Comparison of daily primary production between east and west in the subarctic North Pacific: a review from a new angle

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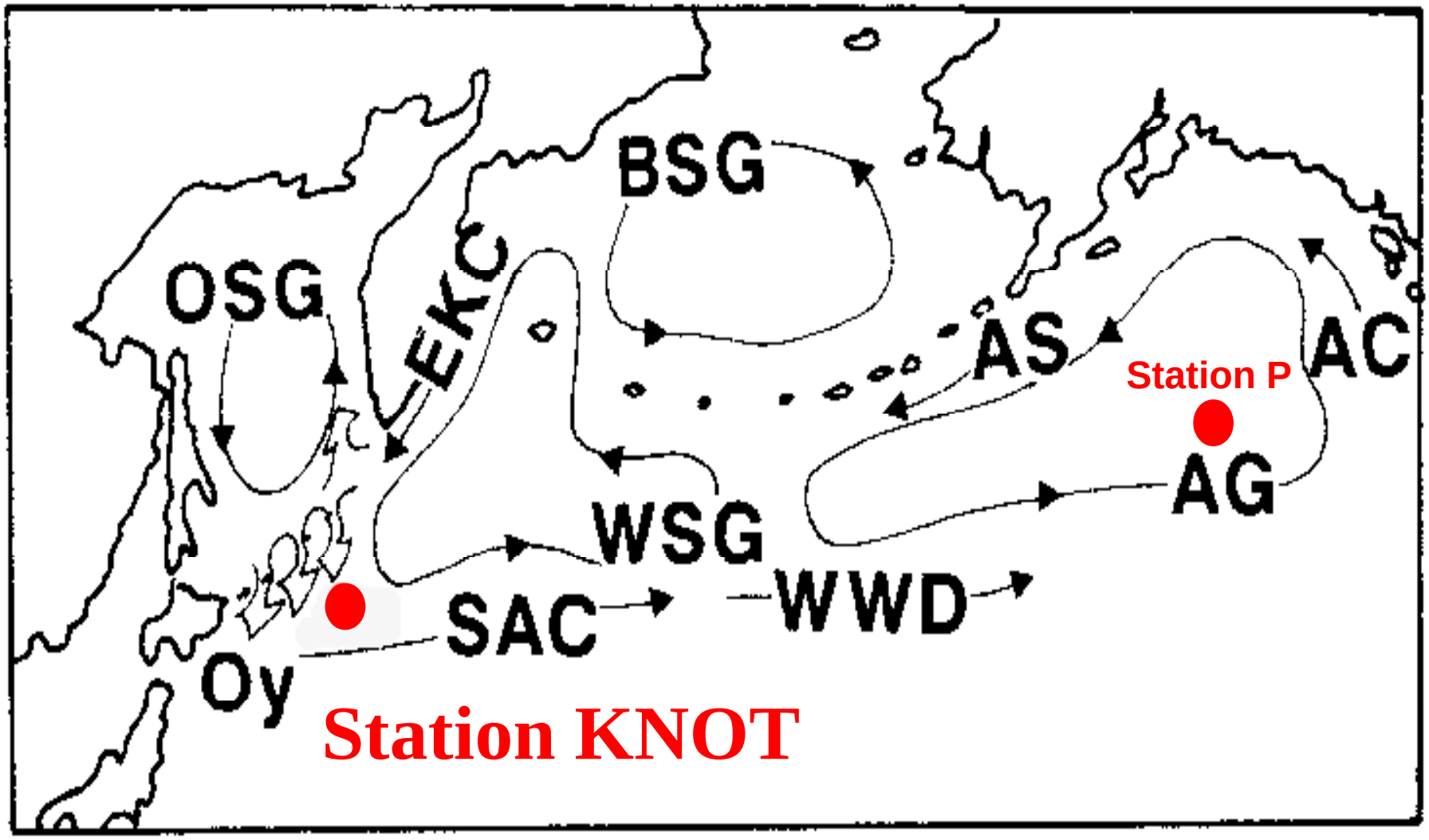
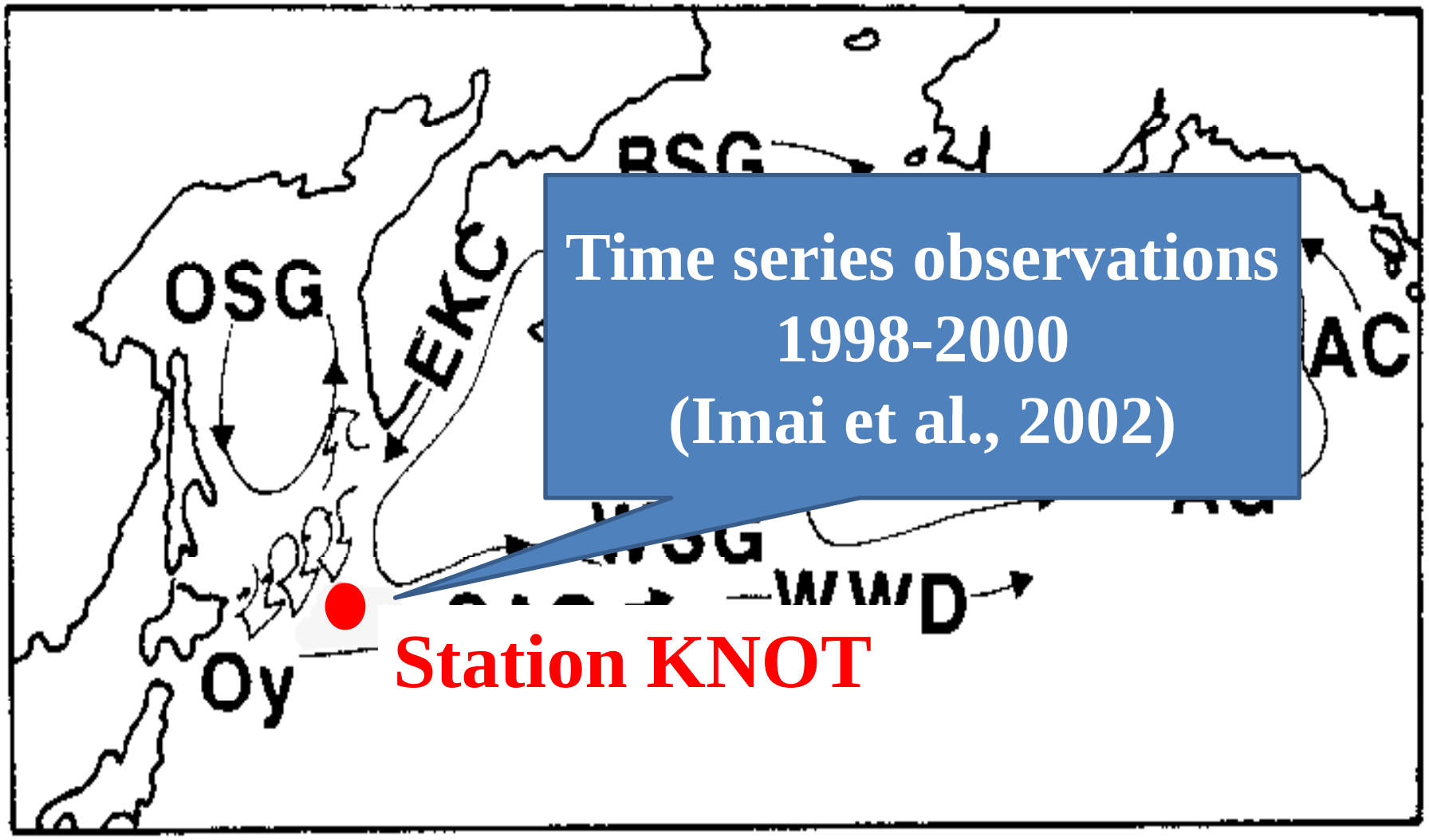

BSG
OSG
EKC
AS
AC
Station P
AG
WSG
WWD
SAC
Oy
Station KNOT


OSG
EKC
RSG
AC
Oy
Time series observations
1998-2000
(Imai et al., 2002)
Station KNOT

Average daily primary production (mgC/m^2/day) at station P and station KNOT

Station	Spring	Summer	Autumn	*Winter*	
Papa	415	466	366	*283*	Wong et al. (1995
Papa	850	850	366	*300*	Boyd and Harrison (1999) Harrison et al. (1999)
Papa				*195-281*	Boyd et al. (1995)
KNOT	526	227	173	*48* (15-110; n=5)	Imai et al. (2002)

Cited from Imai et al. (2002)

Comparison of average daily primary production (mgC/m^2/day)

Station	Spring	Summer	Autumn	Winter	
P					al. (1995
P					d Harrison
					n et al.
P					al. (1995)
K					al. (2002)
r				109	Shiomoto (2000)
KNOT					

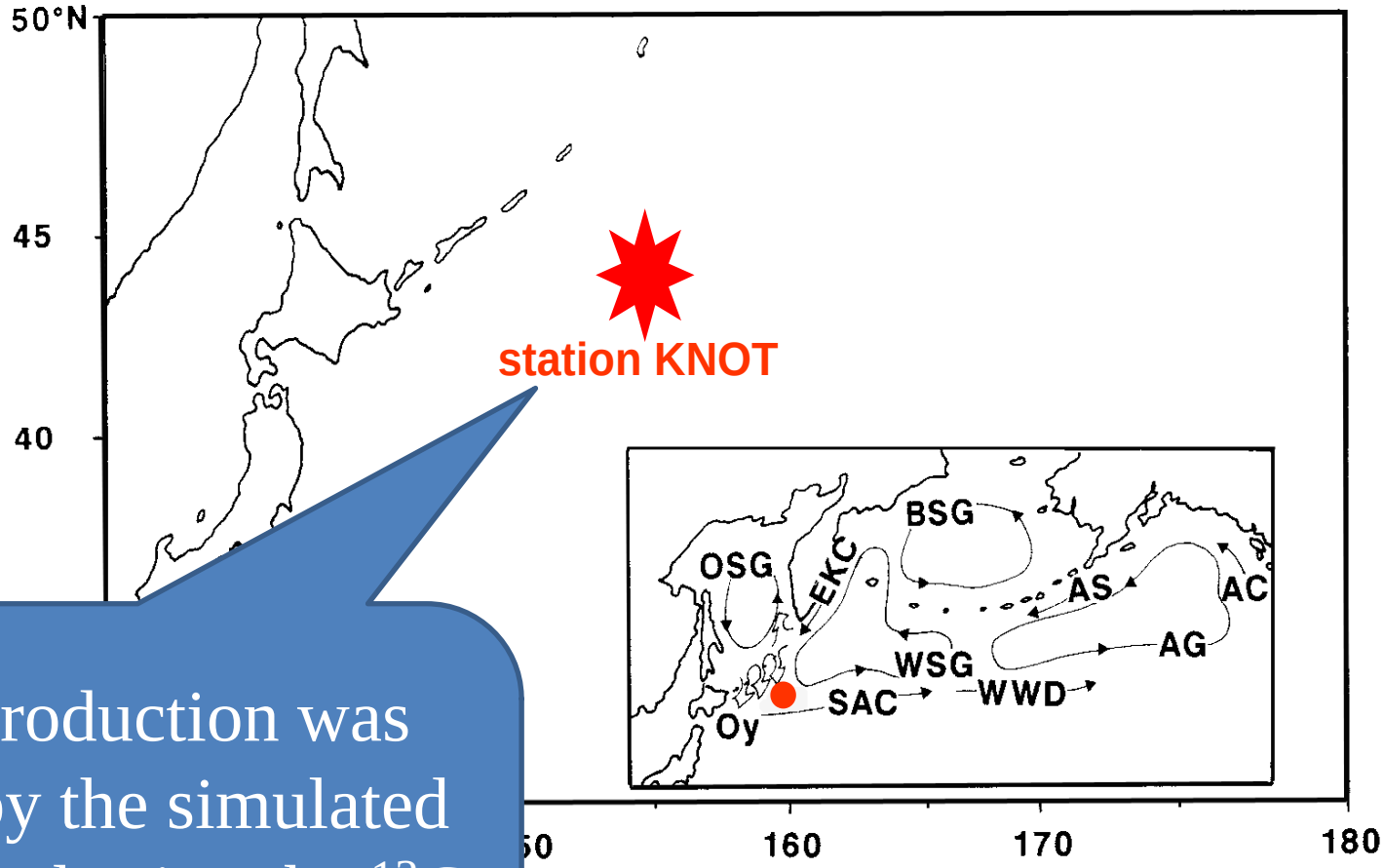
The difference of daily primary production is marked in winter.

Average daily primary production (mgC/m^2/day) at station P and station KNOT

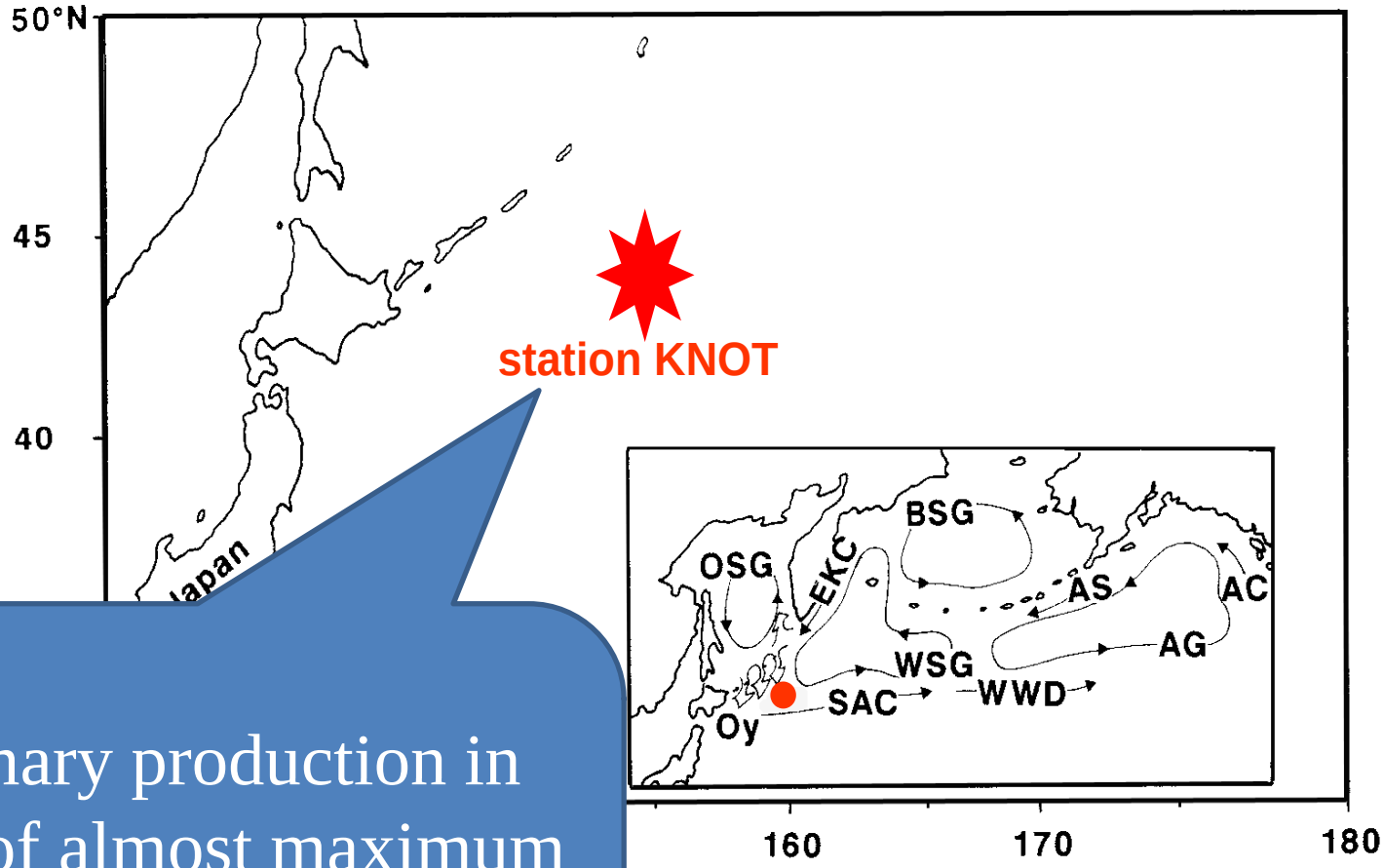
Station		
Papa		l. (1995
Papa		Harrison
		et al.
Papa		. (1995)
KNOT		(2002)

Primary production has not yet been measured on the state of maximum light conditions at station KNOT.

Cited from Imai et al. (2002)



Primary production was measured by the simulated *in situ* method using the ^{13}C uptake technique on January 22, 2006.



Daily primary production in conditions of almost maximum light intensity (18 E/m^2/day) was obtained.

Primary production at station P and station KNOT in winter

Station	Latitude	Longitude	Primary production ($mgC/m^2/day$)	References
Papa	50°N	145°W	283*(226, 340)	Wong et al. (1995)
Papa	50°N	145°W	300*	Boyd and Harrison (1999)**
Papa	50°N	145°W	195-281	Boyd et al.(1995)
KNOT	44°N	155°E	48*(15-110; n=5)	Imai et al. (2002)
Nearby KNOT	44°N	160°E	109	Shiomoto (2000)
KNOT	45°N	155°E	*144*	Shiomoto (unpublished)

*average

**cited from Harrison *et al.* (1999)

Ta[illegible]**uction between east and west in winter**

St			Primary production (mgC m^{-2} d^{-1})	References
Papa	50°N	145°W	283*(226, 340)	Wong et al. (1995)
Papa	50°N	145°W	300*	Boyd and Harrison (1999)**
Papa	50°N	145°W	195-281	Boyd et al.(1995)
KNOT	44°N	155°E	48*(15-110; n=5)	Imai et al. (2002)
Nearby KNOT	44°N	160°E	109	Shiomoto (2000)
KNOT	45°N	155°E	144	This study

*

200-300 mgC/m^2/day

Average: 100 mgC/m^2/day
Range: 15-144 mgC/m^2/day

Table

Statio

Papa

Papa

Papa

KNOT

Nearb

KNOT

KNOT

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**cited fro

9)**

Data

◆Winter

Station KNOT: Imai *et al*. (2002)

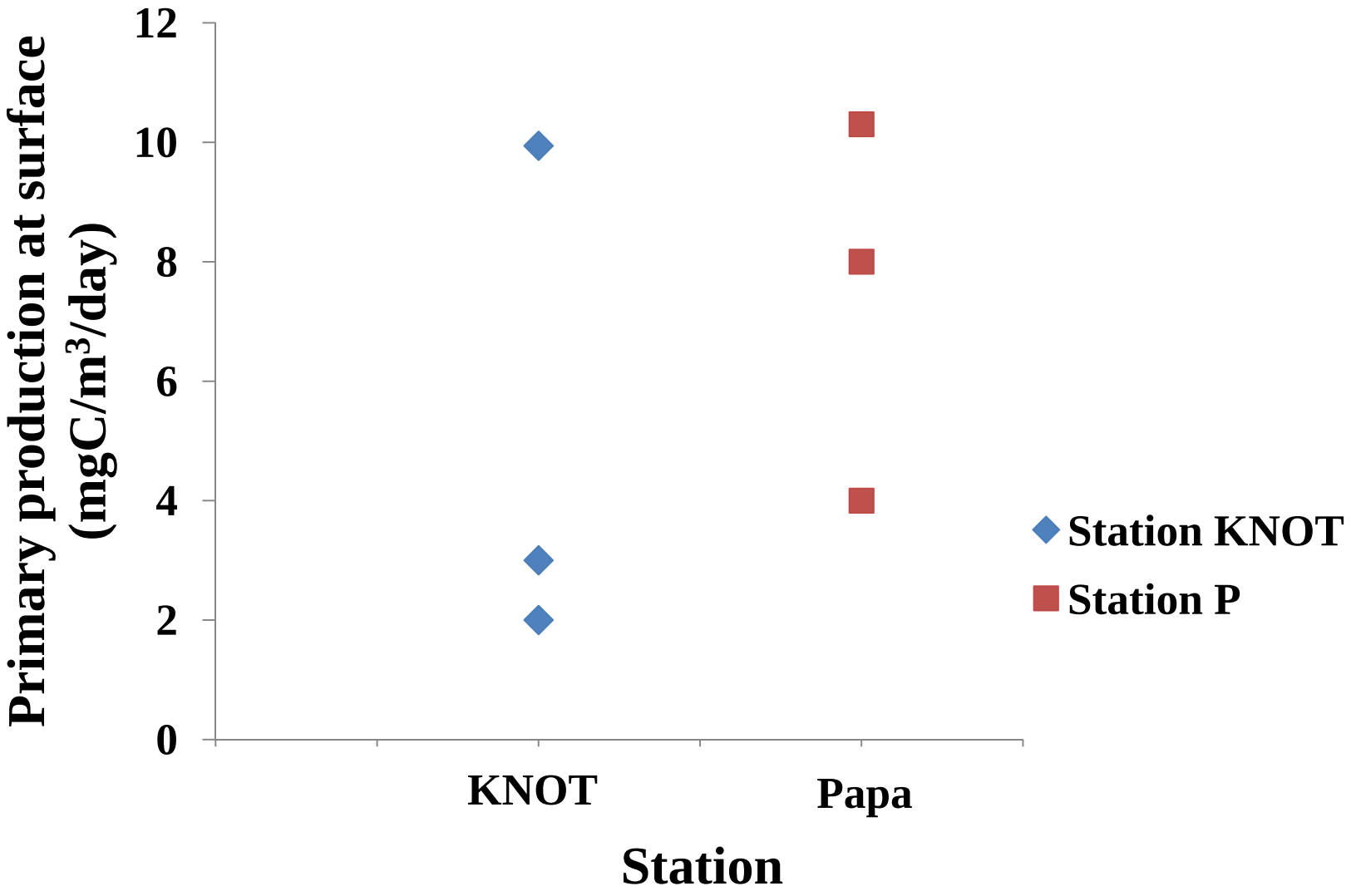
Shiomoto (this study)

Station P: Boyd and Harrison (1999)

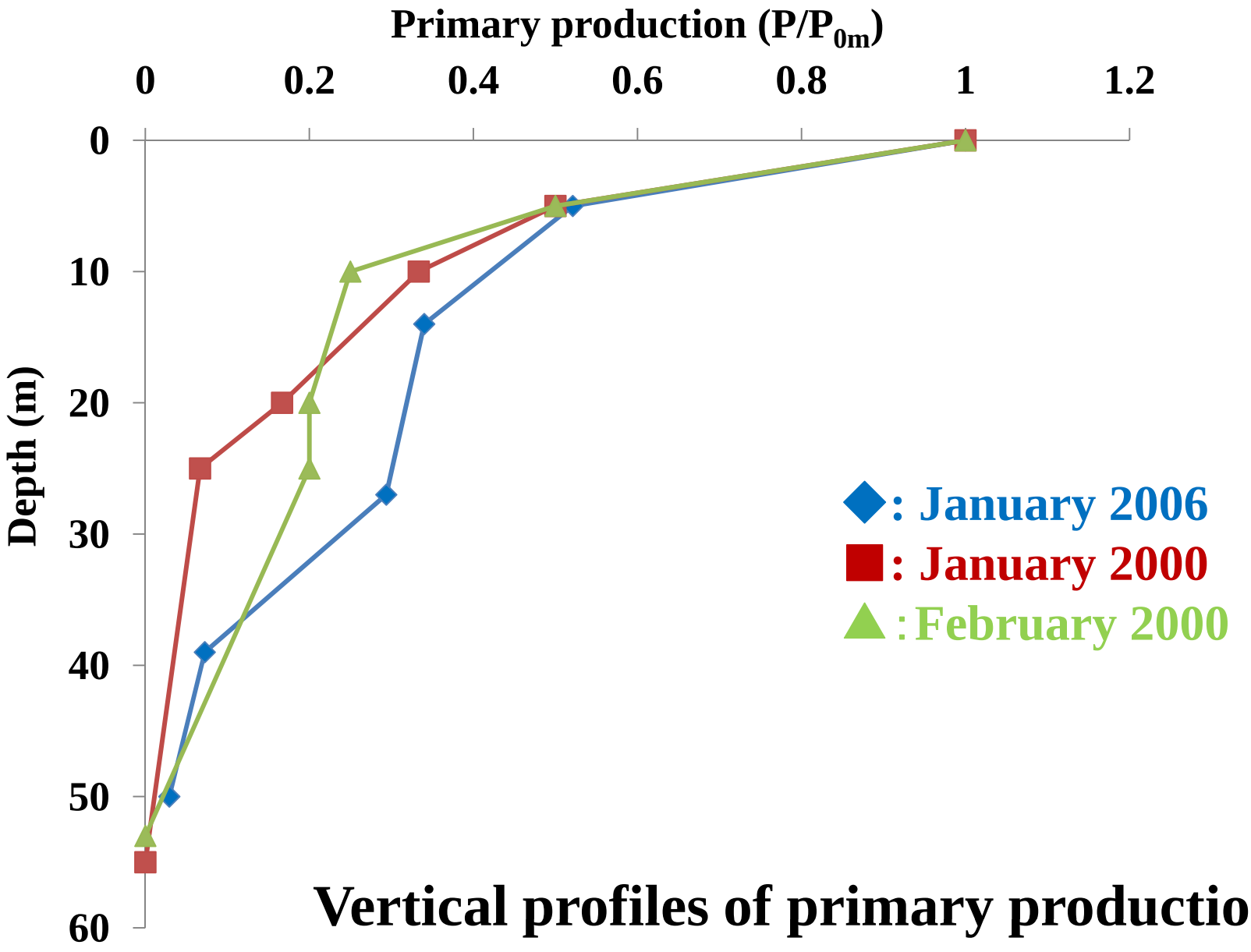
◆Summer

Station KNOT: Imai *et al*. (2002)

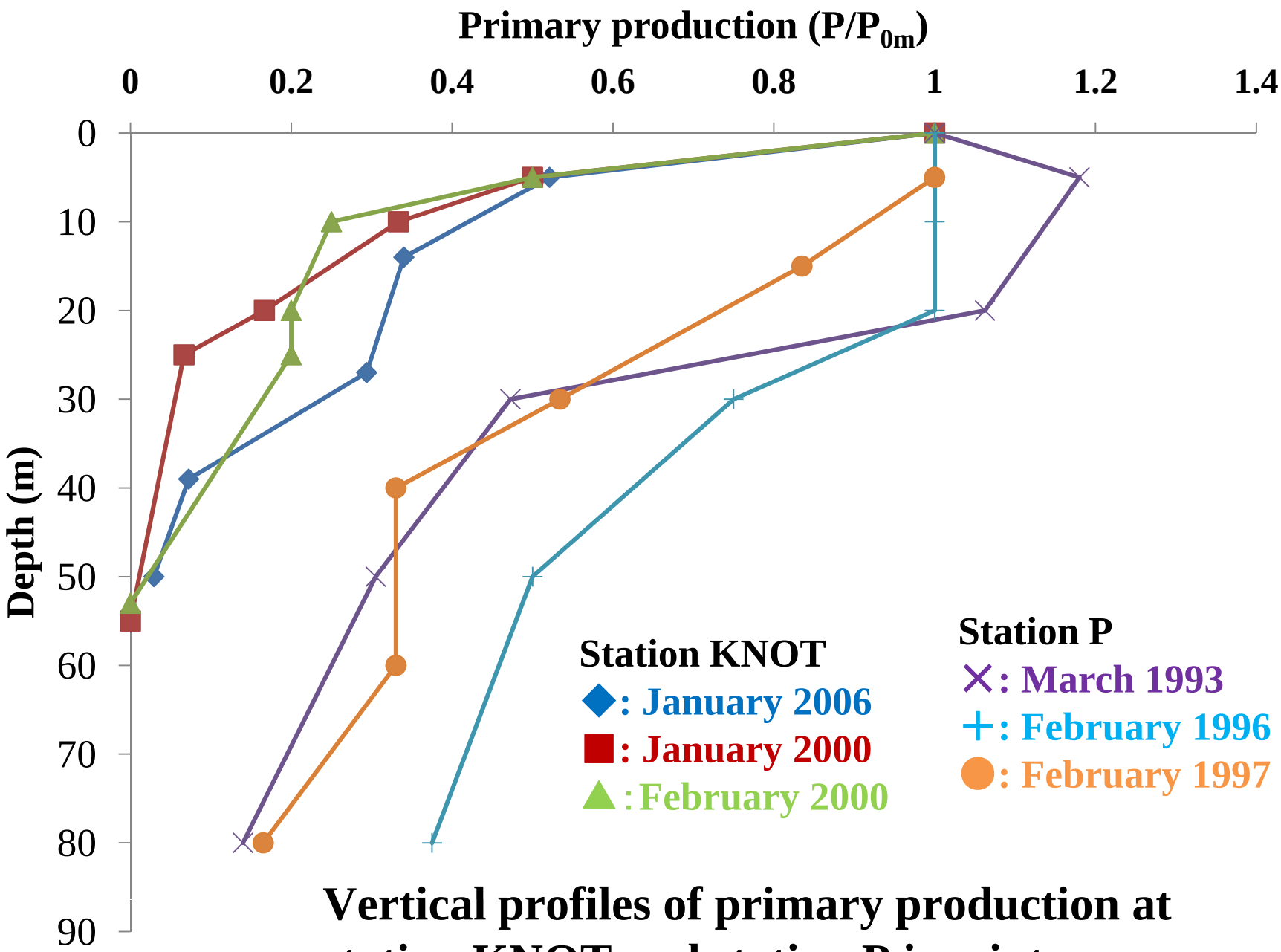
Station P: Welschmeyer *et al*. (1993)



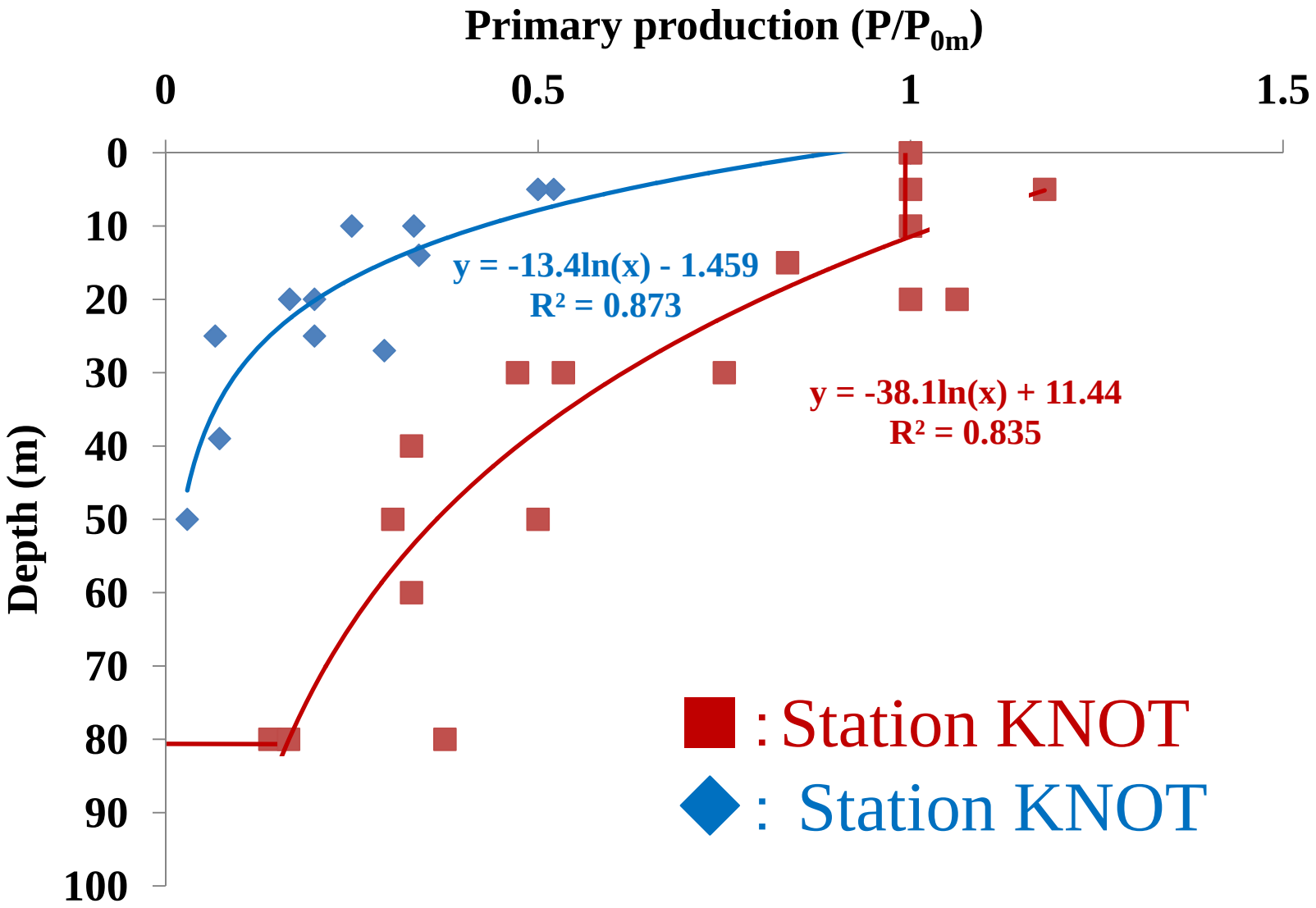
Surface primary production at station KNOT and station P in winter



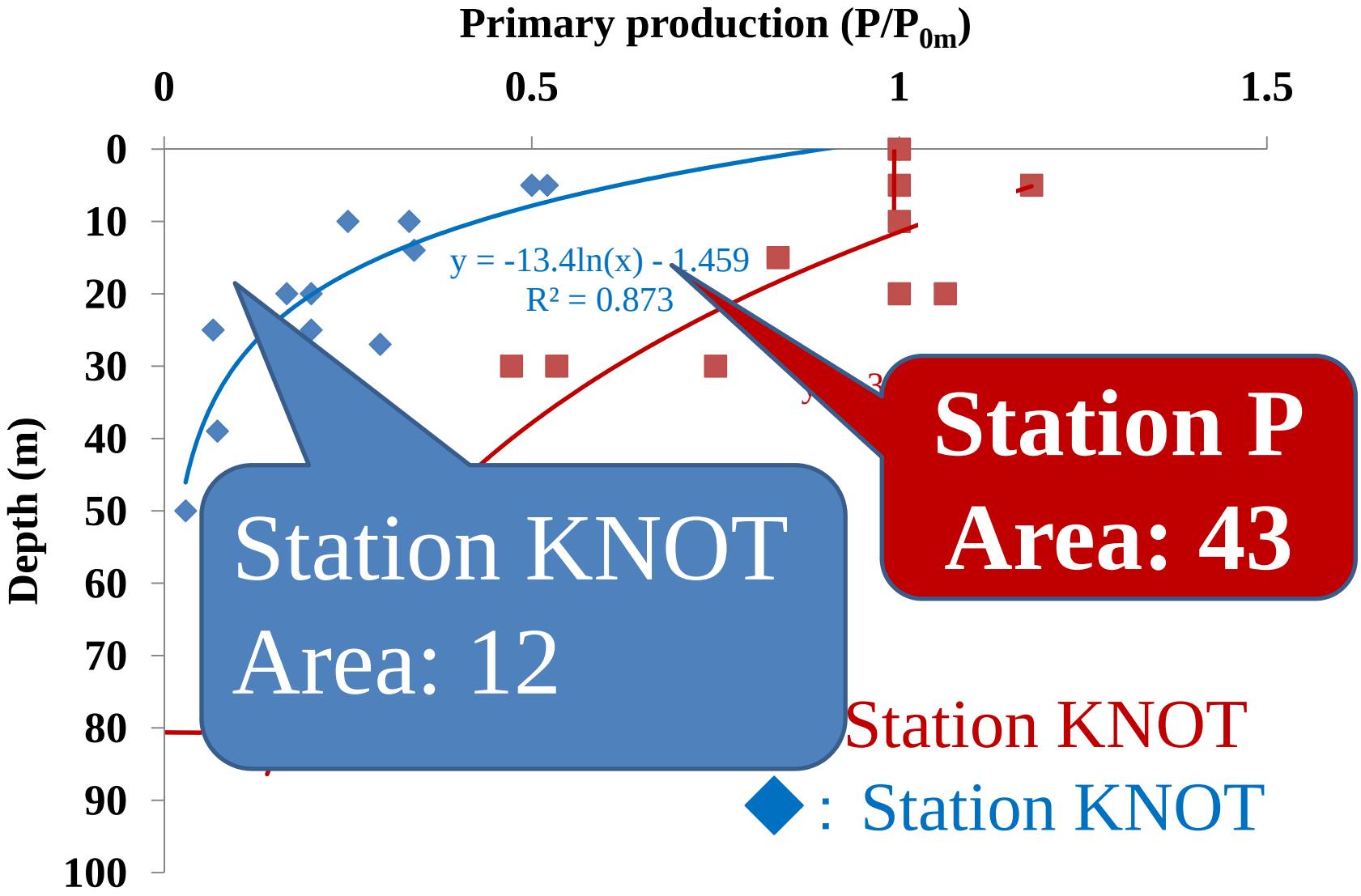
Vertical profiles of primary production at station KNOT in winter

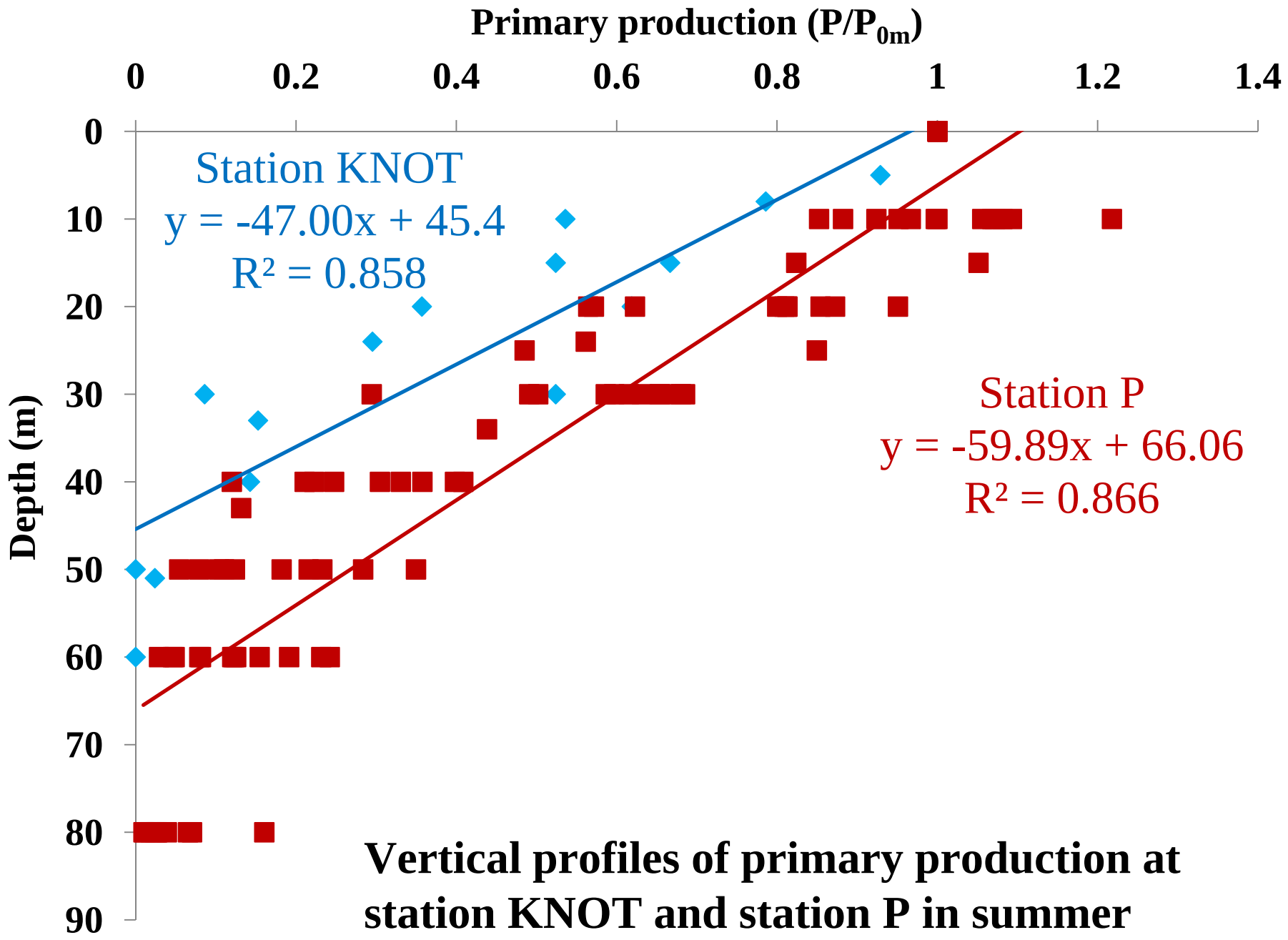


Vertical profiles of primary production at station KNOT and station P in winter

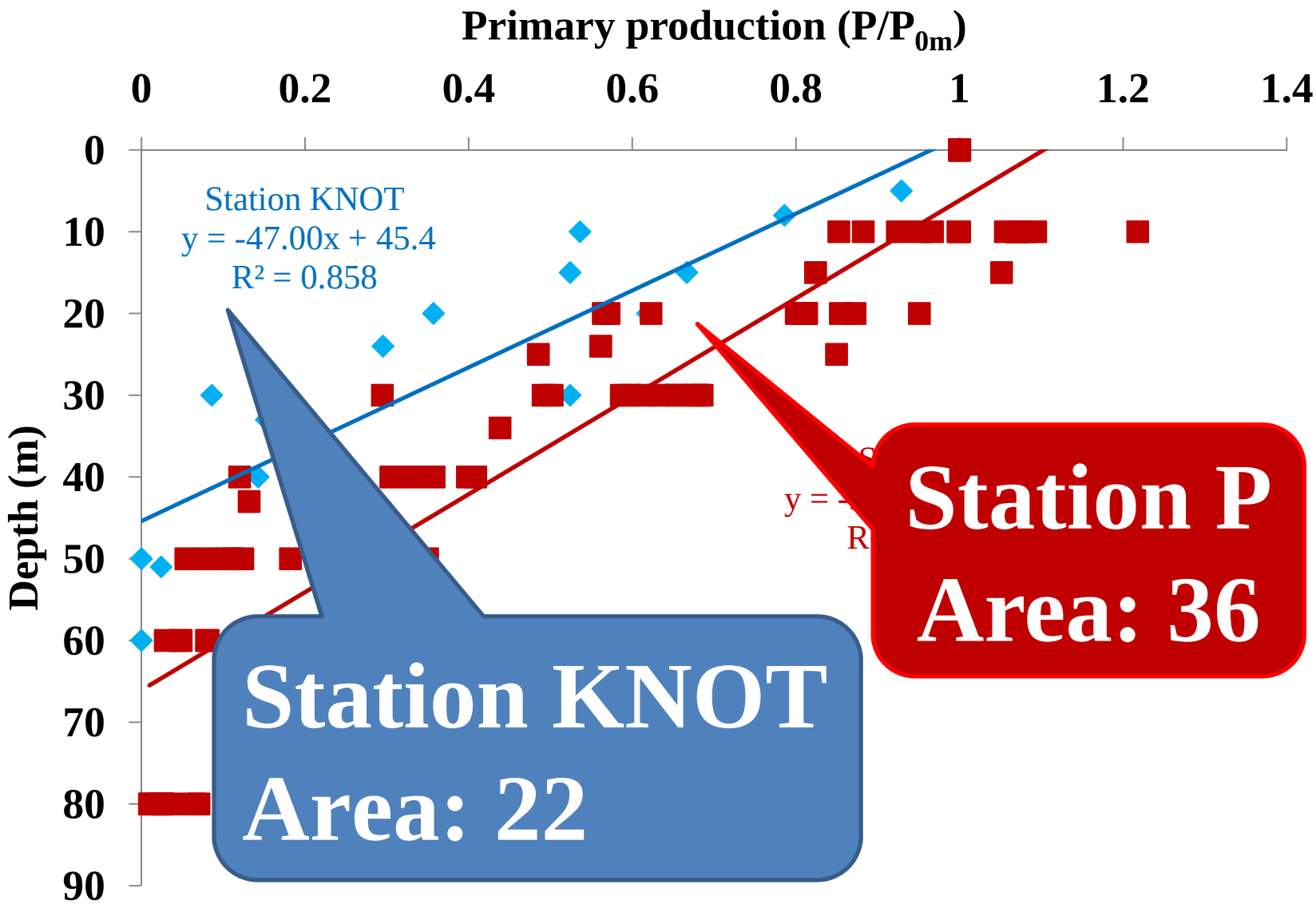


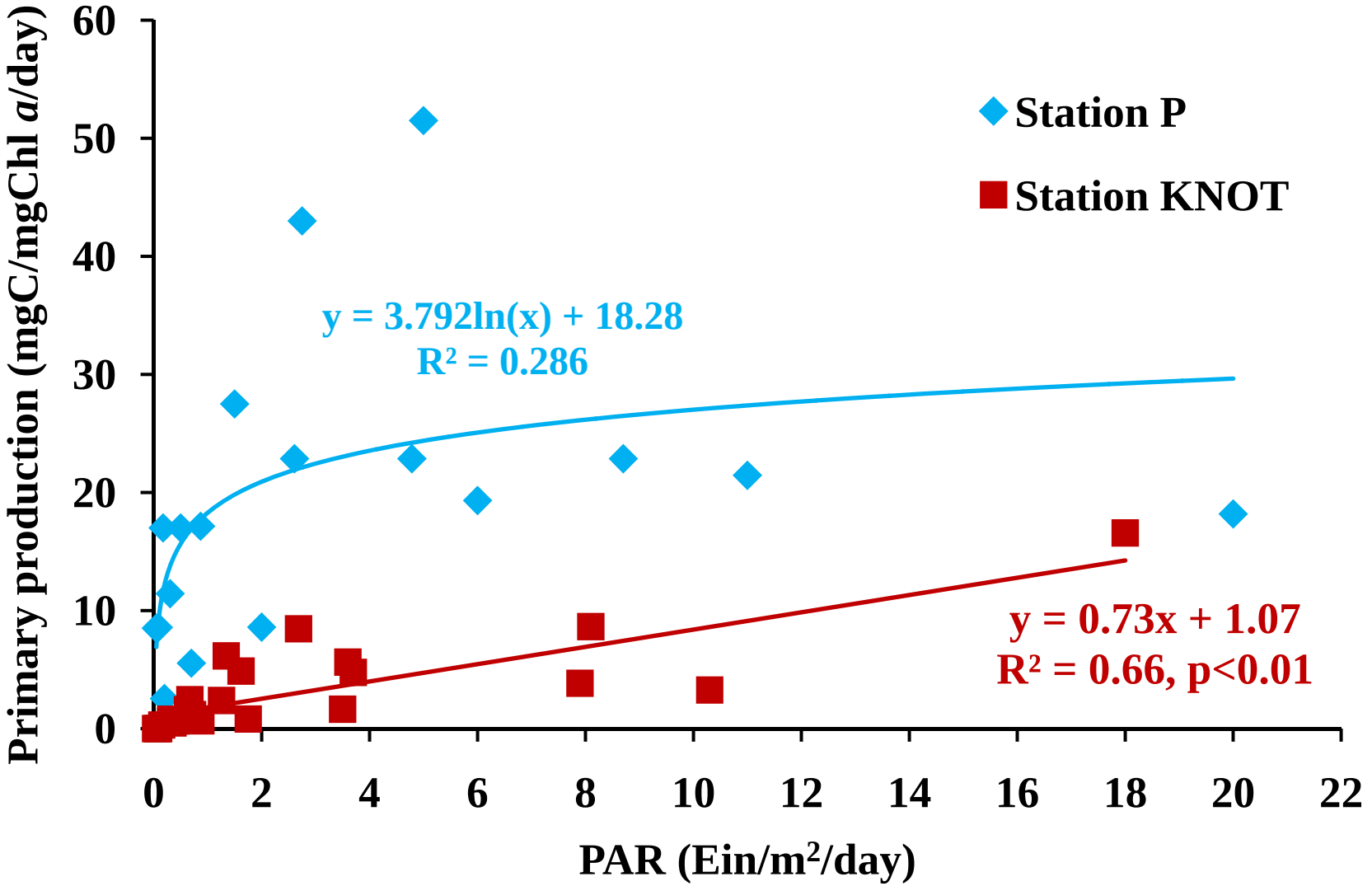
Vertical profiles of primary production at station KNOT and station P in winter


Primary production (P/P0m)
0
0.5
1
1.5
Depth (m)
0
10
20
30
40
50
60
70
80
90
100
y = -13.4ln(x) - 1.459
R² = 0.873
Station KNOT
Area: 12
Station P
Area: 43
Station KNOT
: Station KNOT

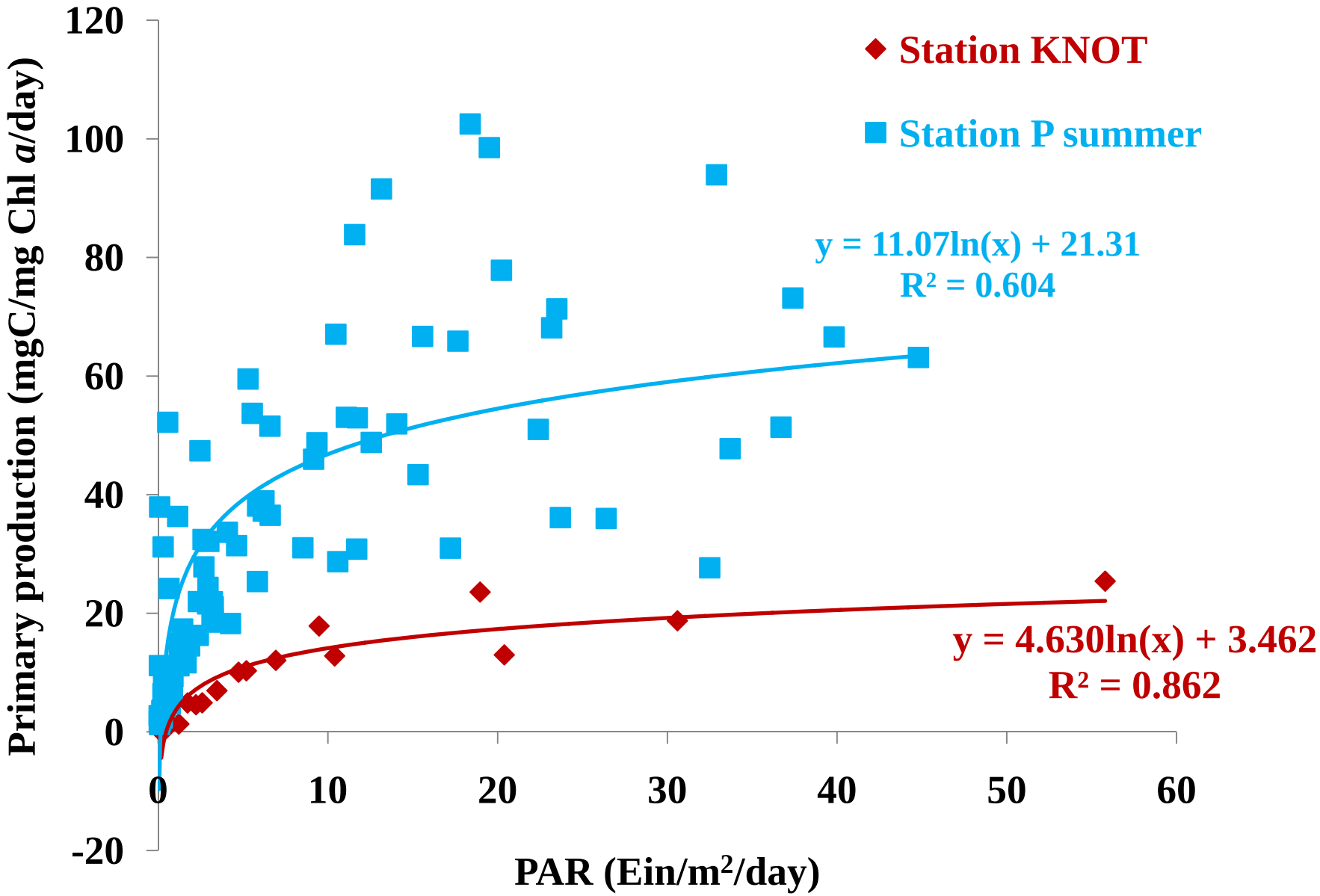


Vertical profiles of primary production at station KNOT and station P in summer


Primary production (P/P0m)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
Depth (m)
0
10
20
30
40
50
60
70
80
90
Station KNOT
y = -47.00x + 45.4
R² = 0.858
Station KNOT
Area: 22
Station P
Area: 36



Relationship between light intensity and primary production in winter



Relationship between light intensity and primary production in summer

Summary

1. **High-east and low-west trend in daily primary production can be explained by the different shapes of the vertical profiles of primary production.**

2. **Phytoplankton community at station P has a photosynthetic characteristic adapting to the more widespread light intensity.**

3. **This characteristic is possibly a primary factor causing the high-east and low-west trend.**

Summary

It is necessary to consider the differences in the response of phytoplankton to light intensity between east and west in the discussion of the differences in daily primary production between east and west.

west trend.