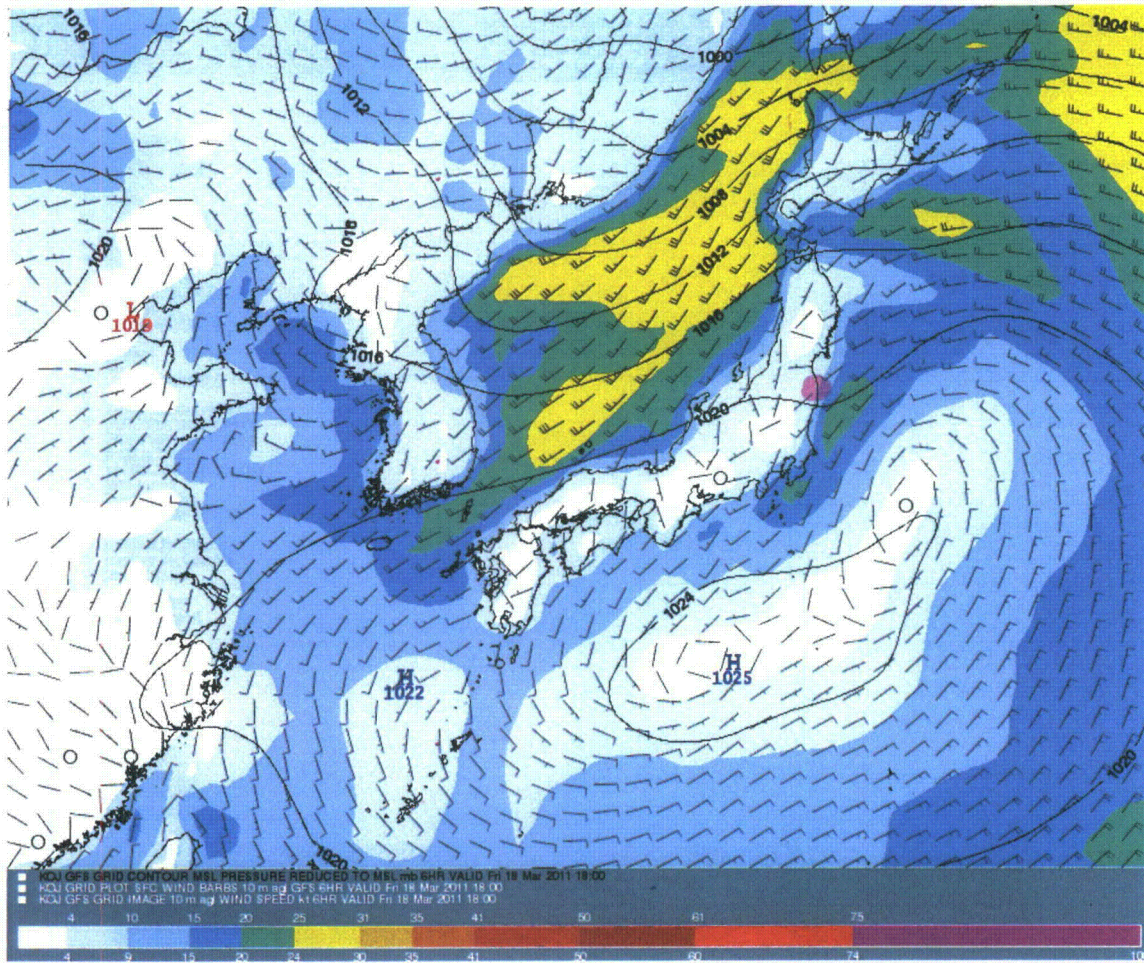
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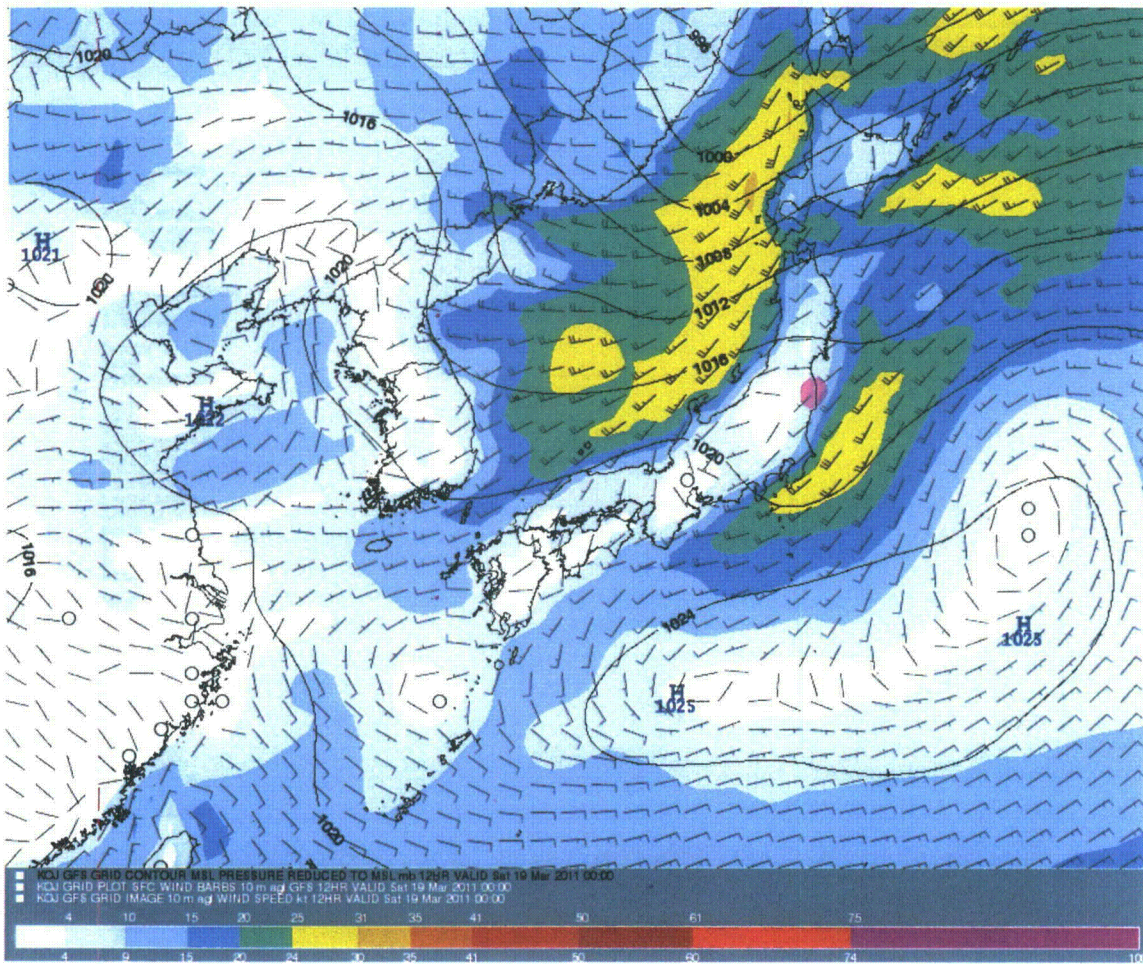
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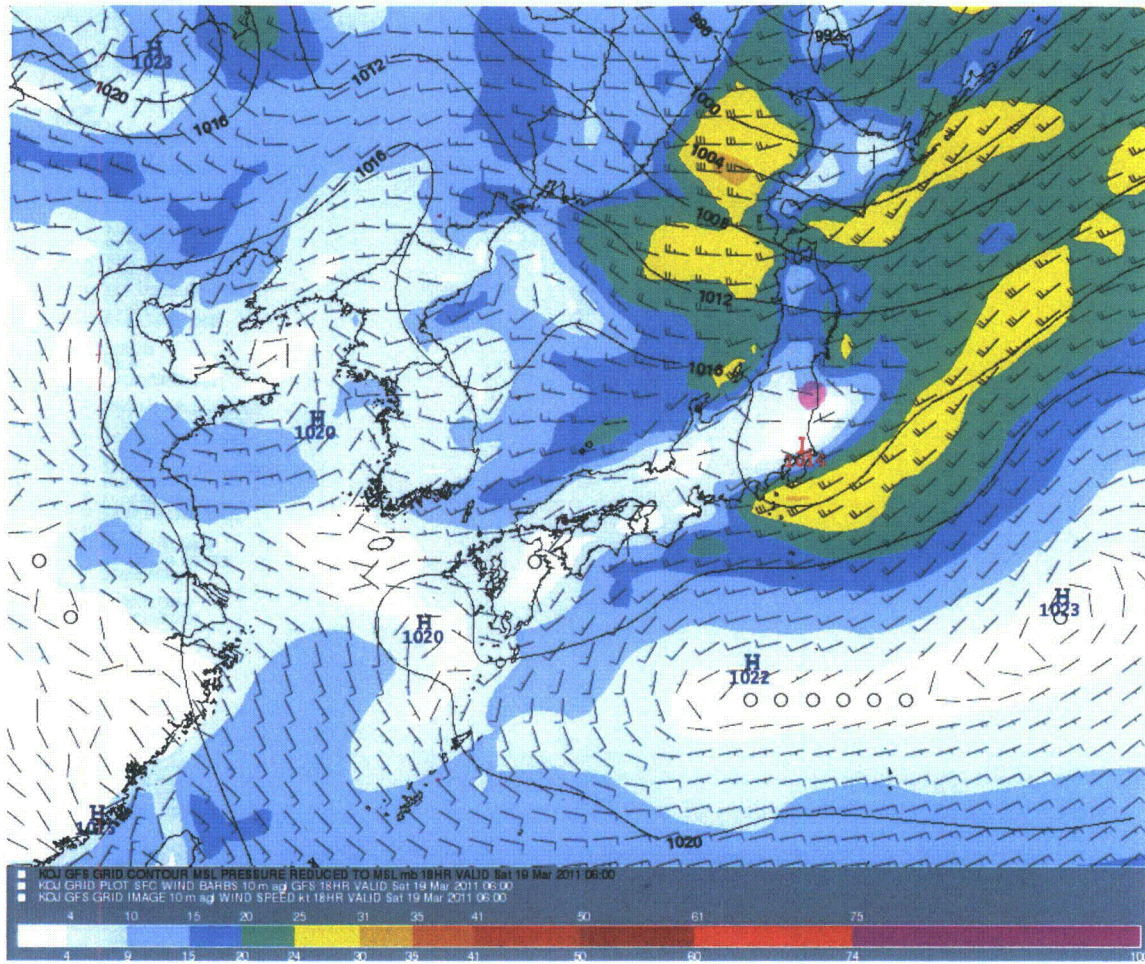
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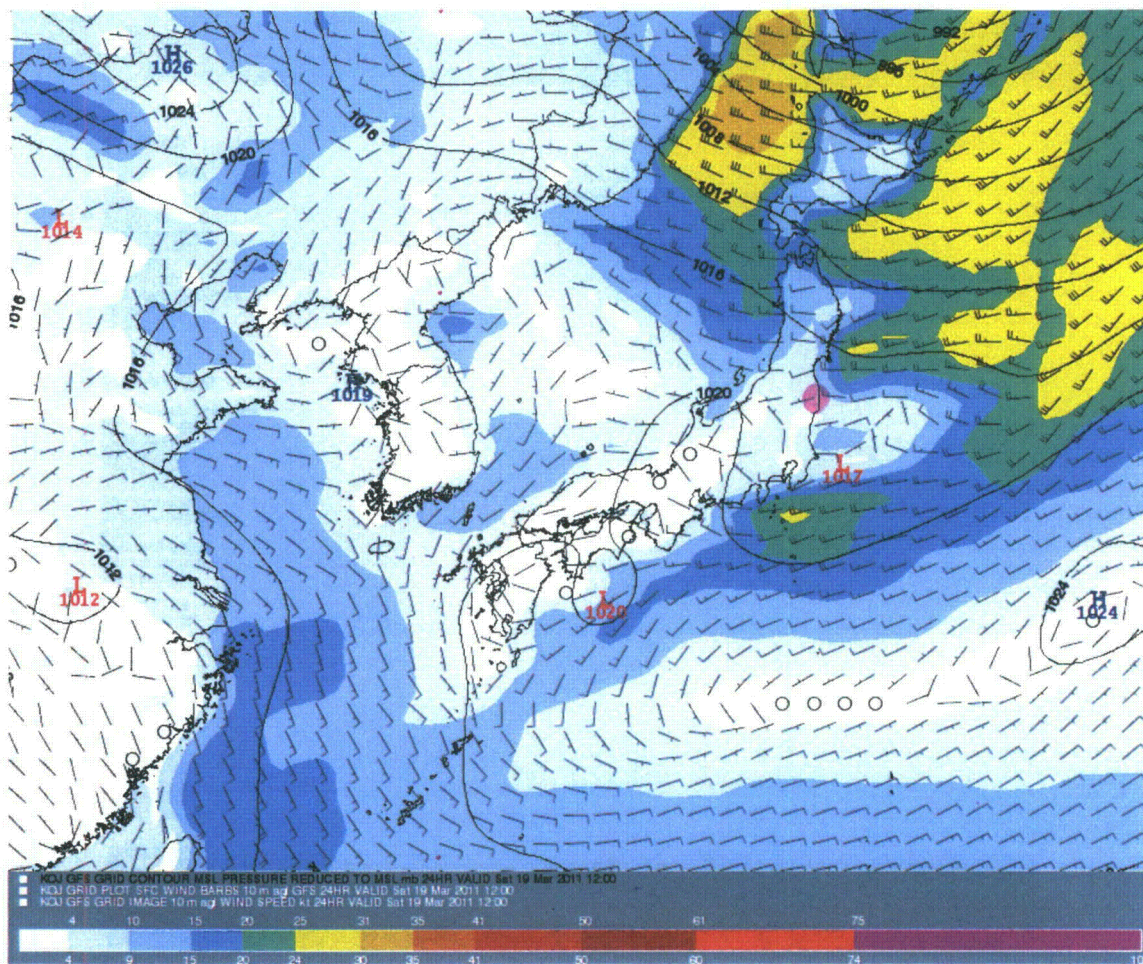
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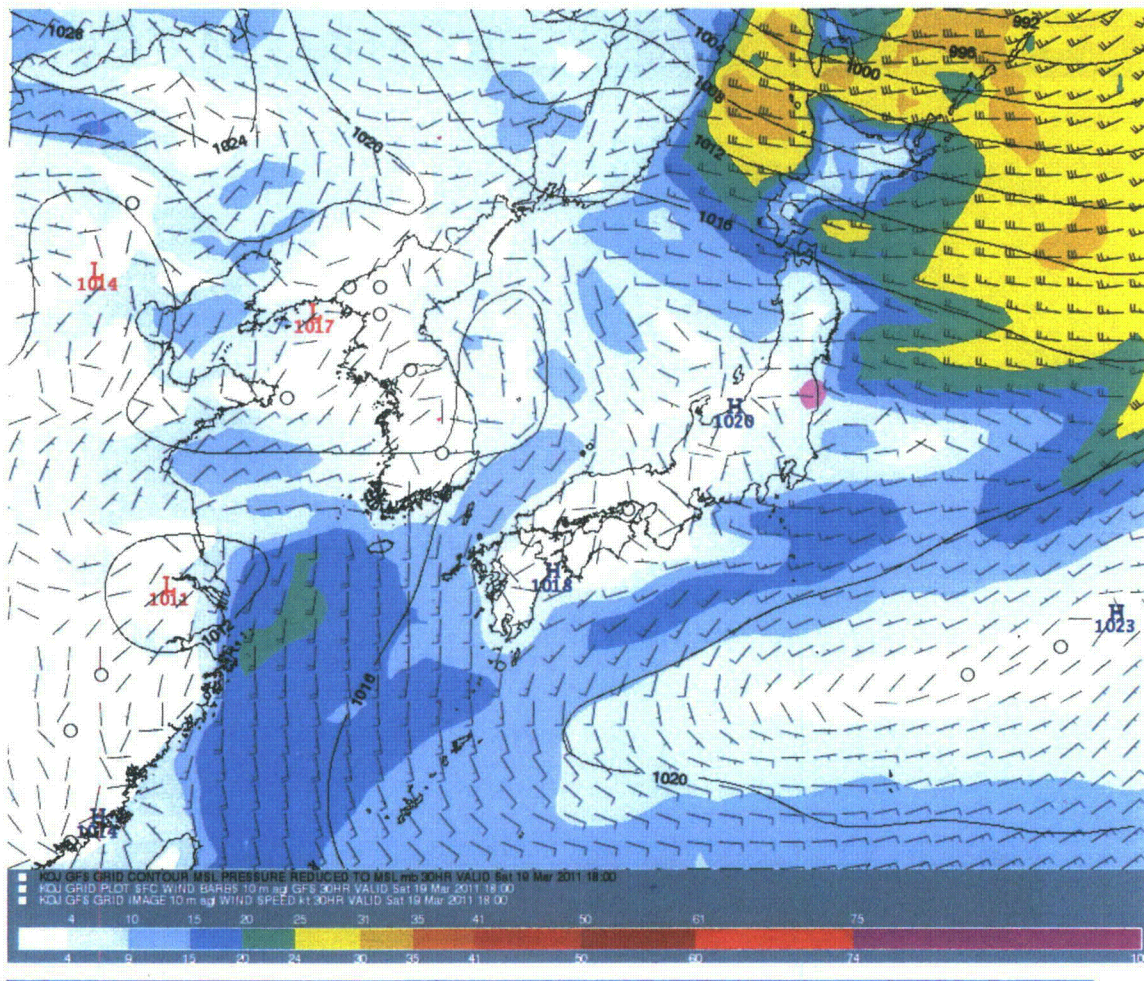
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SAT - 19 MAR 2011 - 12 Z

08 EDT

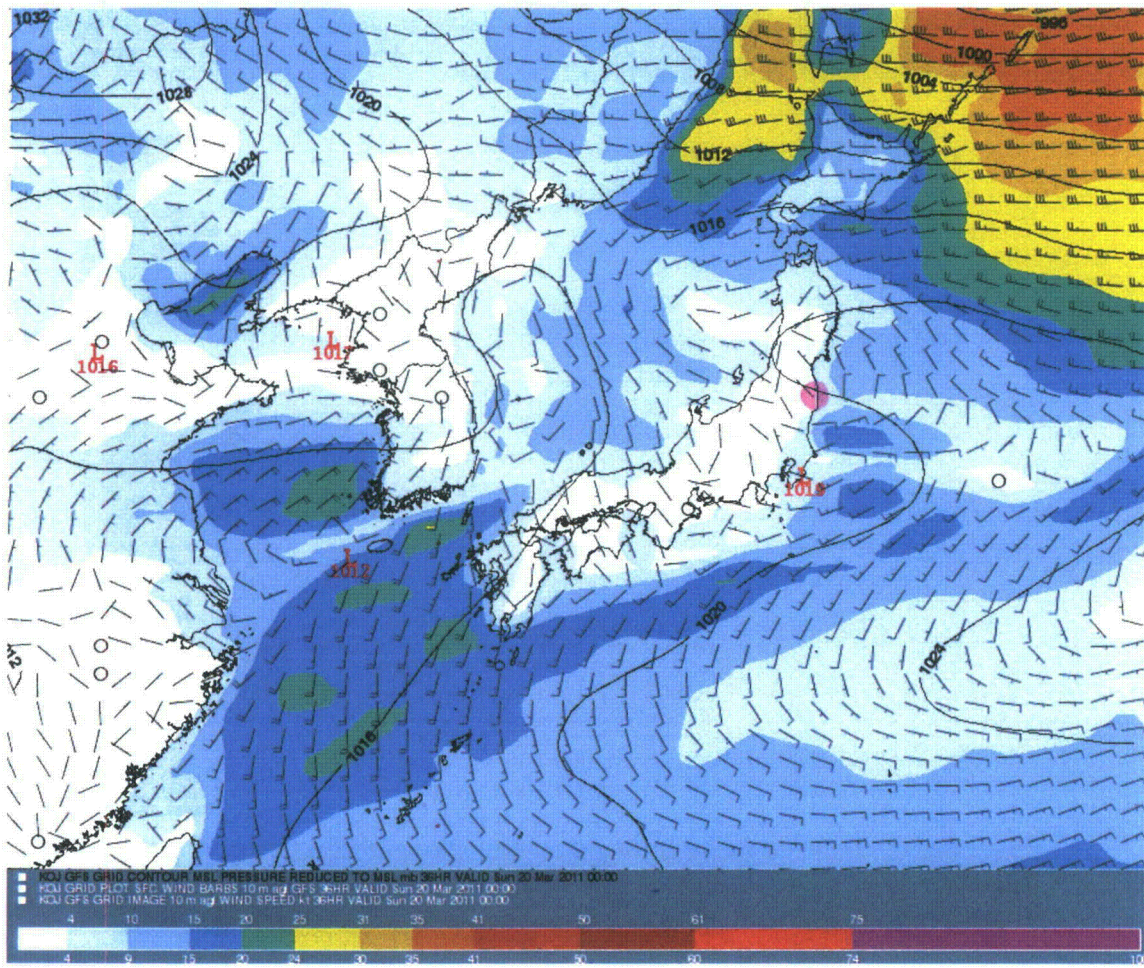
21 JST



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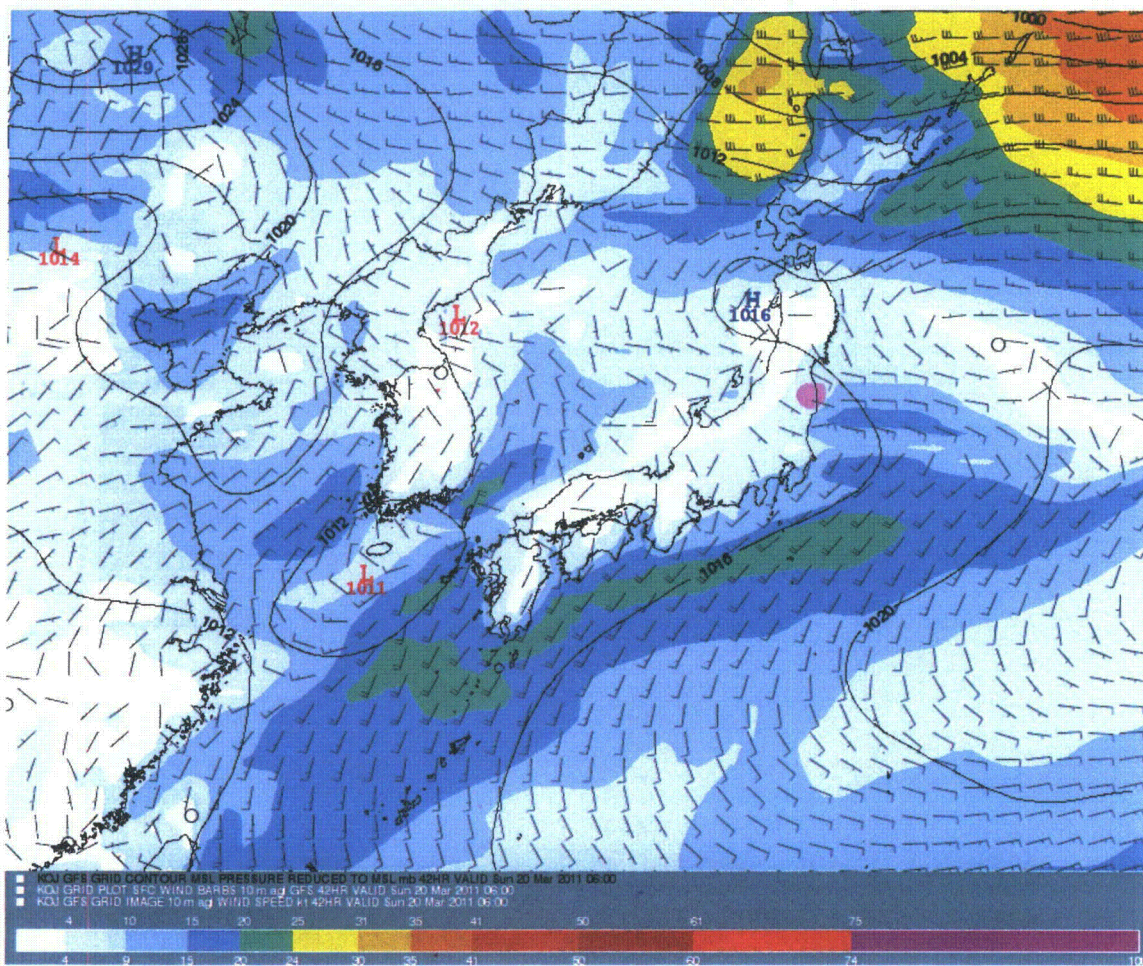
14 EDT
VALID SAT - 19 MAR 2011 - 18 Z
 SUN - 20 MAR 2011 - 03 JST



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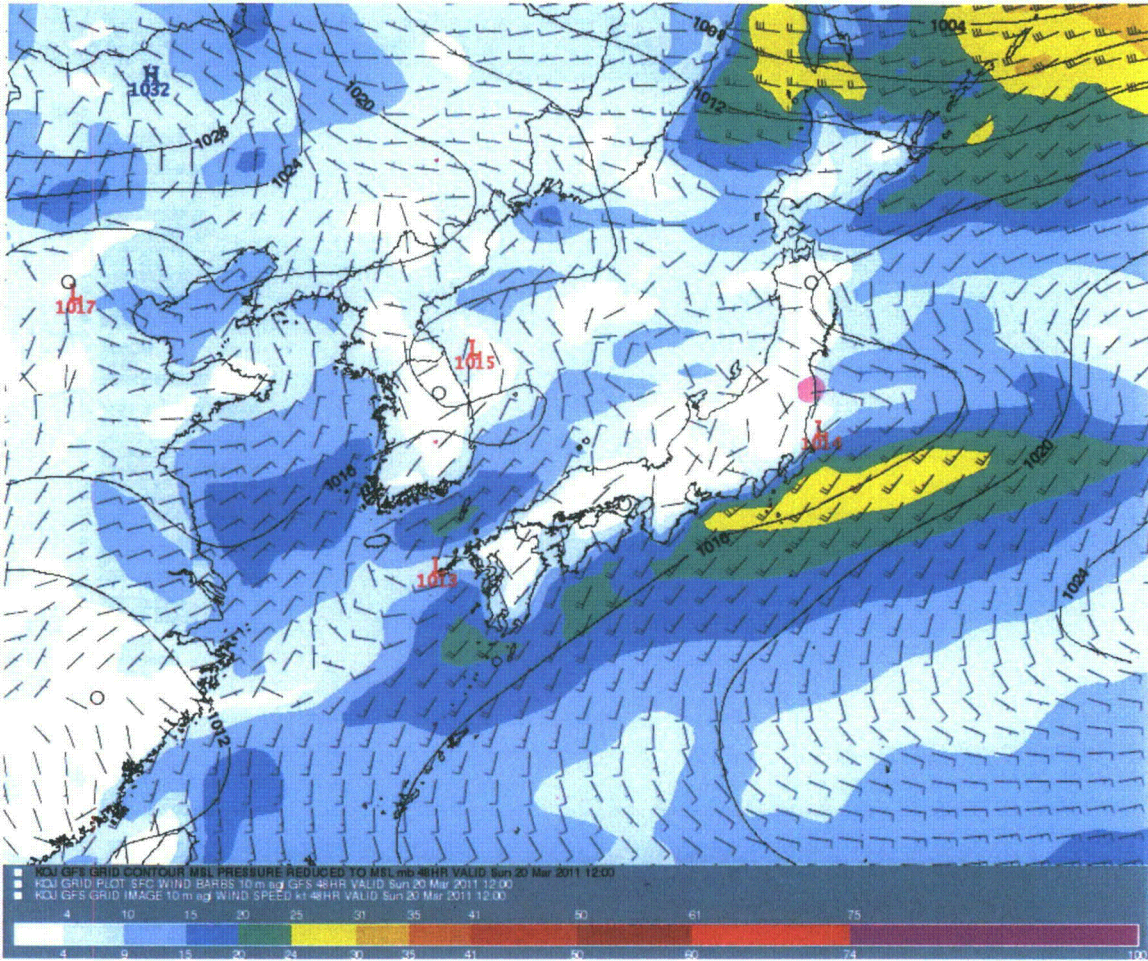
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15 JST



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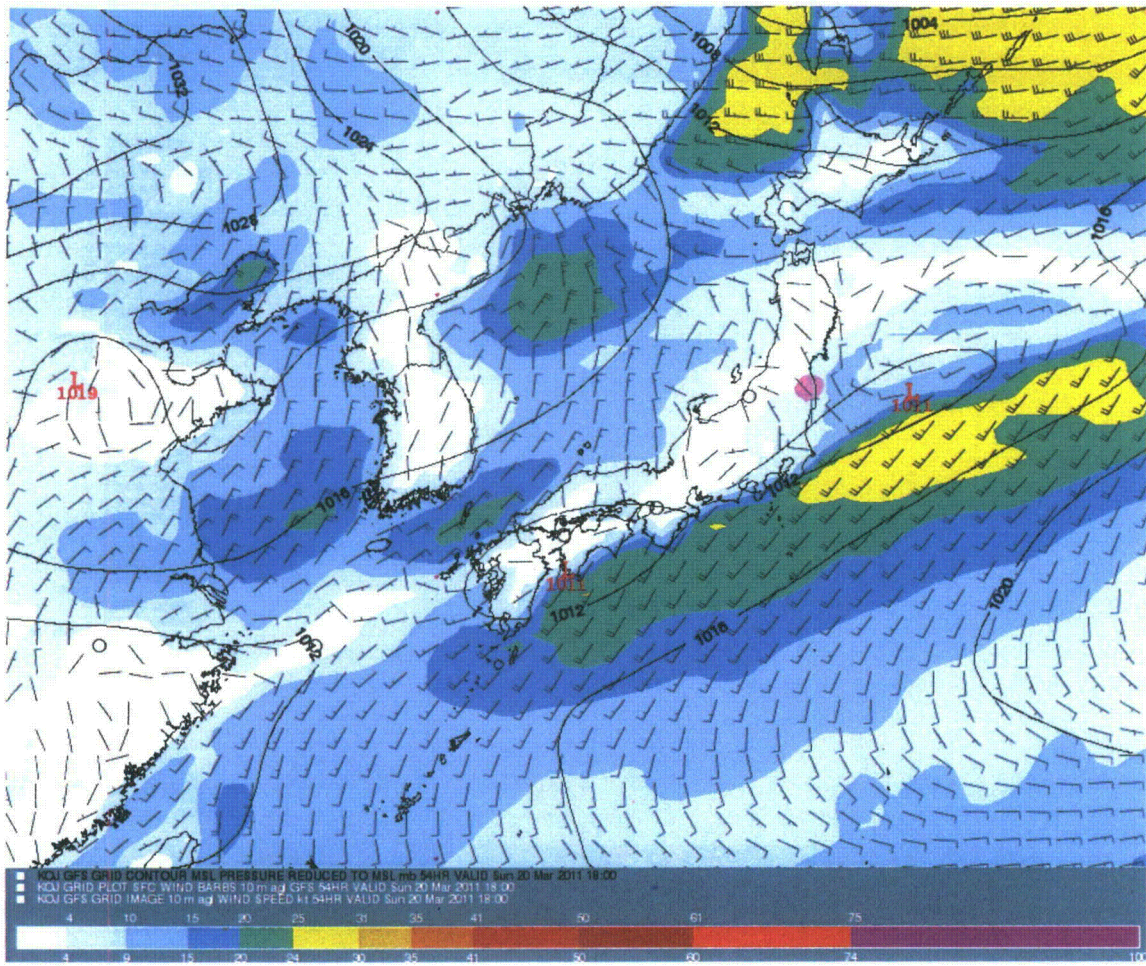
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SUN - 20 MAR 2011 - 12 Z

08 EDT

21 JST



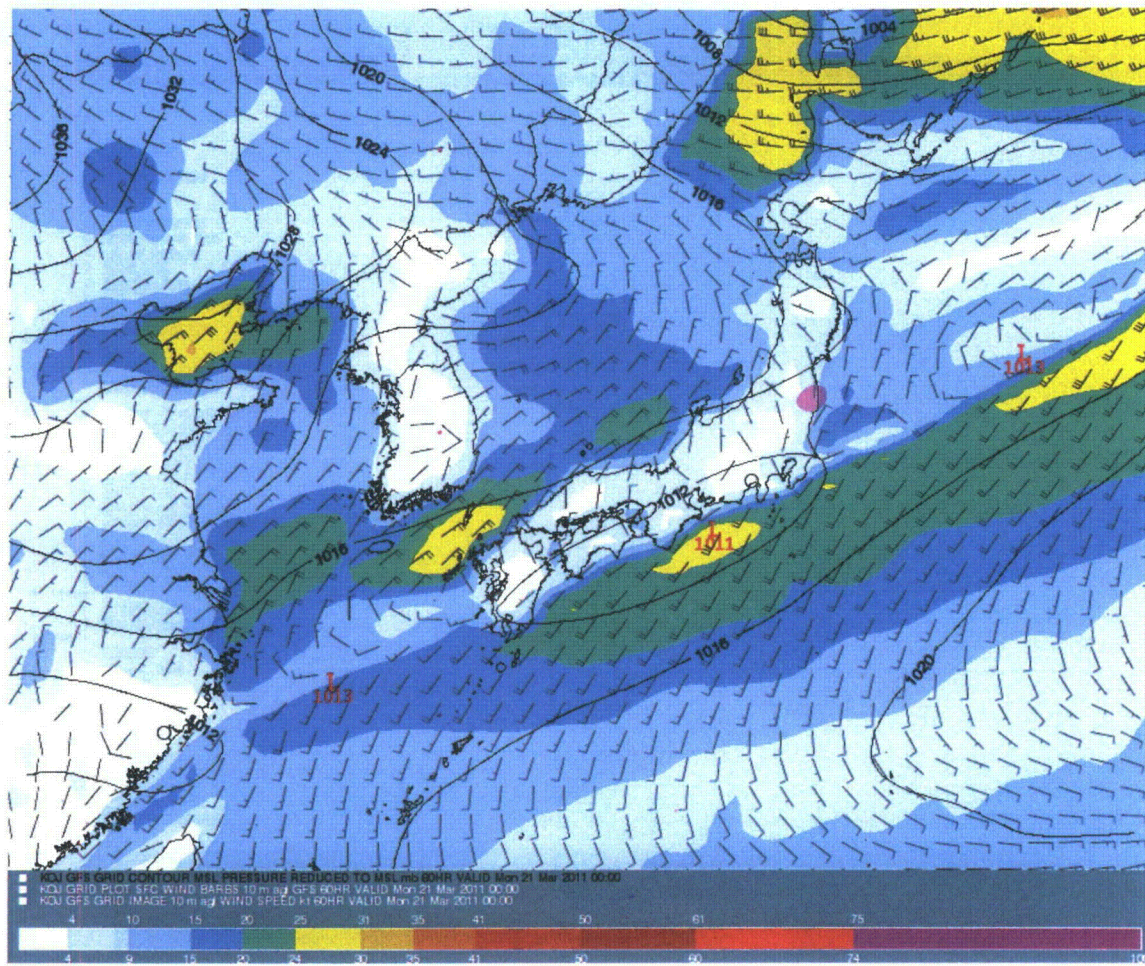
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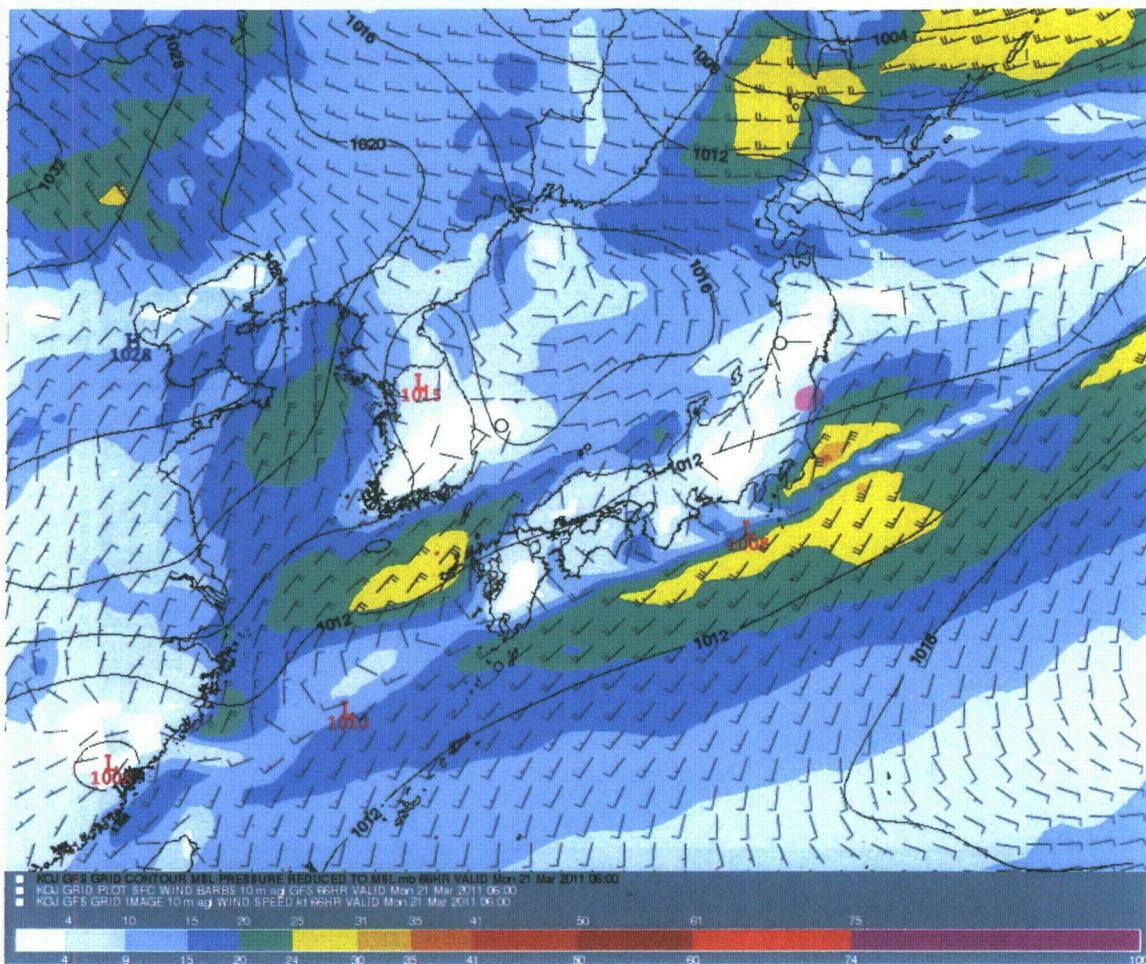
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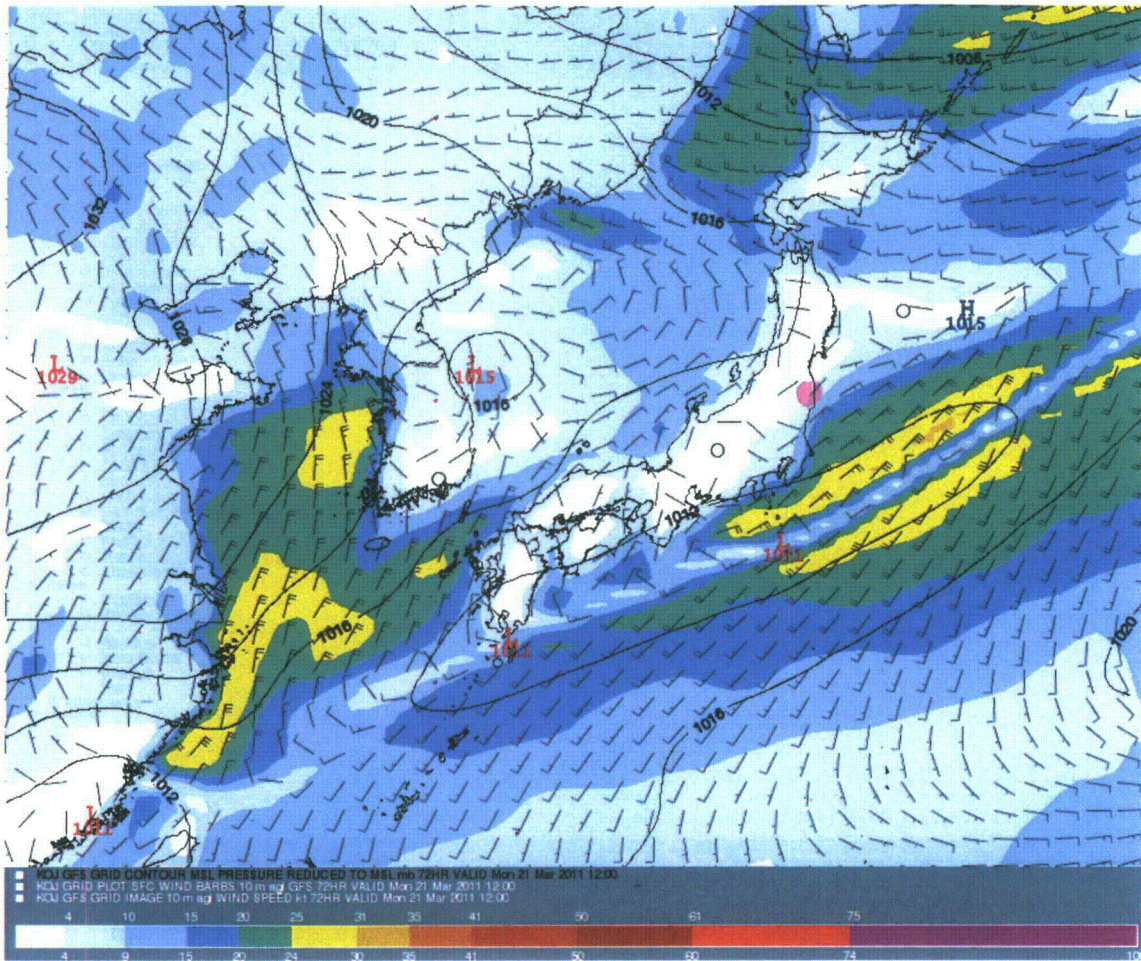
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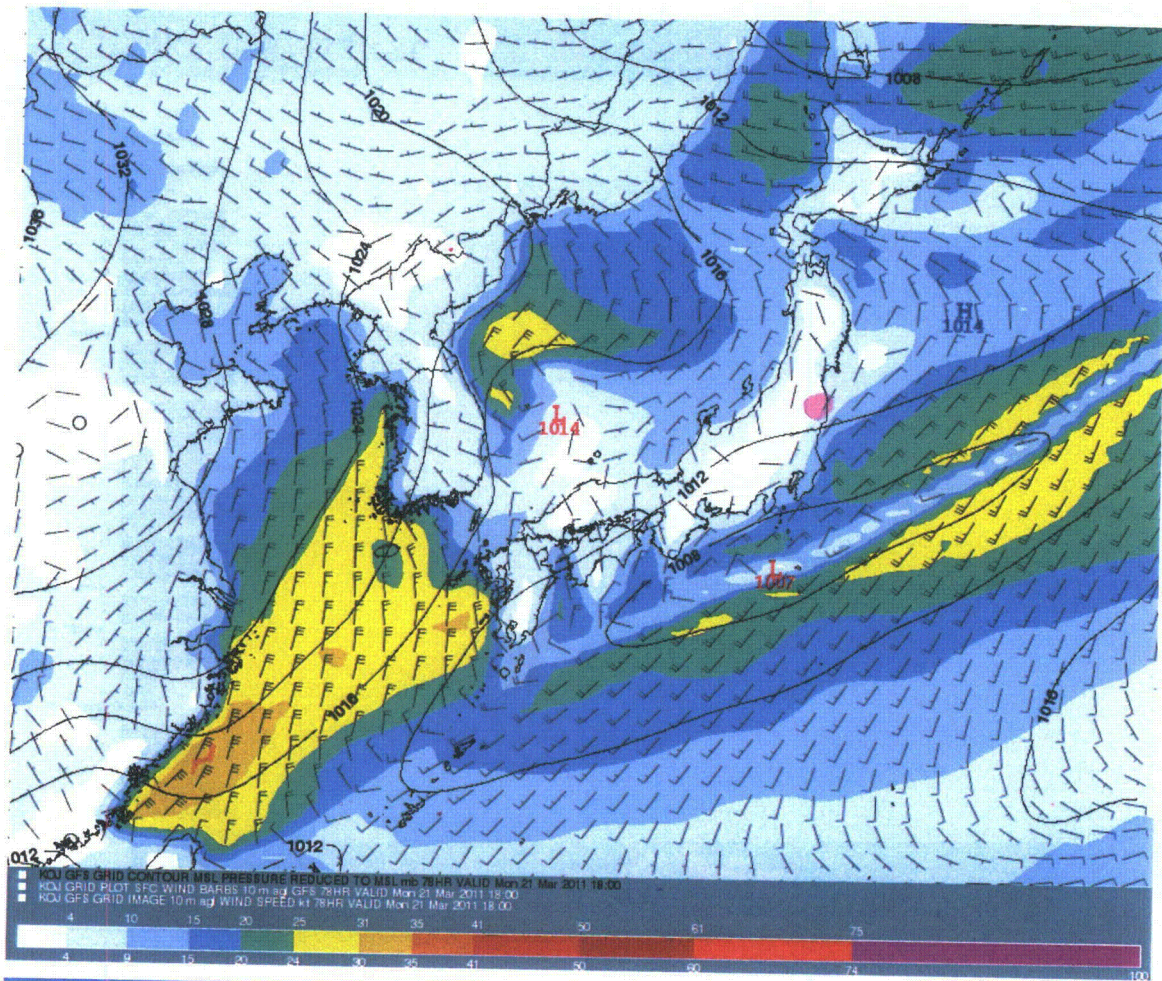
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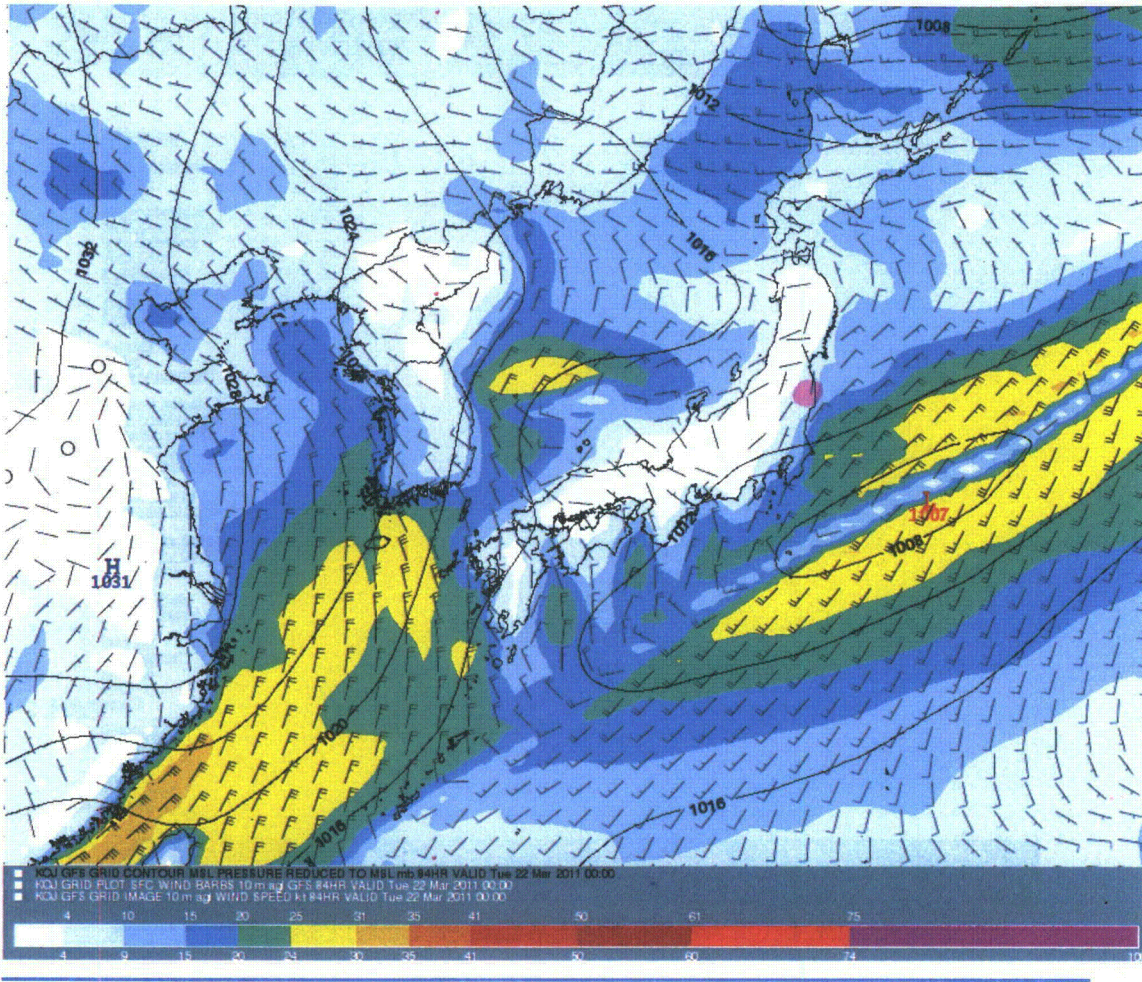
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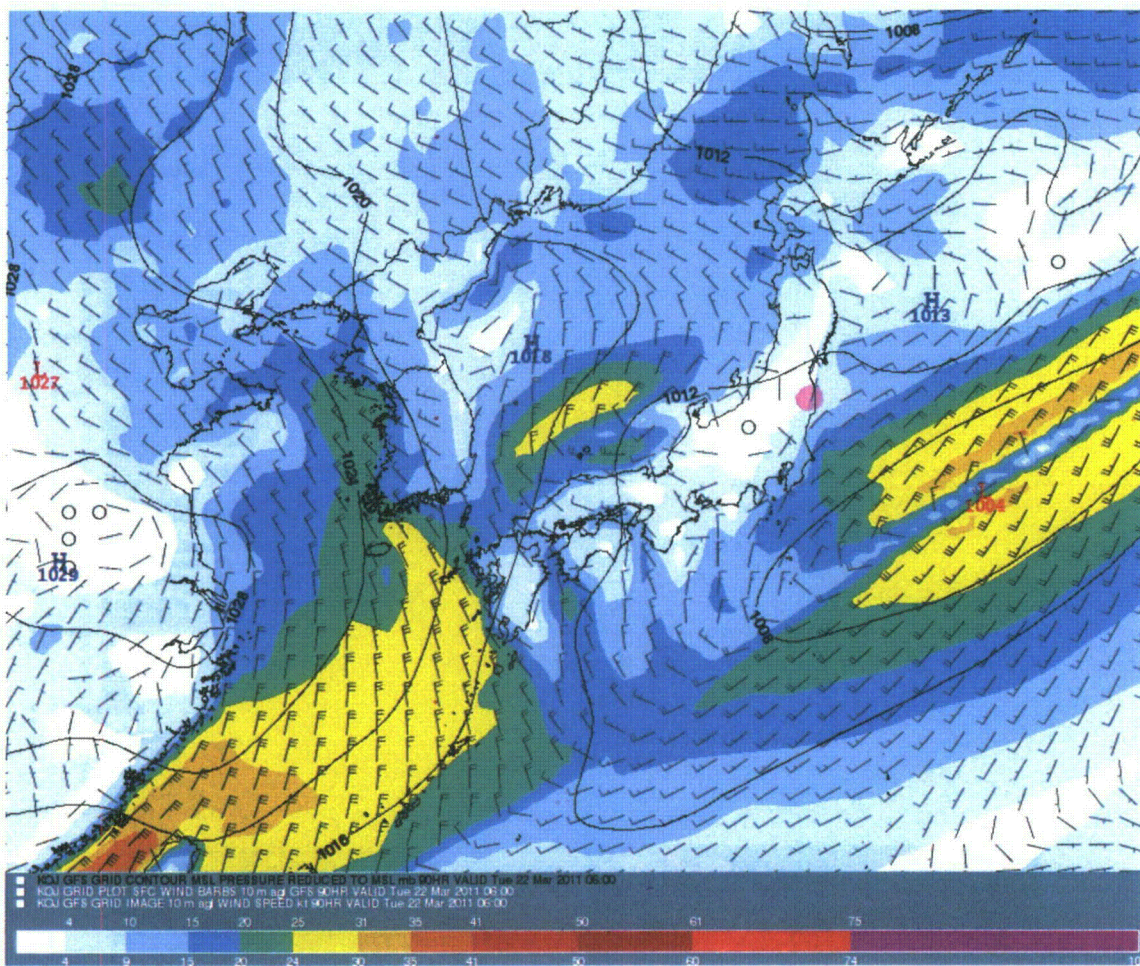
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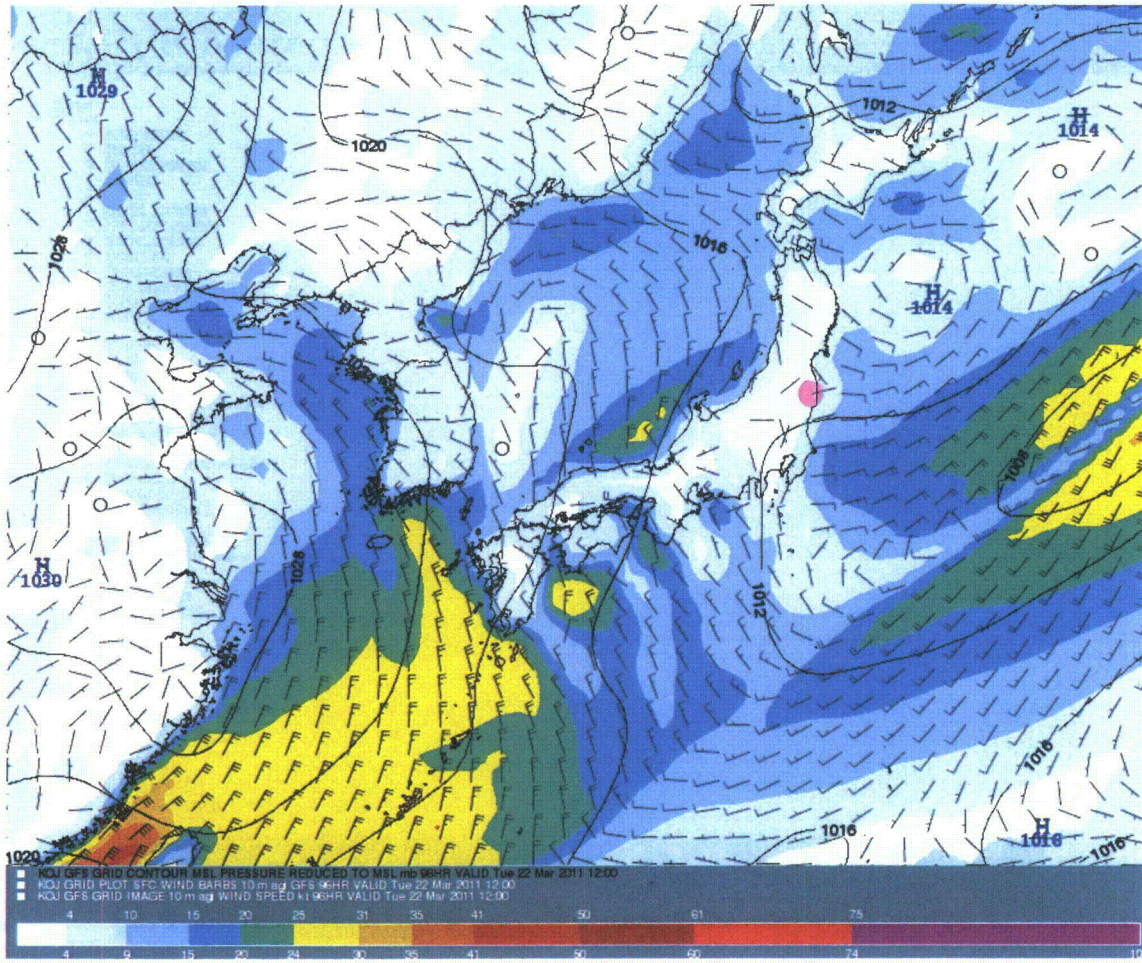
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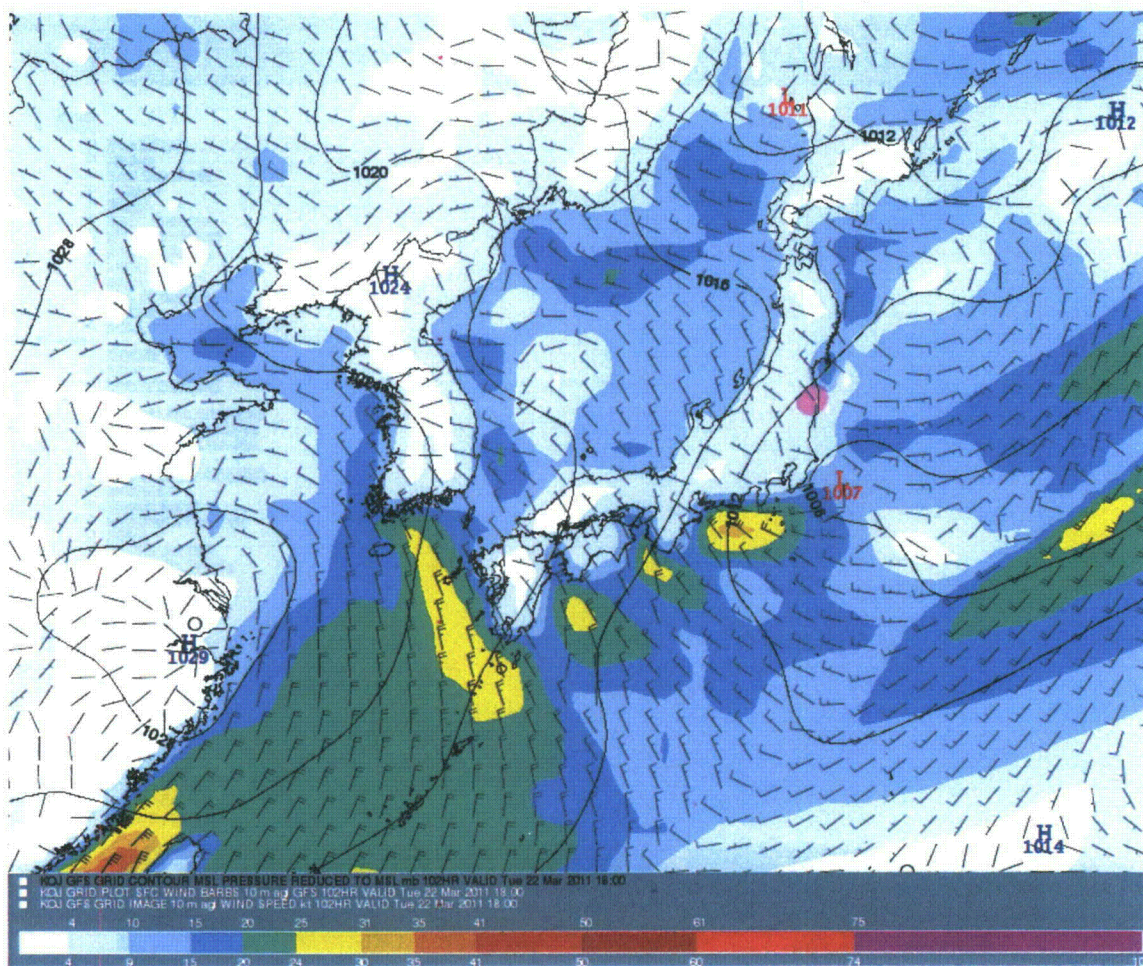
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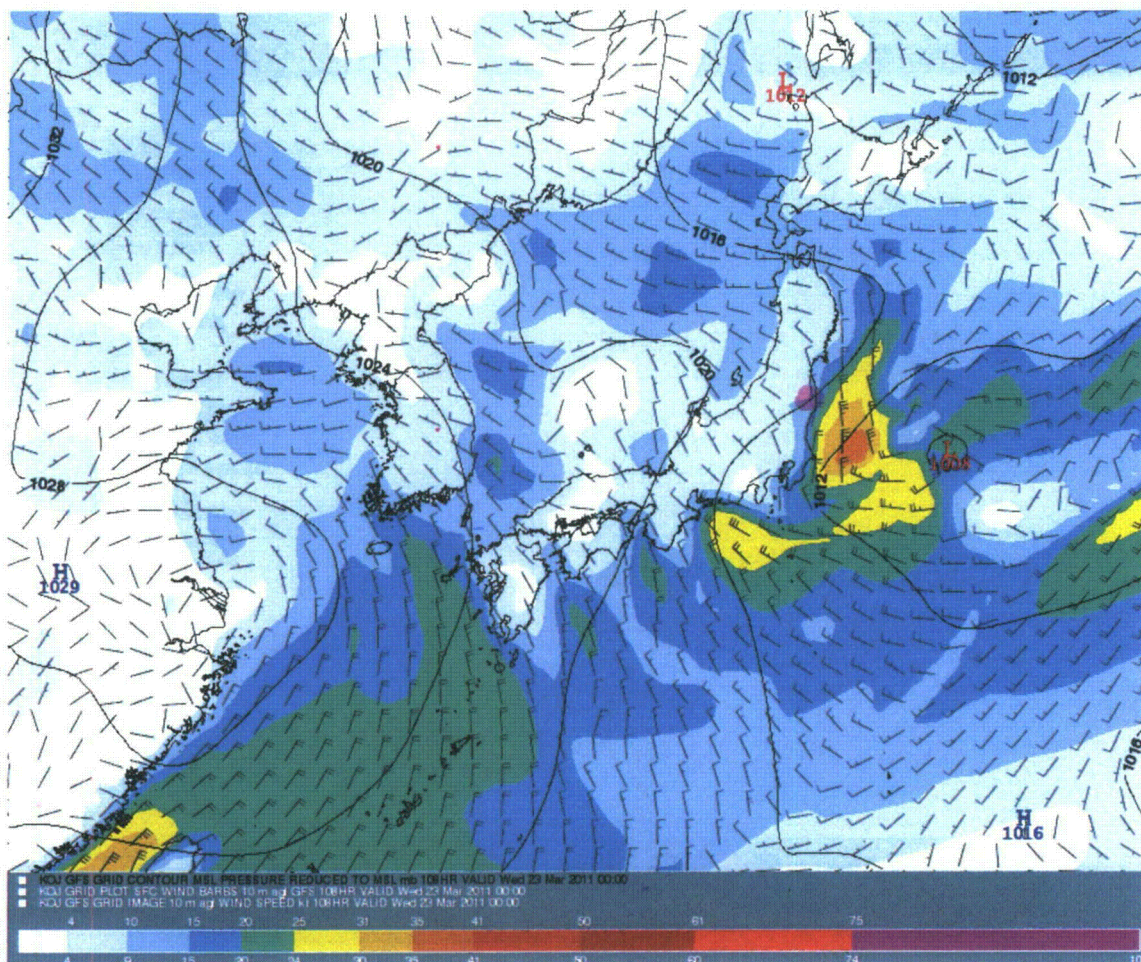
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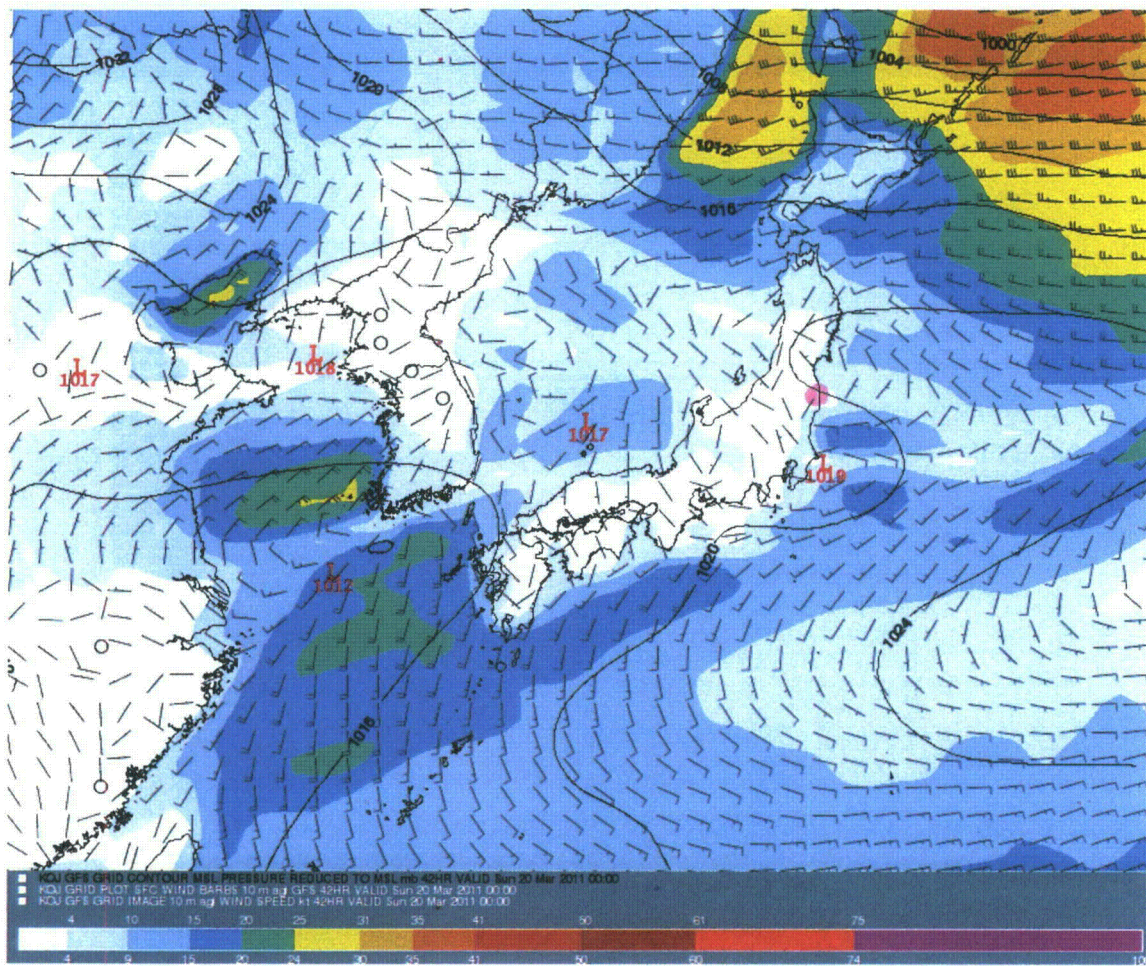
Sendai Airport/Shinko (SENDAI)

Time zone: UTC +9.0 | Sunrise: 05:44 Sunset: 17:45
 Last update: 13:29 local time - initial time: 00:00 UTC



Local date	Friday, Mar 18								Saturday, Mar 19							
Local time	00h	03h	06h	09h	12h	15h	18h	21h	00h	03h	06h	09h	12h	15h	18h	21h
Wind direction	↙	↙	↙	↙	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘
Wind speed (Knots)	12	13	13	12	10	10	6	6	6	6	7	5	6	13	11	9
Wind gusts (Knots)	21	22	21	17	14	13	7	6	6	7	7	7	14	28	25	16
Wave direction [WW3]	↙	↙	↙	↙	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘
Wave height (m) [WW3]	1.5	1.5	1.6	1.5	1.2	1.0	0.8	0.6	0.6	0.6	0.8	1.0	1.1	1.3	1.4	1.5
Wave period (s) [WW3]	5	5	5	5	4	4	4	4	12	13	13	13	13	5	6	3
Cloud cover	☁	☾	☀	☀	☀	☀	☾	☾	☁	☁	☁	☁	☀	☀	☾	☾
Precipitation (mm/h)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Air pressure (hPa)	1017	1018	1021	1022	1022	1022	1023	1023	1022	1019	1018	1016	1016	1015	1015	1017
Air temperature (°C)	0	0	0	2	4	5	2	1	0	1	2	6	10	10	7	6
Local date	Sunday, Mar 20								Monday, Mar 21							
Local time	00h	03h	06h	09h	12h	15h	18h	21h	00h	03h	06h	09h	12h	15h	18h	21h
Wind direction	↘	↘	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙
Wind speed (Knots)	8	6	7	4	4	8	8	5	4	5	6	8	14	13	5	3
Wind gusts (Knots)	9	6	7	4	4	9	10	6	4	5	6	10	18	18	5	3
Wave direction [WW3]	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘
Wave height (m) [WW3]	1.4	1.2	1.0	0.9	0.7	0.6	0.6	0.6	0.6	0.5	0.5	0.6	0.7	0.8	0.9	1.0
Wave period (s) [WW3]	4	7	7	7	6	6	11	11	3	4	4	4	7	7	7	8
Cloud cover	☾	☾	☀	☀	☀	☀	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁
Precipitation (mm/h)	0	0	0	0	0	0	0	0	0	0	0	1	3	4	3	2
Air pressure (hPa)	1018	1019	1020	1021	1020	1017	1017	1017	1014	1012	1012	1013	1011	1012	1013	1012
Air temperature (°C)	5	5	4	6	10	10	9	8	8	7	7	8	7	5	7	6
Local date	Tuesday, Mar 22								Wednesday, Mar 23							
Local time	00h	03h	06h	09h	12h	15h	18h	21h	00h	03h	06h	09h	12h	15h	18h	21h
Wind direction	↙	↙	↙	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘
Wind speed (Knots)	4	8	8	6	8	9	9	10	5	11	12	13	12	12	12	8
Wind gusts (Knots)	4	9	9	7	8	9	12	13	7	15	17	17	15	15	15	9
Wave direction [WW3]	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘
Wave height (m) [WW3]	0.9	0.9	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	1.1	1.1	1.1	1.1	1.1	1.0
Wave period (s) [WW3]	8	8	8	4	4	4	5	5	5	5	3	3	4	4	4	4
Cloud cover	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁
Precipitation (mm/h)	0	0	0	0	0	0	0	1	4	3	0	0	0	0	0	0
Air pressure (hPa)	1012	1011	1013	1014	1013	1011	1011	1011	1010	1011	1012	1013	1012	1012	1013	1014
Air temperature (°C)	7	6	4	6	7	7	7	7	6	4	3	5	6	6	3	2

Local date	Thursday, Mar 24								Friday, Mar 25						
Local time	00h	03h	06h	09h	12h	15h	18h	21h	00h	03h	06h	09h	12h	15h	
Wind direction															
Wind speed (Knots)	6	4	2	8	14	20	13	10	10	10	8	8	14	16	
Wind gusts (Knots)	6	4	2	14	20	26	18	14	14	14	10	13	20	24	
Wave direction [WW3]															
Wave height (m) [WW3]	0.9	0.7	0.7	0.6	0.6	1.3	1.6	1.4	1.1	1.0	0.9	0.8	0.9	0.0	
Wave period (s) [WW3]	4	4	4	10	10	3	4	4	4	4	4	3	3		
Cloud cover															
Precipitation (mm/h)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Air pressure (hPa)	1014	1014	1015	1016	1014	1015	1018	1020	1020	1020	1022	1024	1023	1023	
Air temperature (°C)	1	1	2	4	7	6	3	2	1	1	2	4	6	6	

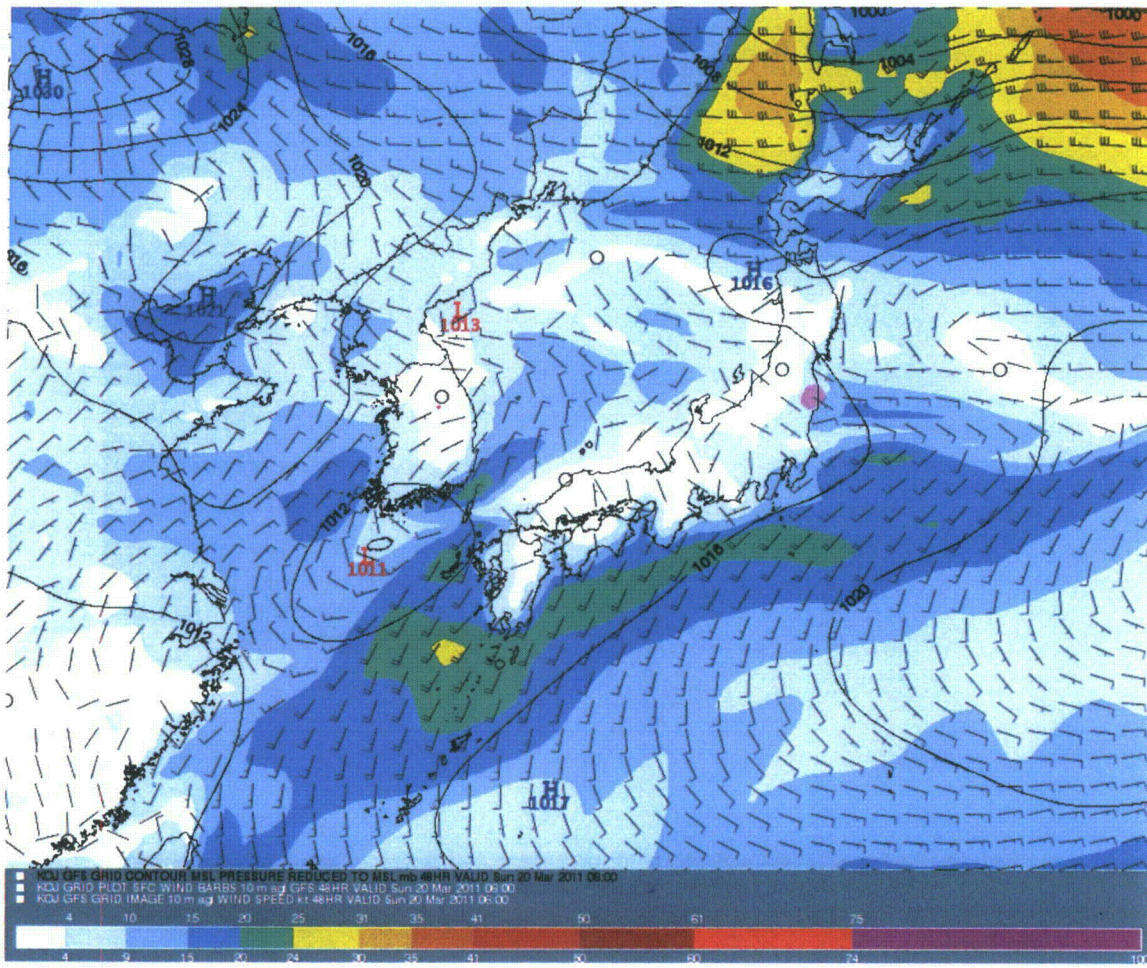


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Valid: Sat 19 Mar 2011 20 ET
 Sun 20 Mar 2011 00Z
 09 JST

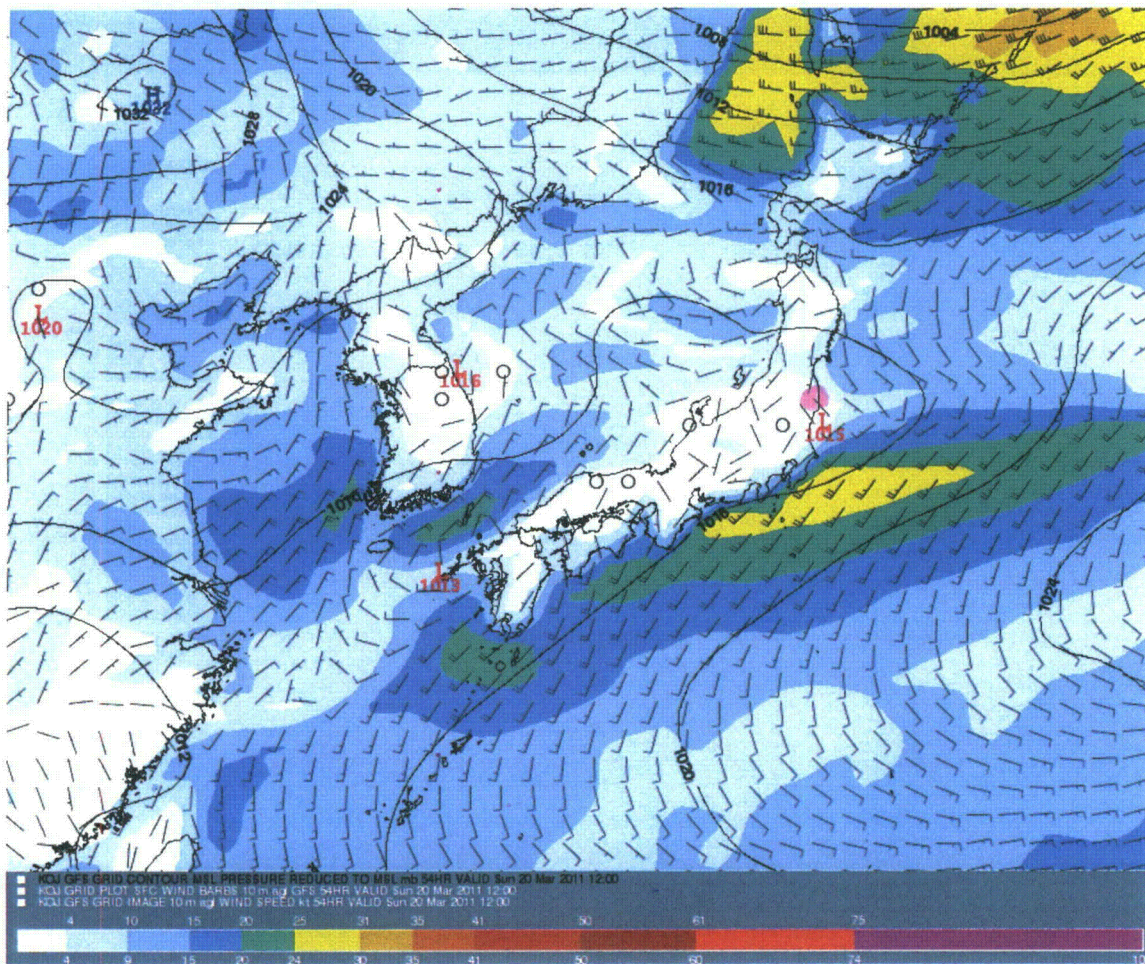
[GFS 50 Km grid]



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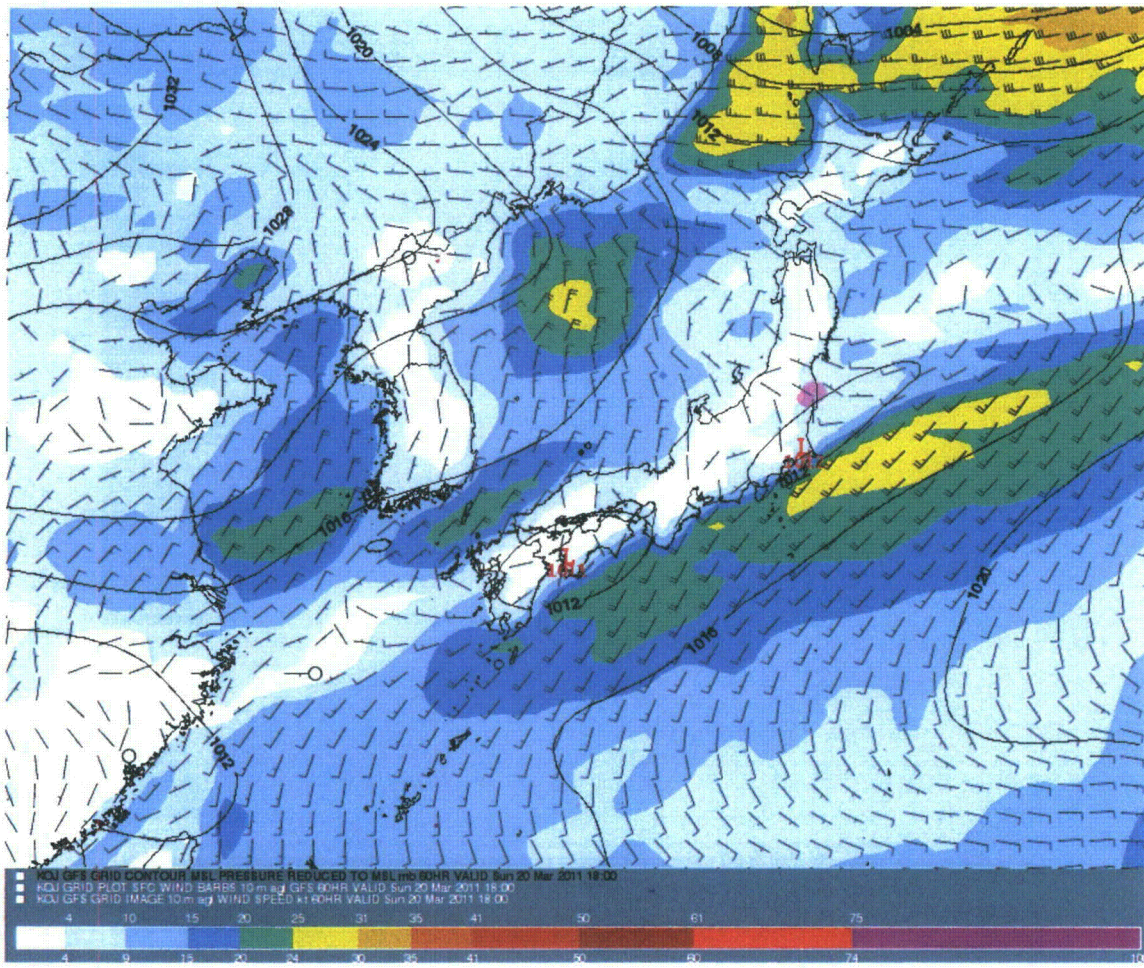
Valid: Sun 20 Mar 2011 02 ET
 06z
 15 JST



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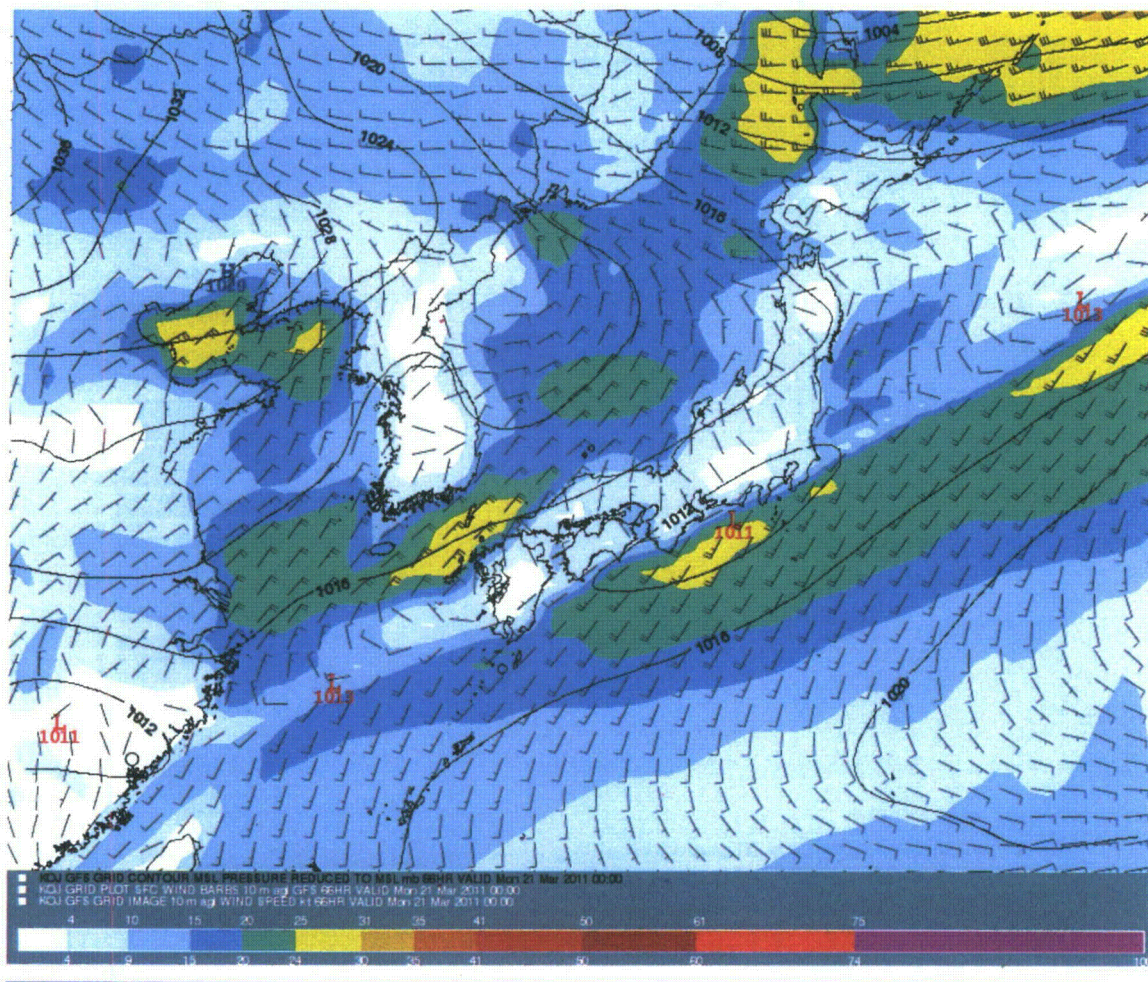
Valid: Sun 20 Mar 2011 08 ET
 12Z
 21 JST



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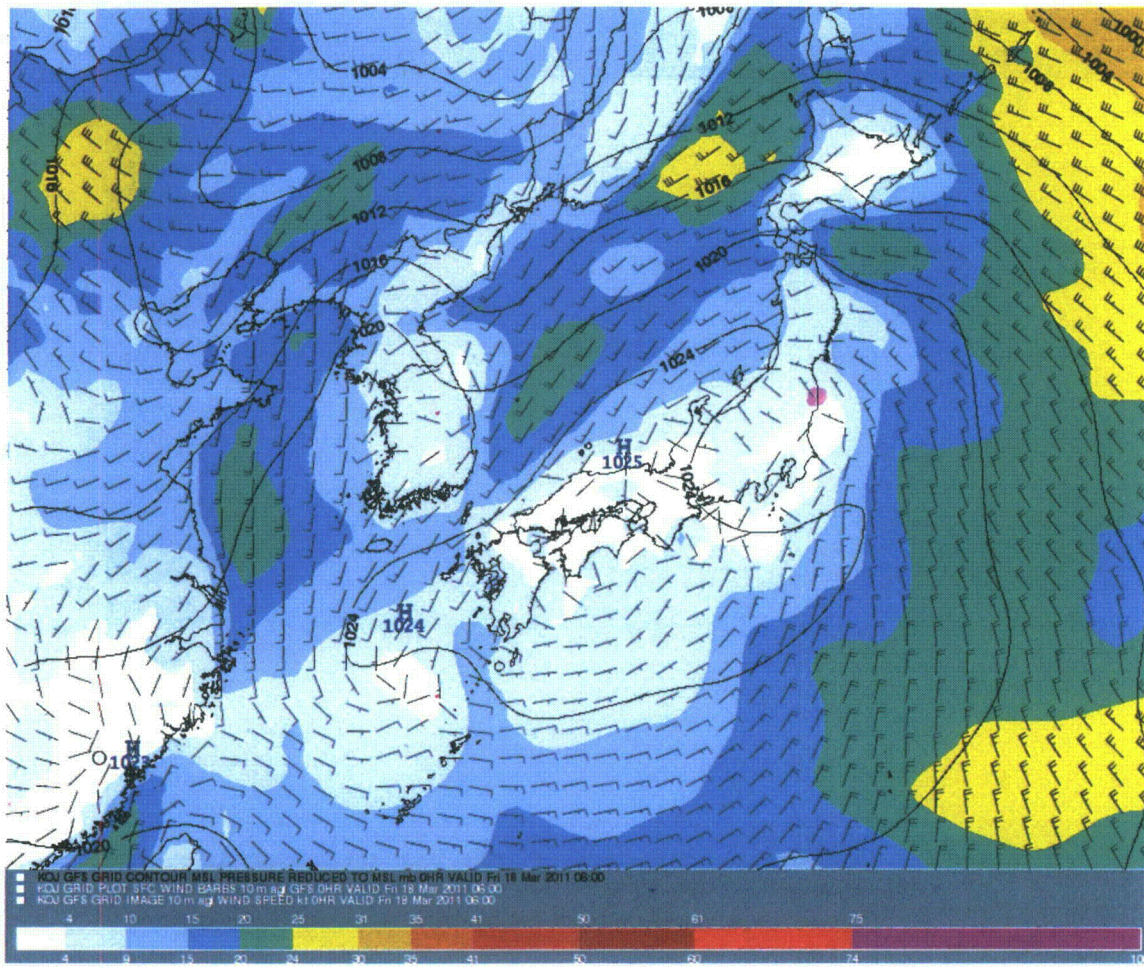
Valid: Sun 20 Mar 2011 14z ET
 Sun 20 Mar 2011 18z
 Mon 21 Mar 2011 03z JST



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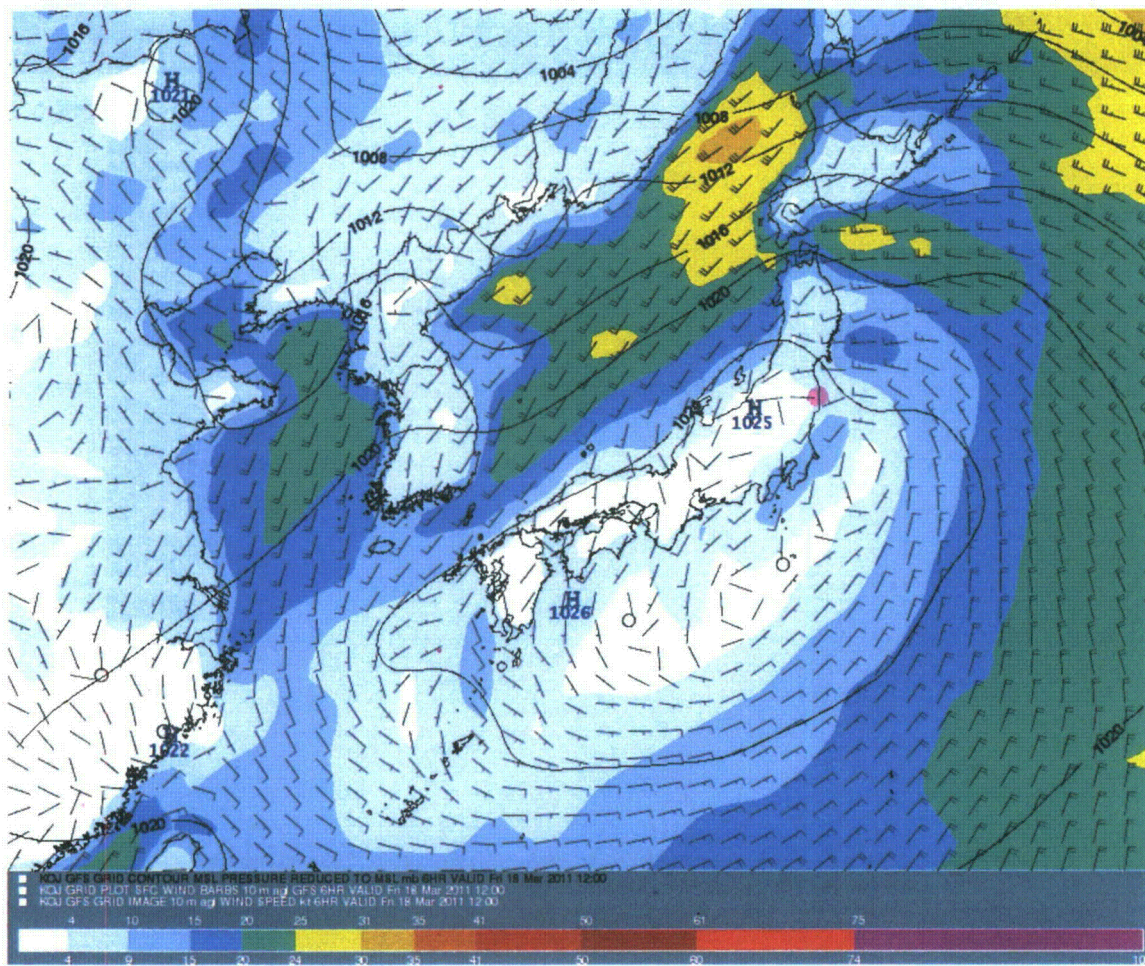
Sun 20 Mar 2011 20 ET
Valid: Mon 21 Mar 2011 00Z
 09 JST



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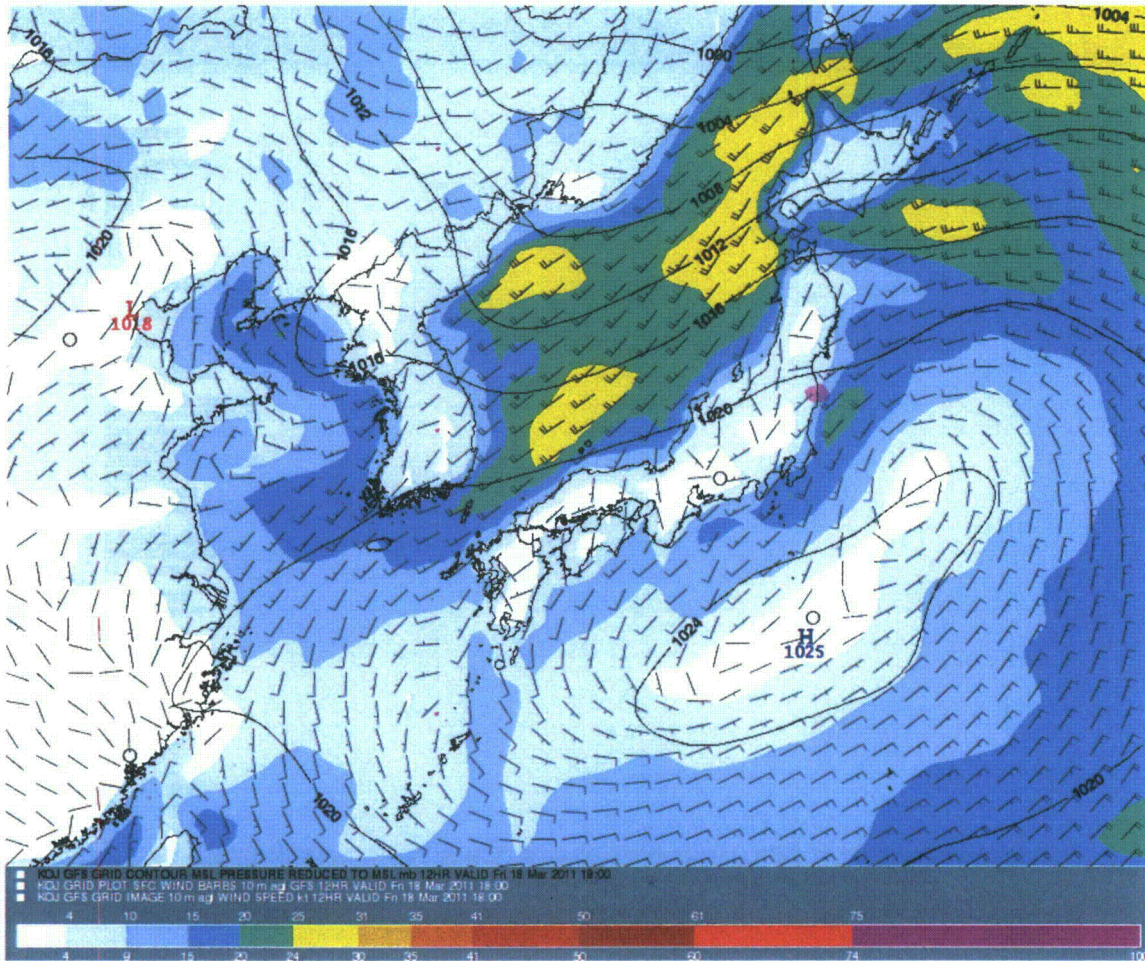
Valid: **Fri 18 Mar 2011** (02 ET) (06z) (15 SST)



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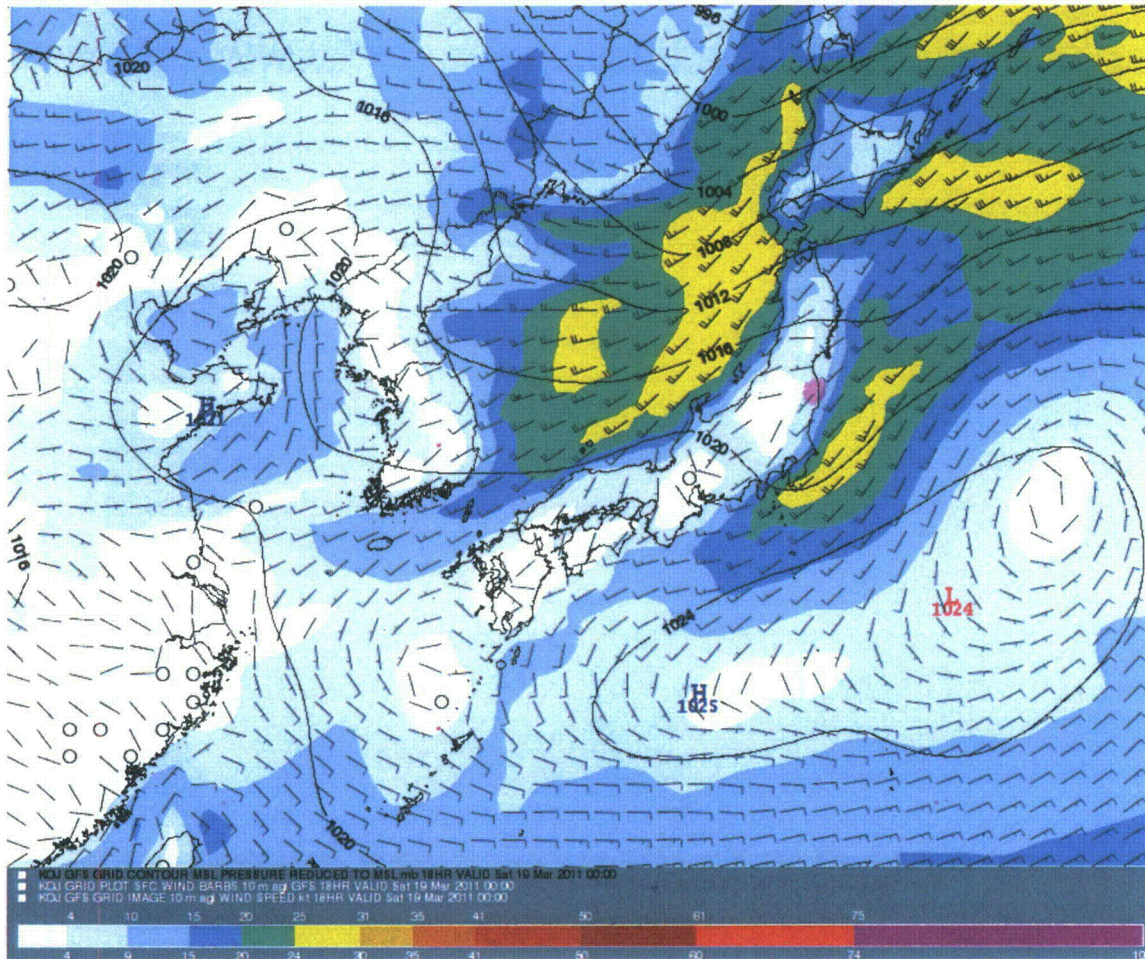
Valid: FRI
18 Mar 2011 08 ET
 12z
 21 JST



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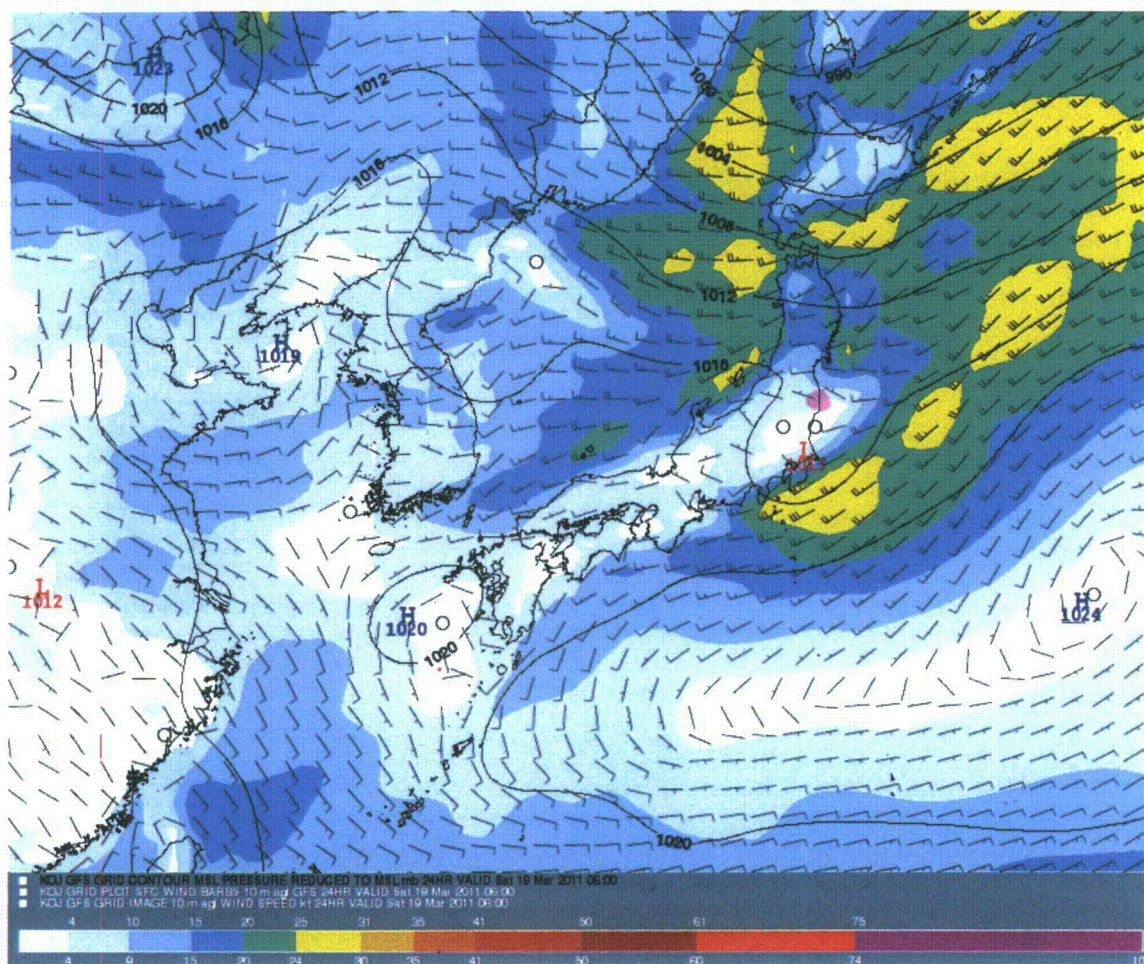
Valid: 18 Mar 2011 14Z
18Z
Sat 19 Mar 2011 03 JST



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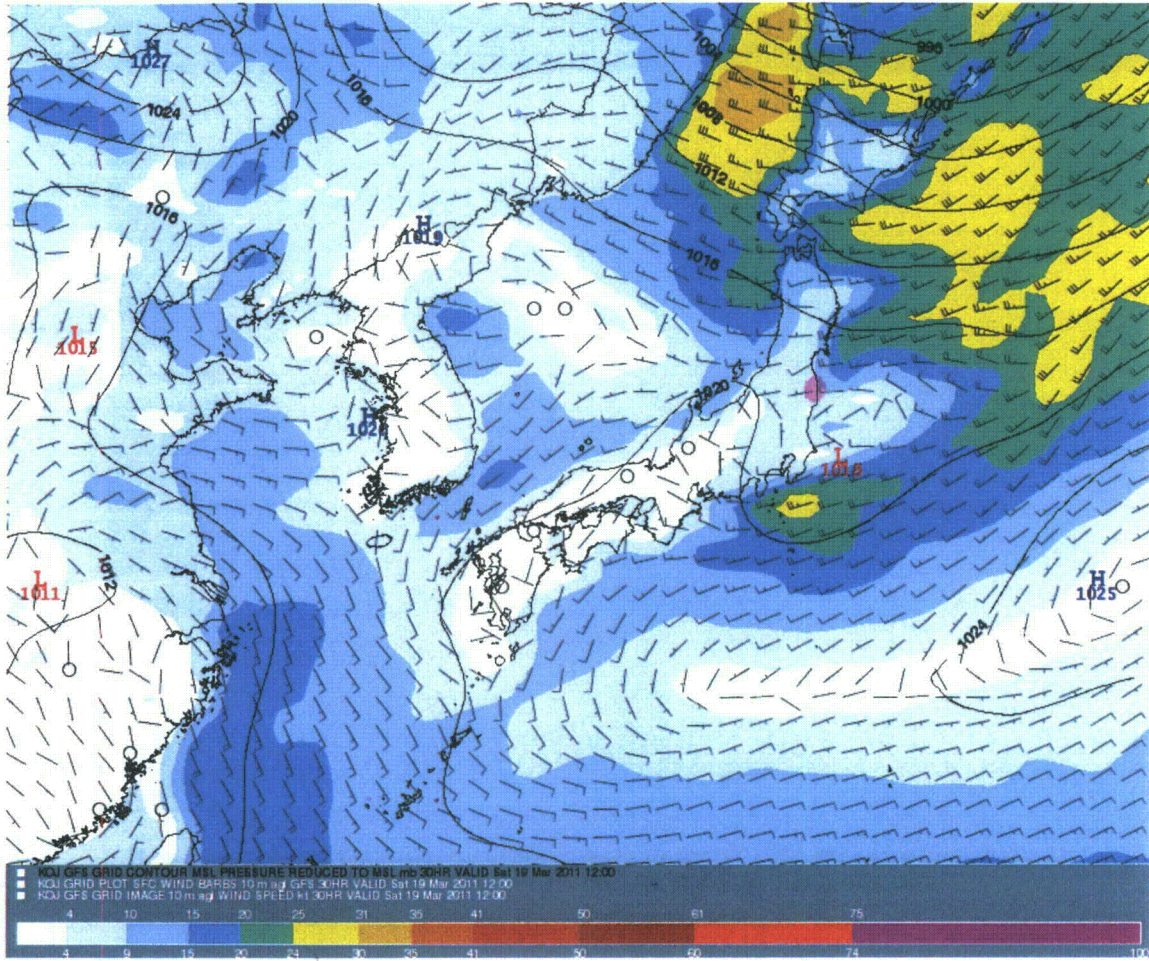
Valid Sat 19 Mar 2011 00Z
18 Mar 20 ET
09 JST



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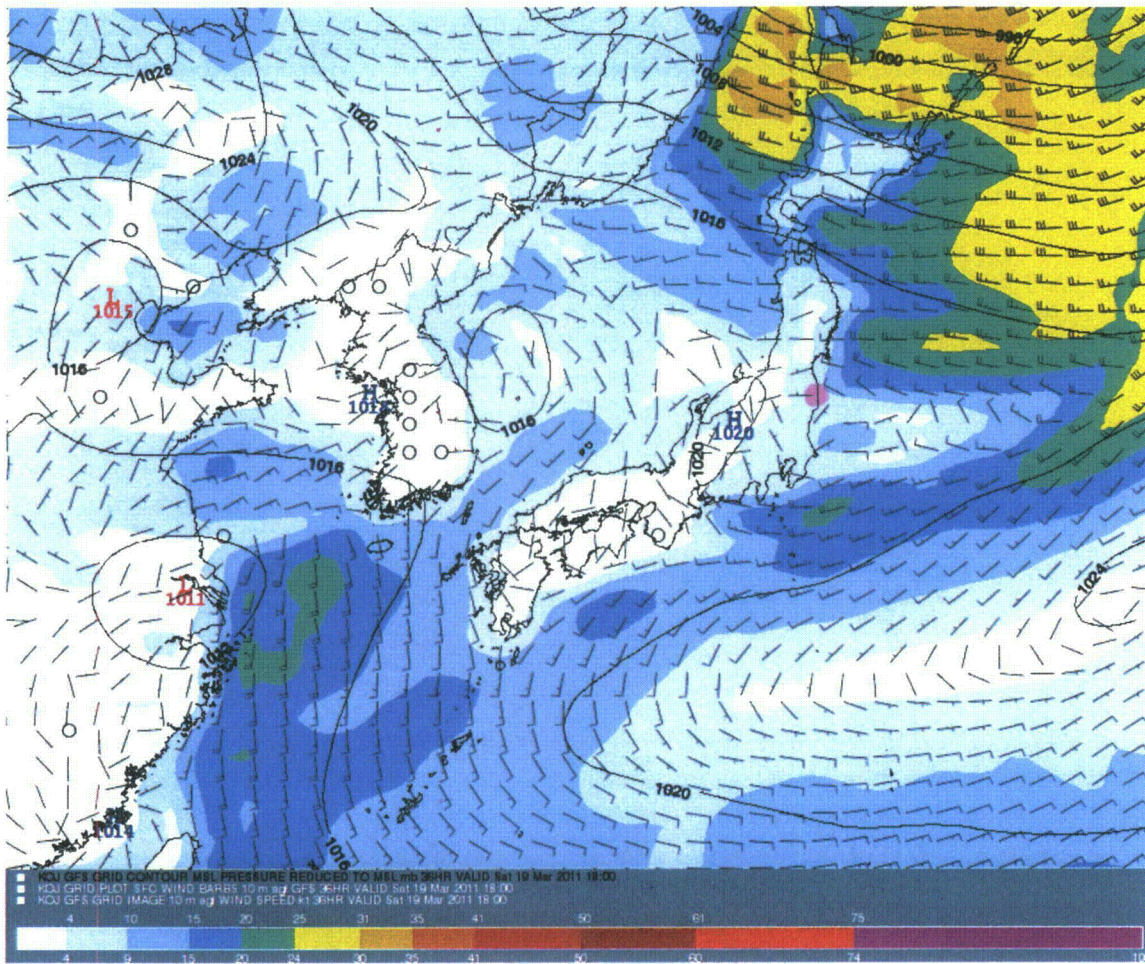
Valid: Sat 19 Mar 2011 02 ET
 06z
 15 JST



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Valid: Sat 19 Mar 2011 08 ET
 12Z
 21 JST



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Valid: Sat 19 Mar 2011 14Z
 Sat 19 Mar 2011 18Z
 Sun 20 Mar 2011 03 JST

Sendai Airport/Shinko (SENDAI)

Time zone: UTC +9.0 | Sunrise: 05:44 Sunset: 17:45
 Last update: 13:29 local time - initial time: 00:00 UTC



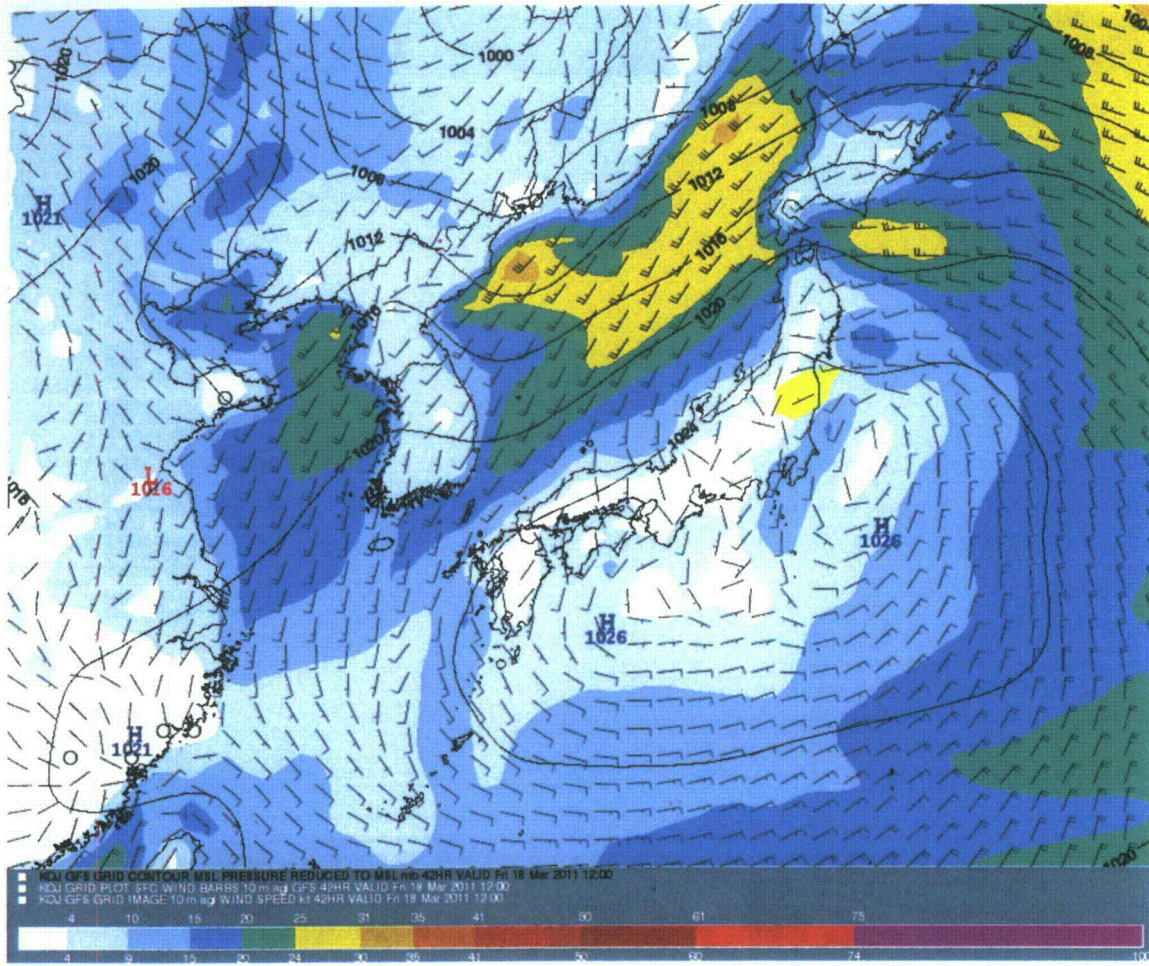
Local date	Friday, Mar 18								Saturday, Mar 19							
Local time	00h	03h	06h	09h	12h	15h	18h	21h	00h	03h	06h	09h	12h	15h	18h	21h
Wind direction	↙	↙	↙	↙	↘	↘	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗
Wind speed (Knots)	12	13	13	12	10	10	6	6	6	6	7	5	6	13	11	9
Wind gusts (Knots)	21	22	21	17	14	13	7	6	6	7	7	7	14	28	25	16
Wave direction [WW3]	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘
Wave height (m) [WW3]	1.5	1.5	1.6	1.5	1.2	1.0	0.8	0.6	0.6	0.6	0.8	1.0	1.1	1.3	1.4	1.5
Wave period (s) [WW3]	5	5	5	5	4	4	4	4	12	13	13	13	13	5	6	3
Cloud cover	☾	☾	☀	☀	☀	☀	☾	☾	☾	☁	☁	☁	☀	☀	☾	☾
Precipitation (mm/h)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Air pressure (hPa)	1017	1018	1021	1022	1022	1022	1023	1023	1022	1019	1018	1016	1016	1015	1015	1017
Air temperature (°C)	0	0	0	2	4	5	2	1	0	1	2	6	10	10	7	6
Local date	Sunday, Mar 20								Monday, Mar 21							
Local time	00h	03h	06h	09h	12h	15h	18h	21h	00h	03h	06h	09h	12h	15h	18h	21h
Wind direction	↗	↗	↙	↙	↙	↘	↘	↗	↙	↙	↙	↙	↙	↙	↙	↙
Wind speed (Knots)	8	6	7	4	4	8	8	5	4	5	6	8	14	13	5	3
Wind gusts (Knots)	9	6	7	4	4	9	10	6	4	5	6	10	18	18	5	3
Wave direction [WW3]	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗
Wave height (m) [WW3]	1.4	1.2	1.0	0.9	0.7	0.6	0.6	0.6	0.6	0.5	0.5	0.6	0.7	0.8	0.9	1.0
Wave period (s) [WW3]	4	7	7	7	6	6	11	11	3	4	4	4	7	7	7	8
Cloud cover	☾	☾	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁
Precipitation (mm/h)	0	0	0	0	0	0	0	0	0	0	0	1	3	4	3	2
Air pressure (hPa)	1018	1019	1020	1021	1020	1017	1017	1017	1014	1012	1012	1013	1011	1012	1013	1012
Air temperature (°C)	5	5	4	6	10	10	9	8	8	7	7	8	7	5	7	6
Local date	Tuesday, Mar 22								Wednesday, Mar 23							
Local time	00h	03h	06h	09h	12h	15h	18h	21h	00h	03h	06h	09h	12h	15h	18h	21h
Wind direction	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘
Wind speed (Knots)	4	8	8	6	8	9	9	10	5	11	12	13	12	12	12	8
Wind gusts (Knots)	4	9	9	7	8	9	12	13	7	15	17	17	15	15	15	9
Wave direction [WW3]	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗
Wave height (m) [WW3]	0.9	0.9	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	1.1	1.1	1.1	1.1	1.1	1.0
Wave period (s) [WW3]	8	8	8	4	4	4	5	5	5	5	3	3	4	4	4	4
Cloud cover	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁
Precipitation (mm/h)	0	0	0	0	0	0	0	1	4	3	0	0	0	0	0	0
Air pressure (hPa)	1012	1011	1013	1014	1013	1011	1011	1011	1010	1011	1012	1013	1012	1012	1013	1014
Air temperature (°C)	7	6	4	6	7	7	7	7	6	4	3	5	6	6	3	2

Onahama (ONAHAMA)																
Time zone: UTC +9.0 Sunrise: 05:44 Sunset: 17:45																
Last update: 13:29 local time - initial time: 00:00 UTC																
																
Local date	Friday, Mar 18										Saturday, Mar 19					
Local time	00h	03h	06h	09h	12h	15h	18h	21h	00h	03h	06h	09h	12h	15h	18h	21h
Wind direction	↙	↙	↙	↙	↘	↗	↖	↖	↖	↖	↖	↖	↖	↗	↖	↖
Wind speed (Knots)	13	12	13	12	6	3	3	7	11	14	13	10	7	1	2	2
Wind gusts (Knots)	23	23	25	17	12	8	4	10	15	22	22	12	8	5	3	3
Cloud cover	☾	☾	☀	☀	☀	☀	☾	☾	☁	☁	☁	☁	☀	☀	☾	☾
Precipitation (mm/h)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Air pressure (hPa)	1016	1018	1020	1022	1022	1021	1023	1023	1022	1019	1018	1016	1015	1014	1016	1017
Air temperature (°C)	0	0	0	3	6	8	3	5	5	6	7	9	13	14	8	8
Local date	Saturday, Mar 19										Sunday, Mar 20					
Local time	00h	03h	06h	09h	12h	15h	18h	21h	00h	03h	06h	09h	12h	15h	18h	21h
Wind direction	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Wind speed (Knots)	6	7	7	5	8	7	7	4	1	3	7	11	14	17	12	8
Wind gusts (Knots)	6	7	7	5	9	9	8	5	1	3	8	14	19	24	17	10
Cloud cover	☾	☾	☀	☀	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁
Precipitation (mm/h)	0	0	0	0	0	0	0	0	0	0	0	1	6	6	3	2
Air pressure (hPa)	1018	1018	1019	1020	1019	1017	1017	1016	1014	1012	1011	1011	1010	1009	1012	1011
Air temperature (°C)	7	7	6	11	12	11	10	10	9	9	9	10	9	8	7	7
Local date	Sunday, Mar 20										Monday, Mar 21					
Local time	00h	03h	06h	09h	12h	15h	18h	21h	00h	03h	06h	09h	12h	15h	18h	21h
Wind direction	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Wind speed (Knots)	6	7	7	5	8	7	7	4	1	3	7	11	14	17	12	8
Wind gusts (Knots)	6	7	7	5	9	9	8	5	1	3	8	14	19	24	17	10
Cloud cover	☾	☾	☀	☀	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁
Precipitation (mm/h)	0	0	0	0	0	0	0	0	0	0	0	1	6	6	3	2
Air pressure (hPa)	1018	1018	1019	1020	1019	1017	1017	1016	1014	1012	1011	1011	1010	1009	1012	1011
Air temperature (°C)	7	7	6	11	12	11	10	10	9	9	9	10	9	8	7	7
Local date	Monday, Mar 21										Tuesday, Mar 22					
Local time	00h	03h	06h	09h	12h	15h	18h	21h	00h	03h	06h	09h	12h	15h	18h	21h
Wind direction	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Wind speed (Knots)	6	7	9	9	7	7	7	9	2	19	16	14	12	13	11	9
Wind gusts (Knots)	7	9	12	11	7	7	9	12	4	28	26	20	18	18	16	13
Cloud cover	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☀	☀	☁	☁
Precipitation (mm/h)	0	0	0	1	1	1	2	2	7	6	0	0	0	0	0	0
Air pressure (hPa)	1011	1010	1011	1013	1012	1011	1011	1010	1008	1009	1010	1012	1011	1011	1013	1014
Air temperature (°C)	7	7	7	7	9	9	8	8	8	6	4	5	7	7	5	4
Local date	Tuesday, Mar 22										Wednesday, Mar 23					
Local time	00h	03h	06h	09h	12h	15h	18h	21h	00h	03h	06h	09h	12h	15h	18h	21h
Wind direction	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Wind speed (Knots)	6	7	9	9	7	7	7	9	2	19	16	14	12	13	11	9
Wind gusts (Knots)	7	9	12	11	7	7	9	12	4	28	26	20	18	18	16	13
Cloud cover	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☀	☀	☁	☁
Precipitation (mm/h)	0	0	0	1	1	1	2	2	7	6	0	0	0	0	0	0
Air pressure (hPa)	1011	1010	1011	1013	1012	1011	1011	1010	1008	1009	1010	1012	1011	1011	1013	1014
Air temperature (°C)	7	7	7	7	9	9	8	8	8	6	4	5	7	7	5	4
Local date	Wednesday, Mar 23										Thursday, Mar 24					
Local time	00h	03h	06h	09h	12h	15h	18h	21h	00h	03h	06h	09h	12h	15h	18h	21h
Wind direction	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Wind speed (Knots)	6	6	6	12	10	9	11	11	10	7	9	10	13	13		
Wind gusts (Knots)	9	8	13	19	16	12	18	18	15	10	13	15	18	18		
Cloud cover	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁		
Precipitation (mm/h)	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Air pressure (hPa)	1014	1014	1015	1016	1015	1015	1018	1019	1019	1020	1022	1023	1023	1023		
Air temperature (°C)	3	3	2	6	8	7	5	3	2	1	2	6	7	8		
Local date	Thursday, Mar 24										Friday, Mar 25					
Local time	00h	03h	06h	09h	12h	15h	18h	21h	00h	03h	06h	09h	12h	15h	18h	21h
Wind direction	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Wind speed (Knots)	6	6	6	12	10	9	11	11	10	7	9	10	13	13		
Wind gusts (Knots)	9	8	13	19	16	12	18	18	15	10	13	15	18	18		
Cloud cover	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁	☁		
Precipitation (mm/h)	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Air pressure (hPa)	1014	1014	1015	1016	1015	1015	1018	1019	1019	1020	1022	1023	1023	1023		
Air temperature (°C)	3	3	2	6	8	7	5	3	2	1	2	6	7	8		

Fri 3/18 (1/2) (2155T)

from 3/16 (18₂) Run

Note: A later "Run" exists
TA

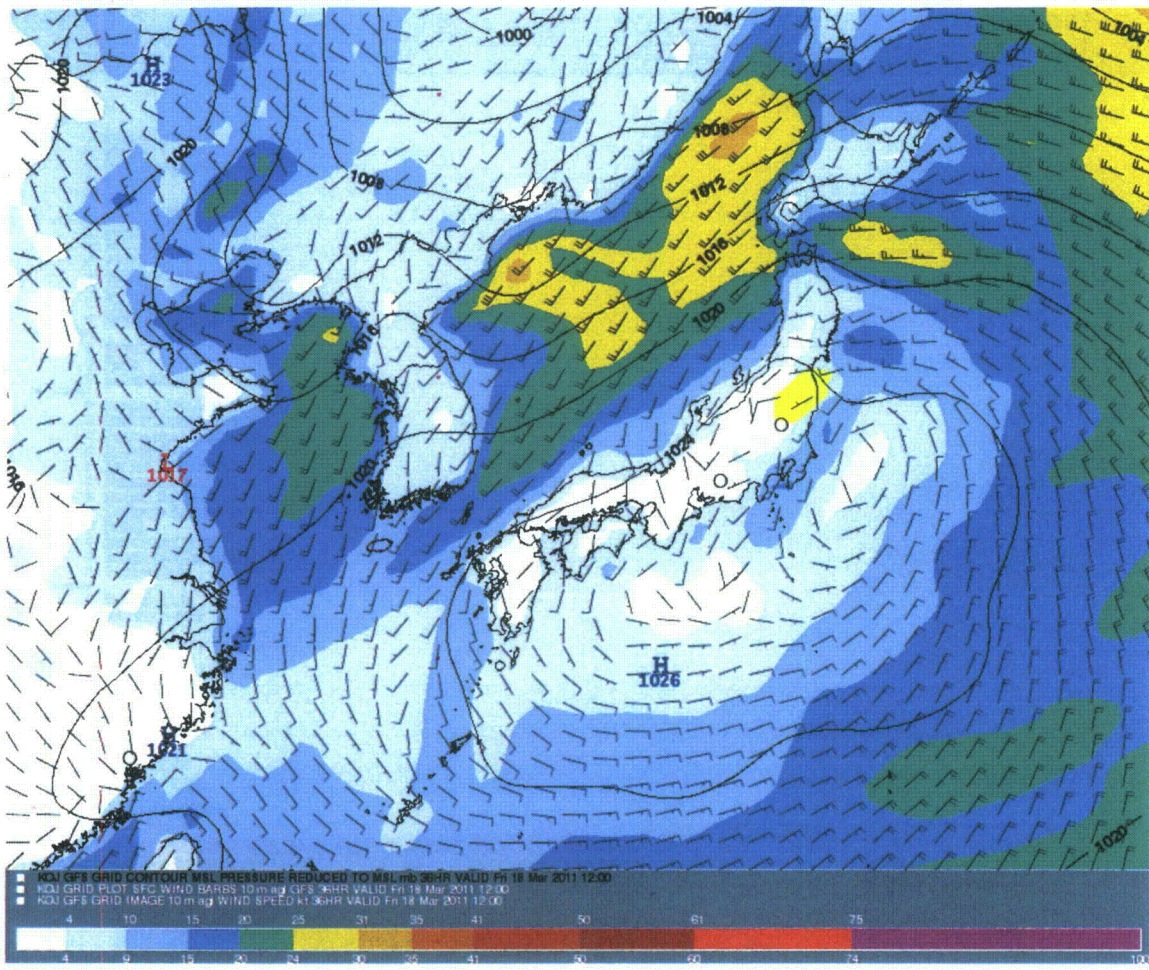


"Double"
1026_{mb} High
Pressure

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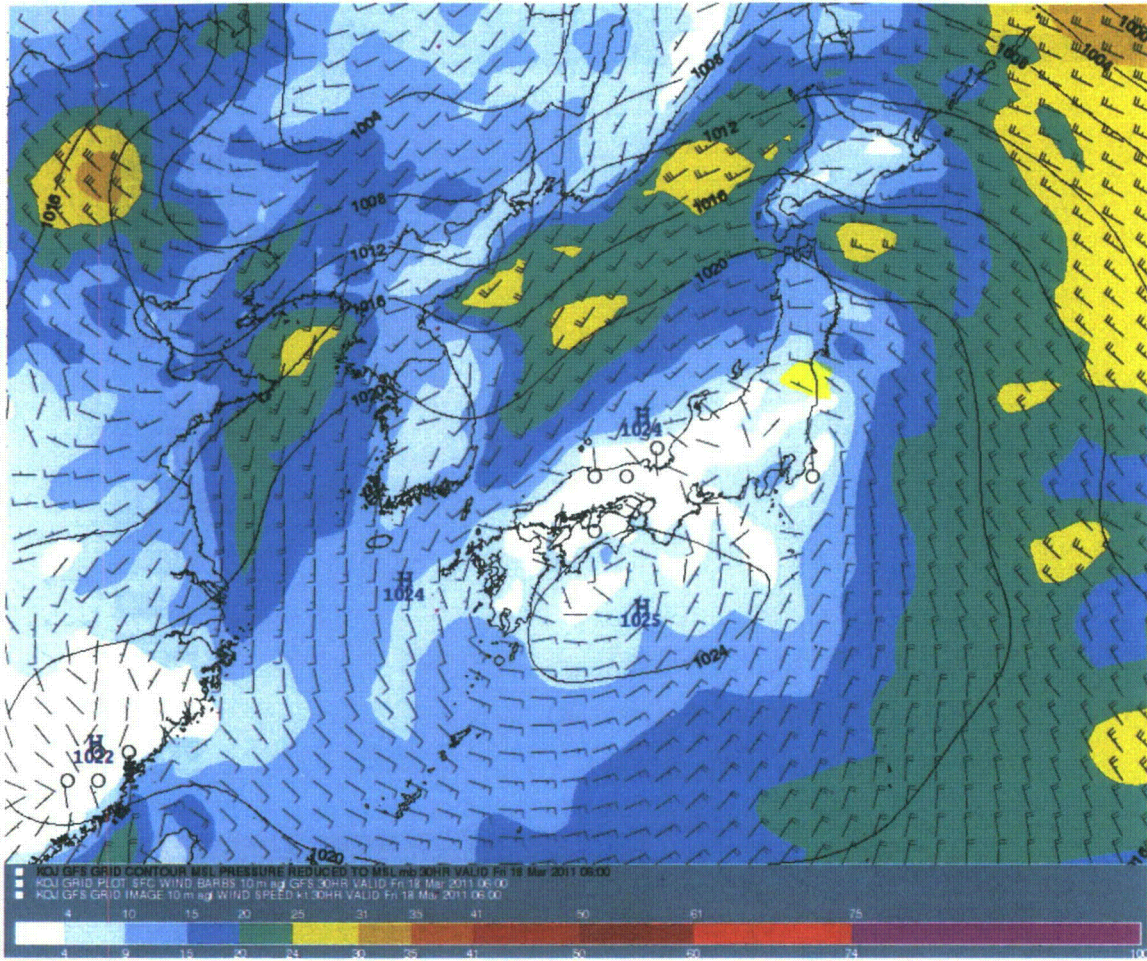
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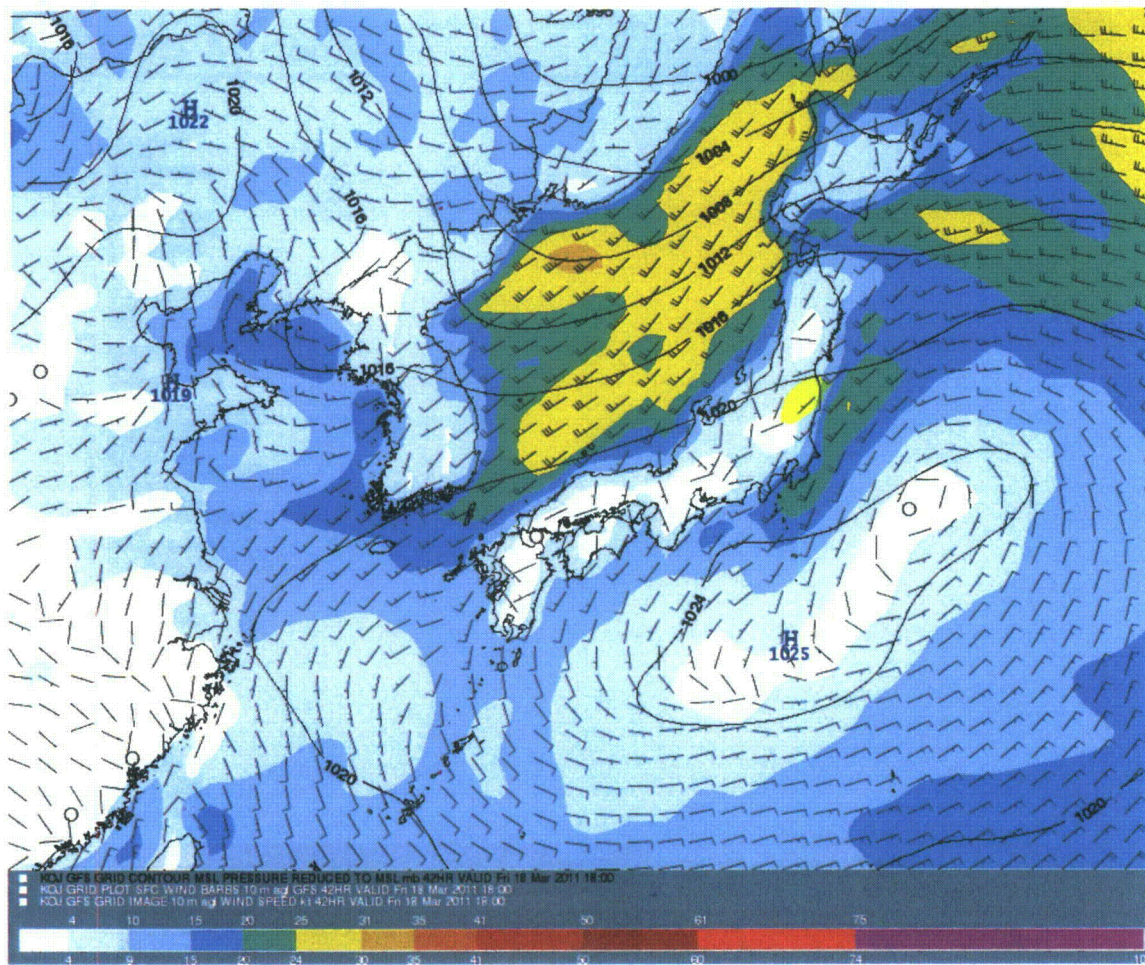
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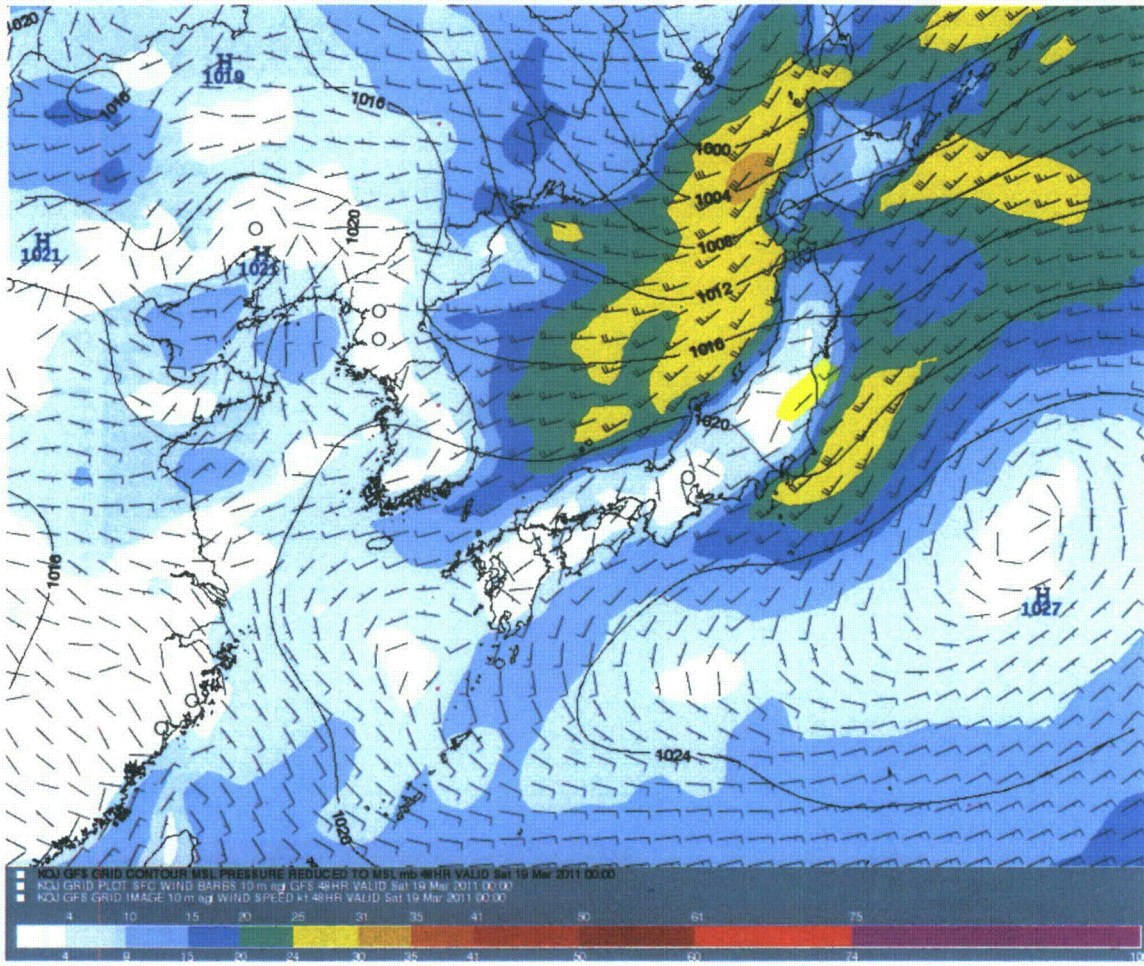
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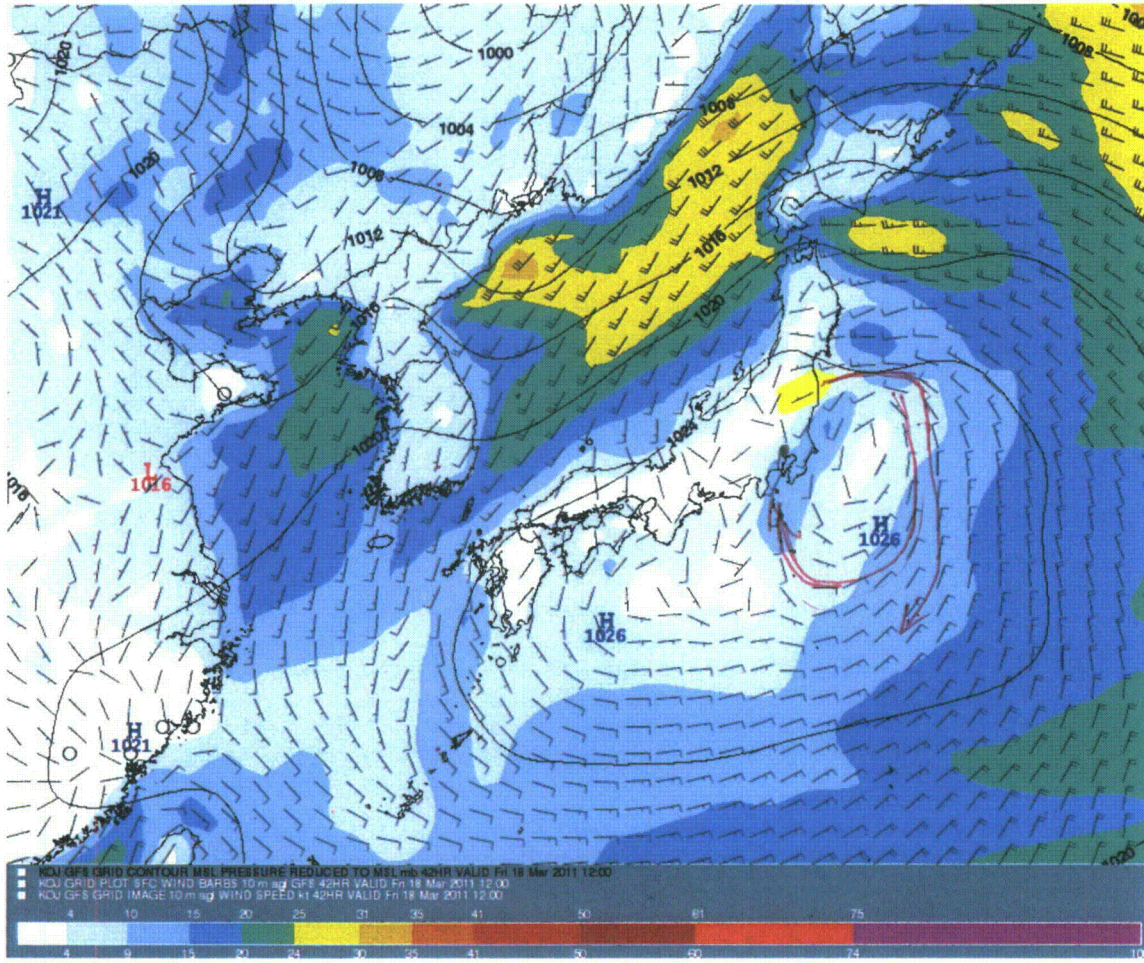
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Valid: Fri 3/18 (12Z) (2100 JST)

from 3/16 (18Z Run)

Note: a later "Run" exists
TA



"Double"
1026 mb High Pressure

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Expect $10^{-10} \frac{\mu\text{g}}{\text{ml}} \cdot (10^{-14})$